

**Household Air Pollution Intervention Network (HAPIN) trial:
objectives, design and formative research results**

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Globally, nearly 3 billion people rely on solid fuels for cooking and heating, the vast majority in low- and middle-income countries. The resulting household air pollution (HAP) is a leading risk factor in the global burden of disease, accounting for an estimated 1.6 million deaths annually, largely among women and young children. Previous interventions have provided cleaner biomass-based cookstoves, but have failed to reduce exposure to levels that produce meaningful health improvements. There have been no large-scale field trials with liquefied petroleum gas (LPG) cookstoves, likely the cleanest scalable intervention.

The Household Air Pollution Intervention Network (HAPIN) trial is a multi-country randomized controlled trial designed to assess the health impact of cooking with LPG over traditional solid biomass fuels. A total of 3200 pregnant women are being enrolled in rural across 4 LMICs (India, Guatemala, Peru, and Rwanda). They, their newborn child and (in a subsample of 800 households) an older adult woman are being followed until the child is 1 year old. Primary outcomes are low birth weight, severe pneumonia incidence, and stunting in the child, and blood pressure in the older adult woman. Secondary outcomes include preterm birth and child development in the child, maternal blood pressure during pregnancy, and endothelial function, respiratory impairment, atherosclerosis, carcinogenic metabolites, and quality of life in the older adult woman. We assess cookstove use, conduct repeated personal exposure assessments to HAP (PM_{2.5}, carbon monoxide, black carbon), and collect dried blood spots and urinary samples for biomarker analysis and biospecimen storage on all participants at multiple time points.

As the trial is still enrolling participants, this presentation will focus on the design and rationale for the study and some of the challenges in conducting large, multi-country trials. Results from some of the formative research will also be described.