

Can India lead the way with the development of safer cookstoves?



Indoor use of wood-burning and other biomass-fuelled cookstoves remains a major, if frequently overlooked, respiratory health hazard. In India, these cooking practices translate to high burdens of pneumonia, tuberculosis, and chronic obstructive pulmonary disease (COPD)—potentially leading to low birthweights in infants of women who spend much of their days cooking indoors, Giridhara R Babu (Public Health Foundation of India [PHFI], Bangalore, India) told *The Lancet Respiratory Medicine*.

“Open a newspaper on any given day and you are likely to find a story about outdoor air pollution in India rivalling that of China”, noted Joseph G Allen (Harvard TH Chan School of Public Health, Boston, MA, USA). “But what about indoor air pollution from burning solid fuels? Rarely, if ever, do we see a news story about the millions of people globally who die prematurely due to burning solid fuels indoors.”

Exposures to particulate matter in homes “can far exceed what is happening outdoors even on the worst of days”, Allen said.

Yet, efforts thus far to reduce harms to respiratory health with cleaner-burning stoves have met with mixed success, noted H.S. Udaykumar (University of Iowa, Iowa City, IA, USA). The recently published Cooking and Pneumonia Study found no evidence that cleaner-burning biomass cookstoves reduce pneumonia risk in young children in rural Malawi.

The sheer scale of biomass-fuelled cooking is one challenge. “Nearly 780 million Indians living in 160 million households rely primarily on biofuels for cooking”, estimated Babu.

Cost is another factor. Even modestly priced alternative cookstoves can be beyond the reach of the poorest households—eg, liquefied petroleum gas (LPG) stoves must be maintained and repaired regularly. “So-called improved cookstoves are typically handed to the user by well meaning NGOs who may not follow up to repair or replace these”, Udaykumar noted.

“The problem is largely one of poverty and the relative cost of cleaner fuels, including the cost of getting them to the rural areas where they would provide the greatest benefits”, explained Marc A Jeuland (Duke Global Health Institute, Duke University, Durham, NC, USA).

These challenges have inspired efforts to make cleaner biomass-burning stoves, and although Jeuland sees value in such efforts for the purposes of reducing the effects on climate, he is sceptical of such efforts. “From a health perspective, most research suggests that large improvements in reducing emissions are necessary

to deliver benefits, at least with respect to particulate matter—and the only technologies that achieve this right now with any reliability are LPG and electric options”, he cautioned. “A few highly advanced biomass fuel stoves can get close, but have run into translational challenges related to scale.”

But in addition to cost barriers, cleaner-burning cookstoves are frequently designed with low emissions—rather than user preferences or needs—in mind. For example, more efficient, low-emission stoves tend to produce more heat. “Not all ingredients used in traditional Indian cooking are really suitable for high temperatures”, said Onno van Schayck (Maastricht University, Maastricht, The Netherlands). “Curry should be prepared on relatively low heat. A good stove with higher combustion that is not suitable for preparing curry? At the end of the day, it won’t be used.”

Working with people in India’s urban slums, Babu, van Schayck, and colleagues have designed an inexpensive prototype reduced-emission biomass cookstove that meets such cultural needs.

With GVS Murthy (PHFI), they are now embarking on a 3-year cohort study in a Bangalore slum funded by India’s Department of Science and Technology to establish whether the new stove curbs respiratory symptoms and the incidence of low birthweights. The researchers will measure indoor and outdoor air pollutants in households using the new stoves and

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For the report “Respiratory risks from household air pollution in low and middle income countries” see [The Lancet Respiratory Medicine Commission](#) *Lancet Respir Med* 2014; 2: 823–60

For Muyanja and colleagues’ paper on particle concentrations indoors when using solid fuels and kerosene lamps see *Indoor Air* 2017; published online March 7. DOI:10.1111/ina.12377

For Udaykumar and colleagues’ paper on why improved cookstove initiatives have failed in India see *World Develop* 2017; 92: 13–27

For the Cooking and Pneumonia Study of cleaner-burning cookstoves failure to reduce pneumonia rates among young children in Malawi see [Comment](#) *Lancet* 2017; 389: 167–75



For Jeuland and colleagues' paper on household air pollution see [Annu Rev Resour Econ 2015; 7: 81-108](#)

For Babu, van Schayck and colleagues' report on managing threats to respiratory health in urban slums see [Comment Lancet Respir Med 2016; 4: 852-54](#)

matched controls throughout the course of the study. 3 years should be long enough to establish whether the stoves deteriorate with time, and whether or not women abandon the new design and go back to using traditional cookstoves, van Schayck said.

The researchers hope that local production can meet the challenge of supplying local communities if the stoves become popular. Previous initiatives brought stoves into the communities from elsewhere, but Babu's team

hopes to teach local entrepreneurs to build the stoves using inexpensive local materials. If it works in India, the team hopes to take the study's lessons to other regions, including Africa.

Curbing indoor air pollution is key to addressing threats to respiratory health in urban slums, van Schayck believes.

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