

Introduction to the Global Burden of Disease: *Global Effects Local Science*

Robert O'Keefe

Vice President Health Effects Institute,

Chair, Clean Air Asia



The Global Burden of Disease (GBD)

- A systematic scientific effort to quantify the magnitude of health loss from disease and injuries in 187 countries around the world from 1990 to 2010
 - E.g. cardiovascular disease, respiratory disease, HIV-AIDS, cancer road traffic injuries and
- Risks associated with conditions linked with those diseases
 - E.g. smoking, diet, high blood pressure, air pollution, overweight
 - Measured as “Disability Adjusted Life Years (*DALYs*) and **Mortality**”
- Last completed with WHO for Year 2000
- Newest version, funded by Gates Foundation, was published in December, 2012
 - *HEI leadership for outdoor air pollution analysis*



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Issue of The
Lancet*

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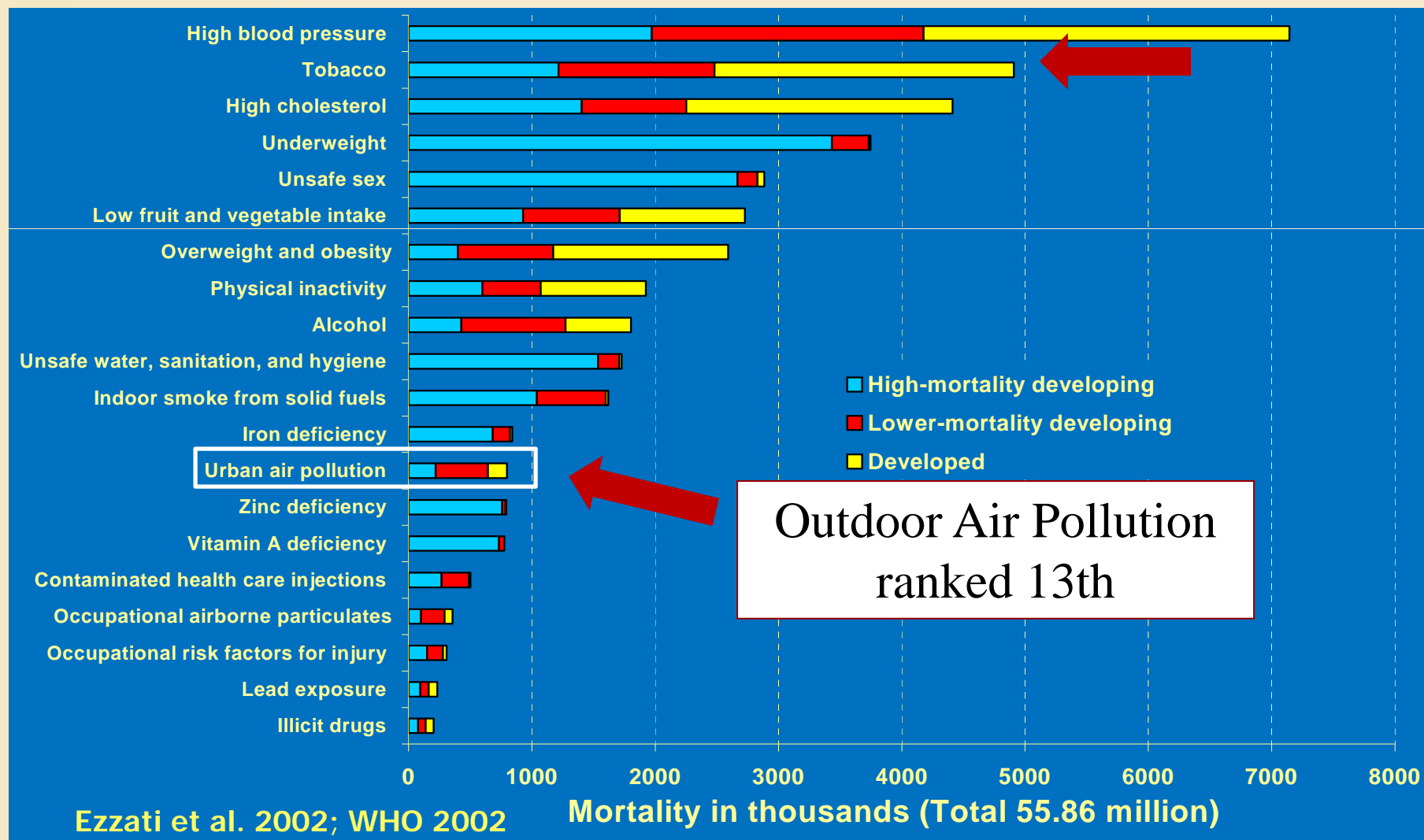
The Global Burden of Disease Study 2010



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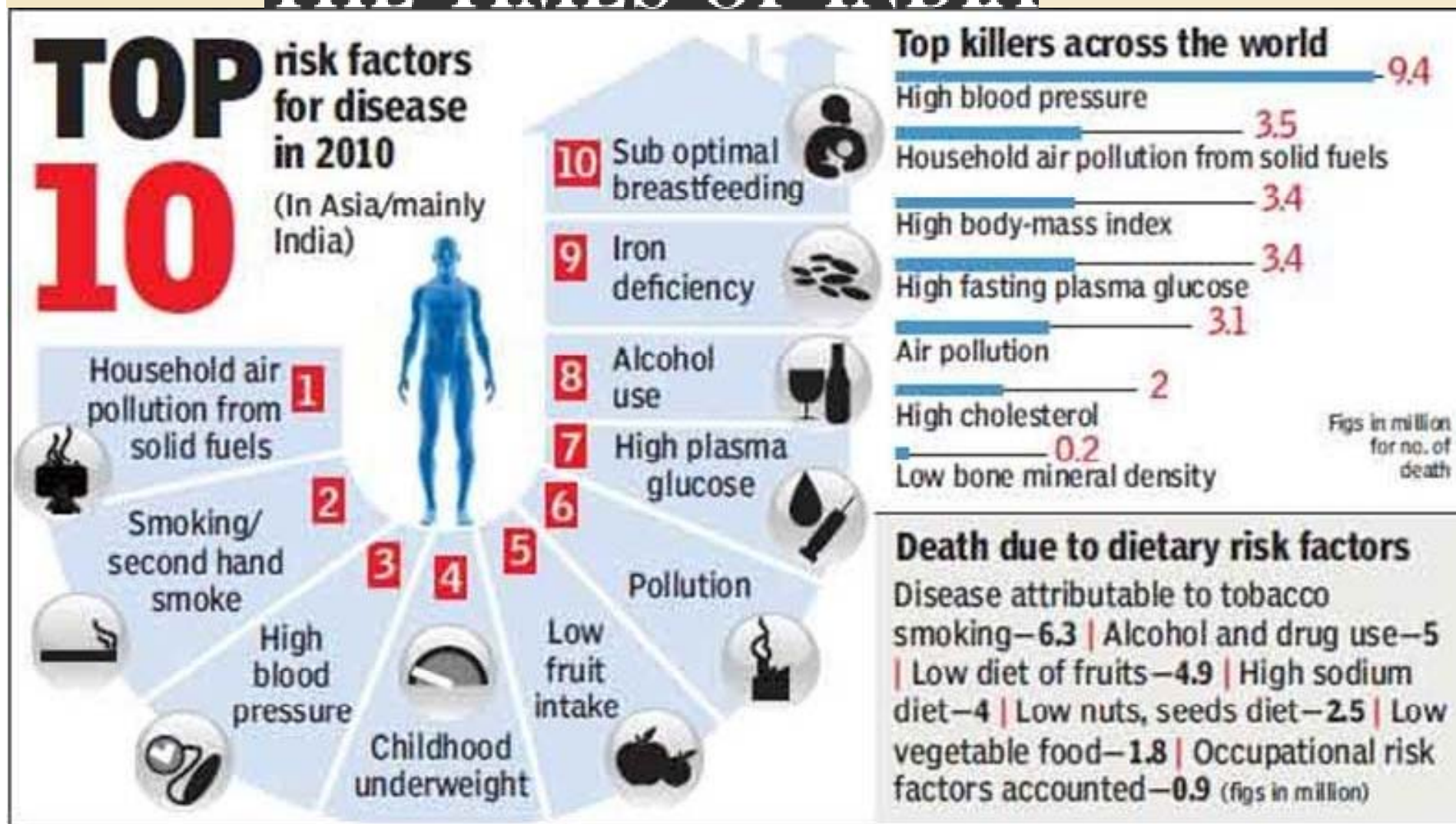
Previous Global Burden of Disease in 2000

Mortality attributable to leading risk factors



Much worldwide press describing the new GBD... from a global perspective, by region

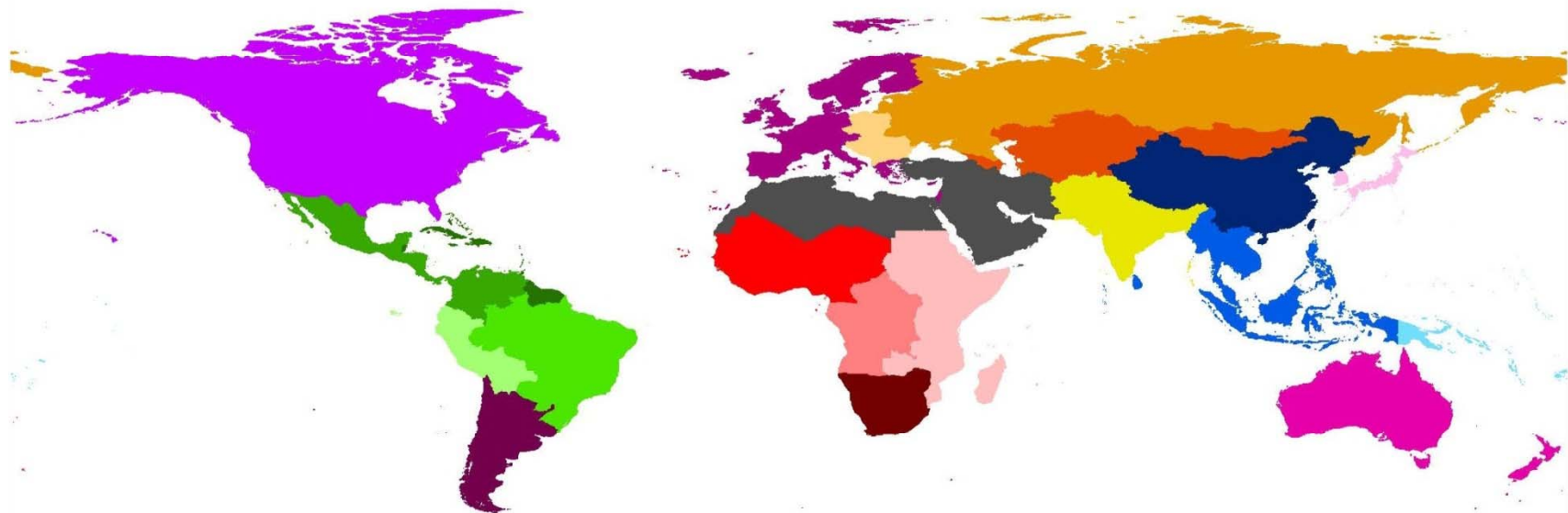
THE TIMES OF INDIA



Global Burden of Disease Regions:

India, included in “South Asia”

(also Pakistan, Nepal, Bangladesh, Afghanistan, Bhutan)



East Asia/Pacific

- Asia, East
- Asia, Southeast
- Oceania

Eastern Europe/Central Asia

- Asia, Central
- Europe, Eastern
- Europe, Central

Latin America/Caribbean

- Caribbean
- Latin America, Central
- Latin America, Tropical
- Latin America, Andean

North Africa/Middle East

- North Africa / Middle East

Sub-Saharan Africa

- Sub-Saharan Africa, Southern
- Sub-Saharan Africa, West
- Sub-Saharan Africa, Central
- Sub-Saharan Africa, East

South Asia

- Asia, South

High Income

- Latin America, Southern
- Europe, Western
- North America, High Income
- Australasia
- Asia Pacific, High Income

All been following press about high air pollution in Beijing, other Chinese cities



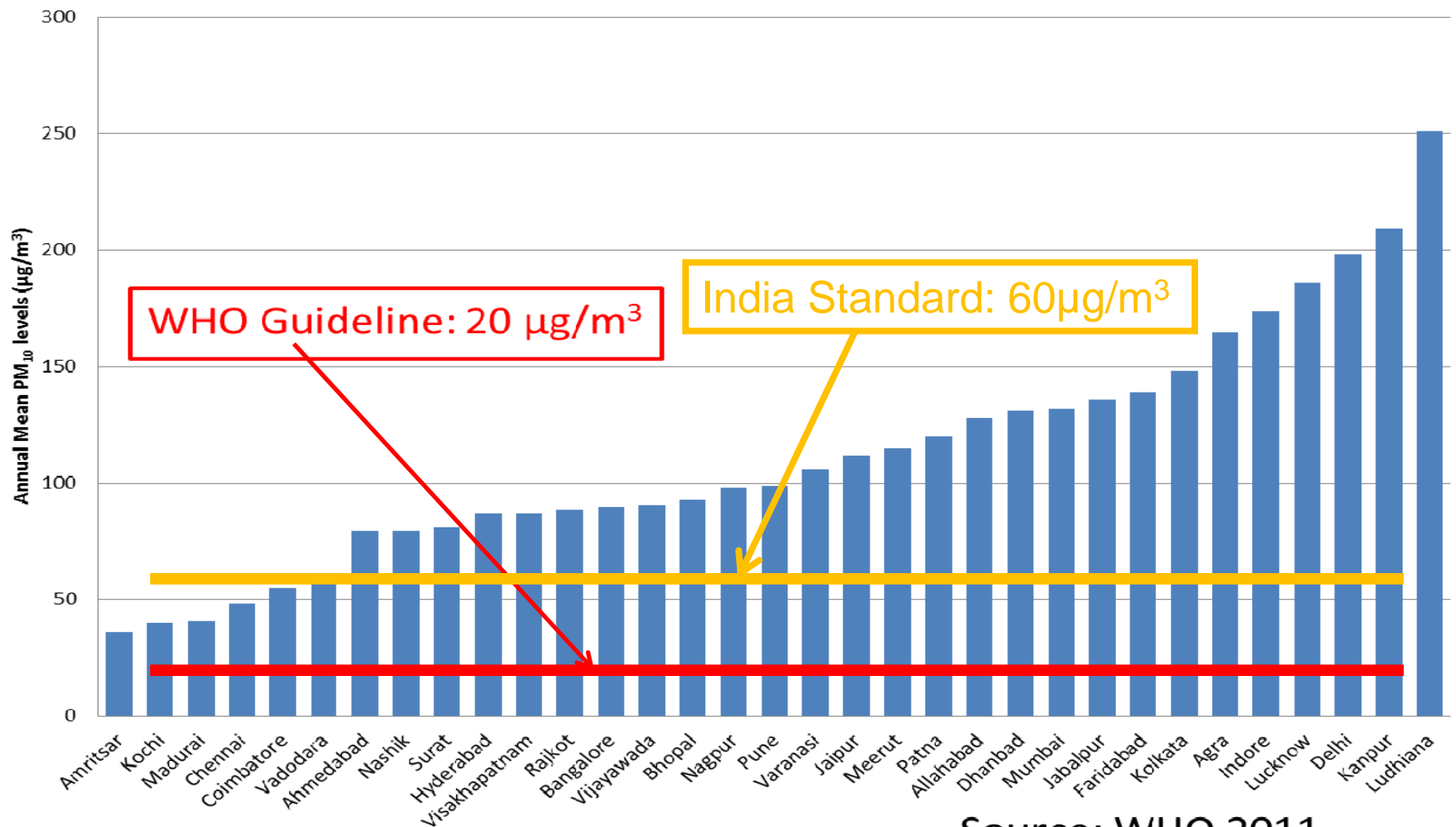
- Cyclists travel on the road on a hazy day in Huaibei, in central China's Anhui province, Jan. 14, 2013.

HEI



India: Many Cities Substantially Exceed WHO and Indian Air Quality Guidelines

2008 Annual Mean PM₁₀ Levels In Indian Cities*



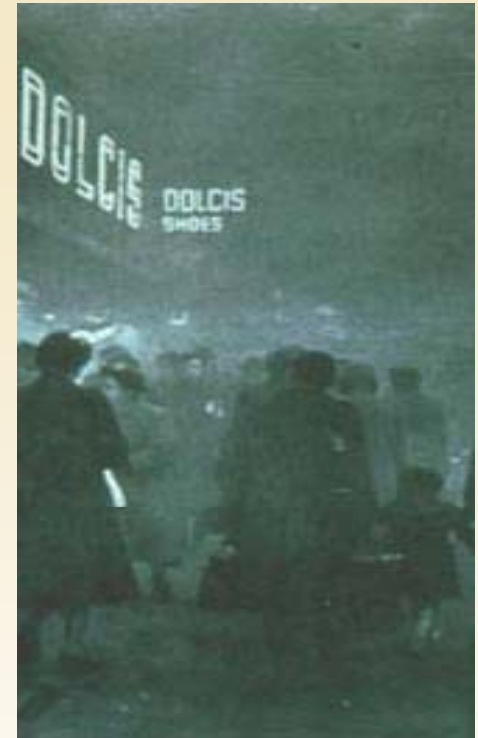
Source: WHO 2011

*What are the sources of global science
on air pollution and health?*



Particulate Matter (PM)

- High levels of PM ($> 500 \mu\text{g}/\text{m}^3$) known to cause premature death
 - e.g. London 1952
- *Many* studies in US, Europe, elsewhere have found association of PM with mortality at much lower levels ($< 50 \mu\text{g}/\text{m}^3$)
 - No evidence of a “threshold” (safe level)
- *Key new information:*
 - *Increasing local studies in Asia, Latin America confirm local effects*



*London at Noon,
December 1952*



Public Health and Air Pollution in Asia – Science Access on the Net (PAPA-SAN)



**Studies of Air
Pollution and
Health in Asia,
1980–2007**

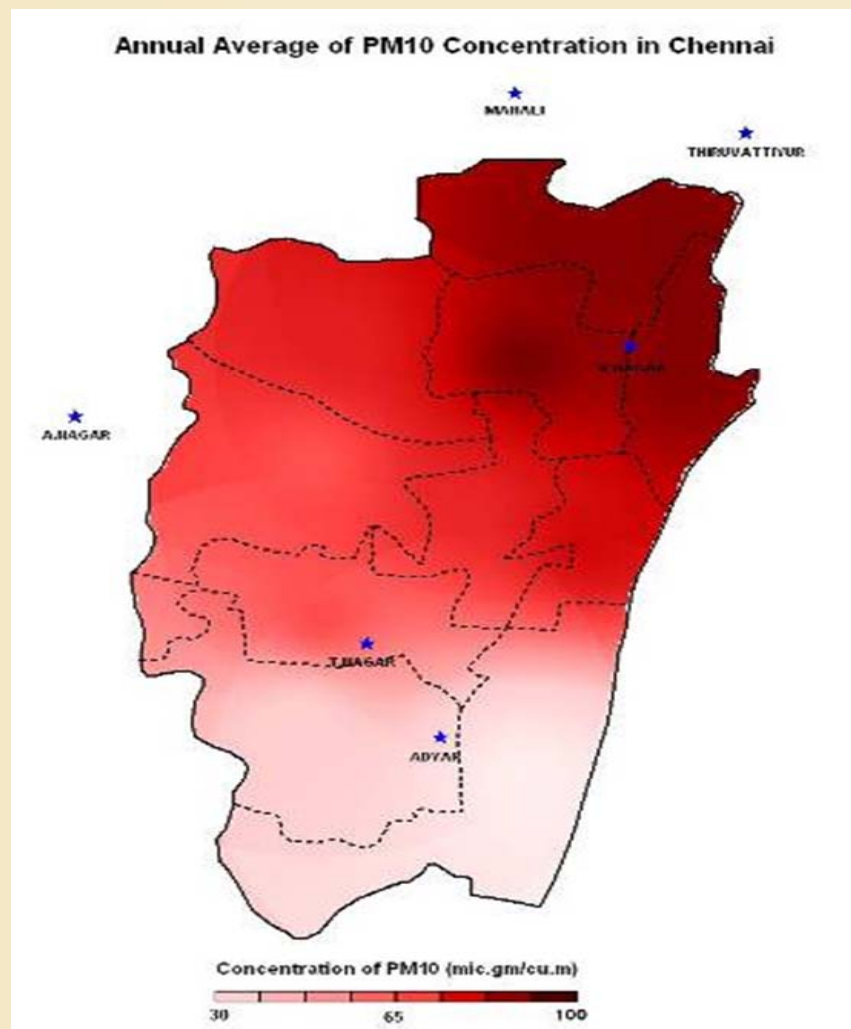
- Compendium of studies on health effects of air pollution in Asia
- Currently > 420 studies in 11 countries
 - 44 Studies in India

*available at <http://www.healtheffects.org/Asia/papasan-home.htm>



Data from India:

HEI Study in Chennai



- Careful analysis of *daily trends in air pollution and all cause mortality*
- Dr. Kalpana Balakrishnan and colleagues
- Overseen by HEI
- Independently and Intensively Peer Reviewed
- **Results:** Approximately 0.3% -0.6% increase in mortality per 10 $\mu\text{g}/\text{m}^3$ PM₁₀

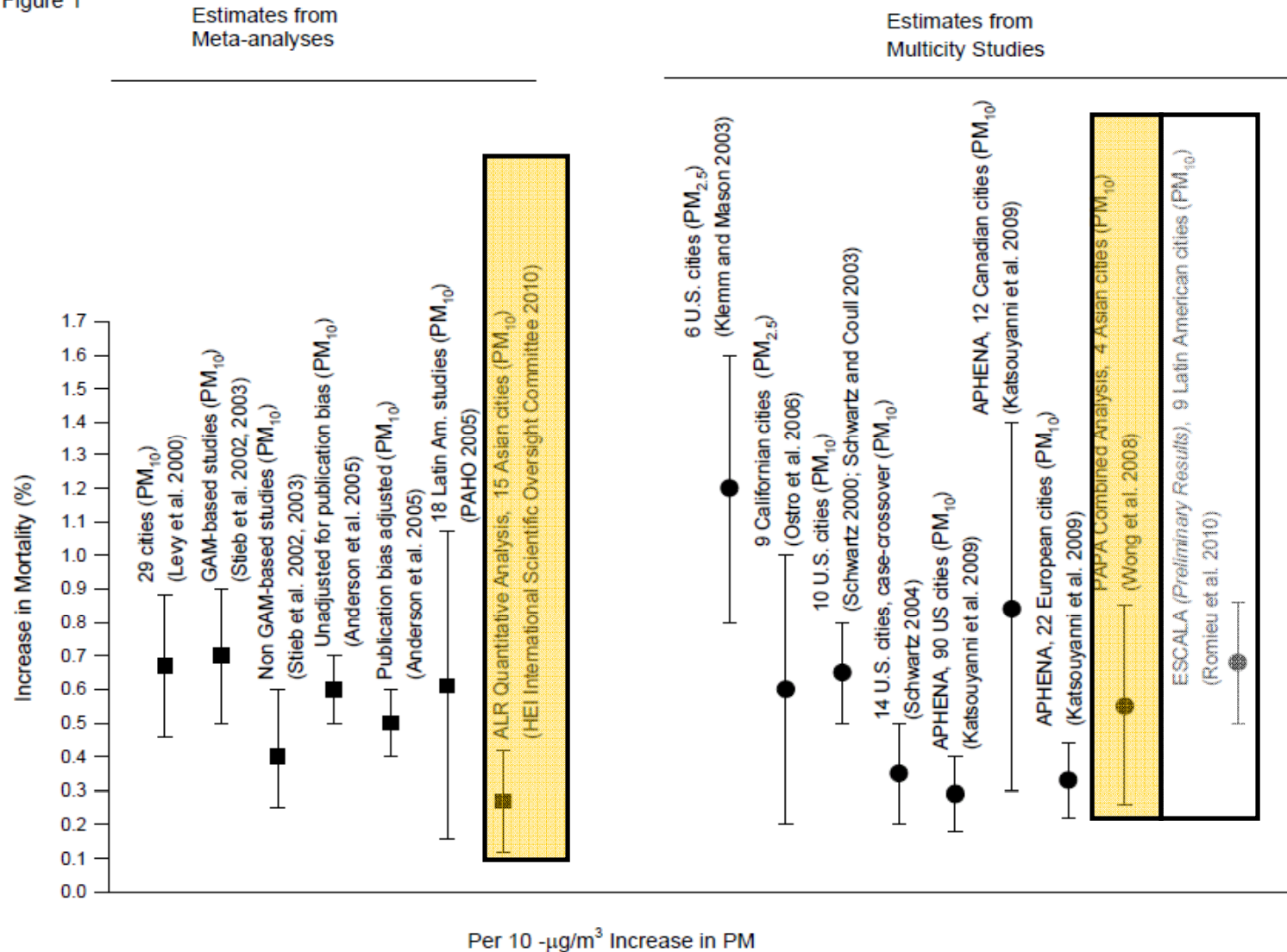


Asia in a Global Context

(PM_{10} and Daily Mortality)

*The effects of pollution are more similar than different ...
...and global science can be broadly relevant*

Figure 1



Public Health Impact can be a major driver of decisions

- GBD documents that air pollution is near the pinnacle of important factors affecting global public health
- High levels of outdoor air pollution, *is responsible for over 3.2 million premature deaths annually and 74 million years of healthy life years lost* around the world
- Developing Asia, including India and China bears fully 2\3 of the world wide global health burden in this key area
- 60 years of western health studies and an increasing base of high quality Indian health studies provide confidence in this assessment



- Today we will hear about the India specific results across a range of pollutants, people, and diseases
- How those results were calculated, and how their impact can be mitigated
- *“Improving the health and well being of the world’s population is a moral imperative essential for stability and progress”* IHME 2012



Thanks!
Robert O'Keefe
Chair, Clean Air Asia



Major Report from:

**HEI's Public Health and Air
Pollution in Asia (PAPA)**

Nov. 2010

***Summary of Current Global Epidemiologic
Evidence on Health Effects of Air Pollution:
Implications For Asia***

**PAPA SAN: Overview of all Asian health
effects studies identified through 2007**

Quantitative review (meta-analysis) of more
than 80 time-series studies of daily mortality
and hospital admissions
- ***Including 7 NEW PAPA Studies***

**First-ever review of over 100 studies of the
chronic effects of exposure to air pollution (to
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November 2010

SPECIAL REPORT 18

**Outdoor Air Pollution and Health
in the Developing Countries of Asia:
A Comprehensive Review**

HEI International Scientific Oversight Committee
of HEI Public Health and Air Pollution in Asia Program
(a Program of the Clean Air Initiative for Asian Cities)

