



Supportive Environments for Healthy Communities

Issue 83 | December 21, 2012 | Focus on Household Air Pollution and the Global Burden of Disease

Please note: Due to holiday schedules, the next issue of the Weekly will be January 11, 2013.

On December 13, 2012, the journal *Lancet* published the Global Burden of Disease Study 2010. The [Global Burden of Disease Study 2010](#) (GBD 2010) is the largest ever systematic effort to describe the global distribution and causes of a wide array of major diseases, injuries, and health risk factors. GBD 2010 consists of seven articles, each containing data on different aspects of the study (including data for different countries and world regions, men and women, and different age groups).

The last of the seven articles reports the comparative risk assessment among about 60 risk factors, including household air pollution. It can be cited as:

A Comparative Risk Assessment of Burden of Disease and Injury Attributable to 67 Risk Factors and Risk Factor Clusters in 21 regions, 1990-2010: A Systematic Analysis for the Global Burden of Disease Study 2010. *Lancet*, 380: 2224-60, 2012. S Lim, et al. ([Link](#)) (Download is free but registration is required)

Below are selected excerpts from a summary of the article by Kirk Smith of the University of California-Berkeley, a WASHplus project resource partner. A [video](#) of Dr. Smith's presentation about the GBD study is also available.

As chair of the skilled and dedicated expert group on Household Air Pollution (HAP), I here summarize four aspects of the assessment related to HAP:

First the numbers. The scale of HAP's health impact is quite large.

- 3.5 million direct premature deaths annually in 2010 – compared to 3.3 million for outdoor air pollution (particles and ozone) and 6.3 million for active and passive

smoking

- 0.5 million more from the outdoor air pollution due to household fuels -- what one might call "secondhand cookfire smoke."
- This makes ~4 million total attributable to HAP from cooking fuel.
- 0.5 million of the total are child pneumonia deaths.
- The rest are adult deaths (men and women) from lung cancer, cardiovascular disease (CVD), and COPD. Cataracts are also included, but they cause very few deaths.
- In terms of absolute impacts, men are more affected than women. This counterintuitive result is because men have so much higher background rates of the major diseases. Thus, although women have higher exposures and higher elevations in risk for these diseases, men end up with the larger burden. In relative terms, as indicated below, however, women are more affected by HAP.
- In terms of DALYs (lost healthy life years), HAP is the 2nd most important risk factor for women and girls globally among those examined and 5th for men and boys. It is 1st for both sexes in South Asia and for women and girls in most of sub-Saharan Africa. HAP is 6th for both sexes in East Asia.
- HAP is the most important single environmental risk factor globally and in poor regions. Behind outdoor air pollution (OAP) in richer countries, of course, and in China, where OAP ranks fourth among all risk factors examined.
- 2.8 billion people rely on solid fuels for their main cooking fuel in 2010, a number that seems to have been roughly stable globally for the last decade or so. This are now more people than anytime in human history relying on solid fuels for cooking.

Second, the bottom lines:

- Most of the impact is now understood to occur in adults.
- But still Acute Lower Respiratory Infections (ALRI) (pneumonia) deaths in children are significant -- 500k globally -- even with much lower background ALRI death rate globally.
- Household cooking fuel emissions contribute substantially to outdoor air pollution in many countries -- 25-30% in India, for example -- "secondhand cookfire smoke."
- The new integrated exposure-response (IER) analyses provide excellent new cross-risk-factor validation of the effects we find for a range of diseases -- lung cancer, COPD, ALRI (IERs link epidemiological evidence across the four particle categories - outdoor air pollution, secondhand tobacco smoke, HAP, and active smoking).
- HAP plays a large role in non-communicable diseases (NCDs) which are now understood to be so important in India and other low and mid-income countries.
- It is important to remember that interventions that do not reduce all the way to the clean levels used for comparison (see next section) will not produce the full health benefits. Based on studies across combustion particle sources in the GBD, it is now believed that the impacts are highly non-linear at the levels commonly experienced in households cooking with solid fuels. Thus, for example, a reduction of a factor of two in smoke exposures at these high levels will produce far less than a reduction of 50% in health impacts. Need to reduce exposures down to levels in the range of the WHO

Air Quality Guidelines to do so.

Third, many will wonder why the results show so much larger effects for HAP compared to what was found in the previous CRA for 2000 published in 2004 (1.6 million premature deaths).

There were actually factors that tended to decrease the attributable burden in the new estimates:

- ~40% of the world use solid fuels for cooking in 2010, down from the ~50% estimated for 2000. This is based on much more robust estimate of global household solid fuel use for cooking informed by ~600 nationally representative household fuel use surveys compared to ~50 last time.
- We were able to be more careful in separating out cooking fuel only. There is much less confusion with heating fuels than before.
- The risks for COPD were less than before, based on the new systematic reviews and meta-analyses.

Fourth, there were other differences, however, that led to higher estimates:

- Evidence now allows us to add estimates for two new categories of disease: cardiovascular disease (CVD) and cataracts.
- As CVD is the chief cause of mortality in nearly all countries, the additional burden is substantial.
- Evidence of effects in men now for all adult endpoints except cataracts.
- We now using a low counterfactual (~7 ug/m³ annual PM_{2.5} -- same as the OAP group used) -- equivalent to cooking with gas.
- This allows the HAP results to reflect the full benefit that could be expected from moving the 40% of households with solid fuel to the low pollution experienced by 60% of world population using gas or electricity for cooking.

The net result was a major increase in the estimated burden.

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Each WASHplus Weekly highlights topics such as Urban WASH, Indoor Air Pollution, Innovation, Household Water Treatment and Storage, Hand Washing, Integration, and more. If you would like to feature your organization's materials in upcoming issues, please send them to Dan Campbell, WASHplus knowledge resources specialist, at dacampbell@fhi360.org.



About WASHplus - WASHplus, a five-year project funded through USAID's Bureau for Global Health, creates supportive environments for healthy households and communities by delivering high-impact interventions in water, sanitation, hygiene (WASH) and indoor air pollution (IAP). WASHplus uses proven, at-scale interventions to reduce diarrheal diseases and acute respiratory infections, the two top killers of children under five years of age globally. For information, visit www.washplus.org or email: contact@washplus.org.

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