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POLLUTION
A GLOBAL PUBLIC HEALTH CRISIS
COMMISSION AUTHORS

SECTION 1
Burden of Disease
Dr. Philip Landrigan

SECTION II
Economic Impact
Maureen Cropper

SECTION III
Pollution and Poverty
Karti Sandilya

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SECTION I

Global Burden of Disease from Pollution

Dr. Philip Landrigan
POLLUTION DEFINED

Any material introduced into the environment by human activity that endangers human health or harms living resources and ecosystems.
DATA SOURCES

Institute for Health Metrics and Evaluation
2015 Global Burden of Disease analysis

World Health Organization
2012 Burden of Disease analysis

Pure Earth/GAHP Toxic Sites Inventory
Soil pollution at contaminated sites
MAJOR TYPES OF POLLUTION

- Household Pollution
- Ambient Air Pollution
- Water Pollution
- Soil Pollution
- Occupational Pollution
- Lead
HOUSEHOLD AIR POLLUTION KILLS ALMOST 3 MILLION PER YEAR
Beijing air pollution in 2012 is now worse.

Ambient air pollution kills about 4 million per year.
POLLUTED WATER & POOR SANITATION KILL ABOUT 1.7 MILLION PER YEAR
POLLUTED SOIL, CHEMICALS, HEAVY METALS KILL OVER 1.1 MILLION PER YEAR
LEAD POISONING KILLS MORE THAN 500,000 PER YEAR
COMMISSION’S MAIN HEALTH FINDINGS

Pollution killed an estimated 9 MILLION people in 2015…

3 TIMES MORE than AIDS, tuberculosis and malaria combined.

9 MILLION premature deaths = 16% of all deaths worldwide
COMMISSION’S MAIN HEALTH FINDINGS

In 2015, pollution was responsible for...

- 268 million DALYs
- 254 million years of life lost
- 14 million years lived with disability
DEATHS FROM POLLUTION VERSUS OTHER MAJOR RISK FACTORS
POLLUTION-RELATED DISEASE IS ABUNDANT IN LOW- AND MIDDLE-INCOME FAMILIES

ALL Deaths from Pollution as % of Total Deaths

92 percent of death is in LMICs.
DEATHS DUE TO AMBIENT AIR, SOIL, AND CHEMICAL POLLUTION ARE RISING

Source GBD study, 2016
THESE ESTIMATES ARE CONSERVATIVE

- Modern pollution not well researched
- Soil and chemical—very limited coverage
- Many chemical toxins NOT included in estimates
CHILDREN ARE EXQUISITELY SENSITIVE

- Greater exposure proportionate to body mass
- 7 times more water per Kg per day; Hand-to-mouth activity
- Diminished ability to detoxify many chemicals
- Heightened biological vulnerability—e.g. thalidomide, DES, fetal alcohol syndrome, lead
- More years of future life
BOTH YOUNG AND OLD ARE AFFECTED
70 PERCENT OF POLLUTION-RELATED DISEASE IS NON-COMMUNICABLE DISEASE

Communicable vs. Non-communicable Disease and Pollution

- NCDs
- Communicable Diseases
THE POLLUTOME: WHAT WE KNOW AND DON’T KNOW ABOUT POLLUTION

Numbers of pollution-related deaths currently included in GBD

ESTIMATES BY ZONE

Zone 1: 9 MILLION
Well characterized health effects of well-studied pollutants. Data included in GBD estimates and in Commission report.

Zone 2: NONE
Emerging, but still unquantified health effects of known pollutants. Data not included in GBD estimates or in Commission report.

Zone 3: NONE
Inadequately characterized health effects of emerging pollutants. Data not included in GBD estimates or in Commission report.
EMERGING CHEMICAL POLLUTANTS

• Developmental neurotoxicants
• Endocrine disruptors
• Novel classes of insecticides such as the neonicotinoids
• Chemical herbicides
• Pharmaceutical wastes
THE GROWING CHALLENGE OF POLLUTION BY TOXIC CHEMICALS AND PESTICIDES

U.S. Chemical Production, 1947–2007
Production index (100 = year 2002)
CLIMATE CHANGE & POLLUTION INEXTRICABLY LINKED

Tackling pollution benefits long-term climate goals and short-term health goals
SECTION II
Economic Impact of Pollution

Dr. Maureen Cropper
COMMISSION’S MAIN ECONOMIC FINDINGS

Up to 2% of GDP in low- and middle-income countries from loss of productivity. A drain on growth that can undercut national development.

These are costs associated with premature mortality and exclude costs of morbidity.

Willingness to pay to eliminate pollution estimated at $4.6 trillion per year = 6% of global GDP

Additional costs resulting from environmental degradation not counted in this analysis.
POLLUTION REDUCES ECONOMIC OUTPUT

Toxic releases devalue potential of land for human and industrial uses.
PRODUCTIVITY LOSSES

• Measure present value of loss in future GDP when a person dies before age 65
• Calculated for each country, for 5 pollutants
• Does not capture all output losses (home production, informal sector output not in GDP)
• Places no value on output after age 65
  – Working age = 15–64
• An incomplete measure of economic impact, but losses are substantial in low income countries
## PRODUCTIVITY LOSSES IN 2015 AS A PERCENTAGE OF GROSS DOMESTIC PRODUCT (GDP)

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Ambient and household air pollution</th>
<th>Unsafe water and unsafe sanitation</th>
<th>Lead exposure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High income</td>
<td>0.048%</td>
<td>0.0033%</td>
<td>0.0029%</td>
<td>0.054%</td>
</tr>
<tr>
<td>Upper-middle income</td>
<td>0.15%</td>
<td>0.027%</td>
<td>0.0059%</td>
<td>0.18%</td>
</tr>
<tr>
<td>Lower-middle income</td>
<td>0.40%</td>
<td>0.40%</td>
<td>0.013%</td>
<td>0.82%</td>
</tr>
<tr>
<td>Low income</td>
<td>0.86%</td>
<td>1.03%</td>
<td>0.013%</td>
<td>1.90%</td>
</tr>
</tbody>
</table>
**WELFARE LOSSES**

- Measure what people would be willing to pay to reduce their risk of death from pollution
- Willingness to pay reflects loss in enjoyment as well as lost output
- Calculated for each country, for each of 5 pollutants
  - Willingness to pay varies by country per capita income
- Willingness to pay calculated per person, and also summed across all people
  - In both cases, reflects willingness to pay to reduce pollution to zero
GLOBAL WELFARE LOSSES FROM POLLUTION

Estimated at $4.6 trillion per year, the equivalent to 6% of global GDP
POLLUTION IS NOT INEVITABLE

Kuznets Curve Hypothesis need not hold for pollution
SECTION III
Pollution and Poverty

Karti Sandilya
POLLUTION KNOWS NO BORDERS

Air pollution from Asia accounts for up to 20% of ozone pollution in western U.S. States

—JPL Study, 2012
POVERTY CAN FORCE PEOPLE TO LIVE IN PLACES THAT MAKE THEM ILL
POLLUTION, HUMAN RIGHTS AND ENVIRONMENTAL INJUSTICE

It affects the rights of the child, the right to safe work, and protection of the most vulnerable
INEQUITABLE EXPOSURE OF POOR AND MARGINALIZED COMMUNITIES TO POLLUTION

Disproportionate burden among these communities of pollution-related disease
POLLUTION IS A HUMAN RIGHTS ISSUE

92% of deaths occur in low- and middle-income countries. Children are most affected.

- In countries at all income levels, pollution disproportionately affects the poor and marginalized.
- Women, children, the elderly and minorities are the main victims.
GOAL 3.9  “By 2030, substantially reduce the number of deaths and illness from hazardous chemicals and air, water and soil pollution and contamination.”
SECTION IV
Effective Interventions

Richard Fuller
IMPACTS ARE UNDERCOUNTED, SOLUTIONS ARE UNDERFUNDED

Deaths

Deaths (millions)

0 1 2 3 4 5 6 7 8 9 10

Total Pollution  AIDS, Malaria & Tuberculosis (2012)

Development Assistance $

US$ (millions)

0 5 10 15 20 25 30

Pollution (Chemicals/Soil and Ambient Air)  HIV/AIDS, Malaria & Tuberculosis

THE LANCET  PURE EARTH  Icahn School of Medicine at Mount Sinai
SOLUTIONS EXIST BUT NOT PRIORITIZED

• Few are aware of pollution’s huge impact

• Political will often lacking: myth of pollution vs. jobs

• Evidence—success in developed world
GDP GREW BY 250%, WHILE AIR POLLUTION FELL BY 70%
POLLUTION CONTROL YIELDS GREAT ECONOMIC BENEFITS

• Control of ambient air pollution in the United States yields about $30 in benefits for every $1 invested
  – An aggregate benefit of $1.5 trillion against an investment since 1970 of $65 billion
• Removal of lead from gasoline has added billions of dollars to economies around the world
POLLUTION CAN BE CONTROLLED AND PREVENTED

• Transition toward a sustainable, circular economy

• High-income and some mid-income countries are making good progress against pollution
ATTENTION IS GROWING

• SDGs include pollution
• UNEA3
• World Bank focal area

BUT MUCH MORE IS NEEDED…
CREATING COUNTRY DEMAND

• Health and Pollution Action Plans (HPAP) are identifying country-based environmental health priorities.
  – All government agencies, Health, Environment, Industry, Development, Finance, Transport

• Focus on most substantive problems

• Design programs and projects accordingly
PROJECTS TO ACHIEVE HEALTH OUTCOMES

**AIR**
Indoor air—move to cleaner fuels, clean cooking.

**OUTDOOR AIR**
control large point source, establish clean fuels, etc.

**WATER**
Sanitation investments, full WASH

**SOIL, CHEMICALS, METALS**
Identify priorities, clean up urgent hotspots

**WORKPLACE**
Bring in international good practices
RESEARCH

1. Quantify the global burden of disease associated with chemical pollutants of known toxicity—lead, mercury, chromium, arsenic, asbestos, and benzene.

2. Discover the diseases caused by new and emerging chemical pollutants, and new diseases from known pollutants.

3. Fund country/local research.
TRACKING PROGRESS—GAHP

• Pollution and Health—follow up on *Lancet* report
• Metrics related to interventions
  – Health burden
  – Exposure
  – Investments undertaken
  – Regulatory structures and implementation
  – Efficacy of solutions, knowledge transfer
• Aggregating data from others (SDG’s, etc.) relevant to pollution
GENERAL PUBLIC

An open-source pollution mapping platform www.pollution.org to advance research and make information on pollution at the local level available to the global public
Achim Steiner
Administrator
UN Development Programme
Gina McCarthy
Former Administrator
US EPA

Carlos Salinas
Former President,
Mexico
THANK YOU