Environmental Health and Sustainable Development
Dr. Maria Neira
WHO
Environmental factors cause over 25% of global burden of disease – important contributions to largest diseases.

Source: WHO Burden of Disease statistics
Public Health and Environment: preventing disease through healthier environments

- Reduce 25% of the global burden of disease
- Promote a healthier environment
  - intensify primary prevention and
  - influence public policies *in all sectors*, so as to
  - address the root causes of environmental threats to health
- Health impact assessment and environmental burden of disease
- Environmental health of the health sector
- Occupational health
- Chemical Safety
- Water, sanitation and health
- Children's environmental health
- Air pollution (in and outdoors)
- Radiation safety
- Climate change and health
Impact of environment on health

- How much disease could be prevented by modifying the environment?

  ![Bar chart showing attributable fraction of disease per sub-region.]

  **World average**
  (best conservative estimate) = 24%

  Based on Comparative Risk Assessment, evidence synthesis and expert survey

  "Preventing disease through healthy environments". WHO, 2006

- What is the modifiable environment?
  - Pollution
  - UV and ionizing radiation, noise, EMF
  - Occupational risks
  - Built environment, incl. housing, land use, roads
  - Agricultural methods, irrigation schemes
  - Man-made climate change, ecosystem change
  - Related behaviour (e.g. handwashing)
Health costs climbing faster than health gains – but disease prevention still neglected

Each year from 2000-2008:

• Life expectancy rose 0.5%

• Health costs rose 6 %

Source: Estimated from OECD, WHO, and Prevention Institute data

Source: US $ 5.3 Trillion
Prevention < 5%

Factors influencing health

World-wide health expenditures
Five health problems we could address through a "new deal" on healthy environments

1. Outdoor urban air pollution → 1.2 million deaths per year
2. Physical inactivity → 3.2 million deaths per year
3. Traffic injuries → 1.3 million deaths per year
4. Traffic noise → stress, memory loss and analytical impairment
5. Climate Change → over 150,000 deaths per year
Exposure: Who & how much? *Household Air Pollution*

- Close to **2.7 billion people**, mostly in developing countries, rely on the traditional use of solid fuels (i.e. wood, dung, coal, crop waste) to meet their household energy needs (i.e. cooking, heating and lighting).

- The incomplete combustion from these solid fuels releases a number of **health-damaging pollutants** (e.g. particulate matter, carbon monoxide) into the indoor and outdoor environment.

- **Prolonged** and **chronic** exposure to these pollutants lead to direct impacts on health.

Global Exposure to HAP, 2007
In 2004, nearly 2 million deaths were attributed to household air pollution from the use of open fires and simple stoves for cooking—accounting for 2.7% of the global disease burden.
Household Air Pollution: **Health Impacts**

- **Respiratory illnesses** (e.g. childhood pneumonia, asthma)
- **Non-communicable diseases** (e.g. COPD, heart disease, cataract, stroke)
- **Cancers** (e.g. lung, cervical, upper aero-digestive)
- **Adverse pregnancy outcomes** (e.g. low-birth weight, prematurity)
Other Health Impacts: Safety & Other
Burns, scalds, violence, poisonings & injury

- Health risks extend beyond those direct respiratory and other systemic effects

- Women & children are at more risk for poisonings, burns & scalding and more vulnerable to attack and injury during fuel collection

- Additional health impacts are seen from the climate impact of inefficient household energy like food security, increased vector-borne diseases, severe weather, etc.

- Time savings from reduced fuel collection can lead to more time available for education and income generation—impacting development and alleviating poverty, all of which also impact health
Climate change puts health at risk

- Each year:
  - Undernutrition kills 3.5 million
  - Diarrhoea kills 2.2 million
  - Malaria kills 900,000
  - Extreme weather events kill 60,000

These, and others, are highly sensitive to changing climate.
Many of the greatest killers are environmentally related

Each year:
- Undernutrition kills 3.5 million
- Poor water and sanitation kills > 2 million
- Indoor air pollution kills > 2 million
- Malaria kills 900,000
- Extreme weather events kill 60,000
- Climate change kills over 140,000
The example of chemicals: Chemical production

- Production and use of chemicals continue to grow worldwide.
- The growth in global chemical output over the last decades was approximately ten-fold.
- Chemical production continues to grow faster in non-OECD countries:
  - 17% in 1970; and
  - 31% of larger world production in 2020.

![World chemicals industry output chart](chart.png)

Source: OECD (2001)
### Chemicals and some diseases

<table>
<thead>
<tr>
<th>Disease / disease group</th>
<th>Examples of chemical exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory infections, chronic respiratory diseases</td>
<td>Pesticides, dust, gases, asbestos, etc.</td>
</tr>
<tr>
<td>Perinatal conditions</td>
<td>Maternal exposure to pesticides or other chemicals.</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>Maternal exposures to pesticides, polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs)</td>
</tr>
<tr>
<td>Cancers</td>
<td>Arsenic, asbestos, benzene, pesticides, air pollution, etc.</td>
</tr>
<tr>
<td>Neuropsychiatric and developmental disorders</td>
<td>Lead, methylmercury, arsenic, toluene, etc.</td>
</tr>
<tr>
<td>Skin diseases</td>
<td>Over 68,000 chemicals considered to cause allergic or irritant contact dermatitis, e.g. pesticides, metals, etc.</td>
</tr>
<tr>
<td>Cardiovascular effects</td>
<td>Pesticides, solvents, cadmium, arsenic, lead, etc.</td>
</tr>
</tbody>
</table>
Heavy metal poisoning from mining, Zamfara, Nigeria, 2010

- Extraction of gold from ore with high lead content
- Over 400 children have died because of high exposure to lead
- In some villages, 10-30% of the children under 5 years old dead
- In some villages, 70-100% of children need emergency medical treatment
- Long-term health consequences, in particular for children
- Event detected by international medical team (MSF)
  - Heavy metals are persistent in the environment and may accumulate in the food chain and they can cross boundaries.
  - Artisanal gold mining and battery recycling release toxic metals in many countries.
Hungarian mud spill, October, 2010

- 7 people died and 120 affected from burns of skin and eye
- Medium and long-term health consequences possible
- 150 similar waste dumps along the Danube
- Concern of possible transnational health and environmental impacts from transboundary movement of chemicals
WHO and chemicals of major public health concern

- Air pollution
- Arsenic
- Asbestos
- Benzene
- Cadmium
- Dioxins & dioxin-like substances
- In adequate or excess fluoride
- Lead
- Mercury
- Highly hazardous pesticides

Action is needed on chemicals of major public health concern

Multisectoral action is urgently needed to protect human health from the harmful effects of improperly managed chemicals. This leaflet summarizes scientific evidence and provides risk management recommendations for 10 chemicals or groups of chemicals of major public health concern. Read the leaflet.

English [pdf 103kb] | French [pdf 80kb]
"I have a dream"
Re-focus on the primary prevention of environmental risks to health

Examples:

- Clean water and sanitation
- Eliminating indoor air pollutants
- Stopping use of alcohol and tobacco

Primary prevention means healthy condition never occurs.
Invest in interventions that bring multiple benefits

<table>
<thead>
<tr>
<th>Program</th>
<th>Savings for every dollar spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunizations (reference value)</td>
<td>$27</td>
</tr>
<tr>
<td>Lead paint hazard</td>
<td>$17- $221</td>
</tr>
<tr>
<td>Improved water &amp; sanitation</td>
<td>$3 - $34</td>
</tr>
<tr>
<td>Sustainable/active transport</td>
<td>$3 - $30</td>
</tr>
</tbody>
</table>

Each of these environmental interventions gives ~ 300% or more return on investment
True Primary Prevention

- Physical activity
  - ↓ Obesity
  - ↓ Depression

- ↓ CO₂
- ↓ Air pollution

↑ Social capital

↓ Cardiovascular diseases

↓ Infrastructure costs

↓ Injuries
Optimize health co-benefits of climate-friendly sustainable development

Example cleaner biomass/biogas cookstoves…

- 131 million improved stoves in Latin America and Sub-Saharan Africa over 10 years could save 1 million lives.

- 150 million improved stoves in India over 10 years could save 2 million lives

- Reduced **black carbon** and **methane** emissions from cleaner stoves could slow pace of global warming

"while the climatic effects of mitigation measures are long-term and dispersed throughout the world, the health benefits are immediate and local" – WHO Director-General Margaret Chan, 2009
Linking health to Green Economy strategies…
Transport reliant on private vehicles increases congestion, pollution, and physical inactivity.

Safe walking/cycling and rapid transit networks can reduce injury, cardiovascular disease & support healthy physical activity.

Cycling to work reduced premature mortality by 30% among commuter groups in Shanghai & Copenhagen.

Rapid transit/NMT improves access to schools, jobs & services for poor, children, women, elderly & disabled, improving equity.
Example 2: Clean household energy for the world's poor is central to improving women's and child health

- Avert 1 million deaths/yr from COPD & cancers (mostly women);
- Halve rates of childhood pneumonia;
- Reduce time spent fuel gathering & promote gender equality;
- Support UN 'Year of Sustainable Energy' & MDGs;
- Reduce deforestation, urban air pollution & climate change emissions of methane/black carbon & CO₂.
21-59% of health clinics in six African countries had **NO** electricity at all. Women give birth in the dark, by candlelight, by car headlights.

5-12% of clinics surveyed in the same six countries lacked **access to clean water** (from an "improved" protected well or piped source).

Small solar panels generate basic electricity for **lights, cold chain/vaccines, diagnostics, telecommunications, water pumps**.
Health as a measure of our Sustainable Development 'vision'...
The Health Sector can lead with *evidence* and *indicators* of Sustainable Development

- Evidence on health impacts of green economy strategies/innovations
- Wider use of Health Impact Assessment (HIA) to ensure health as an income of policies
- Define health-relevant goals, indicators, and tools for measuring/monitoring results
Health Metrics - Examples of indicators for Health and Sustainable Development

- **Sustainable Cities:**
  - % of urban population exposed to air pollution above recommended WHO Air Quality limits.
- **Safe and Healthy transport:**
  - % of the population with access to (living within 1km) rapid transit/public transport.
  - % of urban roadways with dedicated walking and cycling infrastructure.
- **Energy** - % of households using clean fuels/cooking and heating technologies.
- **Green jobs** - % of workplaces/jobs meeting basic occupational health and safety standards – including air, water, exposure to chemicals and radiation, lighting & ventilation.
- **Water** - % of global population with access to climate resilient safe drinking water and improved sanitation.
- **Food** - % of population with access to healthy foods, % undernourished; % obese; % inadequate micronutrients and dietary balance.
- **Health care** – % of health care facilities with access to clean energy and water supplies.
- **Governance** – % of large projects integrating health co-benefits considerations into their planning and implementation, e.g. through a health impact assessment (HIA).
We need a "green economy" to deliver these benefits

• Greening the economy is expected to create a series of health, economic, social and environmental benefits, including a reduction of greenhouse gas emissions and a
Moving from inconvenient to convenient truths