Health: What is the scale of the issue?

World Health Organization

Photo courtesy of: Ajay Pillarisetti

Presentation Overview

- Understanding and taking action on air pollution and health
- Monitoring of HAP & Health
- Methods- Exposure & Mortality
- Results – Global & regional
- Comparing the results
- Moving Forward

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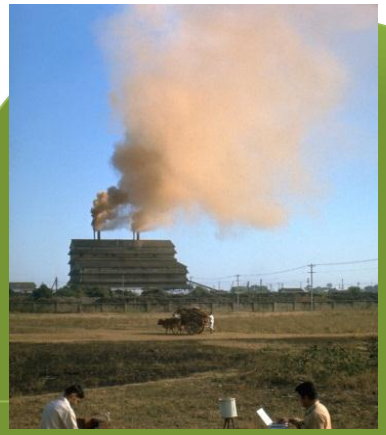
Incomplete combustion of biomass & fossil fuels produces air pollutants and climate pollutants

Direct health impacts - from air pollutants

Indirect health impacts – from climate change (extreme weather events, changes in disease vectors, agriculture production, water shortages etc.)



PM
(e.g black carbon)

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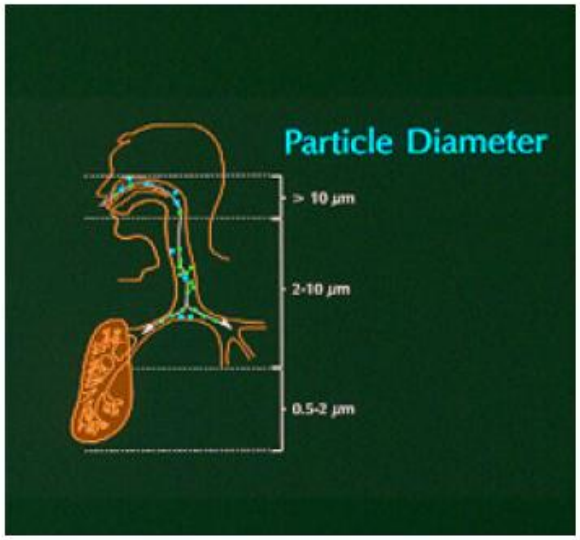
The most studied and health-damaging pollutant is particulate matter (PM)

The relationship between PM & health is size dependent. Particles smaller than 2.5μm are able to penetrate deep into the lungs and effect the body more systematically leading to diseases like *stroke, heart disease, cancers* and *pneumonia.*

PARTICLE SIZE AND DEPOSITION



PM<10μm – Coarse

PM<2.5μm – Fine

PM<1μm – Ultrafine

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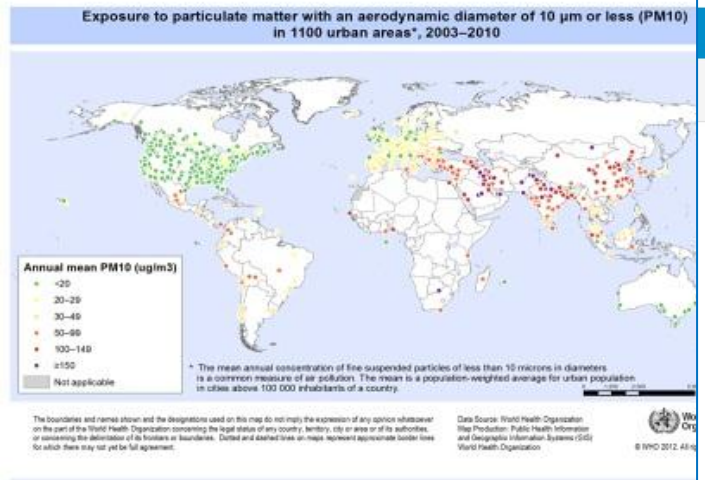
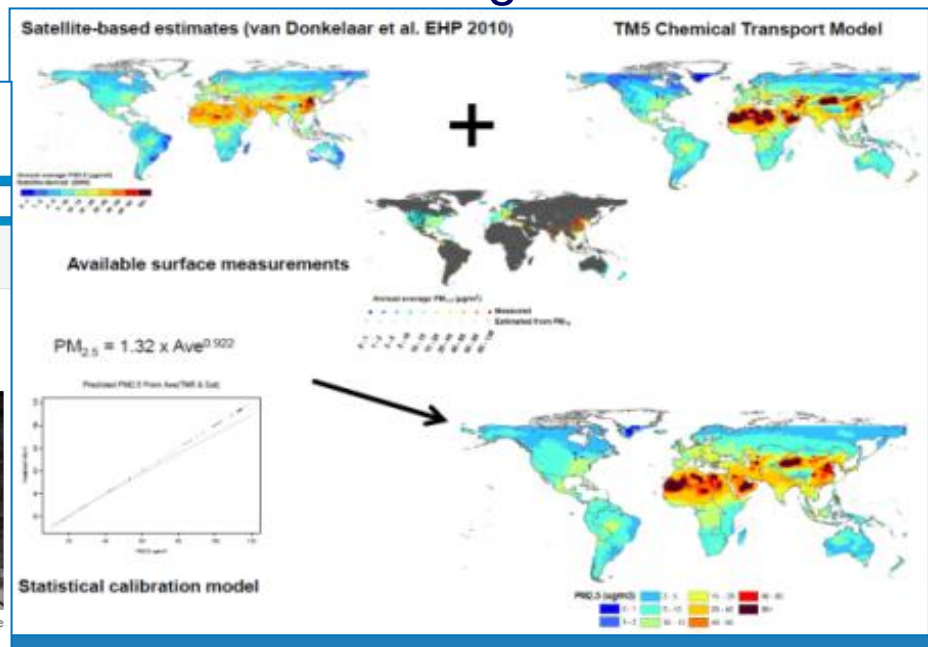
WHO contributions to addressing this major health risk

- **Document the size of the burden of disease** – this presentation

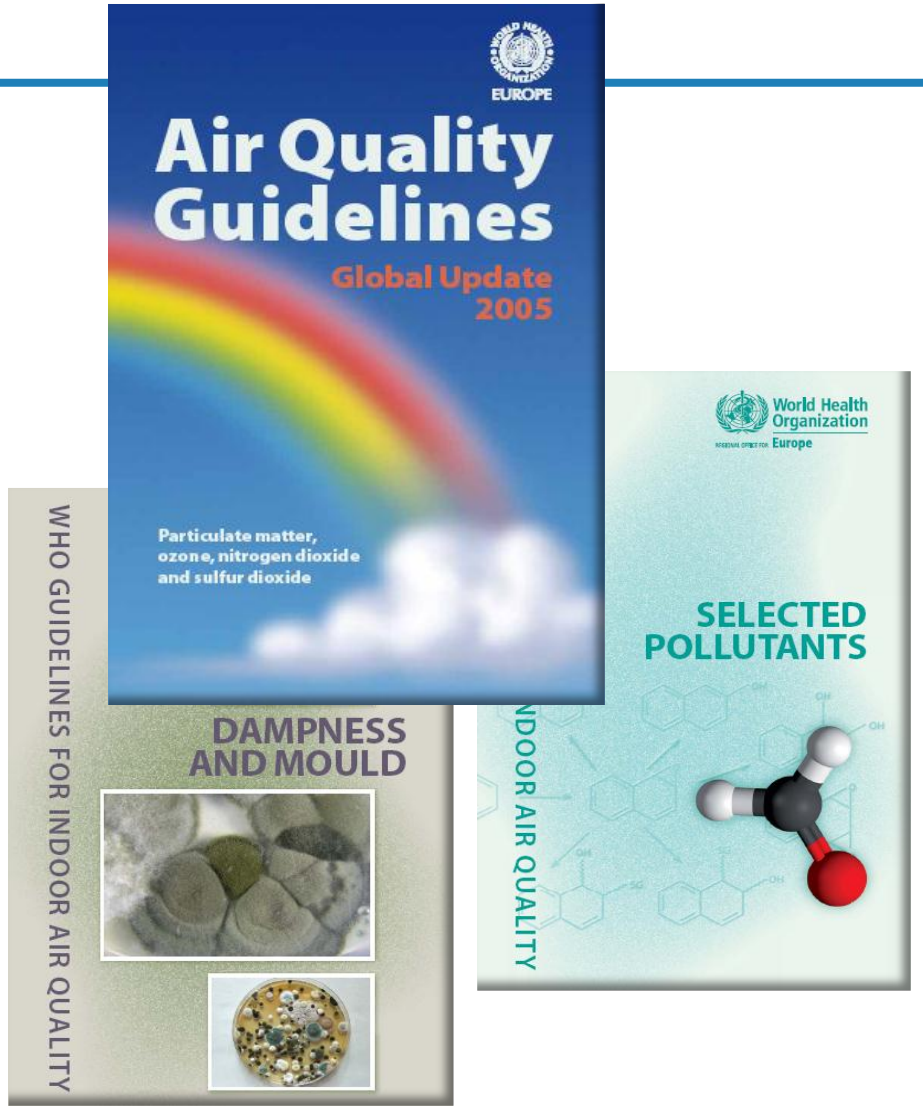
- **Monitoring trends in air pollution**
  - Global databases on Household Energy Use & Household Air Pollution
  - Global database on Outdoor Air Pollution in cities
  - Global platform for Air Quality & Health → combining satellite imagery, chemical transport models & ground-level monitoring in development





WHO contributions to addressing this major health risk…

- **Normative work**
  - **WHO Air Quality Guidelines:** provide the scientific evidence on the health impacts of air pollution as well as recommendations on pollutant levels safe for health
  - **WHO Indoor air quality guidelines for household fuel combustion**: provide guidance on policies and the impact of different fuels/technologies (for cooking, heating & lighting) on health



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WHO contributions to addressing this major health risk…

- **Raising awareness & providing support to countries**
  - Building capacity in-country and various settings for the monitoring of air quality and its impacts on health in both permanent and transitional settings
  - Building a stronger evidence base to guide countries and programmes on how to implement the most effective interventions to meet WHO Air Quality Guidelines levels

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WHO contributions to addressing this major health risk…

Supporting understanding about:

Effective interventions (for health)

Health Risks from short-lived climate pollutants

Health Co-benefits of Mitigation

Connecting air pollution and health to sustainable development , climate & supporting international cooperation

Climate & Clean Air Coalition on SLCP

UN SG Sustainable Energy for All initiative

Global Alliance for Clean Cookstoves

CCAC CLIMATE AND CLEAN AIR COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

RIO+20 United Nations Conference on Sustainable Development

GLOBAL ALLIANCE FOR CLEAN COOKSTOVES

SUSTAINABLE ENERGY FOR ALL

WHO'S MONITORING OF HAP & HEALTH

WHO Monitoring of HAP & Health

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- WHO produces exposure and HAP disease burden estimates to inform:
  - MDG reporting
  - Policy & planning of public health interventions
  - Identify 'hot spots' to help ensure limited resources are allocated to areas where the need is greatest
  - Build capacity in countries to plan, evaluate and monitor their HAP situation
  - Monitor progress of international efforts to address air pollution, household energy, climate and sustainable development

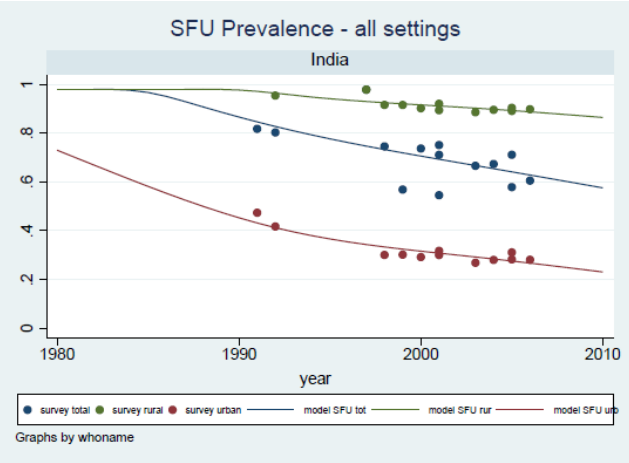
METHODS FOR ESTIMATING EXPOSURE & DISEASE

Methods: Estimating Exposure, 2012

Pop. Exposed to HAP = % of HH primarily using solid fuels for cooking

- Applied a non-parametric multi-level statistical model to estimate the percentage of households primarily relying on solid fuel for cooking
- To derive 2012 estimates, data were used from:
  - 711 National Surveys
  - 157 Countries
  - 99% of all LMIC

One country, so many surveys



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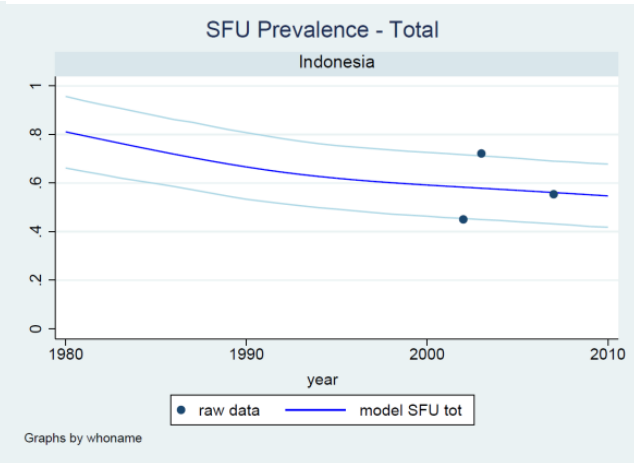

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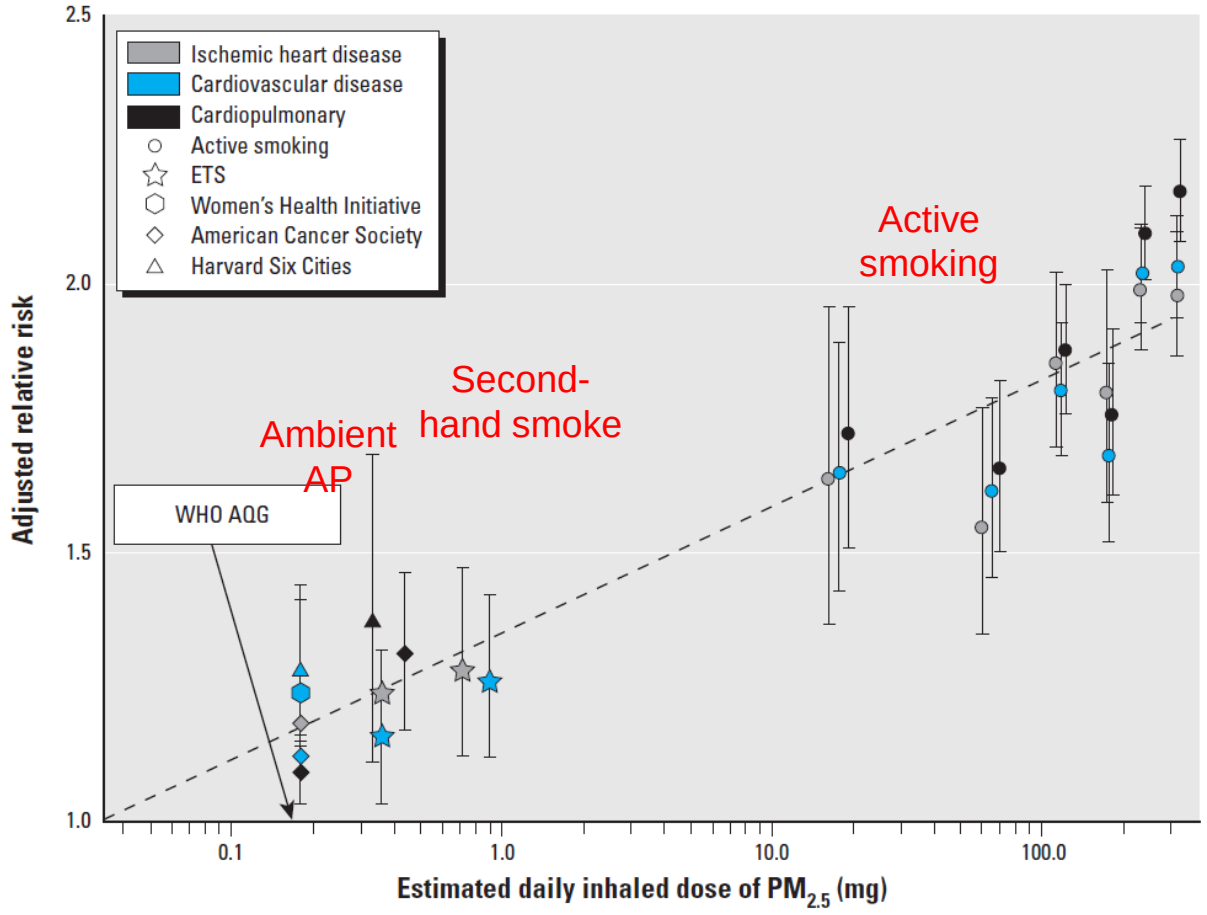
Methods: New Evidence for Health Outcomes

- Integrated exposure response function across combustion risk factors was used to derive risk estimates for ischemic heart disease, stroke, acute lower respiratory infections, and lung cancer



Smith K, Peel J. Mind the Gap, *EHP*, 2010.

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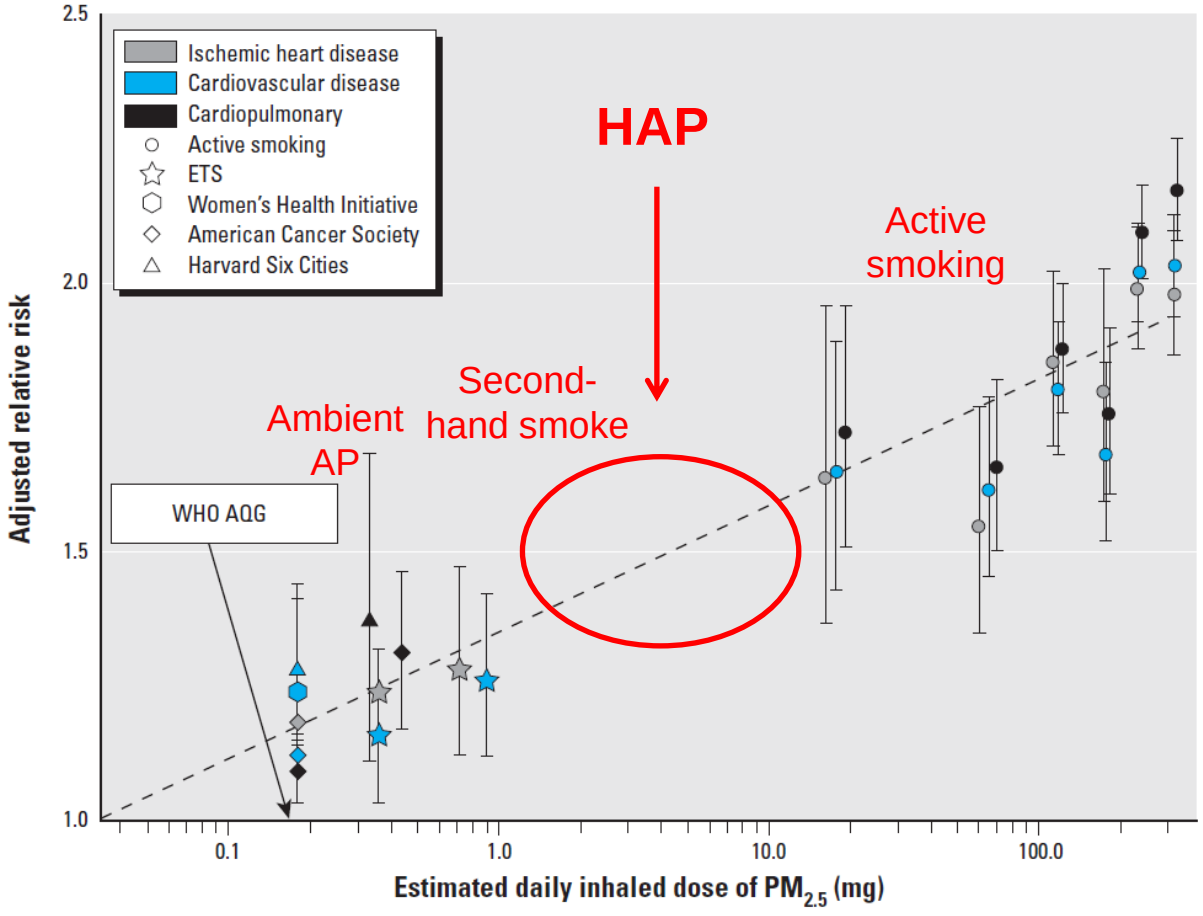

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Methods: Health Outcomes & Risks, 2012

- **Disease outcomes:**
  - Acute Lower Respiratory Infections (ALRI);
  - Chronic Obstructive Pulmonary Disease (COPD);
  - Lung Cancer (Biomass + Coal);
  - Ischaemic Heart Disease (IHD)
  - Stroke

$$PAF = \frac{P_e(RR-1)}{P_e(RR-1)+1}$$

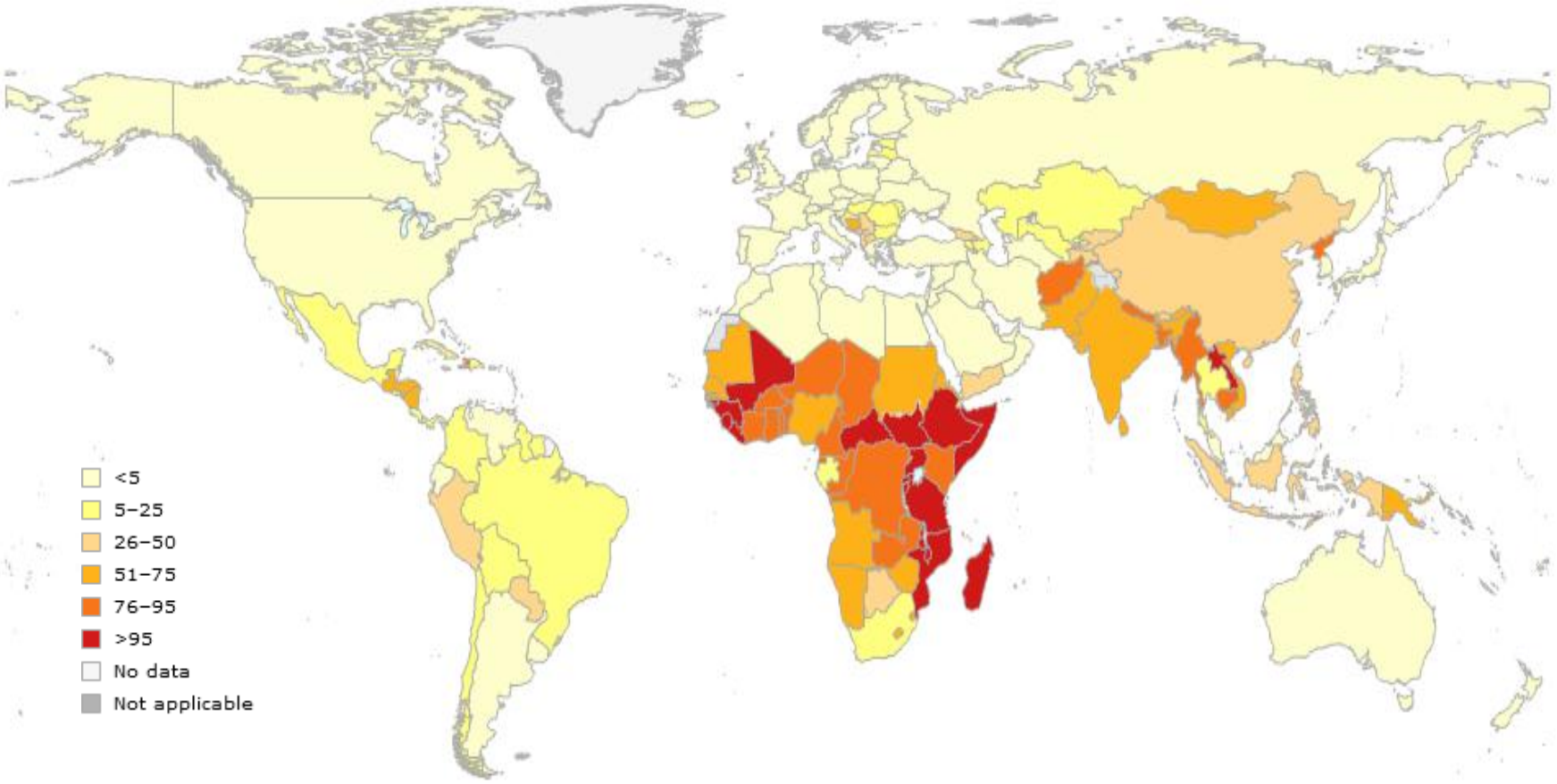
Disease	RR (95% CI) women	RR (95% CI) men
ALRI	2.9 (2.0-3.8) for children	
COPD	2.3 (1.7- 3.1)	1.9 (1.2- 3.1)
Lung cancer	2.3 (1.5-2.8)	1.9 (1.4-2.3)
IHD	(1.4-2.2)	(1.4-2.2)
Stroke	(1.4-2.4)	(1.3-2.4)

Methods: Disease Burden from HAP + AAP, 2012

- In some areas, a significant fraction of ambient air pollution (AAP) is caused by household fuel combustion
- To estimate the fraction of the AAP mortality caused by HAP, emissions estimates of HH solid fuel use for cooking as % of total ambient PM2.5 was calculated and applied to the AAP disease burden

RESULTS: GLOBAL EXPOSURE & DISEASE BURDEN

Results: HAP Exposure, 2012



Population Primarily Relying on Solid fuels for cooking in 2012

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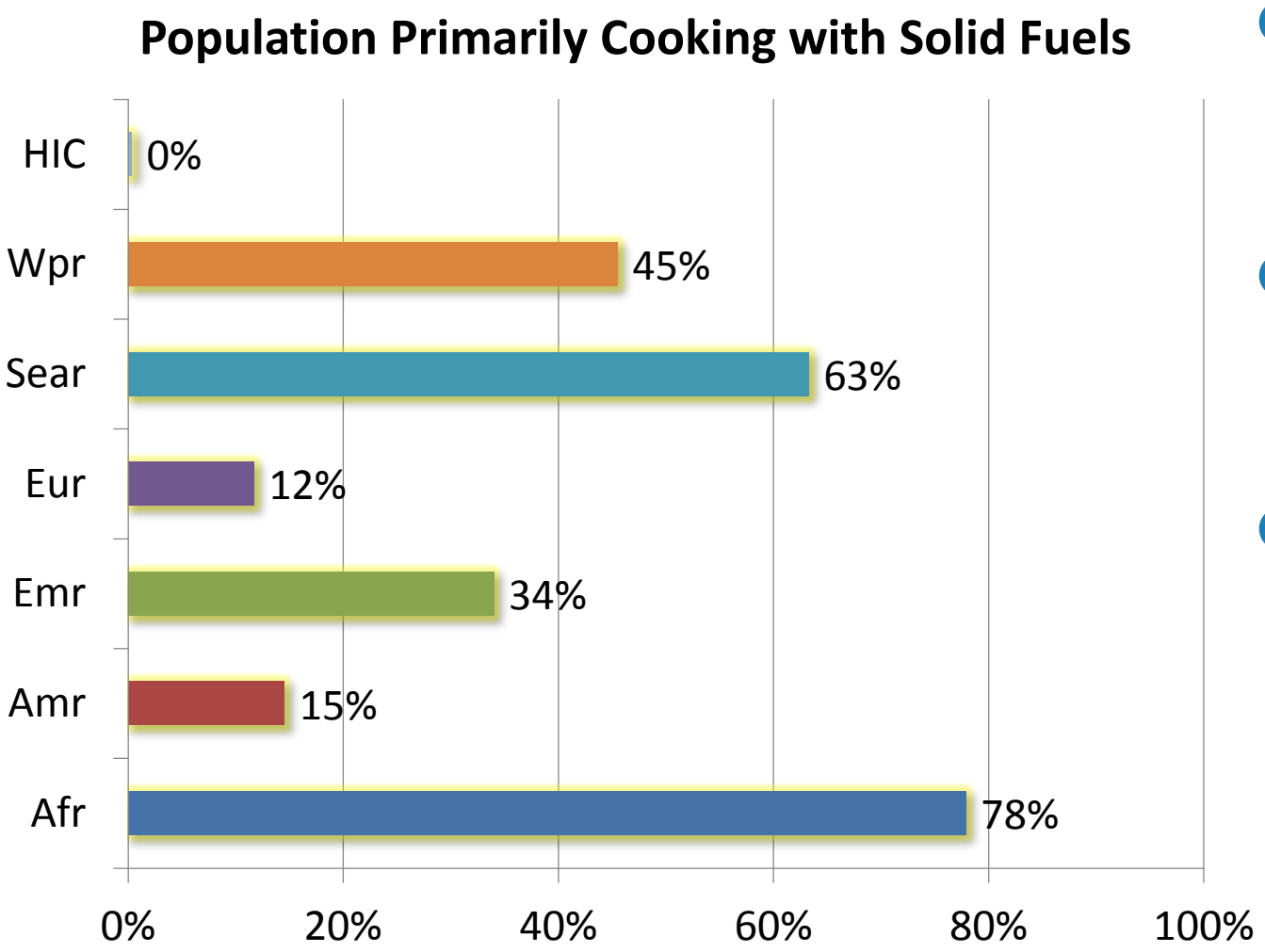
Results: HAP Exposure, 2012



- 2.9 billion people exposed or…
- 42% of the global population
- % exposed has decreased, but the absolute # exposed has remained relatively constant

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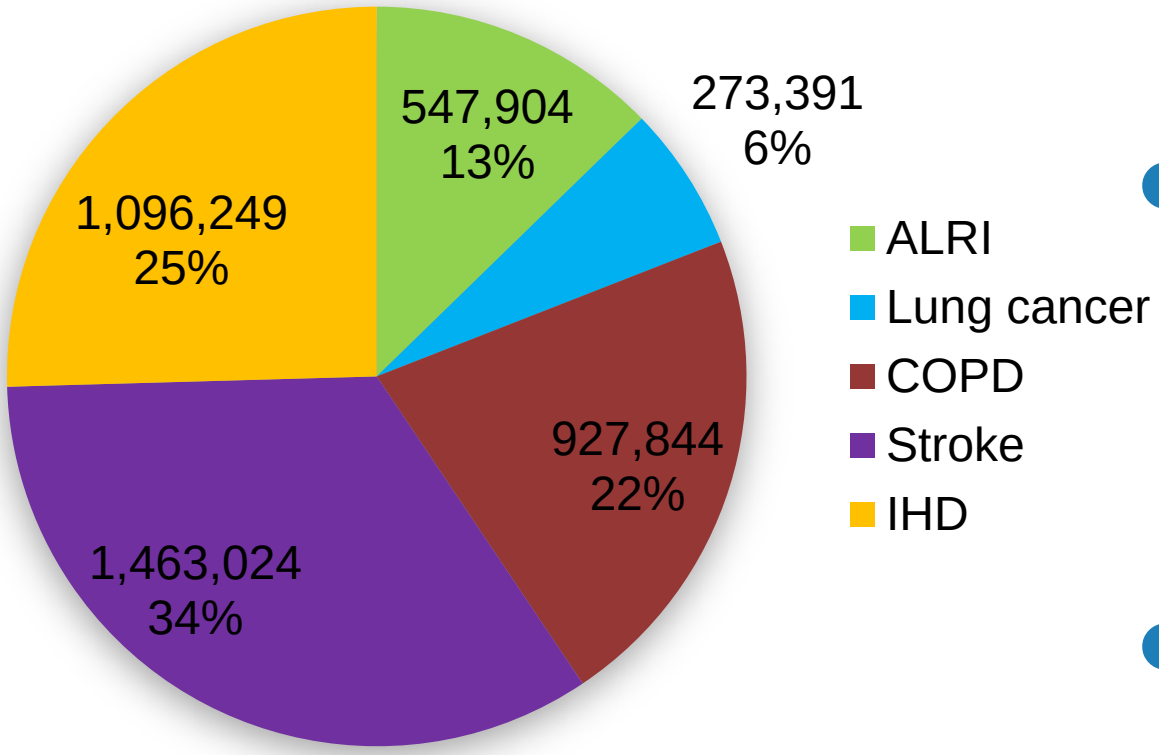
Results: HAP Mortality, 2012



- **88%** due to non-communicable diseases
- **54%** of **all** childhood pneumonia deaths attributed to HAP in 2012
- 22% of **all** stroke, 15% of **all** IHD, & 17% of **all** lung cancer deaths

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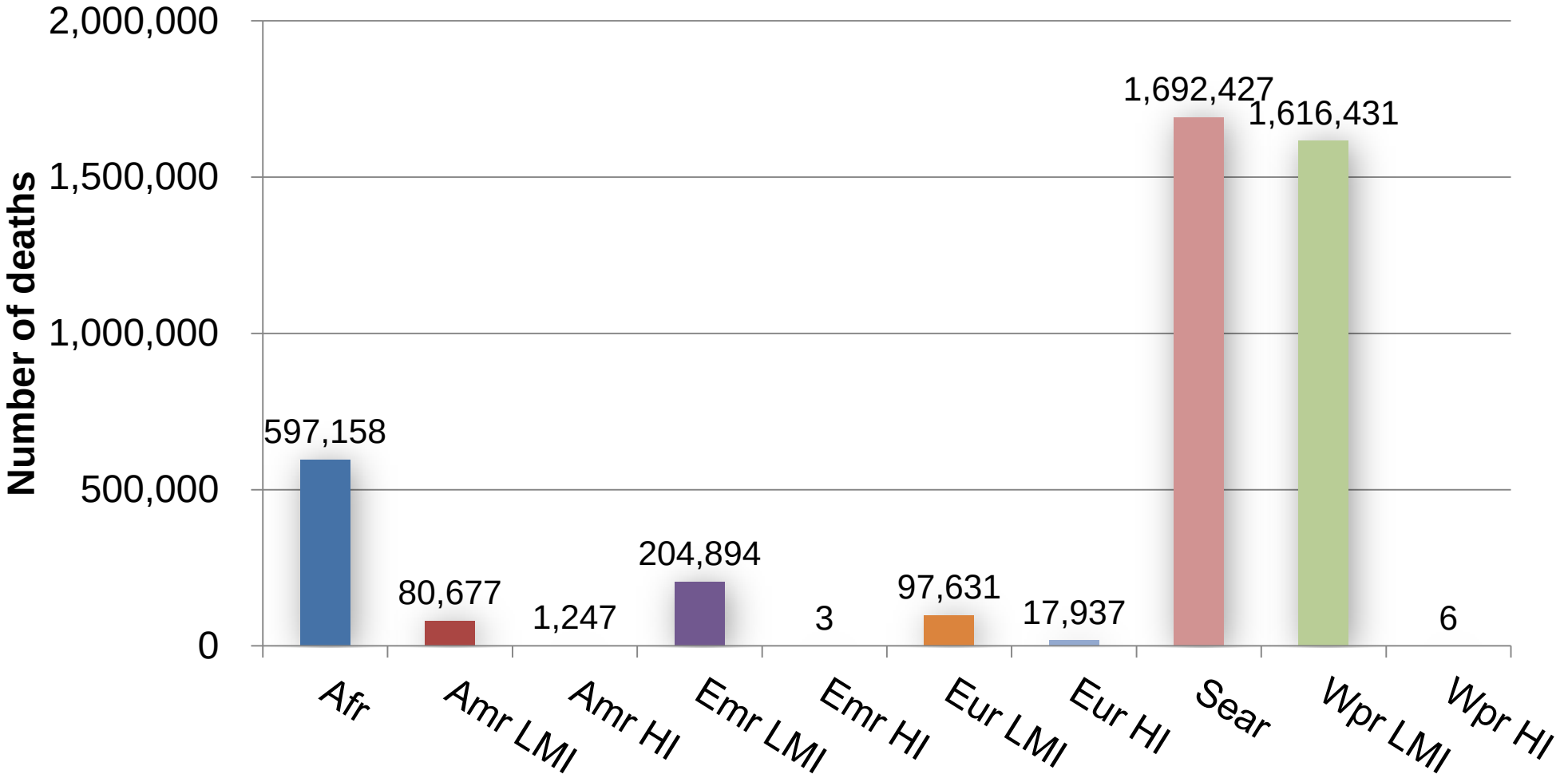
Results: HAP Mortality, 2012



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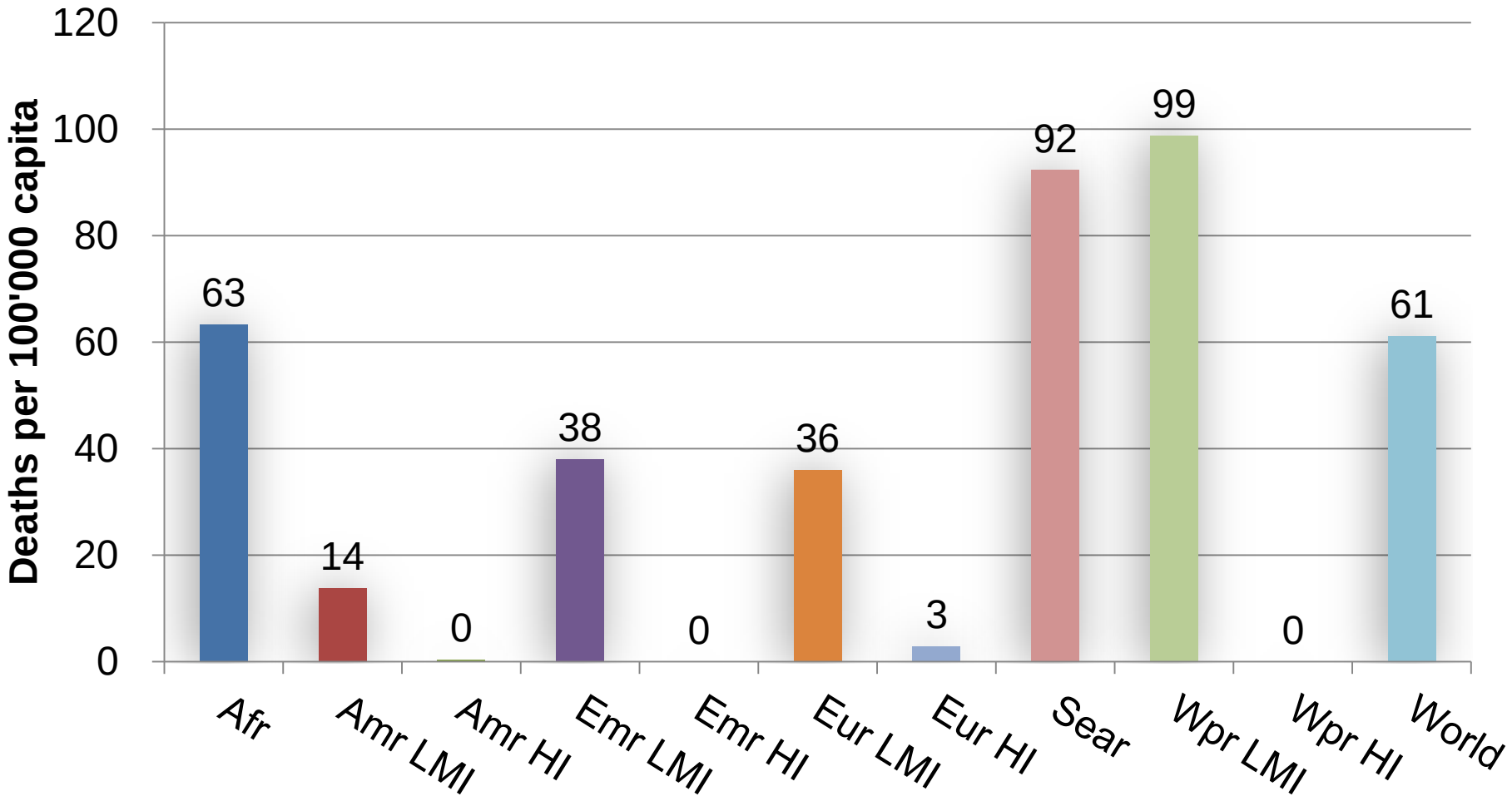

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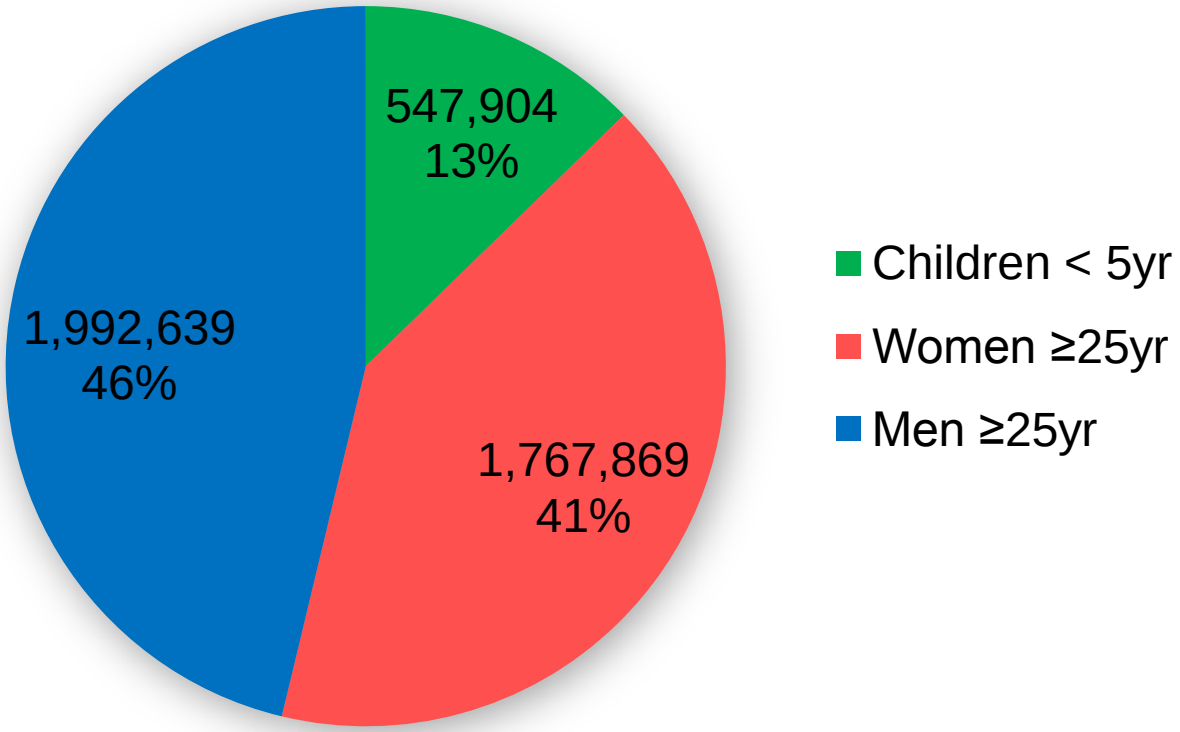

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- More than 50% of all HAP attributable deaths in women & children
- Disease risk from HAP is higher in women than in men, but underlying disease rates are higher in men

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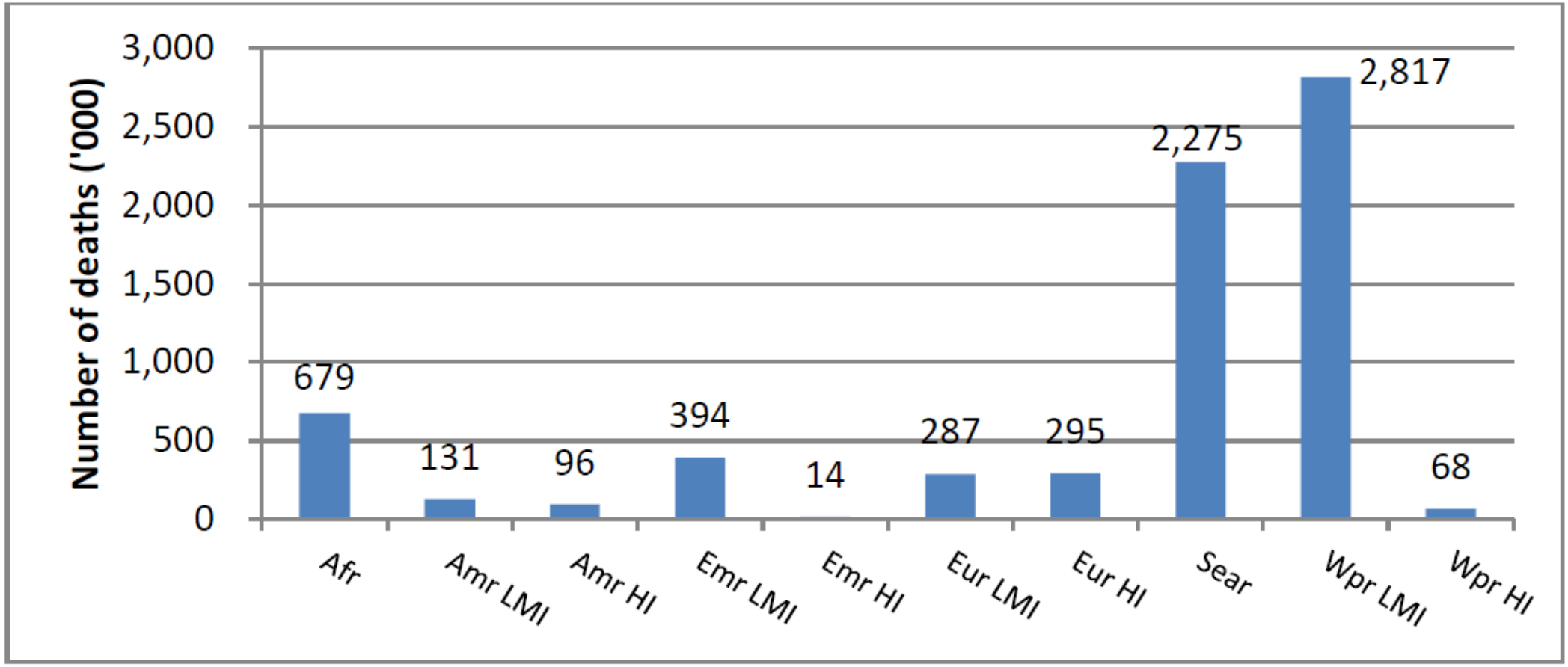
Results: Deaths to joint effects of HAP + AAP, global & by region

~ 7 million deaths globally



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COMPARING THE RESULTS: WHAT ARE THE DIFFERENCES

Previous WHO estimates

- **WHO estimated that in 2002, 2.7 billion people were exposed to household air pollution**

- **Approximately 2 millions deaths- most of which were due to childhood pneumonia and chronic obstructive pulmonary disease**

What accounts for the big increase in 2012?

- Underlying population & mortality estimates
- More disease outcomes accounted for
- Risk estimates – methods & values
- Methods of exposure assessment

How WHO is moving forward…

- **WHO Indoor Air Quality Guidelines: Household Fuel Combustion**
- **Global Platform on Air Quality & Health**
- **Tracking & monitoring of air quality & health impacts**
- **Cooperation with international initiatives on air quality, energy & health**