Technological and socio-economic solutions to reduce indoor air pollution in Nepal (SmokeFreeHomes Nepal)

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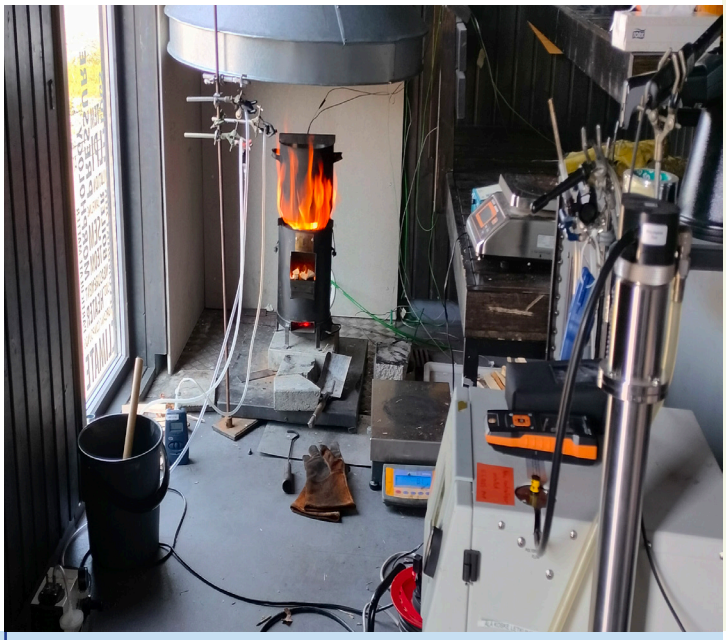
SmokeFreeHomes Nepal project investigates how household air pollution caused by biomass combustion can be reduced in Nepal through technological, socio-economic, and socially acceptable solutions. Residential biomass burning is a major source of harmful air pollutants worldwide, and in Nepal traditional cooking practices remain common, especially in rural areas. The emissions from heating and cooking activities cause a high level of health hazard to the people spending more time in the house (e.g., women and children). Overall, household air pollution in Nepal is estimated to contribute to 25,000 premature deaths annually.

The project aims to improve understanding of indoor air pollution levels in Nepalese households and to identify ways to reduce exposure. The research examines how stove technologies, fuel types, and cooking practices influence emissions and indoor air quality, while also considering the social and economic factors that affect the adoption of cleaner cooking solutions. The findings will support evidence-based decision-making in Nepal and contribute to long-term research collaboration between Finland and Nepal.

The research combines laboratory emission measurements, indoor and outdoor air quality measurements in real households, and questionnaire surveys. Laboratory campaigns carried out at the University of Eastern Finland have investigated emissions and household air pollution from Nepalese cookstoves and the formation potential of secondary aerosols from cookstove emissions. Household air quality measurements were conducted in three geographically different regions of Nepal during 2024–2025, while questionnaire surveys were carried out in four areas to gather information on cooking practices, fuel use, kitchen conditions, stove technologies, and barriers related to the adoption of cleaner cooking solutions.

Results indicate that traditional cooking in rural Nepal can lead to very high exposure levels that exceed WHO guideline values. The findings also suggest that stove technology and fuel type influence emissions and household air quality, and that cleaner fuels and improved stove technologies may reduce pollutant exposure. Survey results indicate strong willingness to adopt cleaner cooking technologies, but the transition is slowed by affordability constraints, subsidy needs, cultural practices, and gendered roles in fuel collection and household decision-making.



Main publications:

Sunil Prasad Lohani, Rosy Pradhan Shrestha, Mandip Shrestha, Henna Rinta-Kiikka, Jarkko Tissari, 2025, *Rethinking clean cooking solutions: Assessing the impact of subsidy and distribution modality on improved cook stove programs in Nepal*, Energy Research & Social Science, Volume 123, 104027, ISSN 2214-6296, https://doi.org/10.1016/j.erss.2025.104027.

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Research Council of Finland

With support from Finland's development cooperation

05/2026