Health In the Green Economy

Co-benefits to health of climate change mitigation in housing

Dr Carlos Dora
World Health Organization
Geneva
This Presentation

1. Rationale for tackling housing as a health issue
   - Global health challenges
   - Global health, climate change and housing challenges

2. Health in the green economy
   - Scope and methods – the climate side
   - Scope and methods – the health side

3. Key Findings – Housing Sector
   - Co-benefits – communicable and noncommunicable diseases; health equity
   - Risks, gaps and implementation tools

4. Co-benefits from related sectors - household energy and transport

5. Looking ahead to Implementing healthy and green sectoral policies
   - Knowledge - Housing and Health Guidelines
   - Incentives, Tools and Experiences
1. Rationale
Global Health & Housing Challenges

Projected main causes of death, worldwide, all ages, 2005

2 in 3 deaths globally from non communicable diseases

- Cardiovascular diseases 30%
- Communicable diseases, maternal and perinatal conditions, and nutritional deficiencies 30%
- Injuries 9%
- Other chronic diseases 9%
- Diabetes 2%
- Chronic respiratory diseases 7%
- Cancer 13%

TOTAL DEATHS 2005

58 million
Key housing and health risks

- Obesity epidemic, including children
- Increase in asthma
- Chronic respiratory diseases
- Heat stroke/ cold exposure
- COPD from woodstoves
- Injuries

- Communicable diseases:
  - TB, diarrhoea and vector borne diseases still rampant in low income countries
Global Health Challenges: Climate Change

- **Water quality and quantity**: doubling of people living in water-stressed basins by 2050.
- **Food security**: In some African countries, yields from rain-fed agriculture may halve by 2020.
- **Risk of infectious disease**: Increasing population at risk of malaria in Africa by 170 million by 2030, and at risk of dengue globally by 2 billion by 2080s.
- **Disasters**: exposure to coastal flooding increasing by a factor of 10, and land area in extreme drought by a factor of 10-30.
- **Heat waves** – increasing NCD mortality
Who is on the innovation edge?

- Of energy-efficient and climate friendly-housing?
- And can we really build healthy housing in "unhealthy" urban designs that rely on the automobile?
Climate impact of Housing

18% of direct CO₂ emissions from home energy use:
- 11.3% - grid electricity and district heating use
- 6.5% - home coal, gas, LPG for cooking/heating (not including biomass)

**BUT:** "The residential and commercial building sector has the greatest potential for reducing GHG emissions cost-effectively within a short time"

*(IPCC, 2007)*
Housing: ideal platform for prevention

- By 2050 the world’s urban population will nearly double: 6.4 billion city-dwellers
- Most urban growth occurring in low- and middle-income cities
- The nature of urban housing and/or slum expansion will determine level of many urban health risks

Fig. 4. Global urban growth and slum growth

Health in a Green Economy – an analysis of IPCC CC mitigation policies for housing
Convenient Truth Number 2: Cutting carbon can bring direct health benefits

"Health benefits from reduced air pollution as a result of actions to reduce greenhouse gas emissions…may offset a substantial fraction of mitigation costs" – IPCC, 2007

"while the climatic effects of mitigation measures are long-term and dispersed throughout the world, the health benefits are immediate and local" – M. Chan, 2009
Health in the 'Green Economy'

- Focus on policies to mitigate climate change
- Identify the health co-benefits & risks
- The gaps from a health perspective
- Priorities for action for health and other sectors
Scope and Methods: the Climate side

Reviewed IPCC mitigation measures for housing in 8 key categories:

- Thermal envelope measures
- Heating systems (low carbon)
- Cooling loads and ventilation
- Better air conditioning and HVAC
- Passive and active solar technologies
- Lighting and daylighting
- Home appliances (energy efficient)
Scope and Methods: the Health side

The mitigation measures reviewed against 3 categories of known health risks:

- **Environmental risks**: e.g. thermal comfort, indoor air quality, unsafe water and sanitation, etc.

- **Disease risks**: (with direct housing linkages), e.g. TB, waterborne diseases, COPD from wood stoves, pests and vector risks, etc.

- **Health inequities**: access to safe, climate protected shelter, water & sanitation; access to safe mobility in and around neighborhoods, etc.
Housing – Summary of key findings

- Energy-efficiency measures considered by IPCC can indeed reduce significant CVD, strokes and respiratory deaths and illness from extreme heat/cold exposures & urban heat island effect;

- But we are missing a focus on low and middle income cities and slums where most population growth is occurring, occupational risks and hazardous construction materials.

...And to prevent asthmas and allergies, tuberculosis and other respiratory and vector borne diseases, we need a greater emphasis on natural ventilation and screens.
Co-benefit Potential – Noncommunicable Diseases

- **Reduced asthma, COPD and other respiratory diseases** through
  - mitigation measures reducing mould and dampness, ensuring thermal comfort
  - Reduced indoor smoke with more efficient biomass and biogas cookstoves in developing countries

- **Less cardiovascular diseases and strokes** through mitigation strategies reducing exposure to extremes of heat and cold

- **Reduced risk of cancer** from harmful insulation and construction materials (e.g. asbestos, lead etc.) by using healthier substitutes

- **Reduced injuries** through safer and more energy-efficient home heating and household appliances and natural lighting

- **Increased well-being and mental health** through housing improvements leading to better thermal comfort
Co-benefit potential - communicable diseases

• **Reduced vector-borne diseases** (e.g. malaria) due to pests and infestations through sealing of cracks, window screening

• **Reduction of the risk for waterborne diseases**, such as diarrhoea, through
  – access to safe drinking water and sanitation as part of planning and siting measures
  – Better access to hot water through low-cost and passive solar systems enhancing hygiene and sanitation

• **Prevention of airborne diseases** (including TB) by low-energy and climate friendly designs improving natural ventilation
Thermal insulation

« Improved insulation saved 0.26 months of life per person »
(UK Warm Front Programme)

« Reduced wheezing, days-off school, doctors’ visits were reported by occupants of insulated homes »
(NZ Insulation study)

Reduction of respiratory illness by 9% to 20% and increase of individual productivity between 0.48% and 11% with natural ventilation strategies
Energy inefficiency in buildings and health
(WHO European Region, LARES Project, 2004)

- Accidents and injuries
  - Extreme temperature – both heat and cold
  - Lighting or glare
- Respiratory illness and inadequate heating
- Mental health
  - Lack of lighting
  - Lack of sufficient protection against temperature, noise, damp
  - Design not conducive to socialization, recreational activities, or isolation (privacy)
- Cardiovascular problems
  - Inadequate temperature regulation
  - Fuel poverty
  - Damp, humid or mould

* Majority of findings related to health issues linked to thermal problems attributed to energy efficiency of buildings (insulation)
Risks to avoid

- **Health-harming materials** in construction, insulation and repair activities (e.g. asbestos, lead paint, foam boards containing carcinogens etc.) lead to cancer, neurodevelopmental disorders etc.

- **Unknow new technology risks**: effect of nanotechnology on health, mercury in compact fluorescent lights, waste byproducts, etc.

- **Lack of ventilation** – radon, infections, secondhand tobacco smoke, infections, mould and damp
Radon in the home accounts for about 9% of deaths from lung cancer and about 2% of all deaths from cancer in Europe.

Darby et al, 2005

Mean in controls 86 Bq/m³

Cigarette smoker
Lifelong non-smoker
The Energy efficiency & Ventilation equation (Health=EeV^2)

Improved natural ventilation can dramatically reduce infectious disease transmission

*Quanta refers to Generation of droplet nuclei

<table>
<thead>
<tr>
<th>Ventilation rate (% air changes/hr)</th>
<th>Quanta* generation</th>
<th>1</th>
<th>6</th>
<th>18</th>
<th>30</th>
</tr>
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<tbody>
<tr>
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<td>0.64</td>
<td>0.16</td>
<td>0.06</td>
<td>0.04</td>
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</table>

*Infection risk from 15-minute exposure

*Quanta refers to Generation of droplet nuclei
Simple measures are effective

Air changes per hour (ACH) for a 7m x 6m x 3m room

<table>
<thead>
<tr>
<th>Openings</th>
<th>ACH</th>
<th>Ventilation rate (l/s)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open window (100%) + open door</td>
<td>37</td>
<td>1300</td>
</tr>
<tr>
<td>Open window (100%) + closed door</td>
<td>28</td>
<td>975</td>
</tr>
<tr>
<td>Open door 100% + closed window</td>
<td>4.2</td>
<td>150</td>
</tr>
</tbody>
</table>
But inadequate ventilation results in:
- increased exposure to indoor air pollutants (e.g. radon, mould and moisture, VOCs etc.)
- Increased airborne infections transmission (e.g. TB)

Natural ventilation needs to be accompanied by a revival of house screening, a measure with documented efficacy in prevention of the vector-borne disease risks. *

Air conditioning associated to some risks

Although it may be the only way to rapidly decrease heat load in some structures

- Large HVAC systems risk bacterial proliferation and transmission of infections
  - If not well maintained
  - If insufficient air exchanges

- Vulnerable to power outages, that can be more frequent in view of large demands on electricity grid, and extreme weather events

- AC also adds to the climate change footprint
Gap: smarth growth – integrate land use plans, climate friendly housing, transport

Great potential to avoid NCDs – by reducing air pollution, noise and injuries, promoting physical activity

- IPCC (and current investments) in housing and transport emphasize improved technologies which may even increase health risks from injuries, physical inactivity, air pollution or infections
- We are missing a focus on mitigation and health co-benefits from smarth growth
Urban planning: green spaces

- Can be used to separate emission sources
  - Highways and transport corridors from sensitive receptor groups

- Trees and vegetation absorb some air pollution and capture GHGs

- Shady areas can reduce the "heat-island" effect in urban areas

- Green spaces have important psychosocial and health benefits
  - Important social and recreational spaces
Occupational Health hazards in construction

- **Risks of accidents** – falls, cuts, electrocution
- **Chemical risks** – silica, asbestos, glues, powders
- **Physical risks** – noise, vibration, heat, cold, UV
- **Ergonomic risks** – heavy weights, twisting, awkward positions
- **Social factors** – migrant workers, long working hours, limited social support
- **Occupational diseases** – silicosis, mesothelioma, hearing loss, dermatitis, musculoskeletal disorders, alcoholism, depression
Hazardous materials - Asbestos

- 95% of asbestos is used in construction materials, e.g. roofing
- 125 million people exposed to asbestos at the workplace
- More than 90,000 people die annually from asbestos-related diseases
- Safer alternatives are available
- WHO considers that the most effective way to eliminate asbestos-related diseases is to stop the use of all types of asbestos

Tsunami reconstruction Nam Khem Village, Thailand 2005
Summary: Gaps in Policies and Analysis

- **Optimized urban planning** can enhance climate change mitigation at the same time as health.

- **Low income and slum housing** in the health and mitigation context.

- **Occupational hazards** associated with construction, construction products and housing retrofits.

- **Healthy housing behaviours** to make best use of climate-friendly housing measures.
Why to focus on Health co-benefits of mitigation in housing?
1. To ensure sound economic decisions

The Market for transport fails to deliver socially optimal patterns as

– Costs are not all paid for the planer/builder/developer, and the costs borne by others are substantial.
– The overall the health risks is then higher than socially optimal

The end result is cost to all society that are not seen by the individual:

• absenteeism to work and costs to businesses,
• increasingly high health care costs of chronic diseases,
2. To ensure policy making draws on existing knowledge and best practice

- Difficulty in accessing information on the health impacts of housing interventions
- Myths about what is good practice are repeated and reinforced
- Scientific evidence is scattered, and often not translated regarding its implications for policy
3. To protect vulnerable groups

- Children are vulnerable to injuries, air pollution, noise, chemicals and vectors in the home.
- Their cognitive and physical development require exploration of the neighbourhood and outdoor activity.
- These groups often do not have a voice to influence decisions.
- Policy makers need to represent children’s interests, evidence should make their case heard.
4. To promote health equity

- Access to low emissions stoves and fuels through cleaner biomass and biogas cookstoves reduce COPDs in poor population and offer gender equity and sustainable development
- Small solar photovoltaic panels and access of poor households to DC (direct-current) household appliances offer health equity as well as climate benefits
- Broader access to effective cooling, heating and ventilation, particularly through design measures, in low-income settings
- Health risks in housing are large among the poor, policies and incentives for healthy and climate resilient housing should improve health inequalities
How to obtain health co-benefits from mitigation in housing?
Next steps for advancing 'Health' and Green Housing Policies

1. Ensure that health receives appropriate support from Climate Finance
2. Build a coalition for including health in housing policies
3. Planning - Use health impact assessment (HIA) to identify policies with best health performance – tools guidance, guidelines, and indicators
4. Support technically sound intervention packages – science based evidence
5. Economic valuation of health co-benefits of green strategies and investments
6. Monitoring-reporting-verification of sector policies and their health impacts
7. Support innovation and build capacity in cities and countries
Case study of Dutch HIA on local reconstruction project

- Hazardous transport by railway
- LPG transport by road
- Sports Boulevard
- Shops, offices, parking
- New housing location
- Hospital
- Park
- Map reconstruction project
Guidance on healthy housing – we’ve done it before…
Evidence-based Guidelines

WHO GUIDELINES FOR INDOOR AIR QUALITY
DAMPNESS AND MOULD

Evaluating household energy and health interventions
A catalogue of methods

World Health Organization
Take health impacts into account in investment decisions:

* Develop tools that help transport and urban planners to include health in their economic analyses.

Download the guidance document, HEAT for cycling and user guide from www.euro.who.int
Monitoring and evaluation systems * that responds to all users’ needs

- Policies/interventions in housing, risks to health, human exposure, health co-benefits, costs/savings
- Reporting in the form of “health performance”
- Advantages regarding incentives from climate change or otherwise – e.g. MRV to justify CDM funding
Environmental Reporting Mechanisms, EEA

• Pressures
• Impacts
• Trends
• Policy measures
To respond:
Are we going in the right direction?
## Tools for healthier housing

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsible Party</th>
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<tbody>
<tr>
<td>Health impacts assessment of housing related mitigation policies and plans to better identify housing and health risks, and mitigation co-benefits</td>
<td>Building planners</td>
</tr>
<tr>
<td>Include land use and transport planning for walking, cycling and rapid transit/public transport, as well as access to green areas to enhance health and climate benefits and reduce risks in housing strategies.</td>
<td>Building planners</td>
</tr>
<tr>
<td>Health-oriented intervention studies on specific housing mitigation measures to identify key opportunities as well as risks to avoid</td>
<td>Scientific public health community</td>
</tr>
<tr>
<td>Systematic inclusion of health needs in housing codes, standards and enforcement mechanisms</td>
<td>Policy makers / Governments</td>
</tr>
<tr>
<td>Develop/use healthy housing criteria, checklists and good practice guidance, to select strategies and investments and to monitor healthy housing indicators</td>
<td>Policy makers / Governments</td>
</tr>
<tr>
<td>Development of linked health and energy efficiency indicators to support monitoring and evaluation of policies in relation health effects and policy effectiveness</td>
<td>Policy makers / Governments</td>
</tr>
<tr>
<td>Capacity building among local and national health authorities, housing and health professionals, housing agencies etc. for better data collection and monitoring systems on housing and health.</td>
<td>Housing and health professionals and experts</td>
</tr>
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</table>
The homes we build will be with us for many years, we will remember for the housing and urban policies we make.

- Public health gains of the 19th century – from water, sanitation and housing interventions

- Challenge and opportunity in the 21st century
  - Housing and the built environment
  - Transport and mobility
  - Land use planning and infrastructure
Thank you