

LondonRIG_23Mar2012_About : HEDON Household Energy Network

Notes from LondonRIG 23rd March 2012

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Notes on the LondonRIG on 23 March 2012, kindly edited by [Kirk Smith](#) at HEDON's request.

We were delighted and honoured to welcome Kirk Smith to the HEDON Rig meeting last week, and to hear about many of the initiatives in which he is involved. This visit was particularly special in a week when Kirk was awarded the Tyler Prize for Environmental Achievement for services to Household Air Pollution reduction. This not only recognises Kirks important and tireless services in this field, but also indicates how smoke is moving up the public awareness agenda. These are some of the key topics which he covered.

The new Comparative Risk Assessment coming out later this year will show mortality of around 4 million people with the increase since the previous CRA (1.6 million) being mainly adults that we know are affected by heart disease and stroke. The importance is that it shows that smoke is a major risk factor not only for acute outcomes like TB, low birth weight, and child pneumonia, but for important chronic diseases in adults.

Part of this new evidence is based on what Kirk calls Generalized Exposure Response or GER curves. These directly link the health impacts of the four major categories of exposure to combustion particles in the world:

1. Smoking
2. Household air pollution (HAP) from cookfires (a three-stone fire puts out the equivalent of about 1000 cigarettes per hour)
3. Passive smoking (from other people's cigarettes)
4. Outdoor air pollution.

The worst thing to do is to put burning stuff in your mouth, but it is not so great either to have a lot burning poorly around your house. Someone else putting burning biomass (tobacco) in their mouth is also bad for your health, but even having combustion particles emitted outdoors is damaging. The amount of ill-health created, of course, goes down with the dose, being greatest for smoking and least for outdoor air pollution. HAP is intermediate in the level of exposure but high in the number of people affected. Also, babies do not smoke, but are affected by the other three categories, including HAP.

Surprisingly, although the dose rate is a 1000x greater for smoking than typical outdoor pollution levels, there is a smooth consistent relationship of dose to health impact running from one end to the other with HAP in between for at least five disease types: COPD, heart disease, stroke, lung cancer, and pneumonia.

Outdoor from indoor

There is substantial outdoor pollution from kitchen smoke, for example in major parts of Asia it is 30-50% of all outdoor particle pollution. It is one of the reasons, for example, that high outdoor pollution is now understood to be a feature of many rural areas, for example in the relatively densely populated but still rural river valleys of India and China.

Thus it a cause of a substantial portion of the burden of disease from outdoor pollution as well as ill-health at the household. One approach they are examining is to see if current regulations related to outdoor pollution might be used to push for clean household combustion, since there is such an important link.

Climate benefits

In the Himalayas, black carbon is likely to be yet more damaging because of the proximity to the glaciers, when it lands on them and reduces their power to reflect. Along with colleagues, Berkeley are doing measurements of BC emission from stoves in a transect of sites across the Himalayas: South China, Tibet, Nepal, and India.

Blower biomass stoves

Kirk is very keen for these to develop widely for populations who cannot access or afford clean fuels, such as LPG and biogas. There are relatively few available, however, that truly achieve clean combustion, and there is relatively little field evidence yet. There are now two low-emissions blower stoves in India, and one in Central America, but field studies are only now being initiated. One of these, the BioLite Home stove for the Indian market, uses a simple and inexpensive thermo-electric generator (TEG) to generate the power for its blower so that it does not require household power connection. In addition, however, it has a USB port to be able to charge a cell phone and battery lamp, features that should enhance sales.

The motto of Kirk's research group is "You don't get what you expect but what you inspect" and thus it is too soon to say whether any of these advanced blower stoves actually reduce pollution exposures to women and children in households day in and day out over long periods, the pattern that is needed to protect health. The good lab results are needed before going ahead with field trials, but do not guarantee good performance in the field. This is not only because of technical issues, but also because of the behavioural change needed for households to adopt and use them. For example, they all require some light chopping of biomass fuel to function well and cannot use large pieces of wood as can the open fire. In addition, households rarely shift 100% to any new stove immediately but retain some use of the traditional stove for some tasks, for example cooking animal food.

More behavioral and marketing work is needed to understand how to design stoves such that they take up as much of the full cooking load as possible and at the same time ways found to simultaneously discourage the use of the old dirty stove. One of the best tools for this kind of work is the Stove Use Monitor, which was first described in print in Boiling Point #55 (2008, pp 16-18). This small temperature-recording device has revolutionized the ability to understand usage and adoption by providing relatively cheap, unobtrusive, and objective ability to "inspect" what is happening. You cannot work to optimize something, like usage, unless you can first measure it.

“Improved” stoves and “indoor” air pollution

Kirk suggests that our community should move away from these terms.

He tries to avoid the term "improved" for a stove without specifying exactly how it is "improved." The word is actually an advertising gimmick developed to fool the consumer without being specific. Half the items in shops around the world, rich and poor, are called "improved" which of course means nothing to most of us as a result of over use. Also, this year's "improved" is next year's traditional — it is not something fixed in time. Also, "improved" in one realm, e.g., fuel savings, does not necessarily mean so in other realms, e.g. smoke reduction. Indeed, sometimes they go in opposite directions. Need to specify exactly what is better. Until we have some quantitative guidelines (which are coming from WHO for emissions), at least a stove should be labeled as "fuel-saving", "chimney/hood", "low emissions" etc.

In addition, it is better to frame a new device not in terms of its distance from the bad old thing (open fire), but in terms of how close it is to the aspirational produce that everyone wants. Most poor household know gas, they see it used by wealthier neighbors and in films, for example. That is the modern aspirational product and in many populations new stoves are better framed that way, e.g., nearly as clean as gas, cheaper than using gas, will not explode like gas, controllable like gas (the adjustable blower stoves), modern like gas, etc. (See Kirk's editorial with Karabi Dutta in ESD, "Cooking with Gas", in 2011, vol15; 115-116).

Household air pollution (HAP) is the preferred term instead of indoor air pollution — idea is to focus on the source, not the location, to emphasize needed interventions. Some of the health-damaging exposures occur indoors, but much we now know occurs around the house, next door, and indeed even outdoor cooking produces significant exposures. In many countries HAP also contributes substantially to general outdoor air pollution --- see above. This pollution also affects the climate and glaciers. Indoors is thus misleading in describing where the problem occurs or where the solution should be. Problem is poor combustion near people in the household environment – get rid of it by better combustion, either through cleaner fuels or advanced biomass combustion.

The term IAP also implies that chimneys alone will solve the problem when they clearly do nothing for outdoor air pollution or climate. On the other hand, they can improve the exposure situation in many areas, although just moving the smoke a meter or two will not reduce smoke exposures to the low levels achieved by better combustion. Nevertheless, chimneys and hoods have an important interim role in many parts of the world to make things better until good combustion becomes available to all. Indeed, best of all is good combustion plus a chimney or hood, as is the case in the kitchens of most rich households around the world. So eventually should all households have them both.

Introducing clean stoves through prenatal care systems

Berkeley is working with colleagues and the Government of India to test the value of providing advanced combustion stoves to poor women expecting their first child (maybe other children not yet clear). In India, 35% - 40% of babies are Low Birth Weight (<2500 g), which is a major problem for health and development.. Current studies show that babies born to women cooking with biomass stoves weigh about 90gms less. He compared this to ba-

bies of a smoking mother, where it is 220gms, and if the father smokes (passive smoking) a reduction of 30gms. Even if introduction of stoves could shift the distribution by half this amount, 45 g, it would be a major improvement and even a \$50 stove would be cost-effective in Indian conditions.

A feasibility study is underway now in Haryana with just 200 women using the Philips blower stove. If successful, Berkeley is planning along with others to apply for funding to do a major trial, with perhaps 10,000 women spread in groups across India. Several different "arms" of the trial would be planned, including different stoves, LPG, different dissemination techniques and incentives, and perhaps combinations with clean water and sanitation. This would require several 10s of millions of USD, but would provide the kind of strong evidence needed by the health sector to invest in an intervention.

They may introduce them by the woman having to bring along her SUMS, and they will download to see if the stove has been used and she will receive payment if they find it has been used regularly. This would encourage clean cooking at least during pregnancy....if she does like it by then, there is no point in pushing it further, but at least the infant in utero will have been given a good start in life.

Kerosene lamps

Berkeley are currently analyzing a study in Bhaktapur, Nepal which had an ideal research mix of households: 25% kero; 25% biomass; 25% LPG; 25% electricity and find that not only biomass but kerosene cooking impacts child health and growth. . Kerosene lamps in Nepal have also been found to lead to 10x more active TB than was expected, a striking finding, which they are now repeating in a larger study. Though they have produce less particle pollution than biomass combustion, kerosene smoke seems to be more toxic per unit particle mass. If these results are verified, it will have important policy implications for those many poor countries that currently subsidize kerosene to help the poor. It may, instead, be making them sick.