Health Benefits of Energy efficiencies

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Major health benefits from energy efficiency in:

- Home energy
- Housing,
- Health care,
- Land use
- Transport

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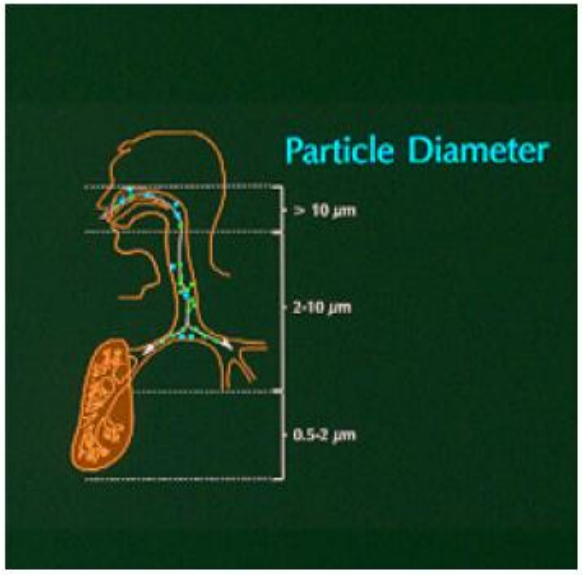
Air Pollution is a major risk to health and a sign of energy inefficiency

New evidence showing that particles smaller than 2.5µm penetrate deep into the lungs and effect the body more systematically leading to diseases like ***stroke, heart disease,*** *in addition to the cancers, COPD and pneumonia/URLI.*



PM<10µm – Coars

PM<2.5µm – Fine

PM<1µm – Ultrafin

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Lungs exposed to tobacco and to Indoor air pollution

Pathology slides - Courtesy Prof. Saldiva, São Paulo, Brazil

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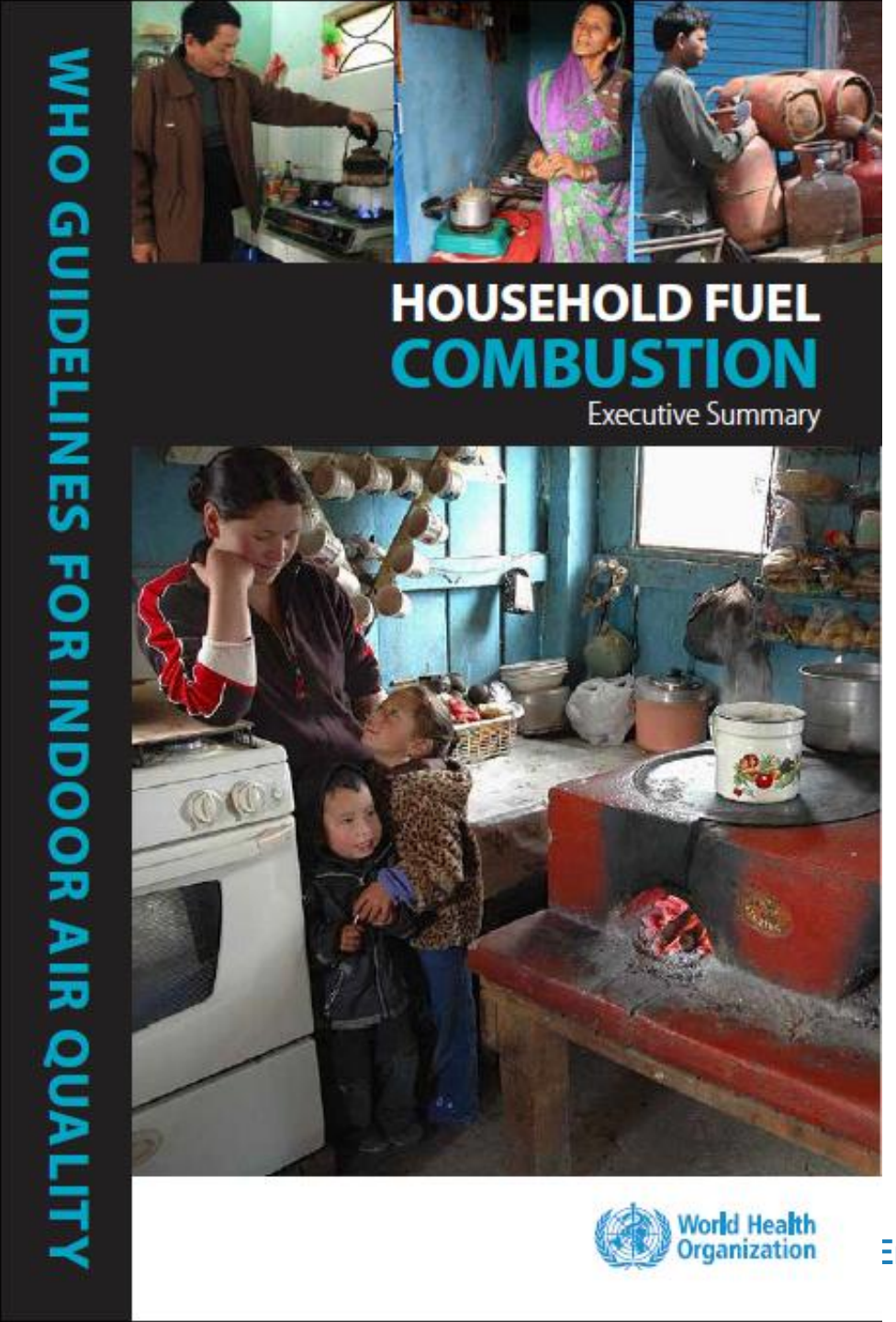

The links: Household energy fuels and technologies used for cooking, heating and lighting

New Air Quality Guidelines:

1. Use only very efficient cookstoves (following emission rates provided by WHO)
2. Don't use Kerosene
3. Don't use Coal
4. Use clean fuels – LPG, Biogas, ethanol…

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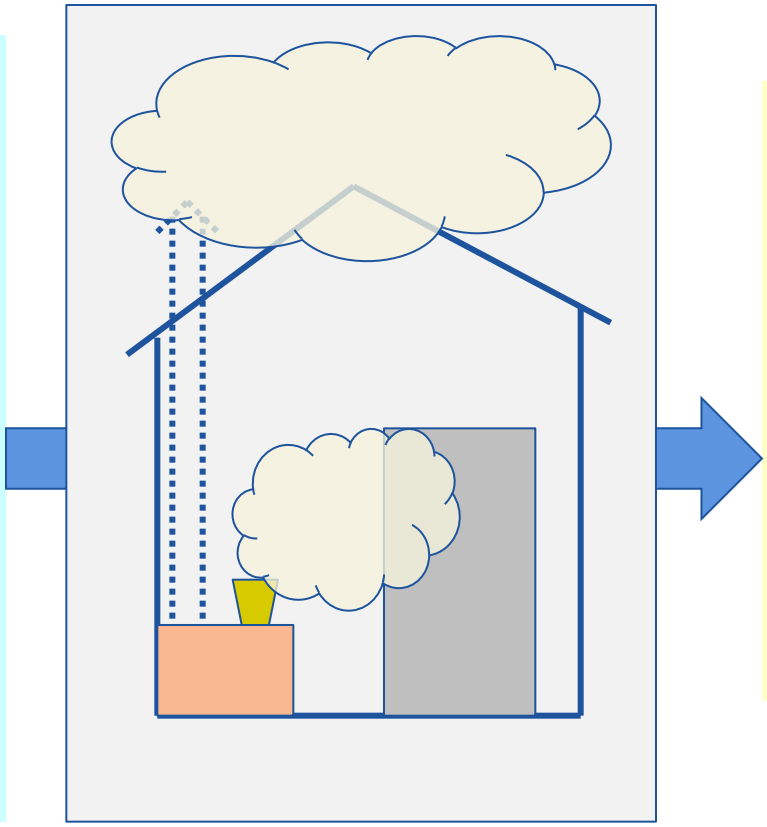
Model linking emissions to air quality

Inputs:

- Emission rates:
  - PM2.5
  - CO
- Kitchen volume
- Air exchange rate
- Duration of use (hours per day)



Outputs:

- Predicted average concentrations of:
  - PM2.5
  - CO

•Assumes uniform mixing of pollutants and air in kitchen

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Energy-efficient homes reduce air pollution & other housing risks such as...

Housing risks

- Indoor/outdoor air pollution
- Damp, mould & allergens
- Poor indoor ventilation
- Inefficient insulation/energy system
- Planning, transport access
- Urban waste, sanitation & water
- Heat Island
- Storms/flooding

Health impacts

- Chronic/acute respiratory disease
- Allergies, asthma
- Other NCDs
- Cold exposures – morbidity/mortality
- Water and sanitation-borne disease
- Heat strokes
- Injuries

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Interventions on housing E-Efficiency improve health

« 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 startegies

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Health co-benefits in housing

Energy-efficient heating, cooling and natural ventilation can reduce strokes and respiratory illness as well as TB and vector-borne diseases;

A focus on slums /sub-standard housing - where needs are greatest/benefits could be multiplied

Solar hot water heating - India

Slum in Mexico City

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Access to clean/sustainable energy in Health Care

- Adopt energy efficient medical technologies
- Substitute diesel generators for sustainable sources (solar, hydro…)
- Access to sustainable transport
- Energy efficient buildings …

Solar suitcase powering a health care facility in Nigeria.

Solar powered refrigerator in Vietnam.

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Low energy medical devices ➡ in resource constrained settings

- **LED lighting** – for better visual management of patients
- **Battery-powered ultrasound –** enables early treatment of multiple births, breach births, and placenta previa
- **1-3 Watt fetal heart monitors -** identify and manage birth complications
- **Digital blood pressure devices** – hypertension management

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Response to a Silent "epidemic" of energy poverty – Initial WHO analysis African facilities

Survey	No. Countries	No Electricity	Unreliable Electricity	No/unreliable electricity	Method
DHS	5	**18-58%**	**15-49%**	-	Nationally representative
Global Fund	4	-	-	**23-55%**	Geographic Balance/high burden areas
WHO SAM/SARA	5	-	-	**42-84%**	Mix nationally representative /geographic balance

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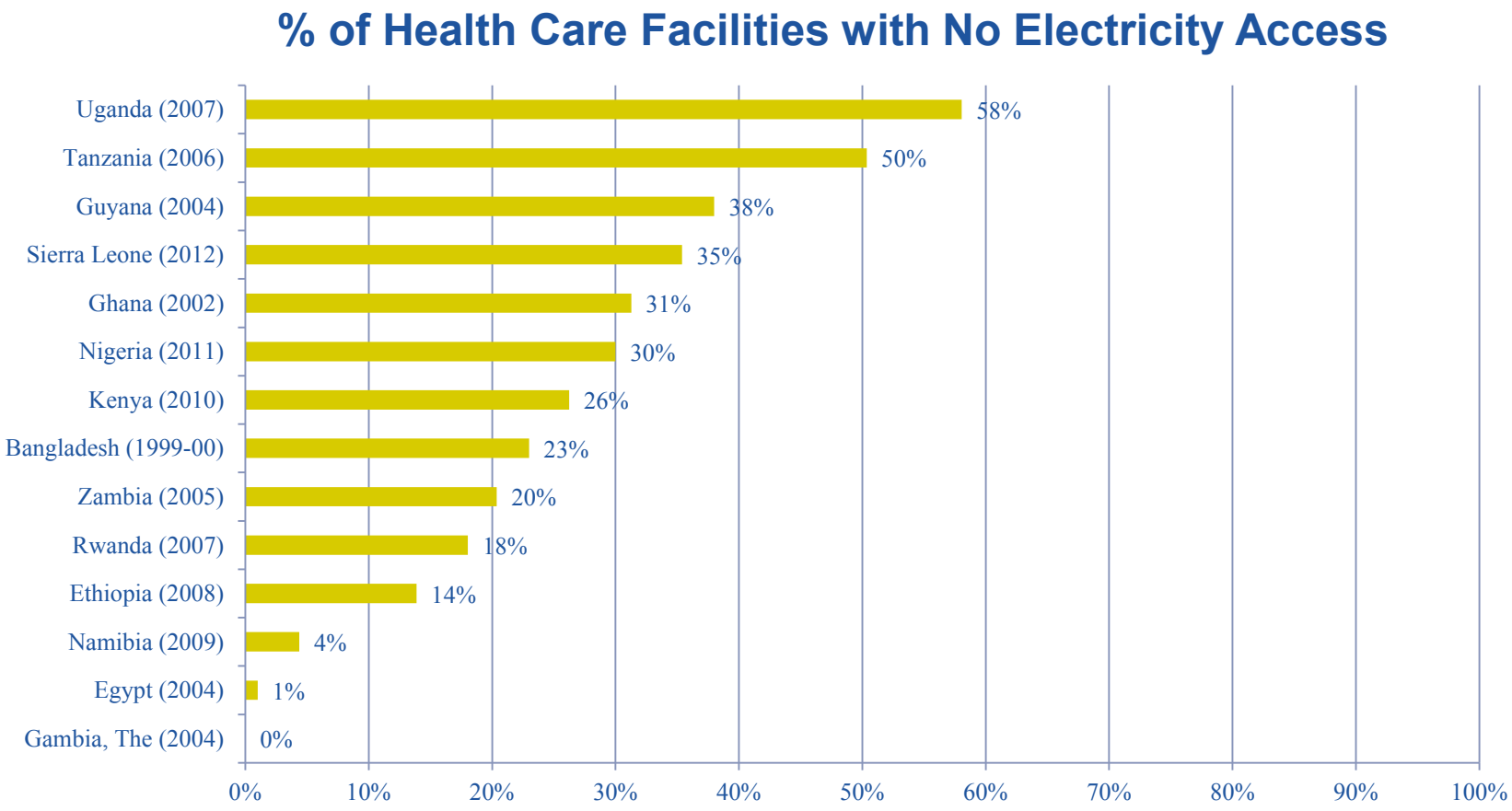
Help fill the energy gap in health care in developing countries



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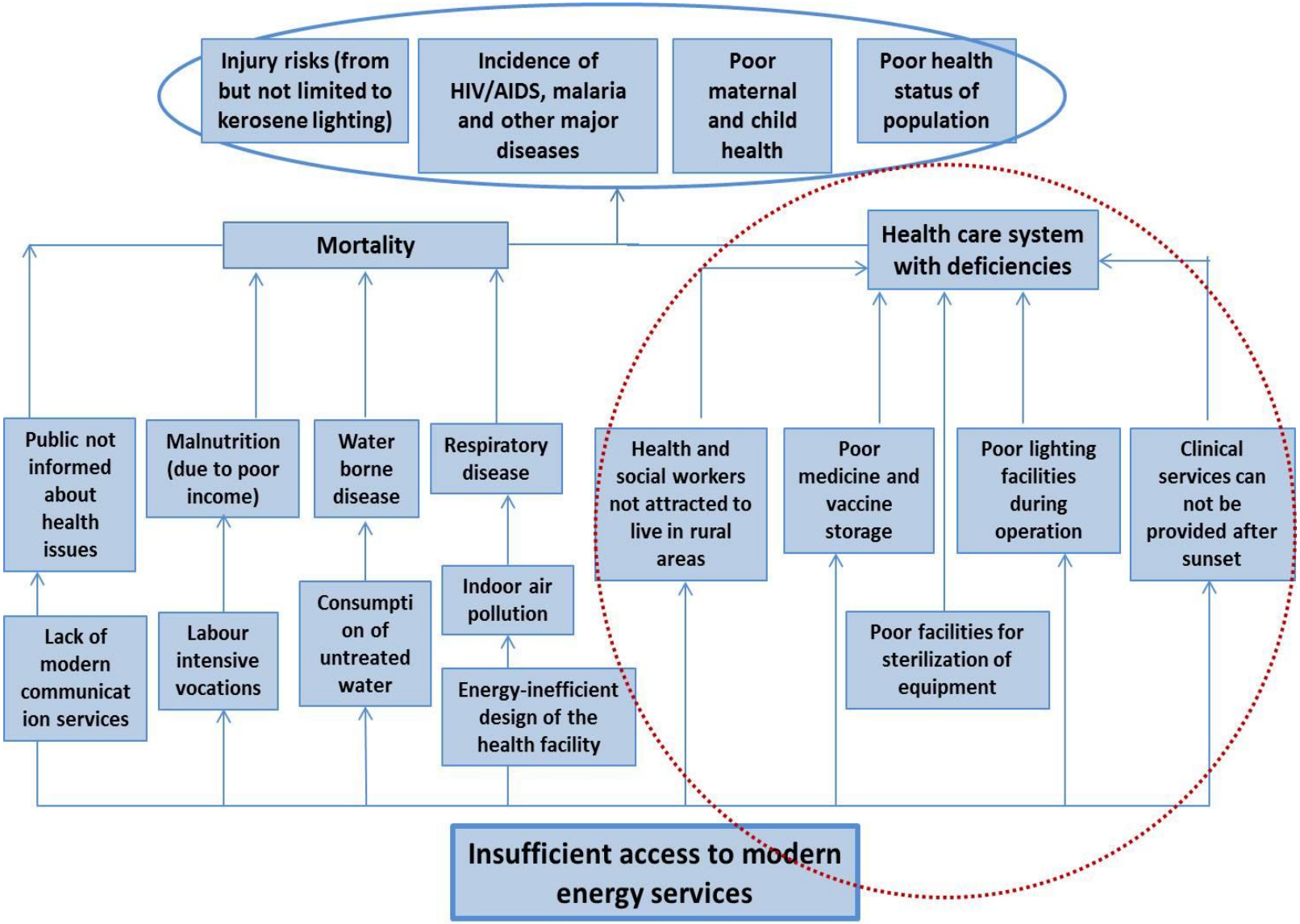

·Figure 1: Impact of Energy Access on *Public Health*. Adapted from EC (2006).

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Integration of land use and transport define the “shape” of a urban growth as energy “obese” or “trim”

Suburban USA

Coyoacan, Mexico City

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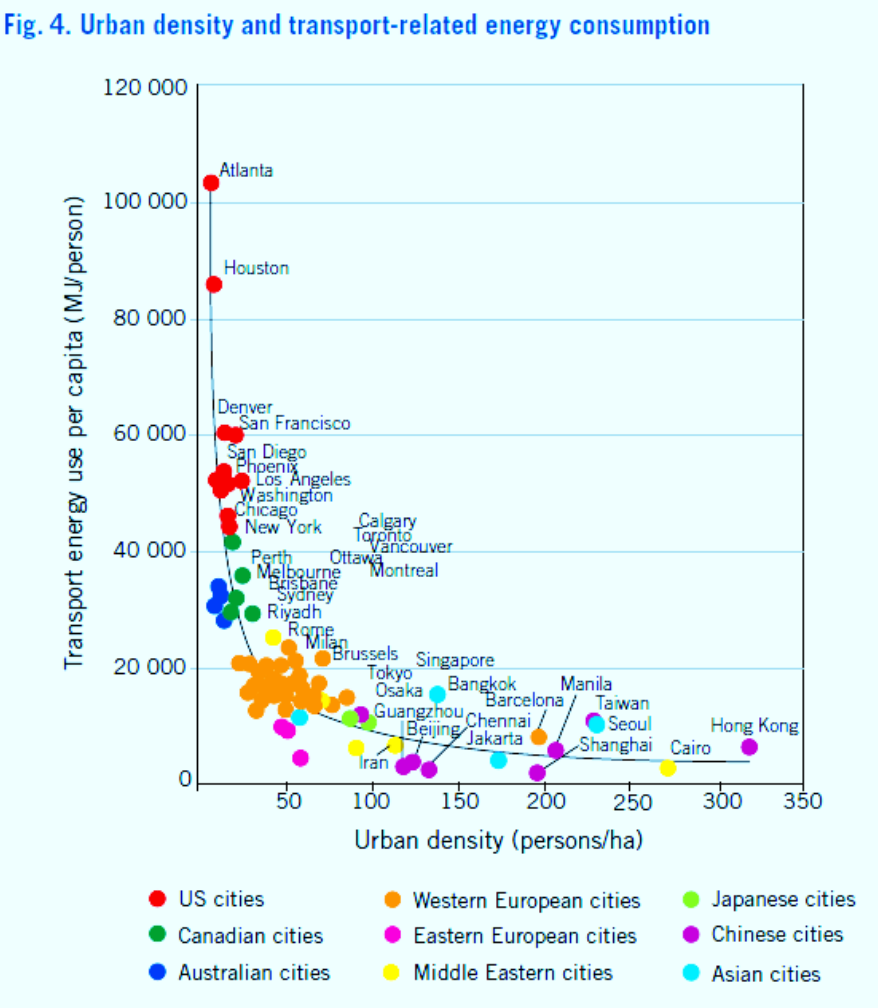
The Geometry of Housing Densities-Transport Energy



Medium density (European) cities achieve largest energy efficiency gains in comparison to **North America.**

Longer vehicle travel distances = more pollution emissions – although tailpipe controls may mitigate some emissions.

Public transport systems are less efficient in low-density/sprawl – destinations are too dispersed. So patronage declines sharply.

Source. WHO, 2012/International Association of Public Transport , 2005

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Housing Density – also a determinant of home energy efficiencies, e.g.

Multi-unit buildings share walls, utility points and energy systems

Planned, multi-unit development is an also an entry point for scaling up resilient, energy-efficient building technologies

- Cities with higher densities and mixed residential/commercial neighborhoods had significantly lower CO_2 emissions than suburban areas with strictly separated zones. (*Glaeser & Kahn, 2008*)
- In Toronto, a low-density suburban development used 2.5 X more energy than a condominium development in the centre city (*Norman J., et al 2006*)

Many developing cities, however, also are growing horizontally - in low-density extremes of slums and suburbs – the latter pictured below.

New suburb in China

Guragaon, India

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Integration of housing, services/schools and recreation reduces travel & promotes active travel

- Land use planning one of most effective measures to promote physical activity (*WHO, 2009*)
- & reduce pollution: e.g. schools within walking distance to homes – reduce CO_2 emissions by 12%; shrinking business-home distance by 20% in Santiago, Chile (*Barias et al, 2005*)

Copenhagen

Zona Rosa, Mexico City

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Sustainable transport health benefits

- Reduce air pollution
- Increases physical activity
- Reduces traffic injury
- Frees urban road/parking for green spaces
- Facilitates more equitable access to mobility
- Eases movements of elderly, children, disabled, women
- Promotes social cohesion in local communities

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More active travel from home to work = greater health

People who cycled to work had 30% lower premature mortality rates, on average, in long-term large population studies of Copenhagen and Shanghai commuters *(Andrews et al, 2000; Matthews et al, 2007)*

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Urban transit – efficient and healthy

- Integrated urban energy use planning – linking housing-density, services proximity, could reduce urban GHG emissions in Canada by 40-50% (*Bataille et al, 2009*)
- Packages of walkways, cycleways and BRT could reduce emissions by 25% in developing countries at low cost (*Wright, Fulton, 2005*)
- Efficient public transit, walking & cycling consistently associated with more physical activity, less obesity, and lower risk of road traffic injuries in WHO Health in Green Economy review (*WHO, 2011*)

Bus Rapid Transit - Curitiba, Brazil

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Need to account and track the health benefits of E-efficiency measures and costs for inaction

Currently working on a model for strengthening capacity of urban stakeholders and the health sector to support decision making in other sectors with relevant information

‘Green’ clustered housing developments, Beijing

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