Viewpoints

An interview with Professor Kirk R. Smith

Kirk R. Smith, Professor of Global Environmental Health
Director of the Global Health and Environment Program, University of California, Berkeley, California, 94720-7360
Email: krksmith@berkeley.edu

In this Viewpoints feature we publish extracts from an interview with Kirk Smith, Professor of Global Environmental Health at the University of California, Berkeley. You can read the full interview online – just follow the link in the @HEDON box at the end of the article.

Kirk, can you talk a bit about yourself, where you live, your work history and your involvement with household energy?

Well my name is Kirk Smith and I am Professor of Global Environmental Health at the University of California, Berkeley. In 1977 I started my career and then worked for almost twenty years at the East-West Centre in Hawaii, a research institute that focuses on problems in Asia and the Pacific.

As part of the first major research effort we undertook I spent considerable time in six Asian countries and, in the process of observing many households, couldn't help but notice the heavy smoke conditions that existed. Since I had a background in biomedical and environmental health I wondered what the pollution levels might be - and what kind of health effects might occur.

We conducted a literature review but couldn't find references to any measurements so we did some 'back of the envelope' calculations and came up with these astonishingly high levels of indoor air pollution (IAP). The end result of this was that in 1981 I borrowed some equipment and with some colleagues in India did the first set of measurements in Gujarat. We basically verified our estimated IAP concentrations and these were orders of magnitude higher than anything that would be considered health protecting, like WHO guidelines, and at least five times greater than even the worst cities.

Around 1990 there was the first major international interest in climate change issues. This meant that we could get increased funding by doing work on the greenhouse gas emissions (GHG) from household combustion, and at the same time do health related work. So in the early 90's we did the first measurements of what's now called 'co-benefit potentials'- that is by addressing incomplete combustion we would reduce both health and climate damaging pollutants.

So these two streams of interest added to the existing efforts in improved household fuels and stoves that came out of the 1970's, which mainly focused on improving fuel efficiency with the idea of reducing women's work and protecting the natural environment. There were also the large national programmes in both India and China in the early 80's and later in the decade many international agencies become involved.

However, these initiatives faded away in the early 90s and then there was a kind of desert period. I think the reason for this, and it's relevant to what is happening now, is that although some people were convinced of the benefits of improved household combustion, they had become disillusioned by the difficulties in actually accomplishing something that was effective.

When I would present the results of our studies in air pollution meetings people would be shocked as they knew of the health impacts of outdoor air pollution, and IAP levels were much higher than these. However, at international health meetings clean indoor air would have to compete with vaccines and antibiotics for the limited public health budgets, $7 per capita per year in India for example. They would want to know exactly how much benefit they would get so just extrapolating from air pollution levels somewhere else is not enough, you need to actually show the benefits in those populations for exactly the diseases of interest. So that's how we've been focusing our biomedical research, by putting data into peer-reviewed medical literature so that they've got the evidence they need, in order to make these decisions.

What would you say are the major issues in the Household Energy Sector today?

Around the year 2000 the WHO organised a very large effort called the Comparative Risk Assessment, to examine the impacts globally of a range of risk factors that could be changed. At this time we did a major review of the health effects literature which was very heavily peer reviewed and published the estimate that is commonly cited now of 1.6 million premature deaths annually from solid fuel use, about two thirds being children and one third women. These deaths are a significant amount, about a tenth or so, of all risk factors globally and in poor countries like India, third after malnutrition and unsafe water/sanitation.

These figures are now being revised to accommodate the health effects studies that have been conducted since 2000. The current thinking is still that the major single effect is pneumonia in young children, probably followed by chronic lung disease in women who have cooked for many years over open fires. But now we have pretty good evidence on Tuberculosis, cataracts and lung cancer in adults and low birth weight in children born to women who are exposed during pregnancy. Other factors we know less about include heart disease, impaired mental abilities in children who are heavily exposed and also birth defects, such as cleft palate. In biomedical science, proving causality is a big part of the issue and as all the diseases that are created are multi factorial it's a question of how much is caused by any one factor.

We have been conducting randomised trials, which is a sort of 'gold standard' type of study, in Guatemala since 2001. Our measurements there are more intensive than anywhere else and are giving us a lot of insights into this problem. One finding is that a chimney alone doesn't lower air pollution exposure sufficiently to get anything near to health guidelines. Although IAP levels went down by a factor of 10 in a household with a chimney, the pollution was not eliminated just moved to outside the house, causing personal exposure levels to only drop by a factor of 2. This still produced a 30-40% reduction in serious pneumonia but there is a need

Profile of the author

Kirk R. Smith is Professor of Global Environmental Health at the University of California, Berkeley. He is also founder and coordinator of the campus-wide Masters Program in Global Health and Environment. Previously, he was founder and head of the Energy Program of the East-West Centre in Honolulu, where he still holds appointment as Senior Fellow in Environment and Health after moving to Berkeley in 1995. His research work focuses on health-damaging and climate-changing air pollution, and includes ongoing monitoring and epidemiological field projects in India, China, Nepal, Mexico, and Guatemala as well as development of new instrumentation and participation in several international assessment efforts. He serves on a number of national and international scientific advisory and editorial boards and has published over 250 scientific articles and 7 books. He holds bachelors, masters, and doctoral degrees from UC Berkeley and, in 1997, was elected member of the US National Academy of Sciences, one of the highest honours awarded to US scientists by their peers.

to actually eliminate the pollution and not just move it downwind.

There is a new set of technologies that greatly reduce emissions at source and among these are the advanced combustion devices like semi-gasifier stoves. In our measurements these reduced emissions per meal by a factor of 15 to 20, producing very little smoke, at least when they are operating properly. There is however limited field experience with these devices. The problem is that they are an expensive technology that the farmers themselves can't afford and donors won't be willing to subsidise. However, with growing interest in the GHGs from these devices, and with the operation of the international carbon market, there is the potential to get the health benefits for free or nearly free.

So this is the model that looks very attractive - a kind of three way, relatively expensive but very well performing technology, the cost of which you can charge partly to the international carbon market, partly to a government or donor who is interested in welfare benefits, with the rest put on the local market for the household to pay.

Six years ago, in your paper titled 'In praise of petroleum' you argued that, contrary to popular belief, fossil fuels and in particular LPG ought "actually to be reserved to help fulfil our obligation to bring the health and welfare of all people to a reasonable level". Why did you say this, and what are your views on liquid fuels?

That was in response to some papers that have been prepared for the World Summit on Sustainable Development in Johannesburg, where it was argued that petroleum shouldn't be used in rural areas of developing countries. But petroleum, in particular LPG, is such a great fuel as it is relatively clean, efficient and easy to implement. So I was making the point that we could look at it the other way round - that this very high quality fuel should be reserved for the most important task in the world, supporting the poor.

In fact, shifting all of the world's poor to cooking with LPG wouldn't have a significant impact on either GHG emissions or energy demand. I think I calculated that half a percent increase in the efficiency of the world's automobile fleet for a few years would be sufficient to provide all of the cooking fuel needed. So to ask the poorest of the poor in the world to bear the brunt of controlling GHGs was a rather odd perspective.

The best fuel from a health standpoint is gas as it can be burned very cleanly. Next easiest are liquid fuels but I have difficulty in knowing what to say about kerosene because I've not seen many systematic measurements and those that have been done show quite a variation. I think the issue is that kerosene can be burned fairly cleanly in a good device, that is a pressurised stove or lamp, but it is often burned in simple wick stoves or lamps and they can be very polluting.

So one cannot just promote a liquid fuel without knowing the technology, you are going to have to be a bit more concerned about the performance and maintenance of the device. This might also be true with some of the newer types of liquid fuels that are coming out - ethanol, jatropha oil, and these kind of things.

Is there anything else you would like to mention in this interview?

I have experienced at least two other major surges of interest in household energy but have seen both of them collapse without major sustained effort.

Our sector needs to work not only from the ground up, but to take advantage of this time to work from the top down by pushing representatives at climate change negotiations to put improved household combustion on the table. We also need to bring the health effects evidence to the attention of our development agencies and foundations. My experience is that the ground up stuff takes a long time and then all of a sudden you have a short window of time in which there is a policy opening. We are in one of these window times now and we should be sure to push on it.

People are looking for cost effective ways of dealing with these major global problems, ill health in the third world and climate change are two of the big ones – and we have a way to do that. I think nowhere is the nexus more strong for health and climate than it is in household combustion, so now is the time to work on it.

What we are going to be asking for is billions of dollars; there are 500 million stoves out there we want to replace, so even if they cost $20 each that's $10 billion right there. Nobody is going to want to spend this amount of money unless you can actually prove that you've done it.

One has to recognise there is a lot of cynicism because of past perceived failures and therefore we have to be quite thorough about validating things in the field. So we have to acknowledge the need for rigorous and independent monitoring and evaluation to provide information to donors and investors. Many promoters and NGO's are uncomfortable with independent verification, but they are going to have to get around that if we're going to move this forward.

However, to date relatively little money has been spent. My estimate is probably that since the beginning of this whole thing, less than $20 million has been spent on improved stove research. That's four times less than is currently spent on air pollution control for one coal fired power plant in China, and about one of these is built every week. Yet the air pollution exposure from stoves is many orders of magnitude above that from power plants, let alone one power plant.

This is an asynchronous world but this is nothing new. There are lots of examples of asynchrony, or inequity if you like, but we are in a window of time in which we can reduce that gap.

www.hedon.info/TEQA

* Read the full interview online
* Visit Kirk Smith's homepage
* Read his paper 'In praise of petroleum'

Meet us @HEDON