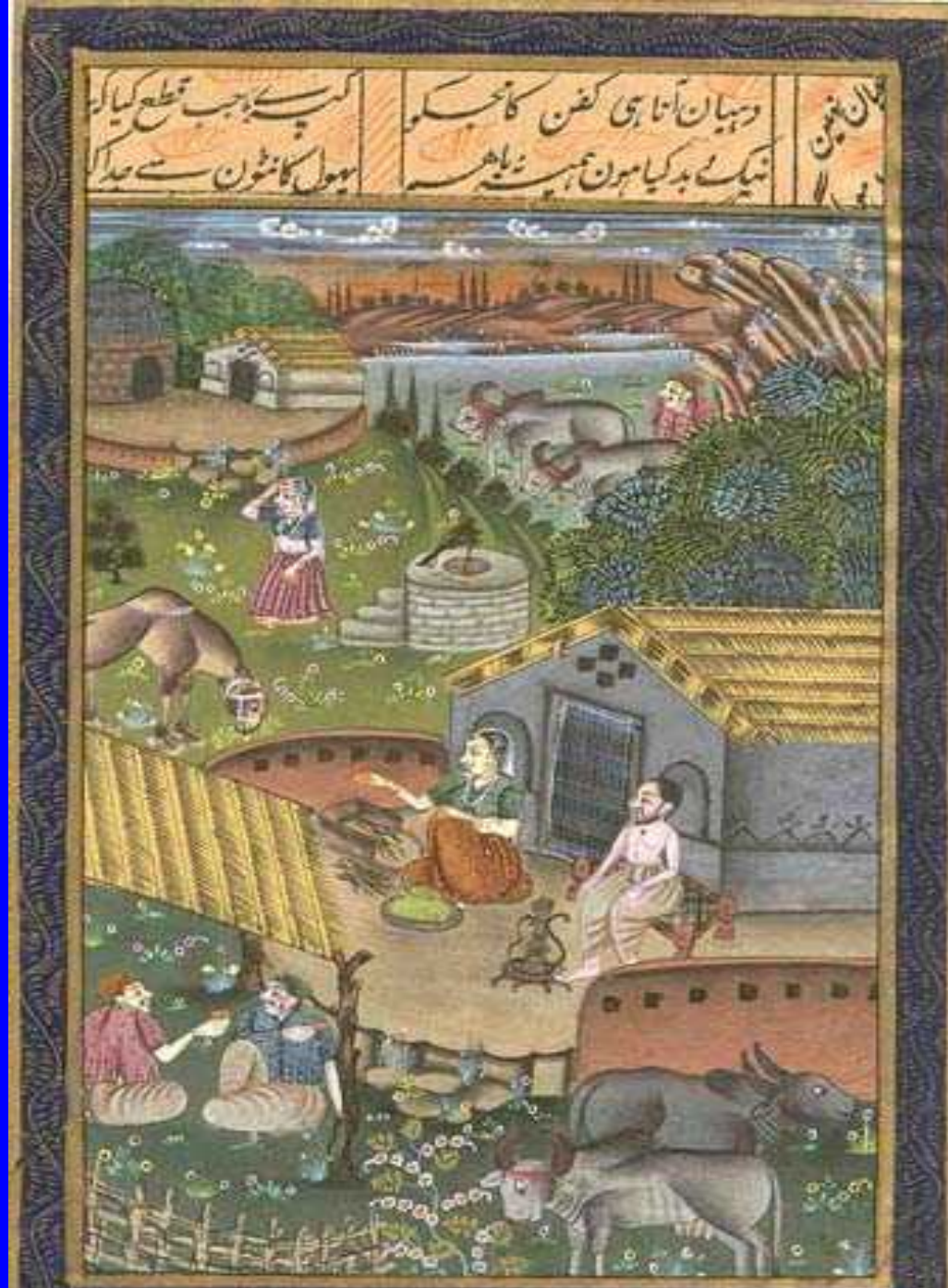


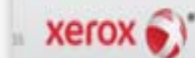
# *The Hearth Kills* *More than the Sword*

Kirk R. Smith  
Professor of Global  
Environmental Health  
University of California  
Berkeley

*Driving Change Shaping Lives*  
*Gender in the Developing World*  
*Radcliffe Institute for Advanced*  
*Study, March 3-4, 2011*



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# The New York Times

Wednesday, February 9, 2011 Last Update: 11:00 AM ET



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## Environment

### Toxic Tsunami threatening US women's health

By OUR CORRESPONDENT

Evidence indicates that a wave of toxic material will soon be affecting US women. As many as half of all households to be exposed to hazards from new technology far exceeding safety standards. Thousands likely to die.

VIDEO

### Cairo's Facebook Flat

In a communal apartment, young Egyptians are



Tony Gentile/Reuters

### Prosecutors Seek Trial for Berlusconi

By RACHEL DONADIO 8:43 AM ET

Prosecutors filed a request on Wednesday to try Prime Minister Silvio Berlusconi of Italy on criminal charges related to prostitution and abuse of office.

Post a Comment | Read (0)

## OPINION »

EGYPT

**Editorial:** The West must press Egypt's vice president to get serious about reform.

**Friedman:** The events of Tahrir Square are the wave of the future.

- Dowd: Forgive Me, for I Have Linked | Comments
- Bittman: Is 'Eat Real Food' Unthinkable?
- Op-Ed: A Friendship of Values, Not Convenience
- Room for Debate: Why Can't Americans Save?



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## WHAT'S POPULAR NOW f

- Brian Jacques, Writer of Redwall Series, Dies at 71



- Forgive Me, Father, for I Have Linked



## MARKETS »

At 11:03 AM ET

S.&P. 500	Dow	Nasdaq
1,322.93	12,241.36	2,796.29
-1.64	+8.21	-0.76
-0.12%	+0.07%	-0.03%

THE NEW  
**DealB%**



# It will wash across the countryside exposing half of US women to a toxic soup containing

- Dozens of poisonous organic chemicals known to be mutagens, immune system suppressants, severe irritants, blood poisons, inflammation agents, central nervous system depressants, cilia toxins, endocrine disrupters, or neurotoxins.
- Several other chemicals firmly established as human carcinogens.
- Other toxic inorganic chemicals known to cause asphyxiation, stillbirth, infant death, heart disease, and severe acute and chronic lung disease.

# The Toxic Tsunami

- It will be the result of a process that pours this toxic soup directly into half of all US homes every day; all year; every year.
- Only when women are present.
- It will expose the women to toxic levels much higher those of people living on top of toxic waste dumps, working in most heavy industries, or residing in the dirtiest cities
- These toxic levels will be tens or hundreds of times the levels set by international and national organizations to protect health

# Why would it happen?

- Because a technology will be widely promoted that takes perfectly safe natural material and converts 10% of it to toxins in the course of functioning. Sometimes as much as 20%
- The efficiency of the process is extremely low, leading to little human benefit per unit toxin created as well as waste of the natural resource.
- Instead of carefully disposing of this toxic material in safe places, this industry will spread the toxic soup by air right into neighborhoods where people live.
- All this, in spite of there being well-known alternative technologies available producing very little toxin.

# What might be the health consequences if this happens?

- Thousands of women would have their breath taken from them as their lung function is slowly eaten away by exposure to the toxins
- Thus, at tragically young ages they will become unable to breathe normally or do common tasks.
- Alarmingly, once a woman is affected, there is no known medical therapy to reverse the process.
- More than 500 per week, 25 thousand per year, would soon start to die prematurely because their lungs would finally give out.

# Anything else?

- There are strong indications that the burden on women would include many other diseases, including
  - Significant exacerbation of heart disease, the most important cause of death in women
  - Increases in cancer, including lung and perhaps cervical
  - Damage to the eyesight of tens of thousands of women every year
  - A significant increase in tuberculosis, one of the most important and intransigent of the re-emerging infectious diseases

# What should the response be?

- **Fu In fact, nothing will happen er ne — no one will notice**
- A major effort coordinated by the National Guard to protect the country?
- Emergency legislation in Congress to provide funds for cleaner technologies?
- New laws and regulations to make sure it never happens again?



## Strikes Add to Egypt Unrest as U.S. Makes Demands

By DAVID D. KIRKPATRICK  
4 minutes ago

As reports filtered in of strikes and unrest spreading on Wednesday, the government seemed to dig in deeper.

- The Lede: Latest Protest Updates [Live Blog](#)
- Allies Press U.S. to Go Slow

VIDEO  
**Cairo's Facebook Flat**  
In a communal apartment, young Egyptians are



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THE NEW  
**DealB%k**



Everything stated about the Toxic Tsunami is true, as best we know, except for three aspects:

1. It is already happening
2. Not half of US women, but half of women in the rest of the world
3. No industry is responsible – but poverty and complacency

**A sin of omission, not commission**

But still killing 1.6 million women and children

A photograph showing a woman from behind, cooking over a large, dark, round pot on an open fire. A young child, wearing a red beanie and a plaid shirt, is sitting next to her, looking towards the camera. The scene is set in a rustic, outdoor or semi-outdoor environment with a dirt floor.

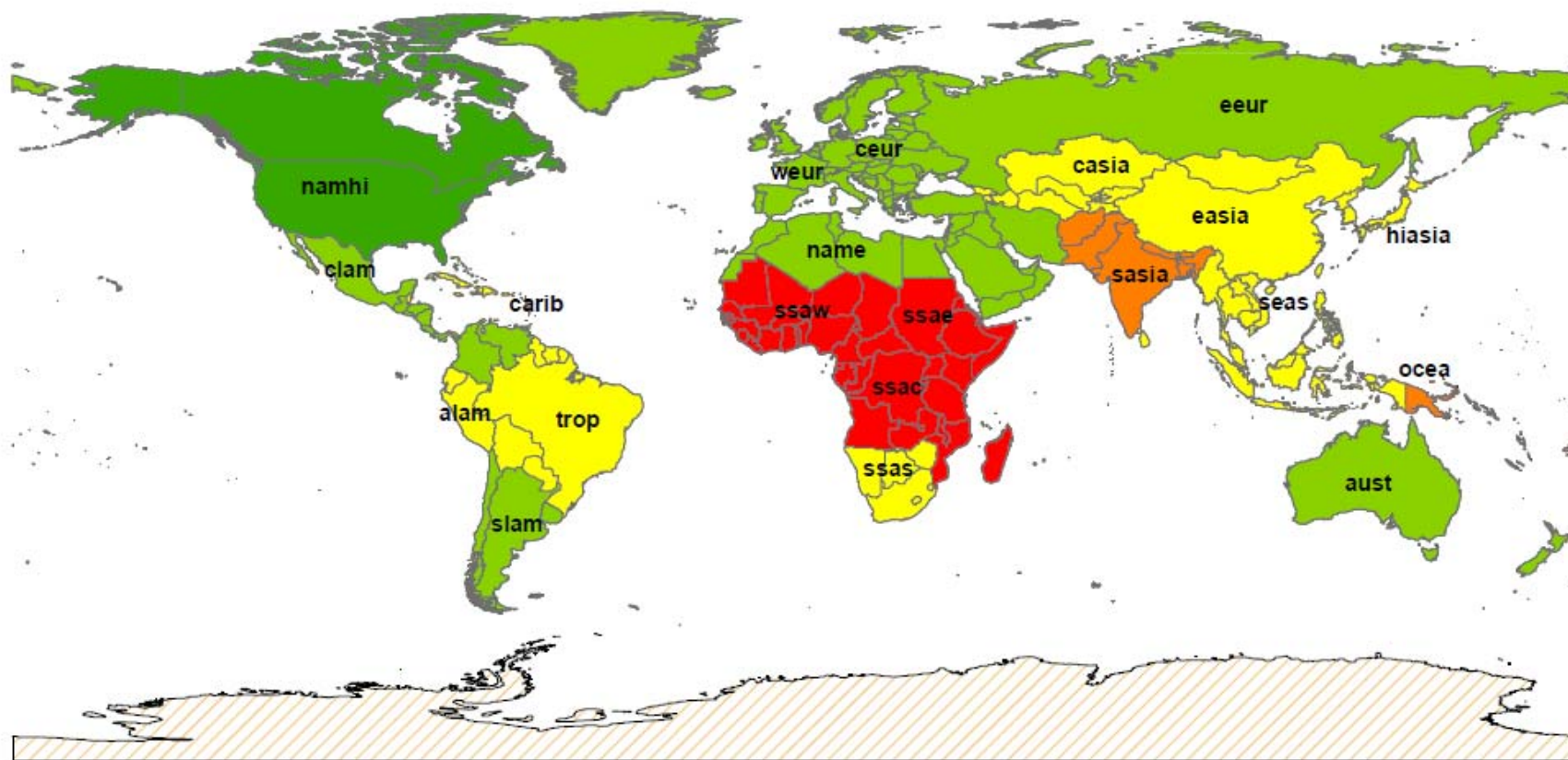
A sin of omission, not commission

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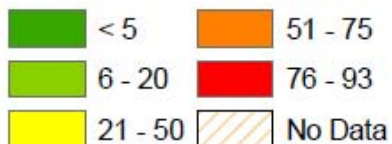
Household pollution from burning simple solid fuels like wood



# Households Using Solid Cooking Fuels



% of HH Exposed to HAP



For 2005, CRA-10 preliminary

# Woodsmoke is natural – how can it hurt you?

Or, since wood is mainly just carbon, hydrogen, and oxygen, doesn't it just change to  $\text{CO}_2$  and  $\text{H}_2\text{O}$  when it is combined with oxygen (burned)?



Reason: the combustion efficiency is far less than 100%

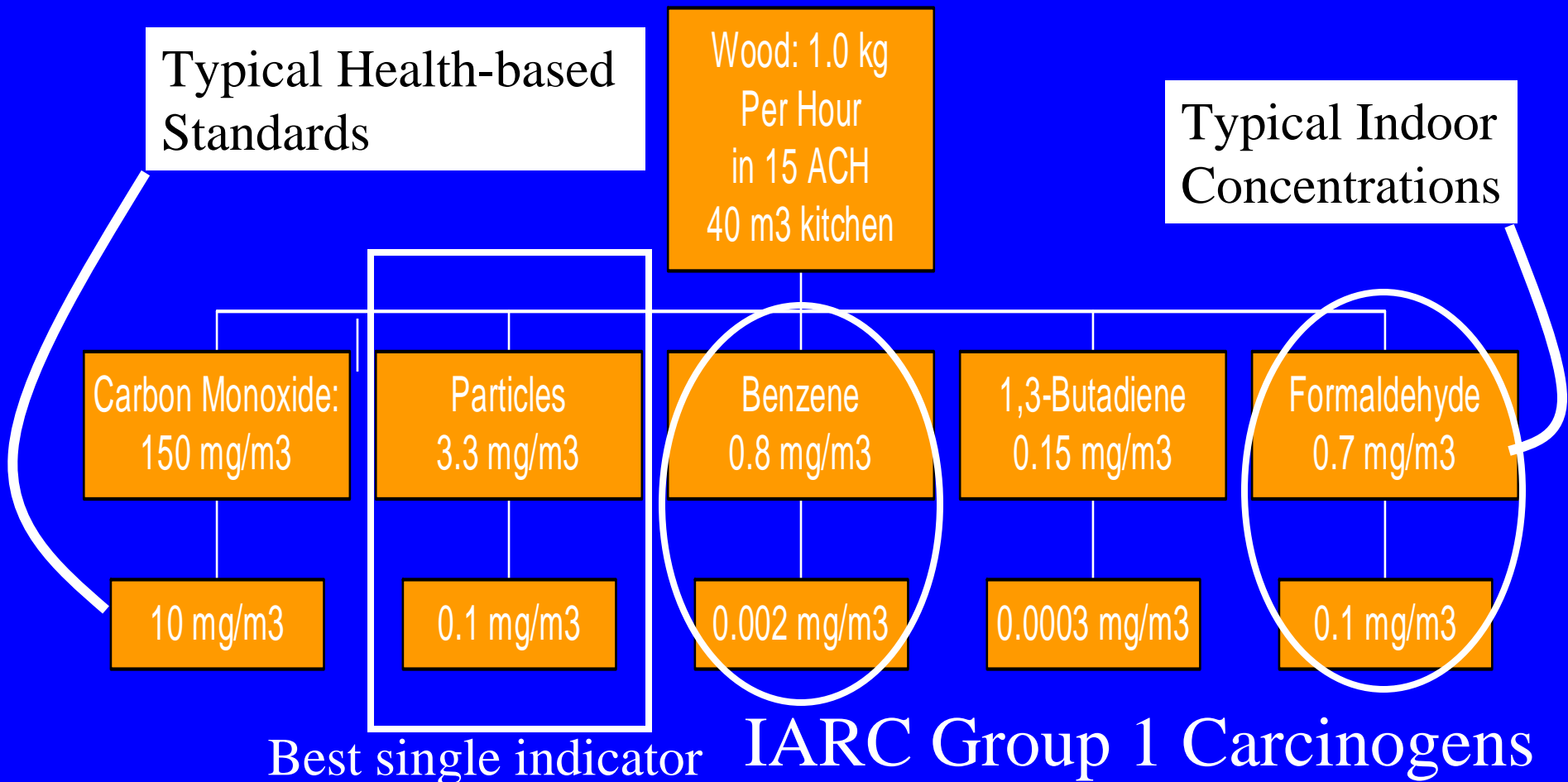


# Toxic Pollutants in Biomass Fuel Smoke from Simple (poor) Combustion

- Small particles, CO, NO<sub>2</sub>
- Hydrocarbons
  - 25+ saturated hydrocarbons such as *n-hexane*
  - 40+ unsaturated hydrocarbons such as *1,3 butadiene*
  - 28+ mono-aromatics such as *benzene & styrene*
  - 20+ polycyclic aromatics such as *benzo(α)pyrene*
- Oxygenated organics
  - 20+ aldehydes including *formaldehyde & acrolein*
  - 25+ alcohols and acids such as *methanol*
  - 33+ phenols such as *catechol & cresol*
  - Many quinones such as *hydroquinone*
  - Semi-quinone-type and other radicals
- Chlorinated organics such as *methylene chloride* and *dioxin*

Source: Naeher et al,  
*J Inhal Tox*, 2007

# Health-Damaging Air Pollutants From Typical Woodfired Cookstove in India.



First person in human history to have her exposure  
measured doing the oldest task in human history

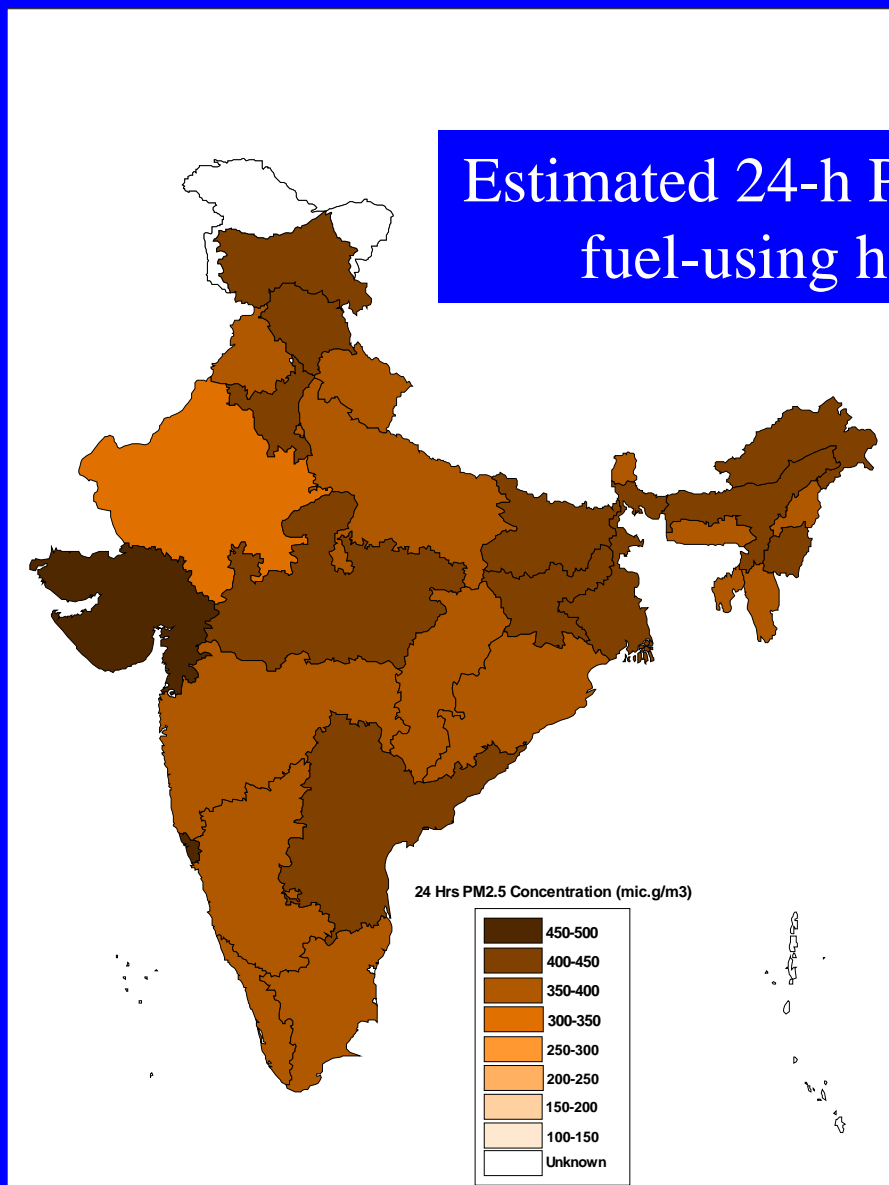
How much  
ill-health?

Kheda District,  
Gujarat, 1981



# Household Air Pollution Comparative Risk Assessment, 2011

## Preliminary Estimates for India



~400  $\mu\text{g}/\text{m}^3$  mean

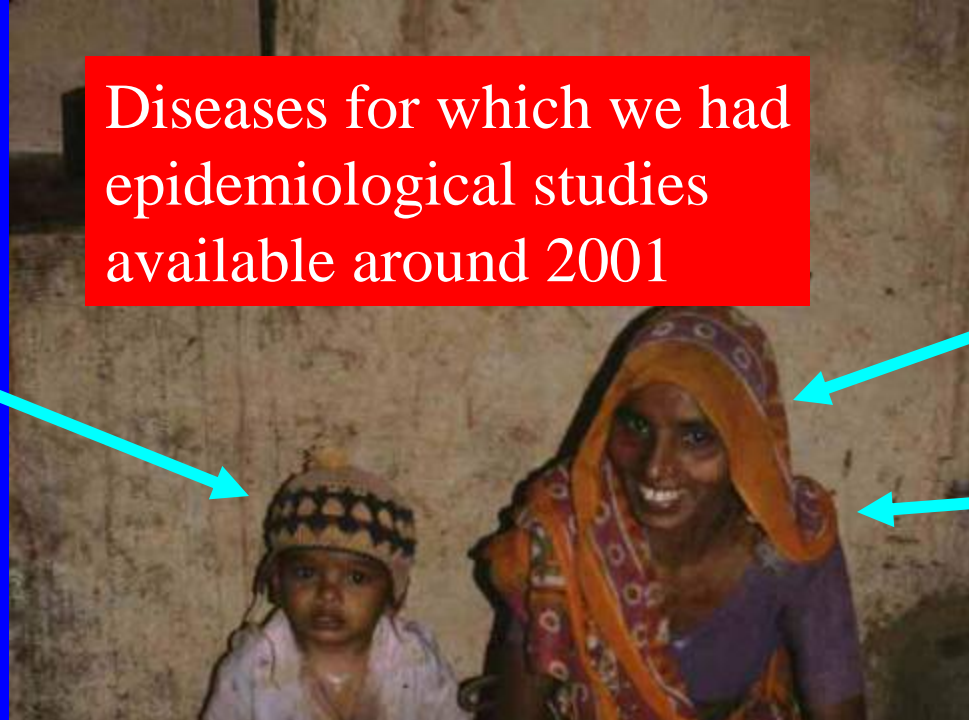
EPA standard  
= 15  $\mu\text{g}/\text{m}^3$   
WHO AQG  
= 10  $\mu\text{g}/\text{m}^3$

Diseases for which we had  
epidemiological studies  
available around 2001

ALRI/  
Pneumonia

Chronic  
obstructive  
lung disease

Lung cancer  
from coal only

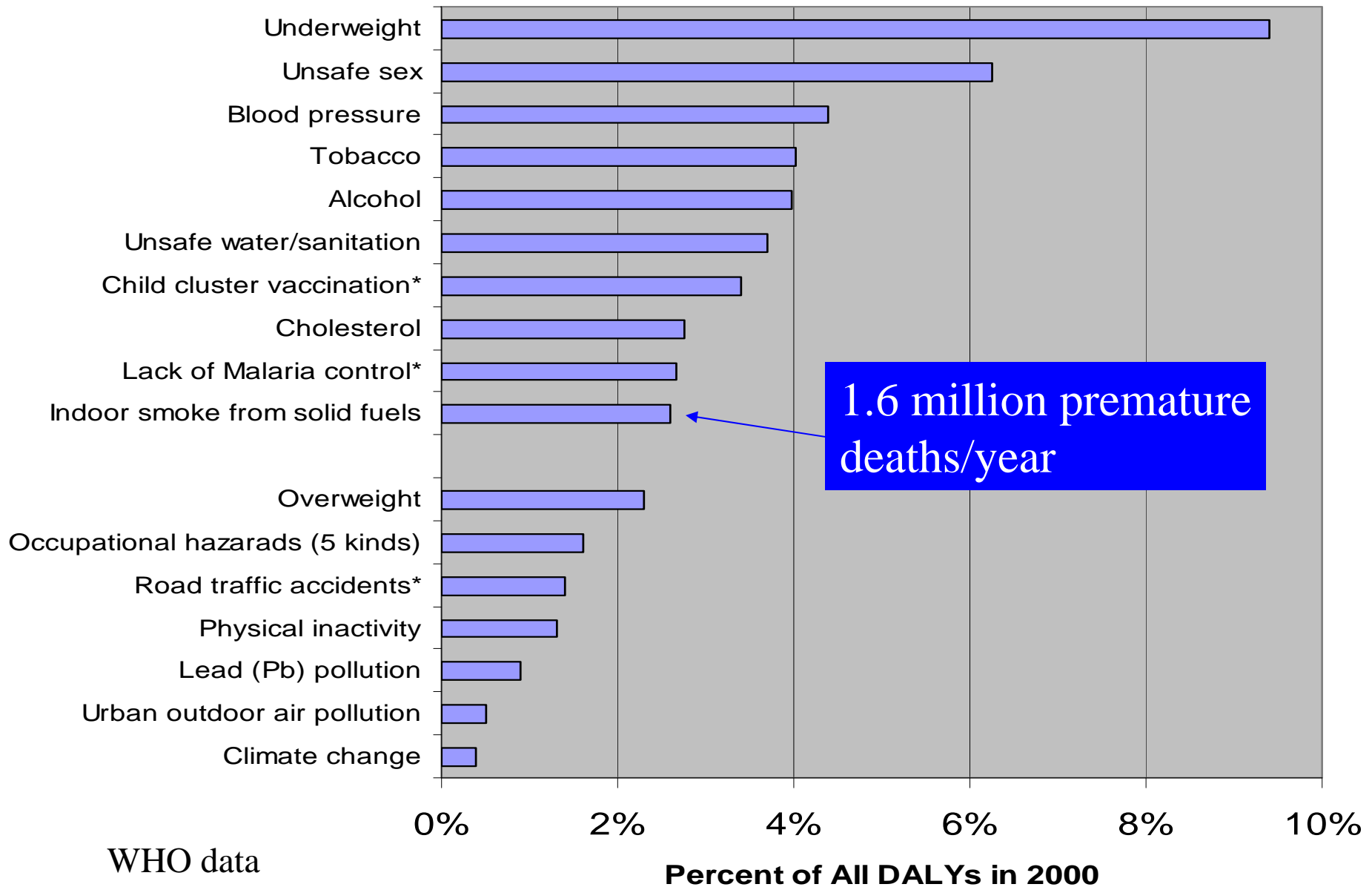


Three outcomes qualified with  
sufficient evidence to be  
included in the World Health  
Organization's

Comparative Risk Assessment  
of 2004



# Global Burden of Disease from Top 10 Risk Factors plus selected other risk factors



Diseases for which we have  
epidemiological studies - 2011

ALRI/  
Pneumonia  
(meningitis)

Low birth  
weight

Stillbirth

Cognitive  
Impairment?

Asthma?

Birth defects?

Chronic  
obstructive  
lung disease

Cancer  
(lung, NP, cervical,  
aero-digestive)

Blindness  
(cataracts, opacity)

Tuberculosis?

Heart disease\*  
Blood pressure  
ST-segment

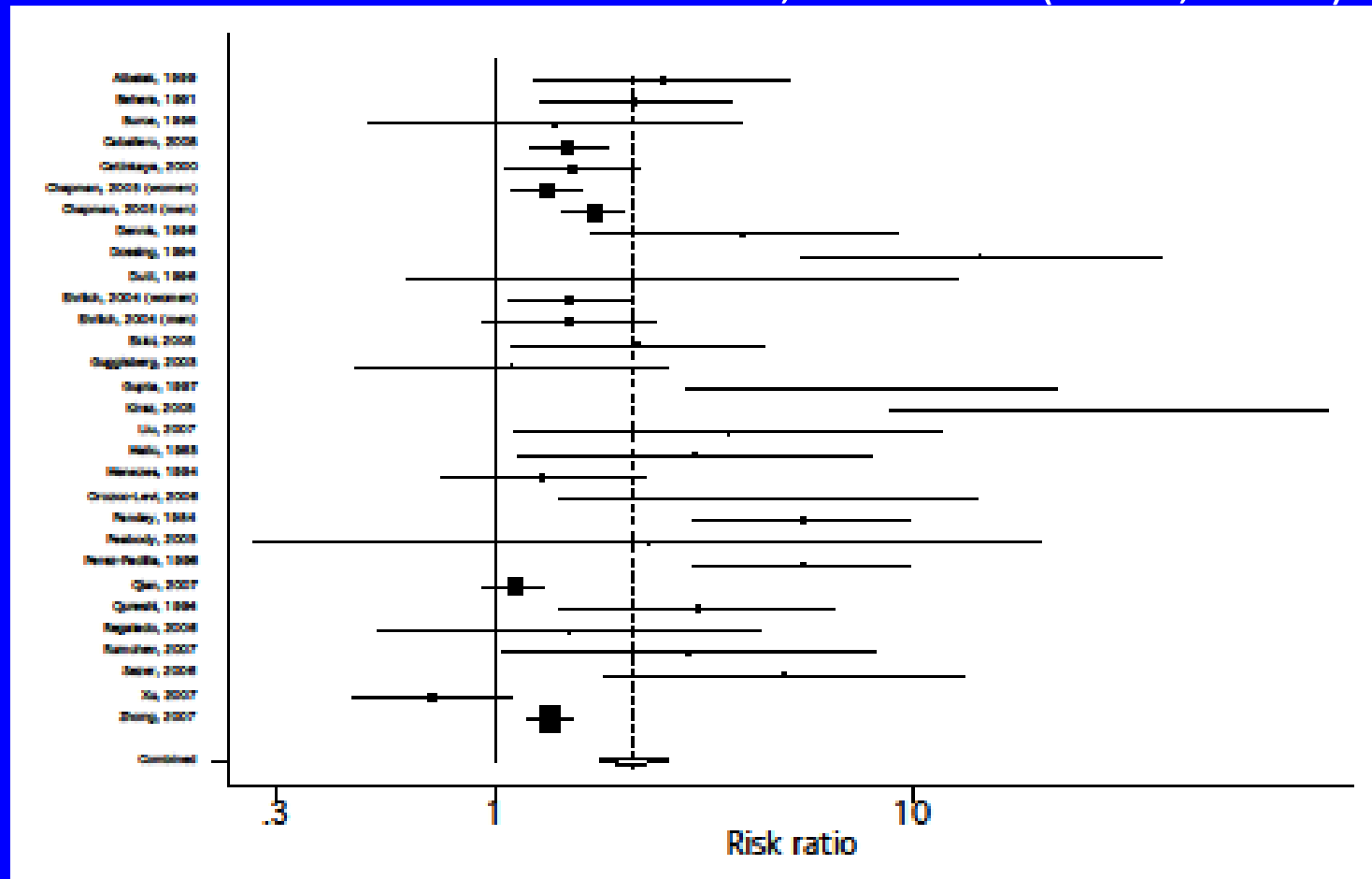
\*Interpolated

Burns, health and safety  
impacts of fuel gathering?



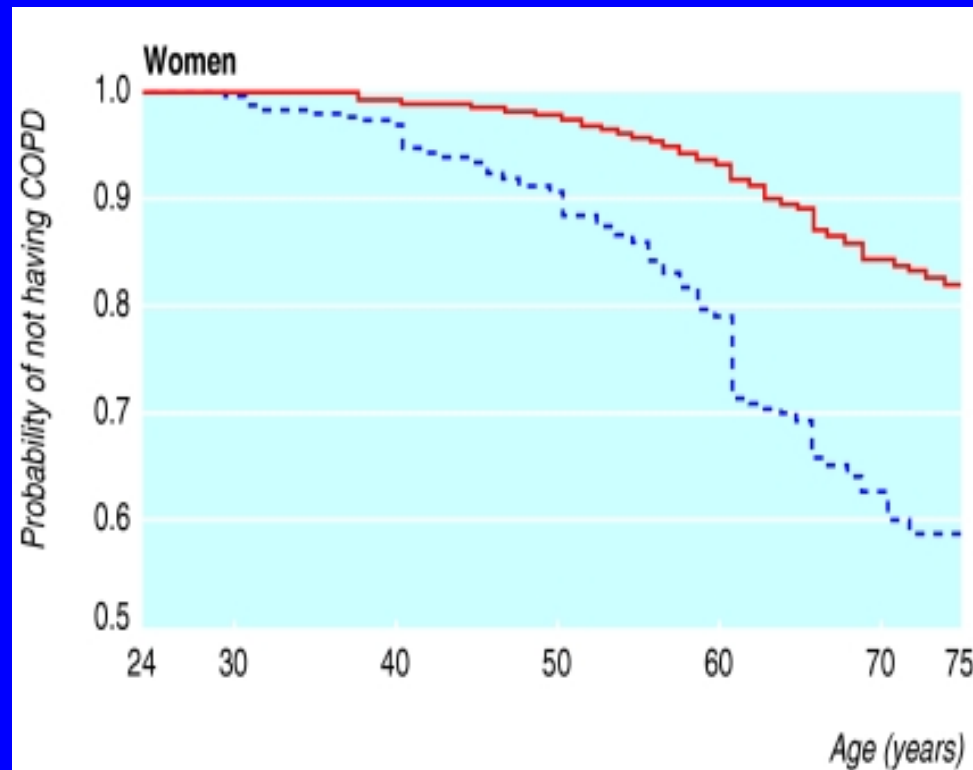
# Meta-analysis for Studies of Household Air Pollution and COPD in Women

- Random effects model was used to account for significant heterogeneity between studies  $X^2=150.329, df=29 (p=0.000)$
- Overall effect measure for all studies,  $OR=2.140 (1.777, 2.577)$



# Risk of COPD: Vented vs. unvented coal stoves

Xuan Wei County  
China,  
retrospective cohort,  
1976-1992,  
20,453 subjects  
81% added chimneys



Chapman et al. Br Med J  
2005; 331: 1050.

# Cataracts

- Major burden of disease in developing countries
- In South Asia, 2.8% of total DALYs in 2005
- Half that of ischaemic heart disease
- Roughly same as TB or stroke
- Greater than COPD or maternal conditions
- Women suffer 40% more than men

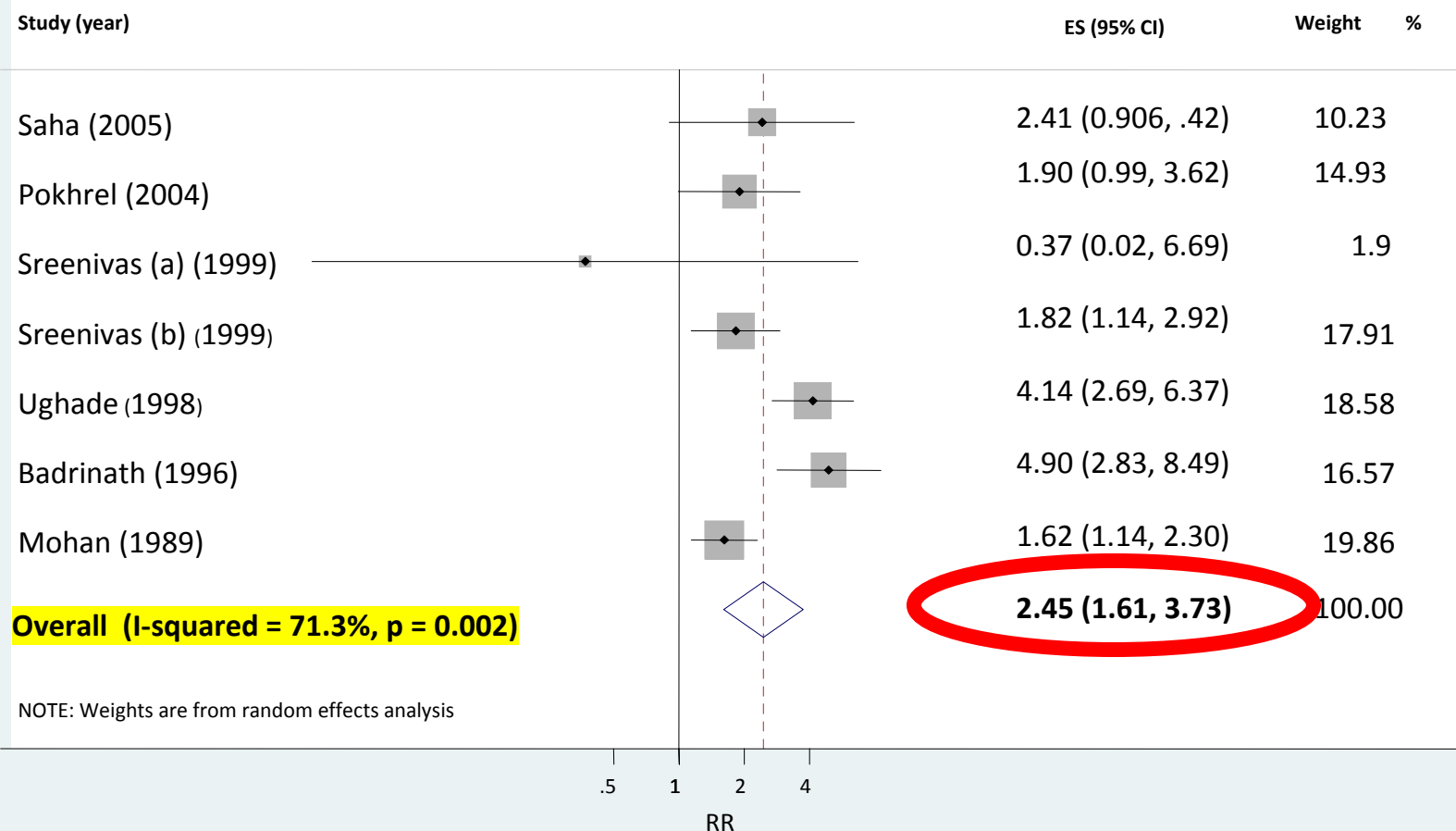


# HAP and cataract: biological plausibility

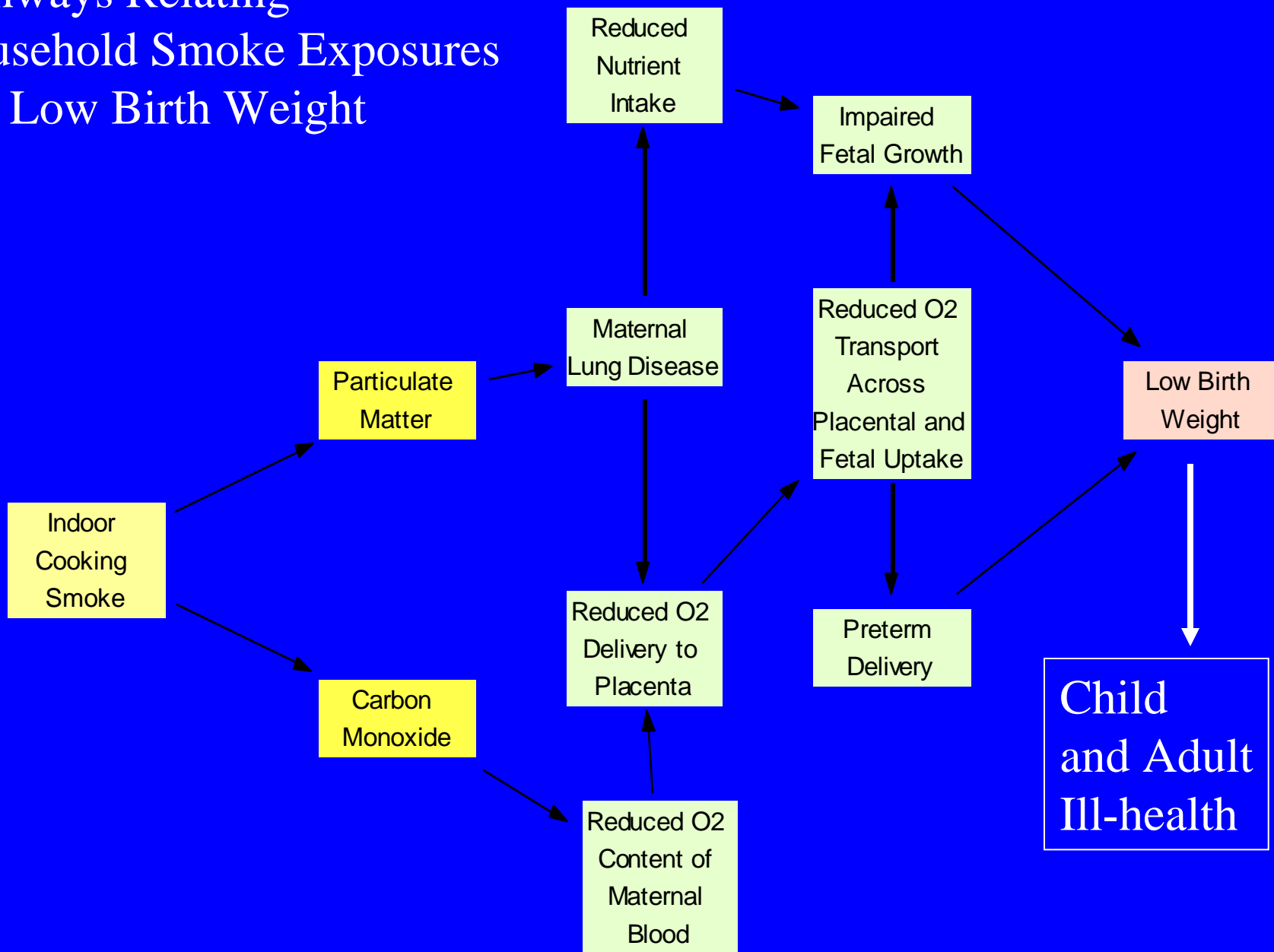
- Cataracts have several known risk factors: UV, diabetes, tobacco smoke
- Naphthalene, a prevalent product of incomplete biomass combustion, is a reactive oxidative species (ROS) causing oxidative stress & damage to the eye,
- Cataract outcomes have been shown in rabbits and cows with prolonged exposure or under high doses
- Recent study in Nepal shows exposure-response with biomass smoke exposure and lens opacity, a preclinical indicator of cataracts.

# Summary of 7 (of 9 total) studies

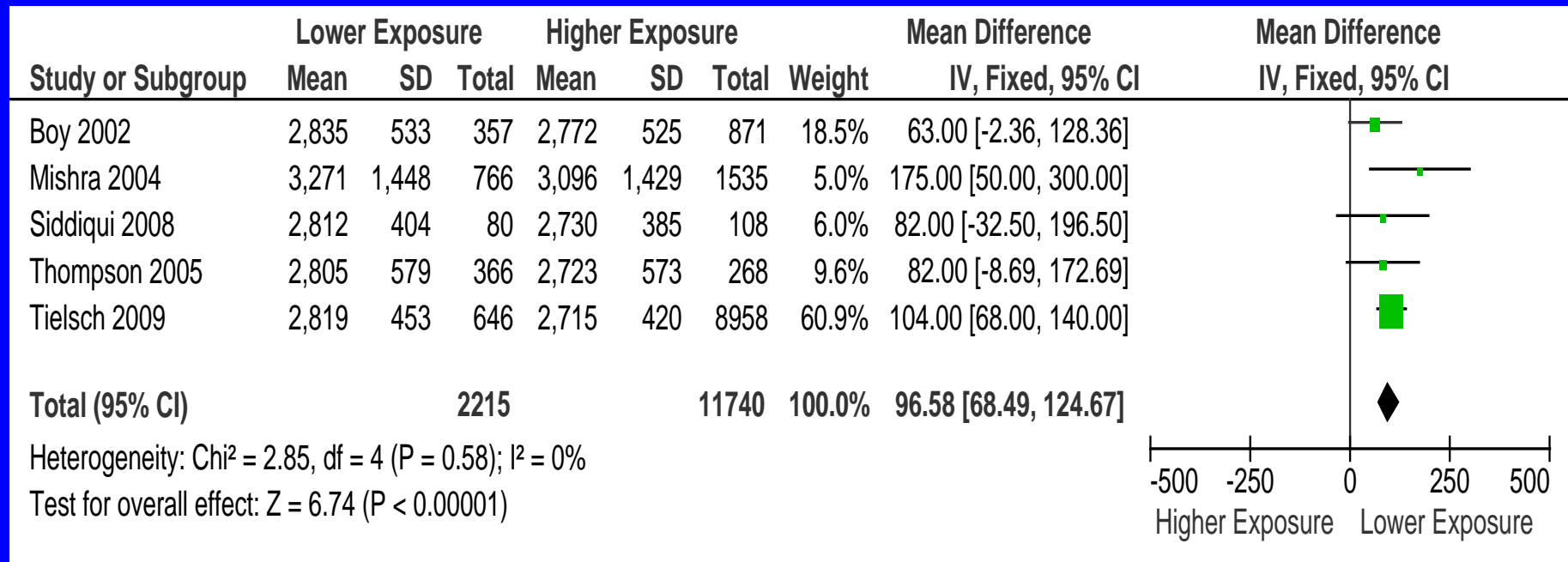
## Studies adjusted for smoking (*random effects*)



# Pathways Relating Household Smoke Exposures and Low Birth Weight



# Pooled birth weight difference (low minus high exposure): Adjusted estimates



All estimates: +96.6g (68.5, 124.7)  
**Excluding self-reports +93.1g (64.6, 121.6)**

Start Eudora - [In] 5 Microsoft Office ... 12 Microsoft Office... 5 Microsoft Office... Windows Media Player WHO Statistical Infor... Type to search 9:36 AM



# Perfect Storm for Health Impacts

- Highly polluting activity
- Half of world households
- Several times a day
- Just when people are present
- Most vulnerable (women and young children) most likely to be there

In other words, the Intake Fraction  
is extremely large

IF is the fraction of material emitted  
that is actually breathed in by someone

# Food for a Week, Germany

© 2005 PETER MENZEL PHOTOGRAPHY



ALLEMAGNE 1500 sortes de saucisses, 1200 restaurants McDonald's, 750 millions de kebabs

avalés chaque année... Plus de la moitié des Allemands sont en surpoids ou obèses.



# Food for a Week, Darfur Refugees, Chad

© 2007 PETER MENZEL PHOTOGRAPHY



**TCHAD** 230 000 réfugiés de guerre soudanais vivent dans les camps de l'Onu. Chacun a droit à 2100 Cal par jour: céréales, sucre, sel, huile, légumes secs et farine vitaminée.

# Joan's Question

- Men have been standing around the kitchen watching women cook since the control of fire – a million years ago.
- But my husband is the first one to make career out of it.
- Why is that?
- A number of reasons, but among them is that these are the people at the bottom of the pyramid in economic and political power: poor, rural, and female.





# ENERGIA

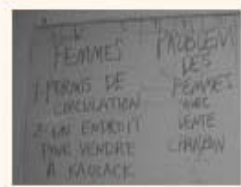
INTERNATIONAL NETWORK ON GENDER AND SUSTAINABLE ENERGY

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## Home



### Online Course: Gender & Energy Concepts

What is gender and what is energy? How are they interlinked? Follow our online course and find out. [Sign up](#)



### ENERGIA News

## Who are we?

ENERGIA's goal is to contribute to the empowerment of women -both rural and urban- through a specific focus on energy.

ENERGIA is the international network on gender and sustainable energy, founded in 1996. We work in Africa and Asia through and with our regional and national gender and energy networks. We work from the contention that projects, programmes and policies that explicitly address gender and energy issues will result in better outcomes, in terms of the sustainability of energy services as well as the human development opportunities available to women and men.

[Read more](#)

## News

### Factsheet Gender, Energy Technology and Climate Change

Friday, 26 November 2010

This factsheet, jointly produced by the Women's Environment and Development Organization (WEDO) and ENERGIA - the International Network on Gender and Sustainable Energy, highlights

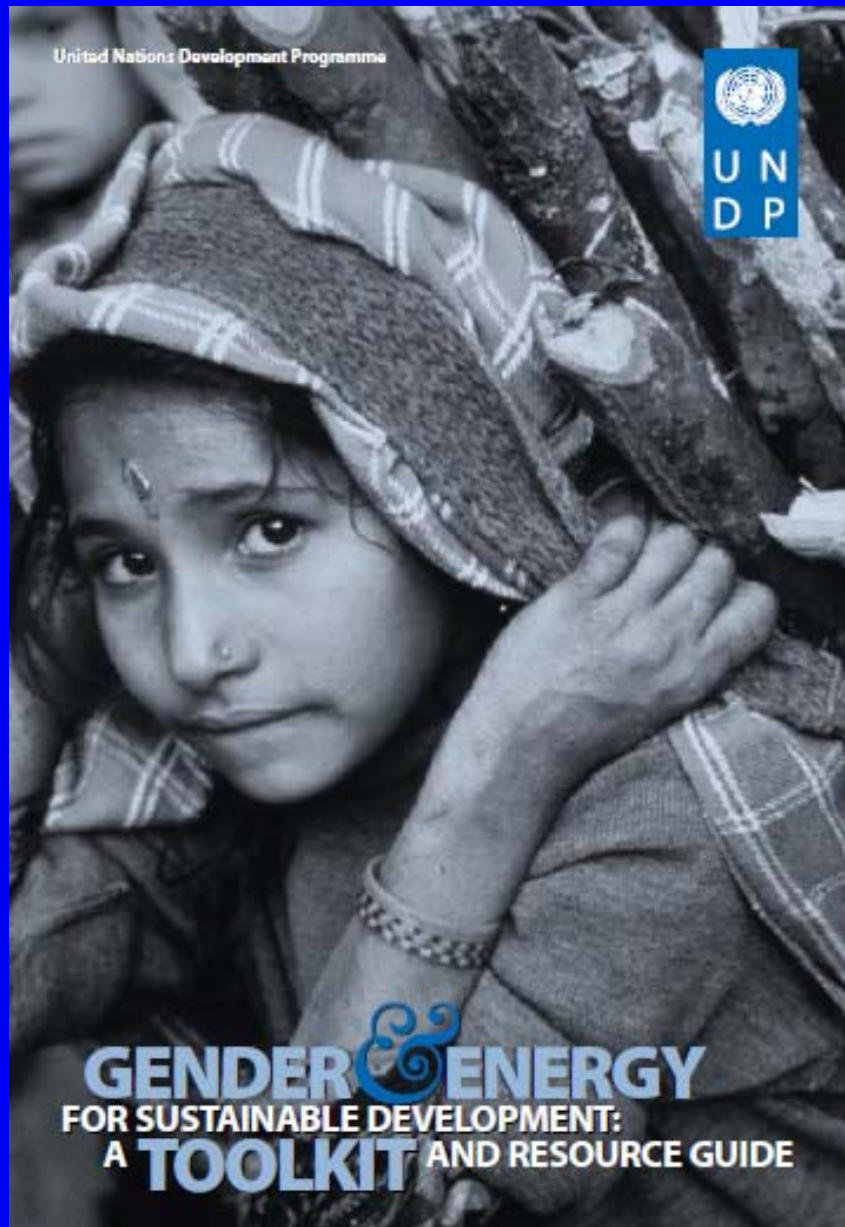


Visit the ENERGIA-Africa regional website and learn more about ENERGIA's activities in the 13 network countries in Africa. [View](#)



Visit the ENERGIA-Asia regional





UNDP, 2004

# Question for the Conference

- Cooking is probably the most prevalent gender-specific but non-biologically determined task today and perhaps in human history
- Do solutions such as improved stoves, therefore, need to be gender sensitive?
- **Affirmative:** The hearth is central to women's social and cultural identities and any change must consider them to work
- **Negative:** A better stove need be no more gender-specific than a refrigerator, light bulb, bicycle, or cell phone – just a matter of good design and marketing.

# Many thanks

Publications and presentations available at my  
website: <http://ehs.sph.berkeley.edu/krsmith/>

Or just Google “Kirk R. Smith”