# Implementation Science to Reduce Household Air Pollution Exposures in LMICs

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- Can improvements in clean cooking really improve human health?
- Can these improvements in clean cooking be brought to scale?
  - How clean is clean enough to achieve health benefits?
  - How do we measure/estimate changes in both short and long term health outcomes?
  - How can we improve and adapt ongoing interventions to overcome the implementation challenges of proper adoption of clean cooking technologies in LMICs?
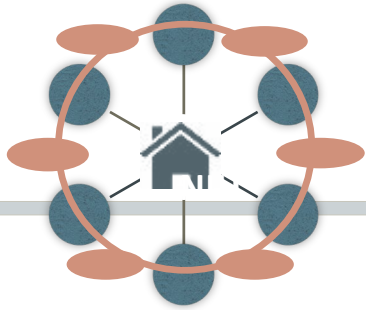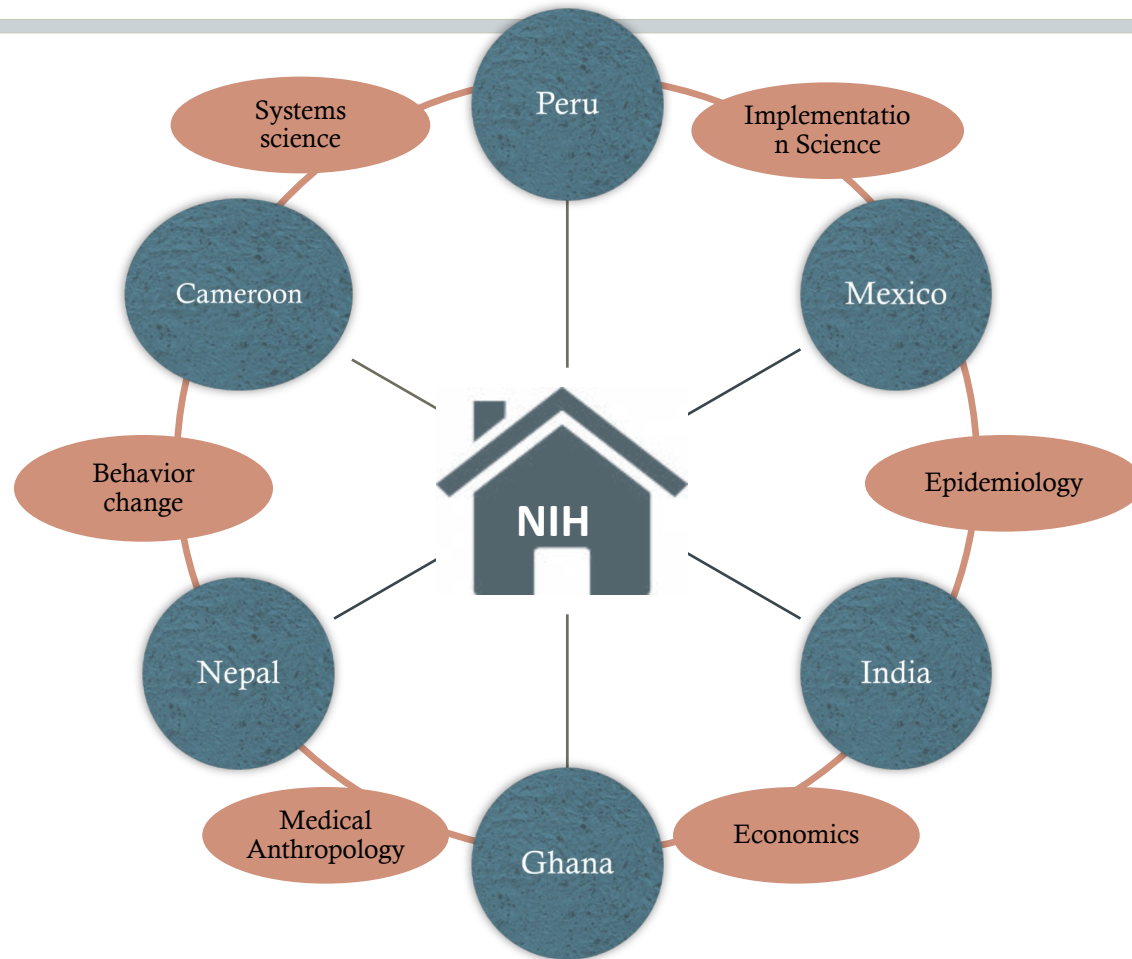
Implementation Science Network: A Systems Approach

1. Orient to system behavior changes that improve health
2. Focus on clean fuel interventions
3. Build on model frameworks for Implementation Research
4. Expand analytical toolkit using existing technologies
5. Analyze influences on adoption and scale-up in case studies
6. Evaluate current program _processes and outcomes_
7. Experiment with new approaches at household & community levels
8. Engage policy and program leaders
9. Develop new models for planning and evaluation future interventions
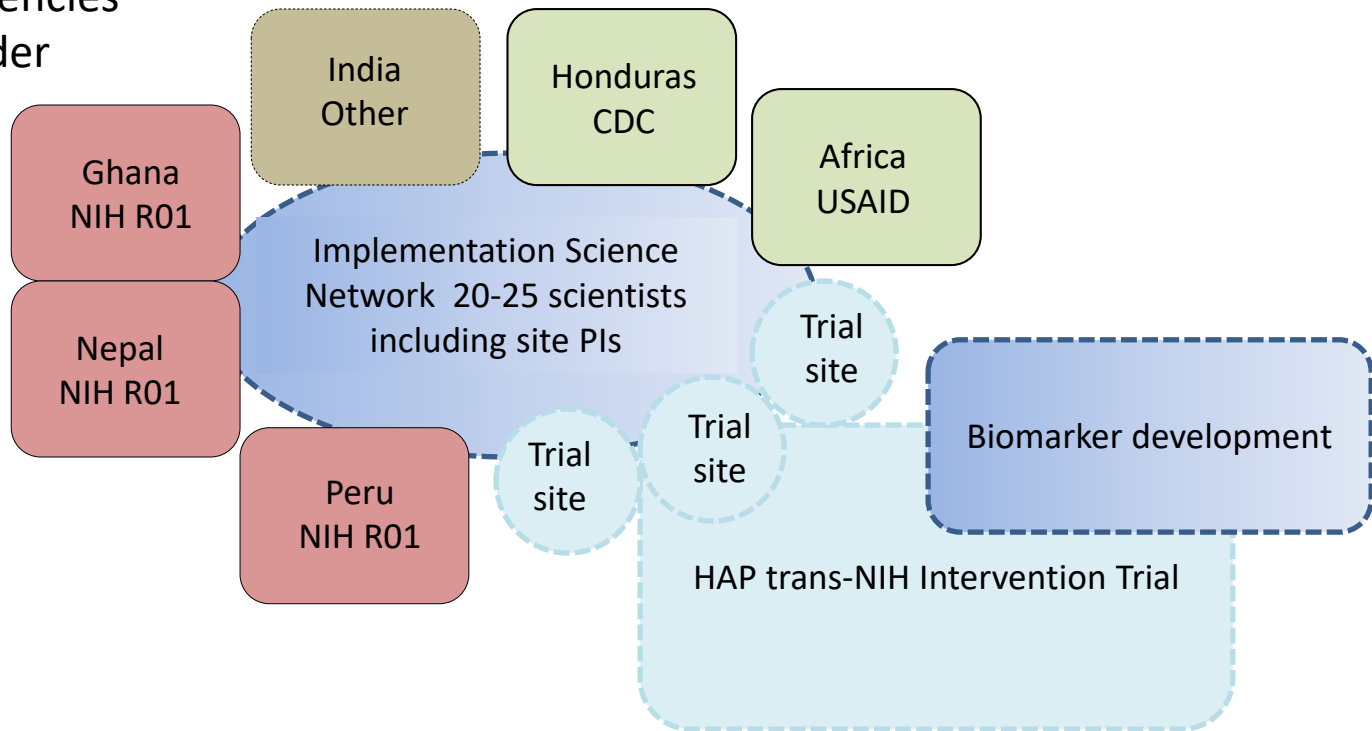
Implementation Science Network

- Improve the science of uptake of clean fuel based cooking

- Tied to funded research and implementation projects

- Additional expertise from critical fields

- Initial 5 year time frame

Rosenthal et al 2017 Environmental Health Perspectives

Implementation Science Network in relation to other projects

Legend:
- NIH Awarded
- Common Fund
- Trans-NIH HAP
- Partner agencies
- Other funder

Current
Current Projected

Ghana NIH R01

Nepal NIH R01

Peru NIH R01

India Other

Honduras CDC

Africa USAID

Implementation Science Network 20-25 scientists including site PIs

Trial site

Trial site

Trial site

Biomarker development

HAP trans-NIH Intervention Trial

Oversight by HAP Working Group - Steering Committee
Program Staff from NIH (FIC, NIEHS, NHLBI, NCI, NIEHS, NICHD, OD) CDC, USAID
and Global Alliance for Clean Cookstoves

Implementation Science

…is about trying to use research strategies to gain a better understanding of the complex array of structural and human factors that can determine whether new programmes or interventions will work as intended.

Lavery, 2016
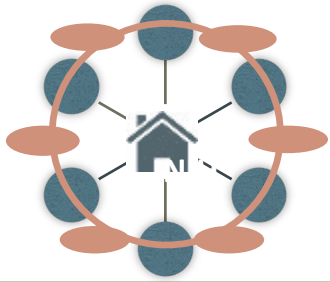
ISN adoption studies

- **Novel technology package for in Cameroon to reduce LPG fuel use and cost**: Daniel Pope, (University of Liverpool), Bertrand Mbatchou, (Douala General Hospital)

- **A conditional cash transfer system to enhancing LPG use during pregnancy in India**. Kalpana Balakrishnan (Sri Ramachandra University), Sanjay Juvekar, (KEM Hospital Research Centre), Kirk Smith, (UC Berkeley)

- **Experimenting with prices, peers and perceptions: to accelerate scaling up LPG adoption in Northern Ghana.** Abraham Oduro and Maxwell Dalaba, (Navrongo Health Research Centre), Katie Dickinson, (UC Boulder and NCAR)

- **Community based system dynamics and network analysis to understand adoption and abandonment of LPG technology India.** Gautam Yadama (Washington University), William Checkley (Johns Hopkins University)

ISN Clean fuel case studies
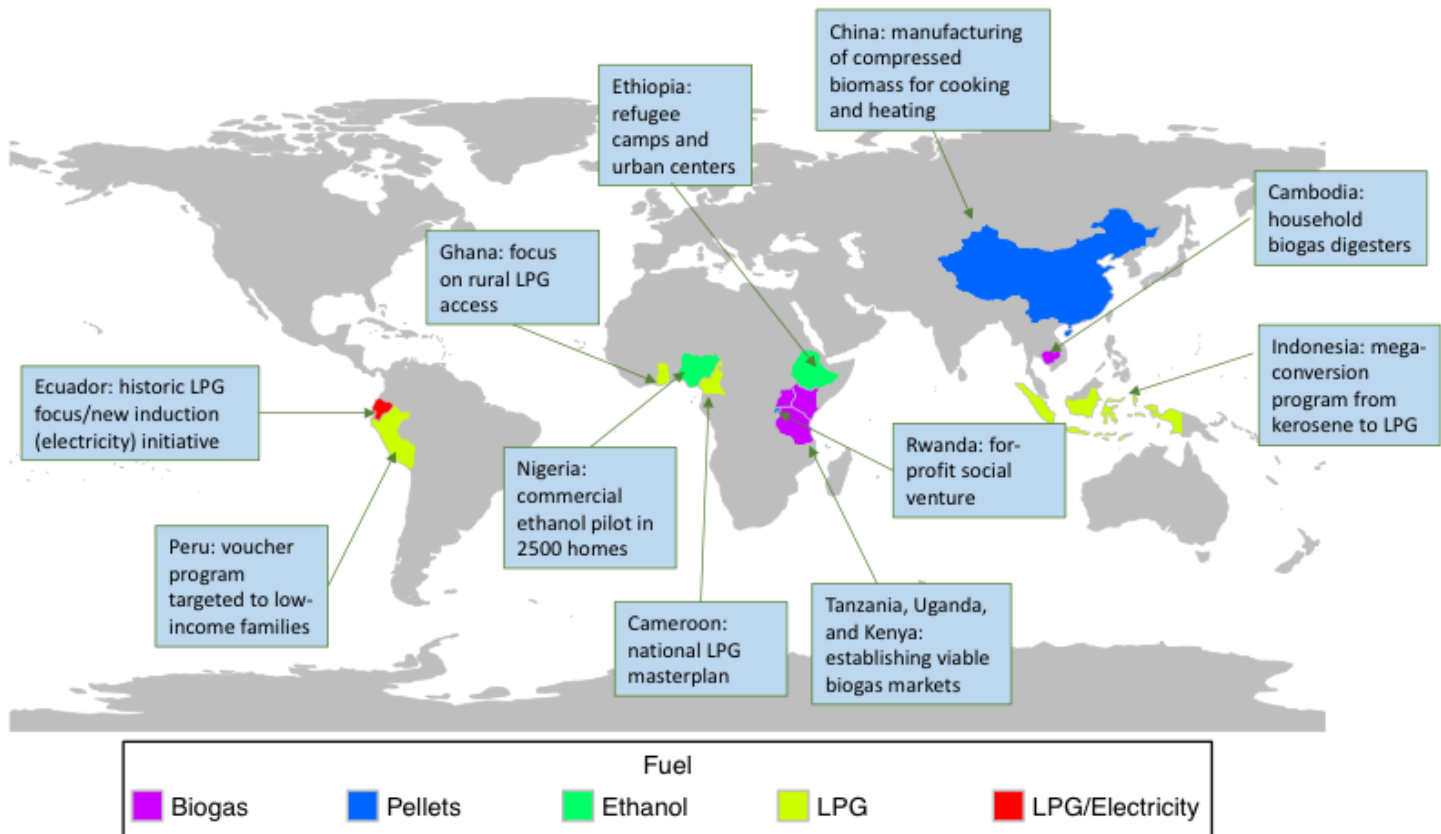
https://www.sciencedirect.com/journal/energy-for-sustainable-development/vol/46/suppl/C
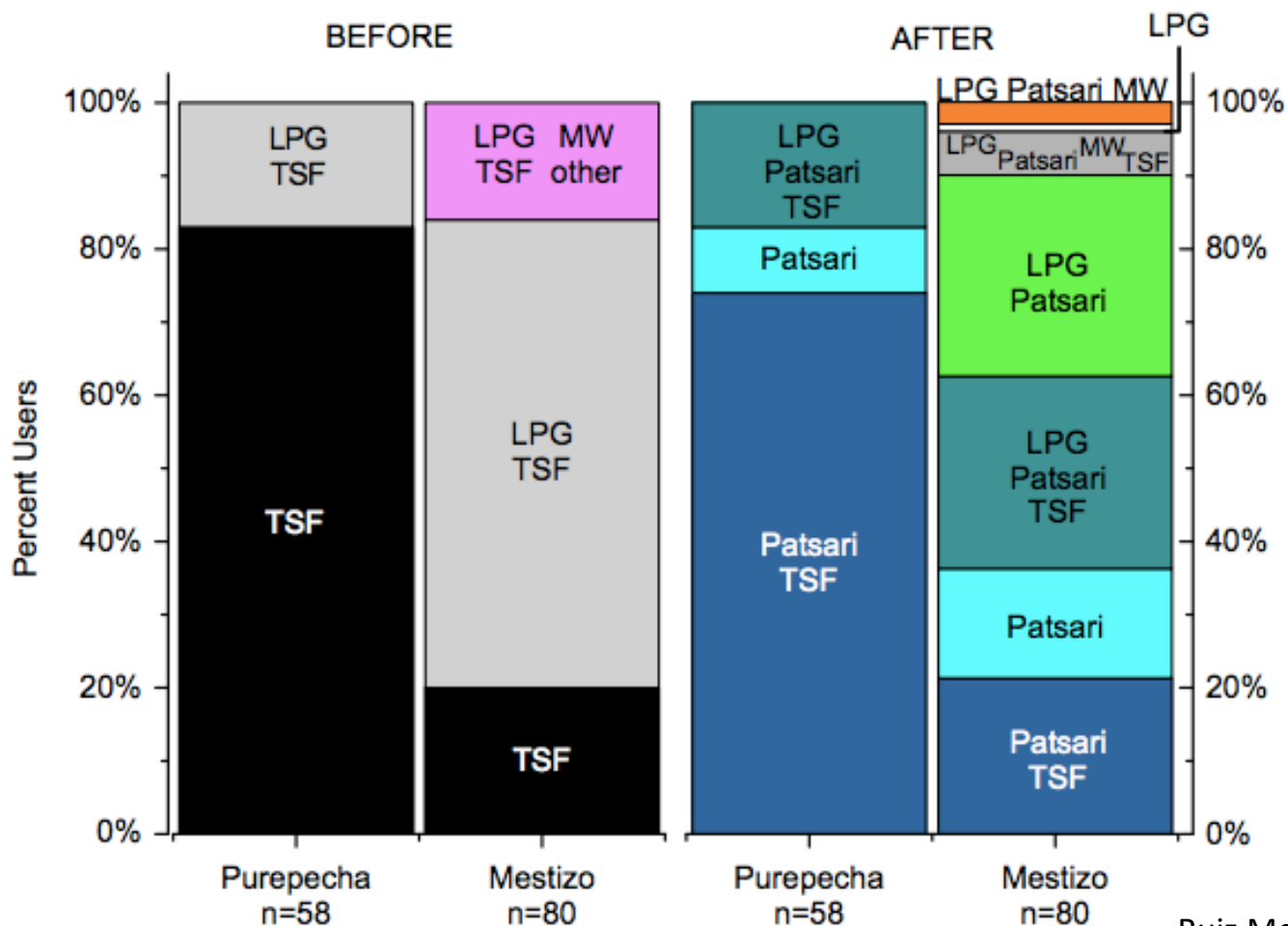
Exposure reduction – how clean is clean enough?
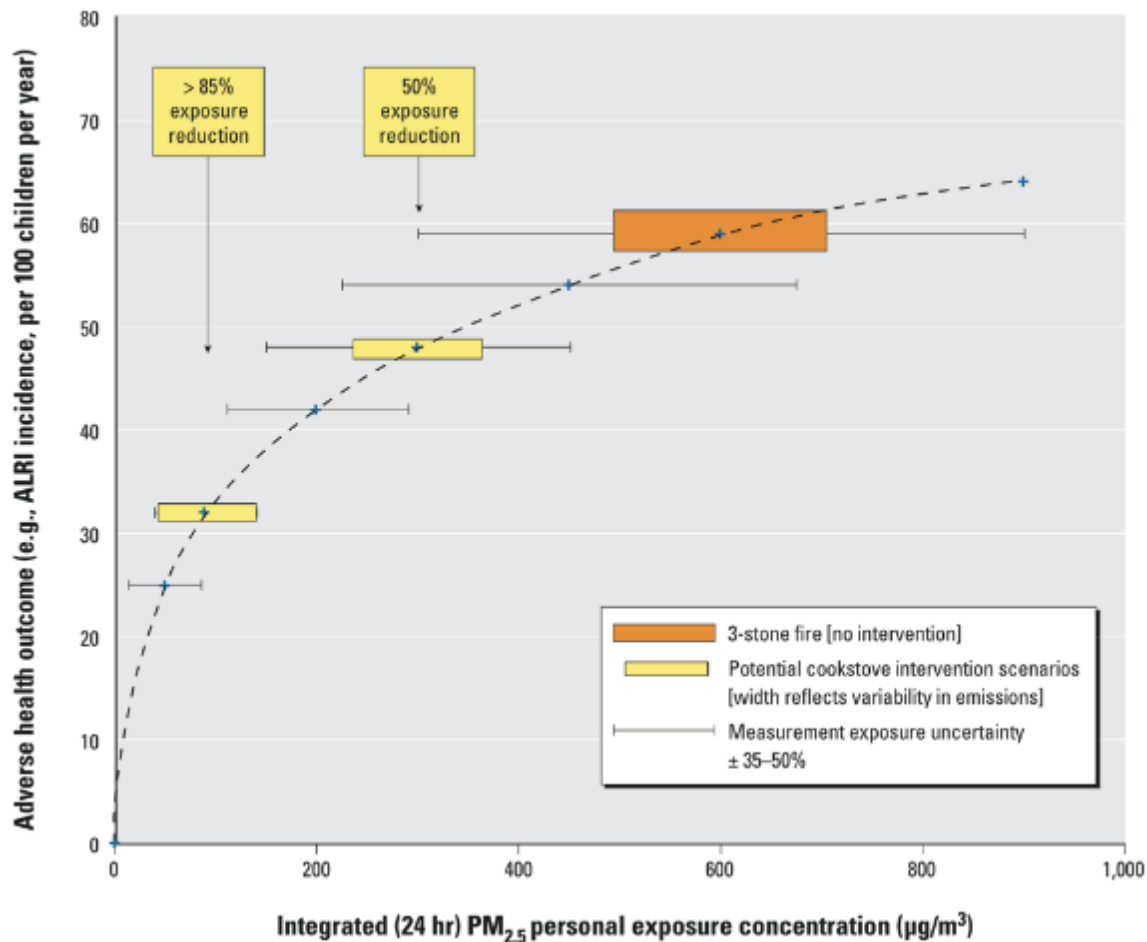
1. Clean fuels probably critical to achieve major reductions
2. Ambient conditions, heating, lighting and other confounders abound
3. Stove and fuel stacking behavior a major challenge

Modified from Clark et al 2013

Adoption and sustained use:
the "stacking" problem

Ruiz Mercado et al 2011

Fig. 5. Stacking of fuels and devices in the case of Mexico's highlands (Zamora, 2010). Even in the non-indigenous population (Mestizo), 50% of the households continue using the three-stone fire (TSF) with gas (LPG) stove and even microwave

ISN Team

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