

New study in Malawi finds that improved stoves had no impact on pneumonia in children

Key points:

This is sadly an unsurprising finding. Levels of exposure to smoke must reduce dramatically before we should expect a measurable impact on pneumonia. We expect that our work in Nepal is reducing levels of exposure more effectively than in this study; but we await the publication of their data to explore this further. Cookstoves have a wide range of other benefits that are important to poor people, beyond rates of severe illness.

The World Health Organisation has for some time now been studying the impacts of exposure to air pollution (both indoor and outdoor) on health. We know it is a serious problem, and their most recent studies of the Global Burden of Disease reveal that exposure to indoor air pollution causes over 4 million deaths a year. Half a million of these deaths are to children under 5 years from pneumonia.

As part of their research, WHO has shown that it takes dramatic reductions in a person's exposure to smoke before there is much impact on their health. Even a 50% reduction, for example, will only have very limited impact on health outcomes.

This [Lancet article](#) does not discuss levels of personal exposure, and the amount of reduction achieved by the introduction of improved stoves. That data will be published soon in a separate article.

The model of cookstove introduced in this study is the Philips HD4012LS, fan-assisted stove which, in the laboratory, reduces emissions by 90%. Test results for this stove show indoor emissions of PM_{2.5} of 9.1-4.7 mg/min. The WHO indoor air quality guidelines suggest that you would need to reduce emissions to 1.75 mg/min to meet even their interim target for indoor air quality.

This stove has been found in other studies to be reasonably well accepted by cooks. It can burn a variety of fuels (which is important in Malawi), and has two settings to either cook food more slowly for a steady simmer, or on a high heat for a fast boil or to fry food.

Even so, the paper highlights that a 90% reduction in emissions from a stove in a lab test doesn't translate into a 90% reduction in exposure to smoke by the users. The paper highlights some of the reasons which, in our experience, are common across the world:

- People don't use the stove as their only stove for cooking, or for cooking every meal. The researchers found that by the end of the study, only 26% were using the stove for 2 or more meals a day. Stove use monitors attached to some of the stoves showed that it was used only every 3rd day on average by the end of 2 years. This was due to the stoves malfunctioning (battery failure was common).
- There are other sources of exposure to smoke pollution, beyond cooking in the kitchen, including tobacco smoking (in about 17% of households), burning rubbish, and smoke from neighbours' fires.

A key finding from this study is therefore that, despite their best efforts, distributing stoves alone will not reduce exposure to indoor air pollution sufficiently to achieve the hoped-for health impacts. This underlines how difficult it is to reduce levels of smoke to acceptable limits.

In our own work in Nepal, we have combined an improved stove (admittedly not as lab-efficient as these Philips stoves) with a smoke hood. We have measured exposure levels of $120 \mu\text{g}/\text{m}^3$ on average, which is approaching the WHO interim target level of $75 \mu\text{g}/\text{m}^3$ (24-hour average). We are not health researchers and do not have the skills or resources to carry out the kind of large-scale randomised control trial that was done in Malawi. As such, these kinds of studies are vital to our collective understanding of the linkages between a technology, its uptake and use, the benefits it brings to poor people.

We must also recognise the important benefits that often mean a great deal to people. After all, these are very poor people who suffer from a range of health risks meaning that, sadly, ill-health is a fact of life. The study points out that there were several severe cases of malaria found during the study, and there is also likely to be water-borne disease related to poor sanitation and hygiene. However, the introduction of the improved stove meant a measurable reduction in burns. Other similar studies have found reduced symptoms of respiratory problems (coughing and asthma attacks), and a slowing of lung function decline. Eye health may also improve, and there may be reduced pressure on local vegetation. Less time will also be taken collecting fuel, which can massively reduce women's burdens as the primary fuel collector in the household. These benefits should not be easily dismissed.

At Practical Action we are sadly not surprised by the findings from this recent study, although we too would have loved to see a direct relationship between the clean-burning stoves and reduced cases of childhood pneumonia. We recognise that:

- A single stove product alone is not the answer. We need to think about all the cooking tasks required and the whole kitchen environment. That's why a smoke hood and advice on storing and drying fuel are also important parts of the work we do.
- There is demand for really clean-burning fuels and this could help reduce exposure – but again, this should not be seen as a 'silver bullet'. In this study, the problem was not how cleanly the stove burned, but other issues of how consistently it was or could be used, and how much people were exposed to other sources of pollution.

For more information, or an interview with Dr Stevens, please contact Andrew Heath on 01926 634552.