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Effects of implementing improved cookstoves and heaters to reduce household air pollution: a FRESH AIR study

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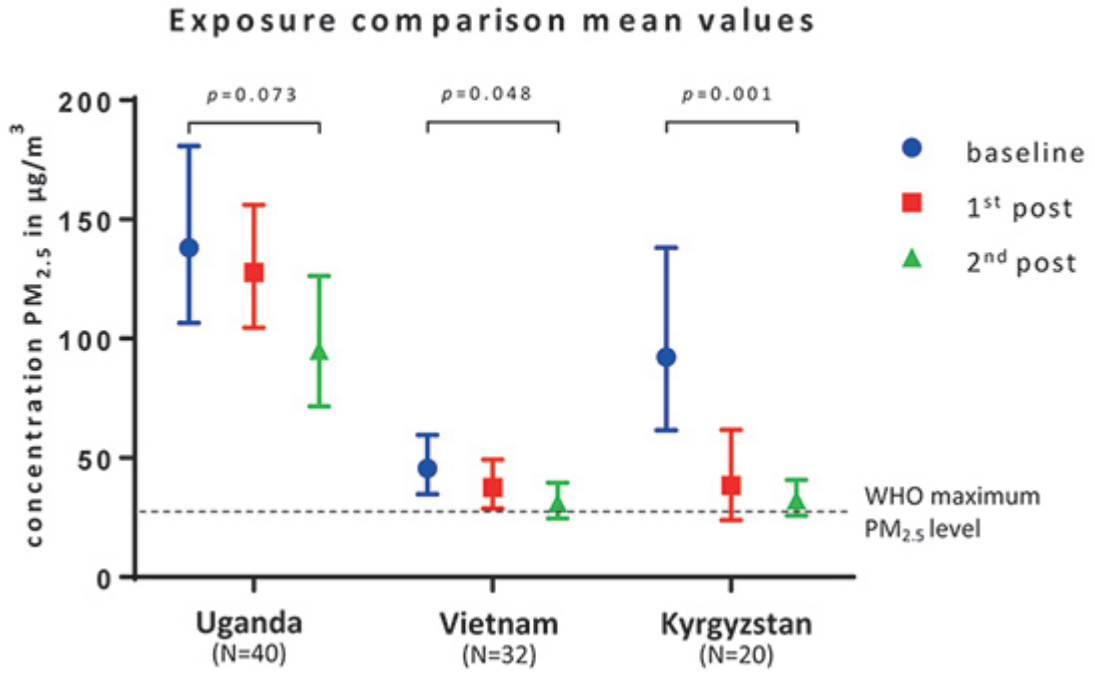
Aim: To evaluate the effectiveness and acceptability of locally tailored implementation of improved cookstoves/heaters in low- and middle-income countries (LMICs).

Context: Exposure to household air pollution (HAP) caused by biomass fuel use is associated with a wide range of health-damaging outcomes. The poorest people, living in the rural areas of Uganda, Vietnam and Kyrgyzstan have limited opportunities to switch to cleaner fuels in the immediate future.

Description of change: Situational analyses and awareness programme followed by implementation of locally-made improved cookstoves/heaters.

Strategy of change: Implementation of improved cookstoves/heaters among 649 adults and children living in rural communities in these three LMICs, provided by local energy providers. Health and HAP outcomes were compared between baseline (still using traditional cookstoves/heaters), and at 2 months and 6-12 months follow-up. Outcomes included respiratory symptoms, chest infections, school absence, objectively measured HAP ($PM_{2.5}$ and CO), and intervention acceptability. The process was evaluated using the RE-AIM framework.

Effects of change: After implementation, many symptoms and infections diminished (and even disappeared) significantly in Uganda and Kyrgyzstan, and to a smaller extent in Vietnam. $PM_{2.5}$ exposures decreased with 31% to 65% but remained above the WHO guidelines. Figure 1 shows mean $PM_{2.5}$ exposures of randomly selected households with 95% confidence interval; *p*-value refers to baseline and 6-12 months difference. CO exposures remained below the WHO guidelines.



Lessons learnt: Locally tailored implementation of improved cookstoves/heaters had considerable effects on respiratory symptoms and HAP, yet $PM_{2.5}$ levels remained too high, especially in Uganda. Participants indicated high acceptance of the improved cookstoves/heaters and almost everybody recommended the cookstoves/heaters to others.
Message to others: It is important to understand the local socioeconomic and cultural circumstances when implementing improved cookstoves/heaters. The short-term effects of reducing HAP exposure may encourage communities to change their cooking methods, including the use of clean fuels.