

From Technology to Impact

Understanding and Measuring Behavior
Change in Improved Biomass Stoves

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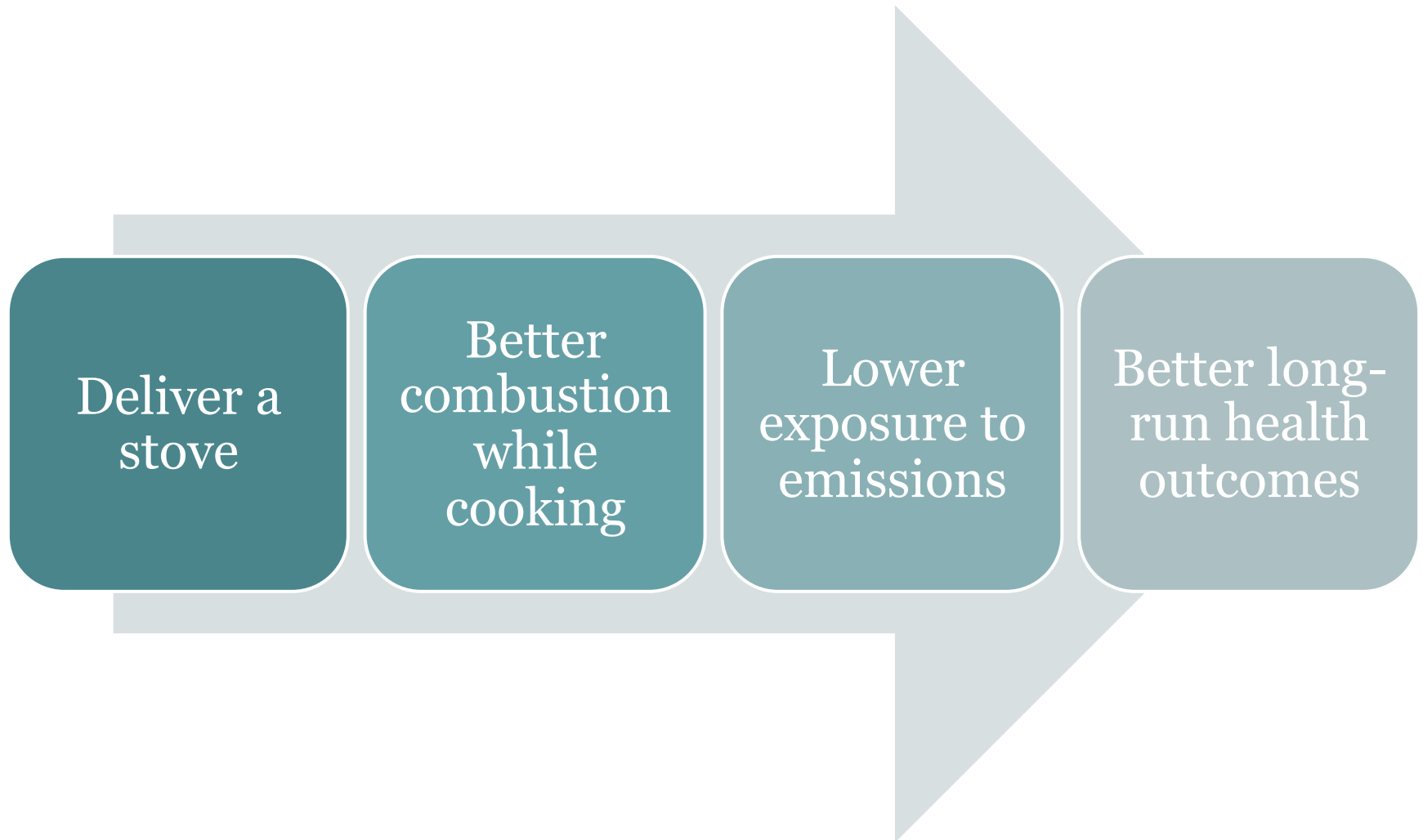
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**“Clean cookstoves...can save lives,
empower women, improve livelihoods,
and combat climate change.”**

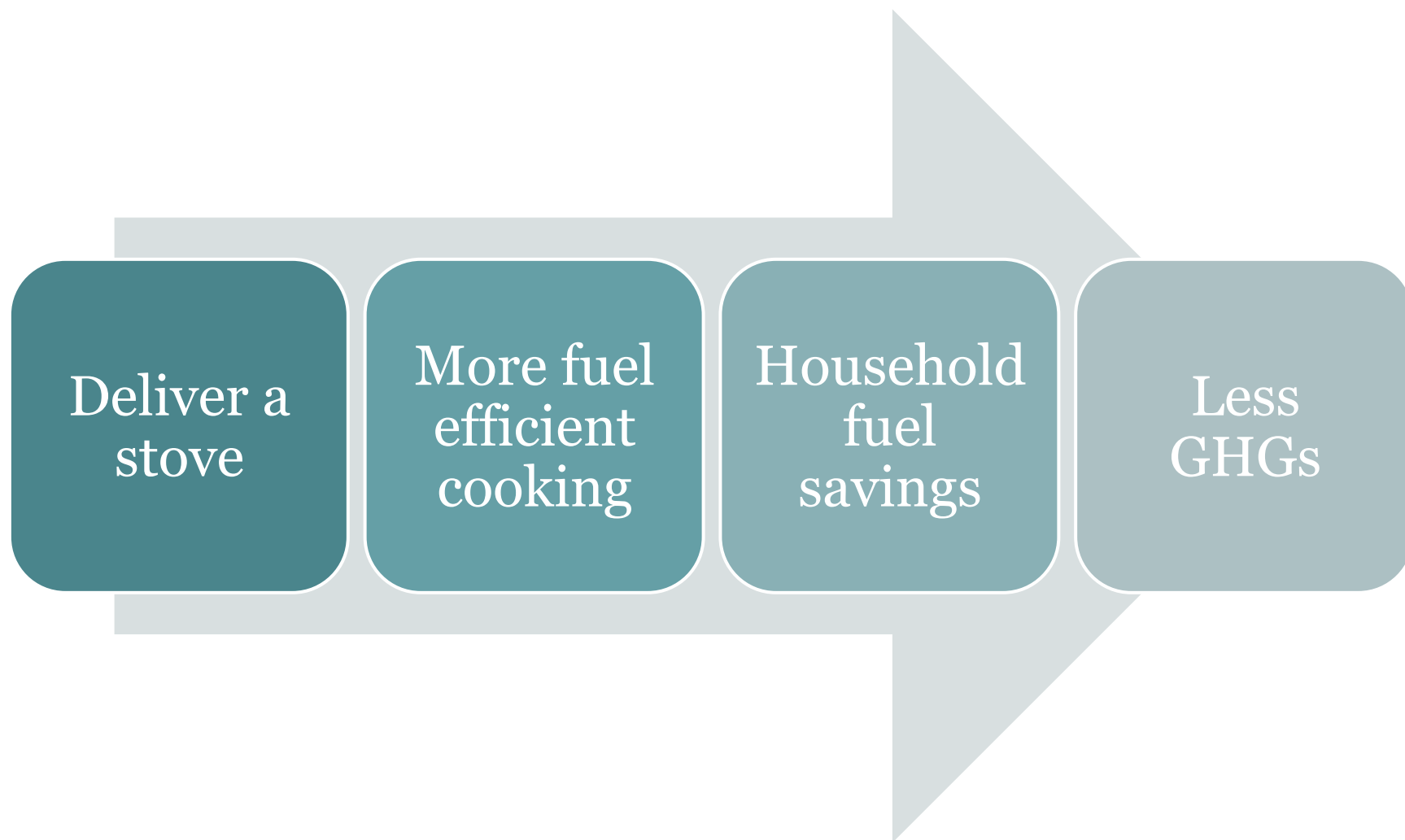
—Global Alliance for Clean Cookstoves



A theory of change: health



A theory of change: environment



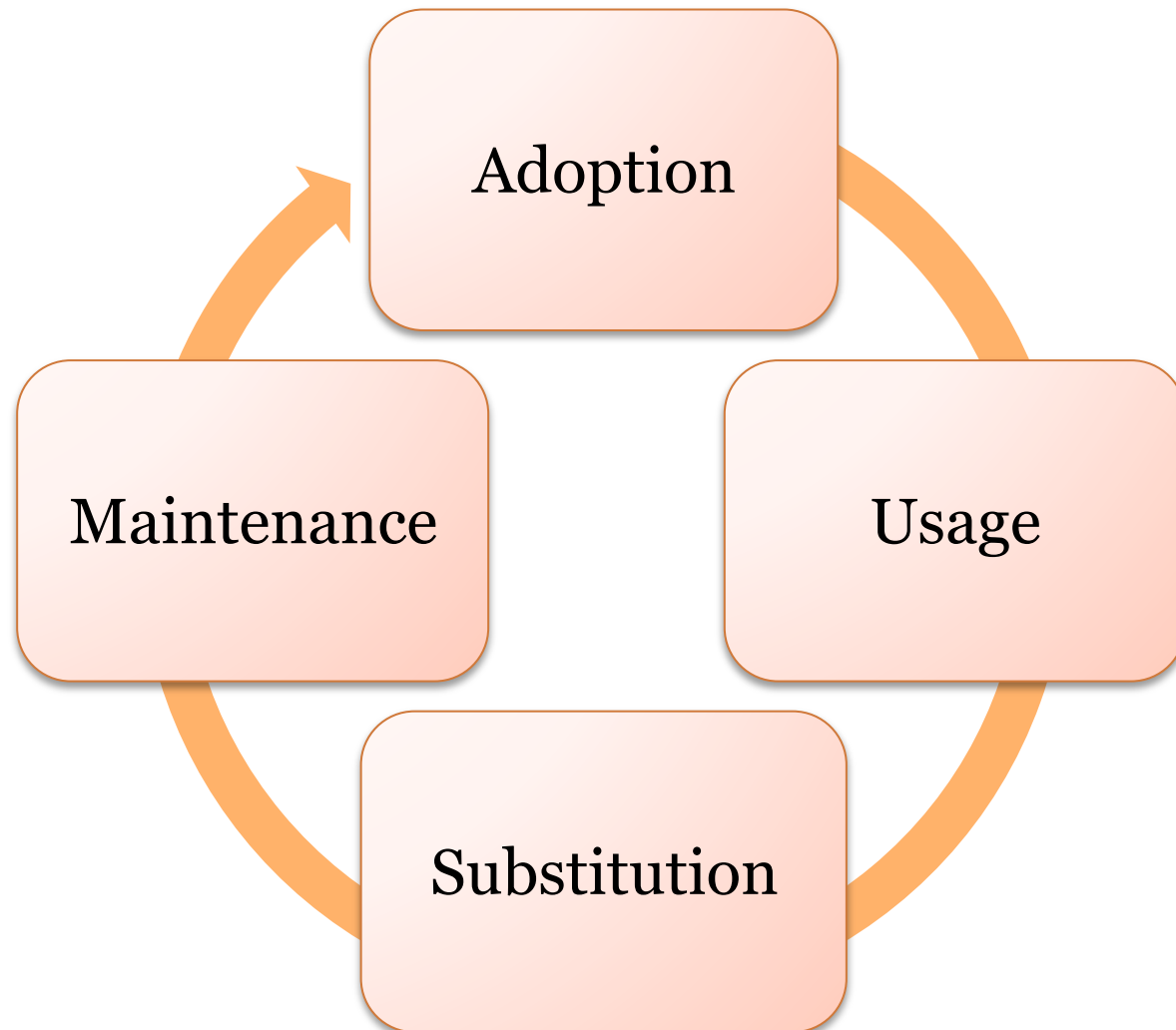
WHERE

ARE THE

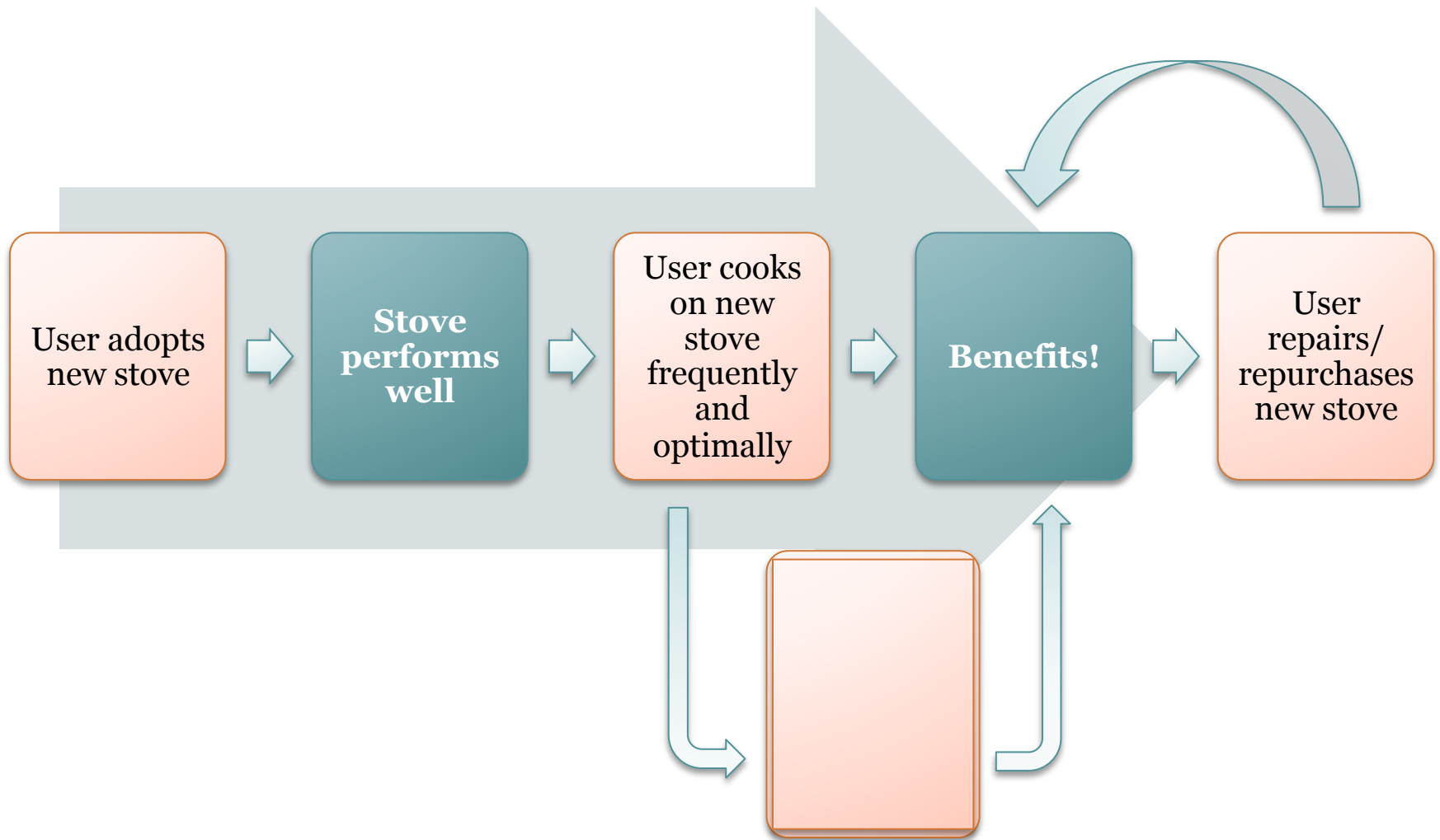
COOKS.



Components of stove *uptake*



Theory of (behavior) change



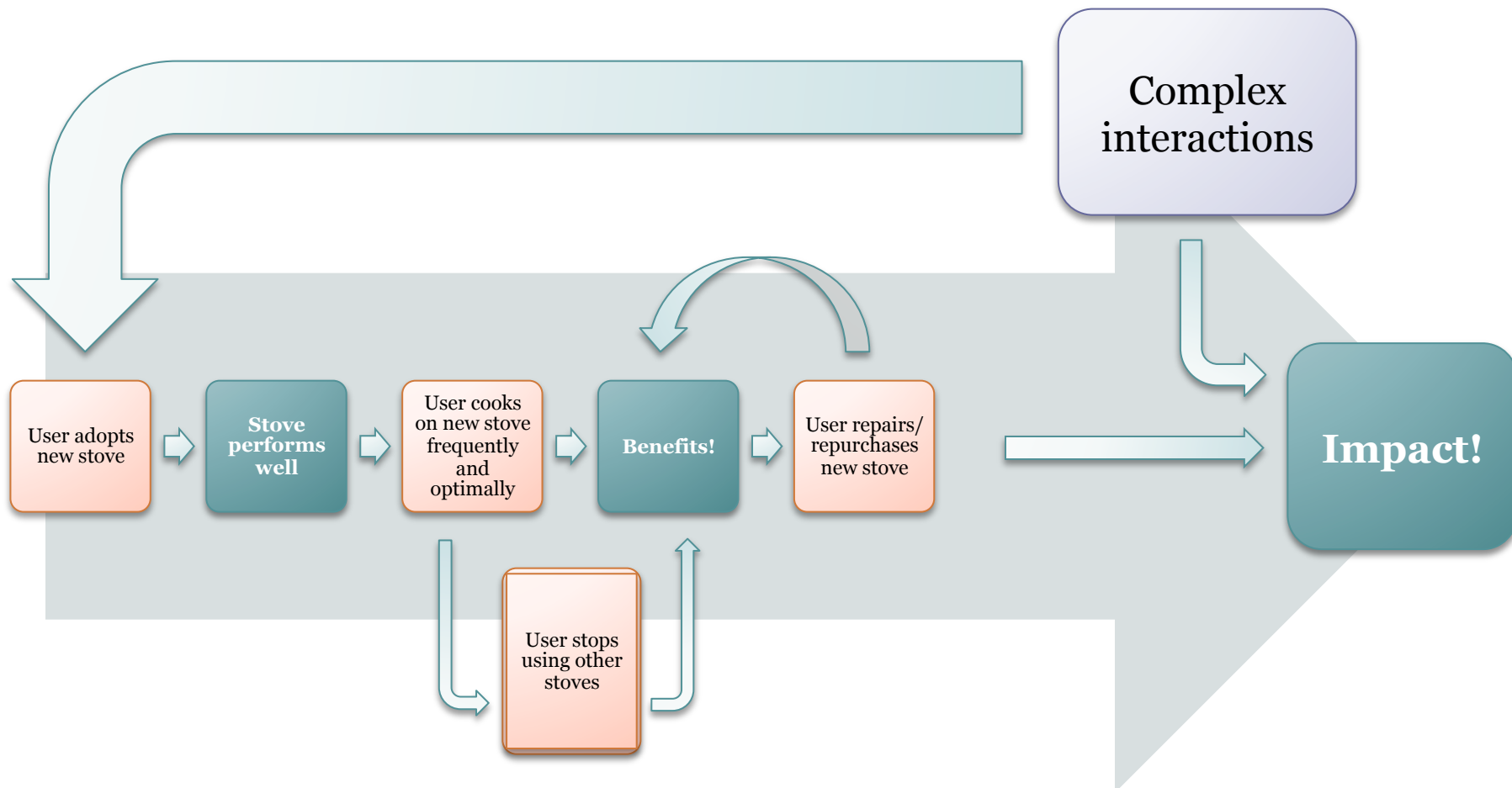
Complex interactions: cooks and stoves



Complex interactions: cooks and context



A complex theory of change



HOW DO YOU KNOW

WHAT

WORKS

Randomized-control trials

Gold standard...



Randomized-control trials

Gold standard...
...or black box?

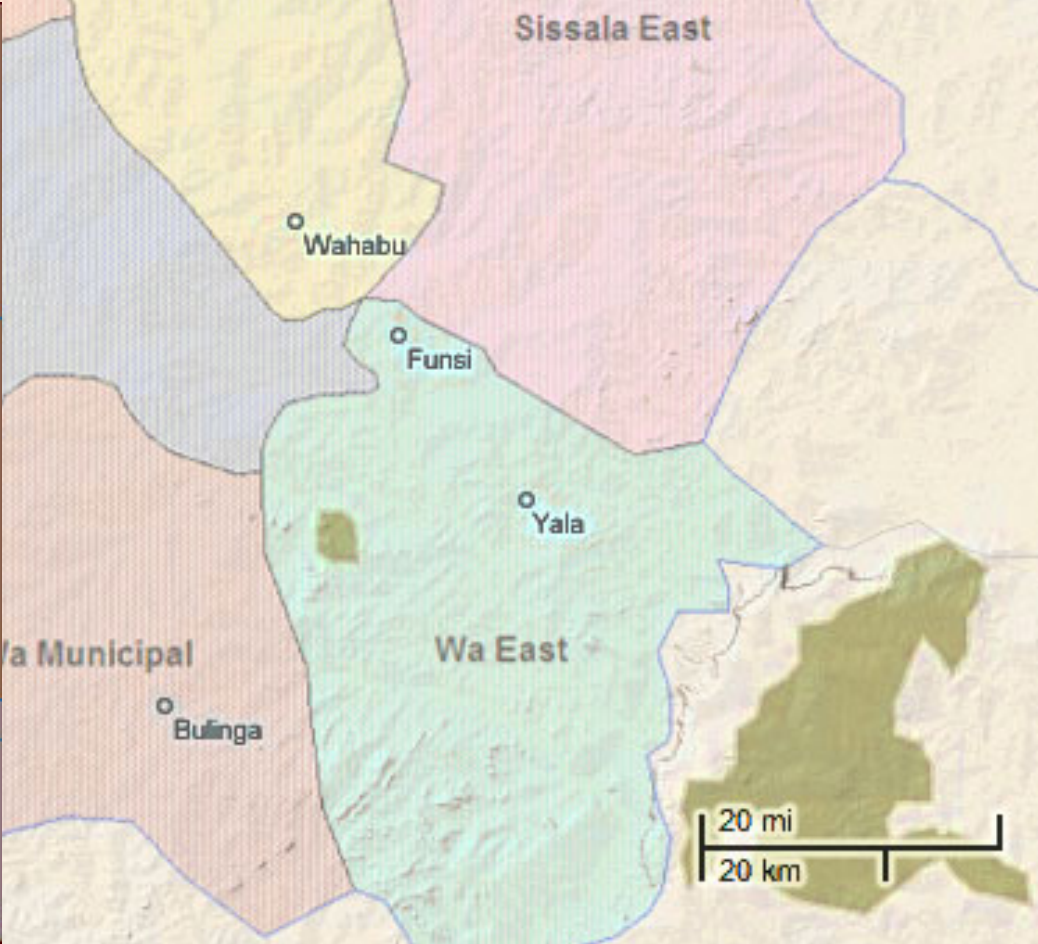
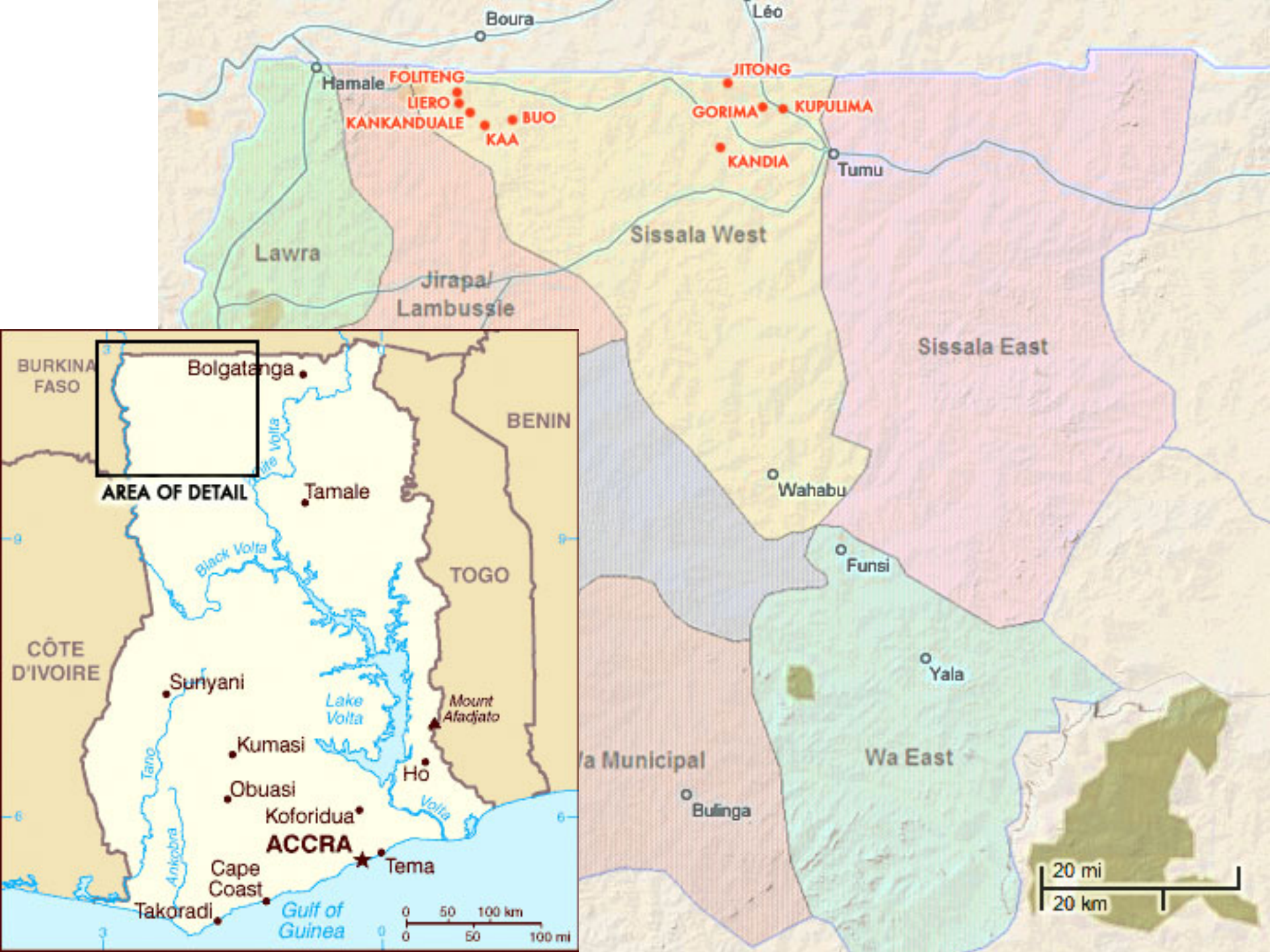


Causal pathways?

My fieldwork in Ghana

- Randomized-control trial of improved stove
 - 768 participants across 8 villages
 - Woman-to-woman trainings
 - Controlled cooking tests
 - Stove usage monitors
 - Follow-up field observations at 8 months







Stove performance results 1

- No detectable difference in exposures to carbon monoxide
- Prompted more indoor usage
 - Negative impacts possible for some individuals



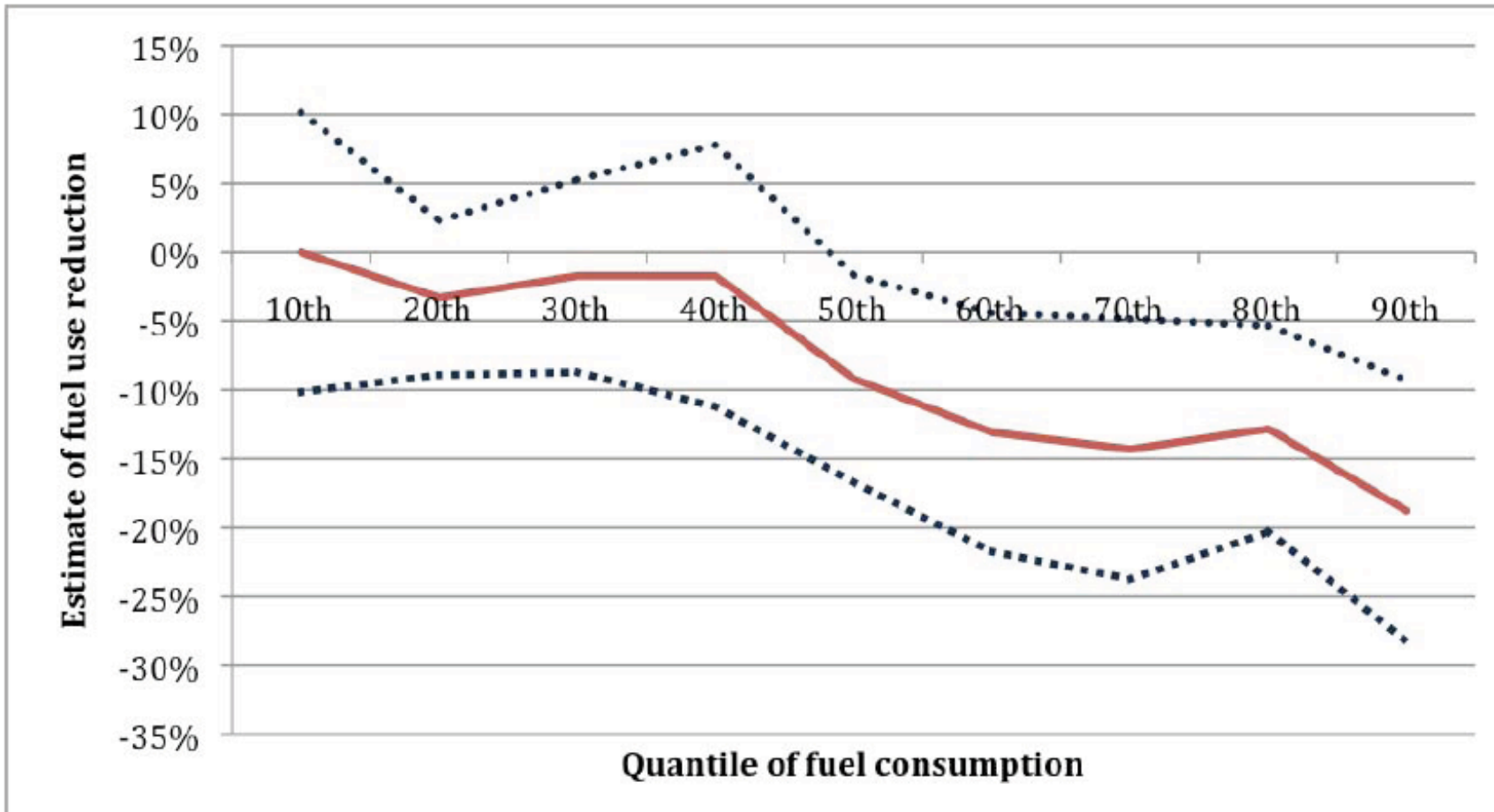
Stove performance results 2

- 14% less fuel use on average



Effect varies with consumption level

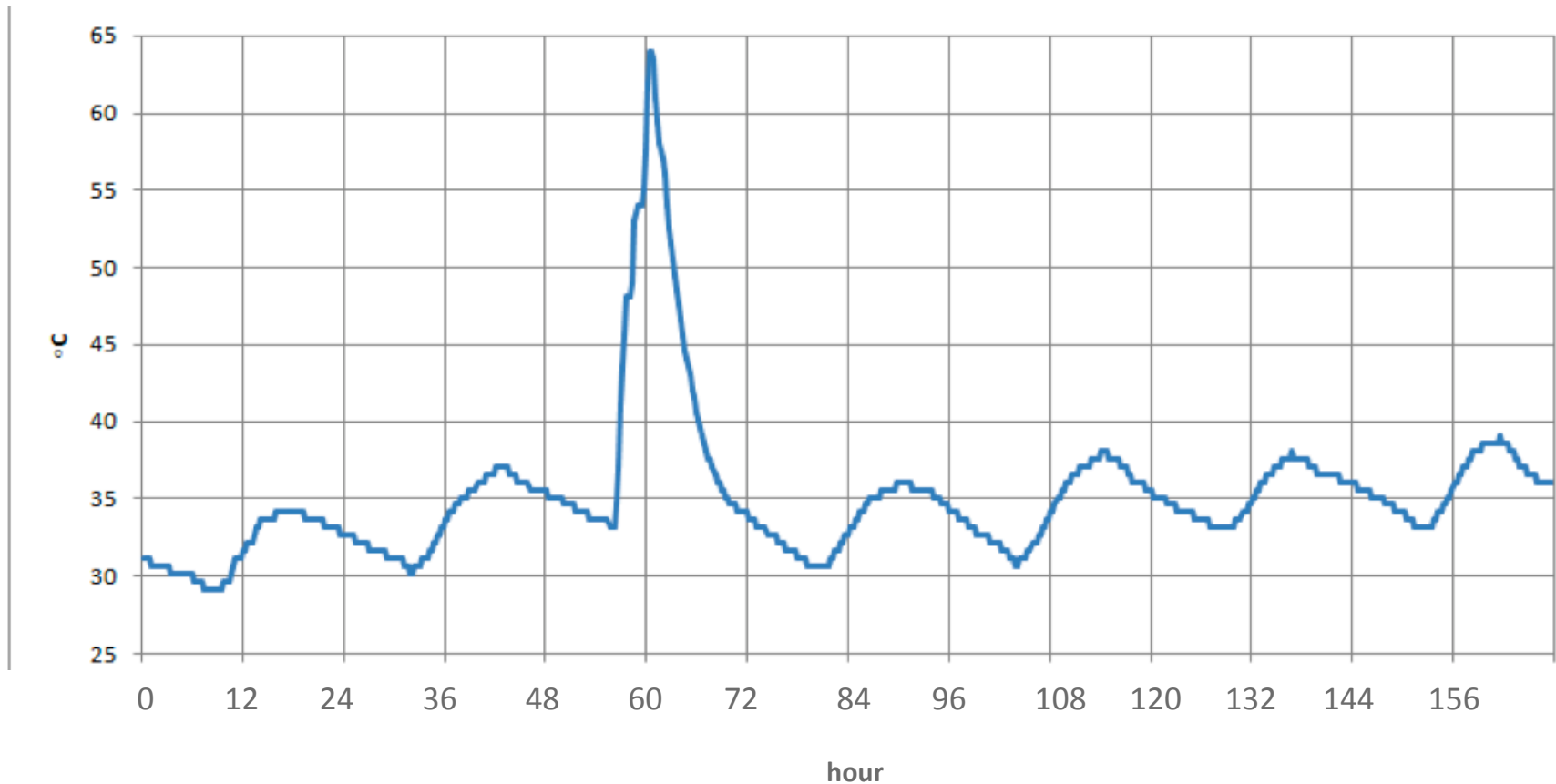
Dashed lines indicate 95% confidence interval.



Fuel use = $\beta_0 + \beta_1$ treatment group status + β_2 outside location + β_3 cooked food weight + β_4 education day attendance + β_5 education day attendance x treatment + ∂ village + e

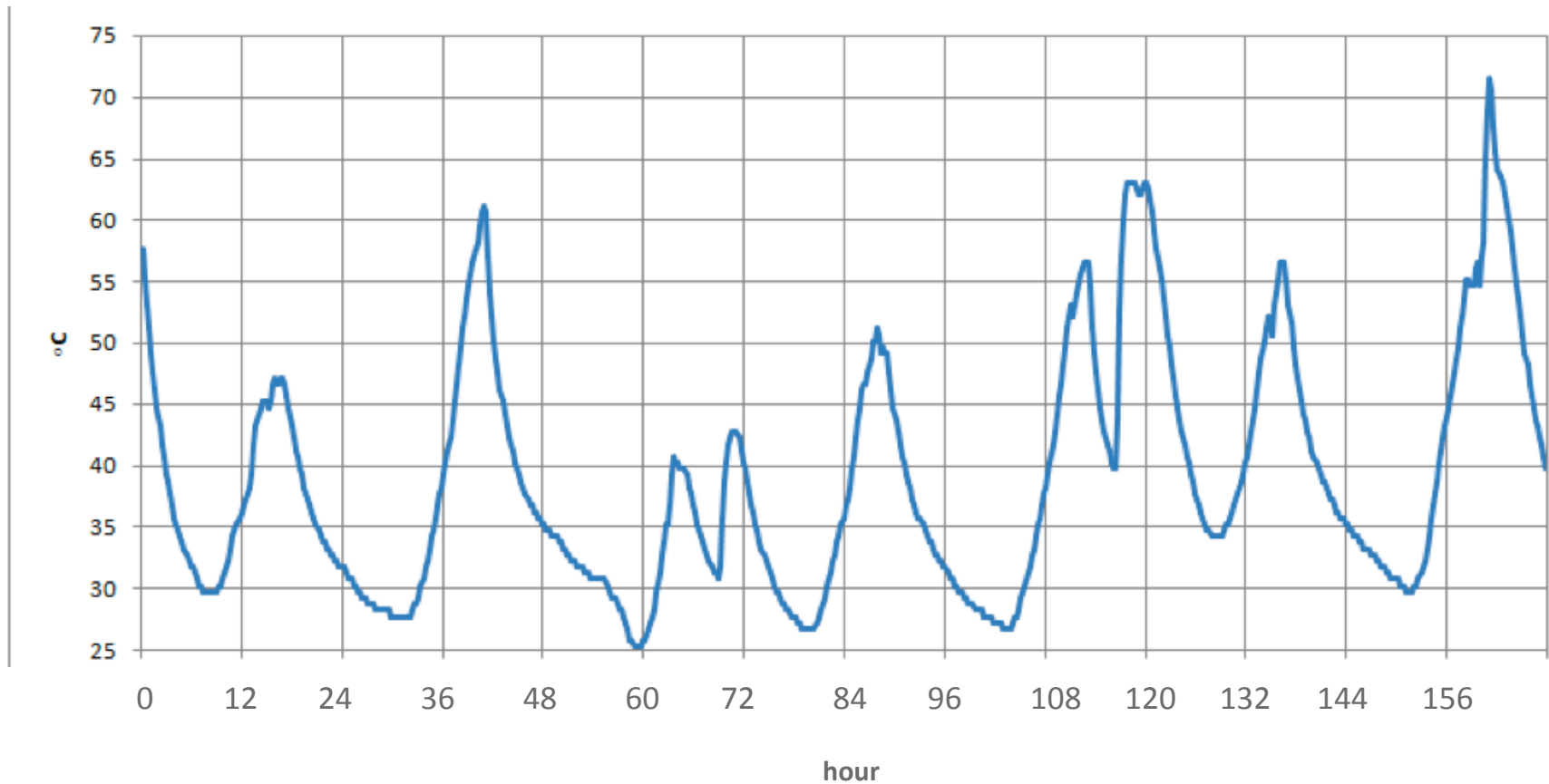
Interpreting stove usage monitor data

- Obvious...

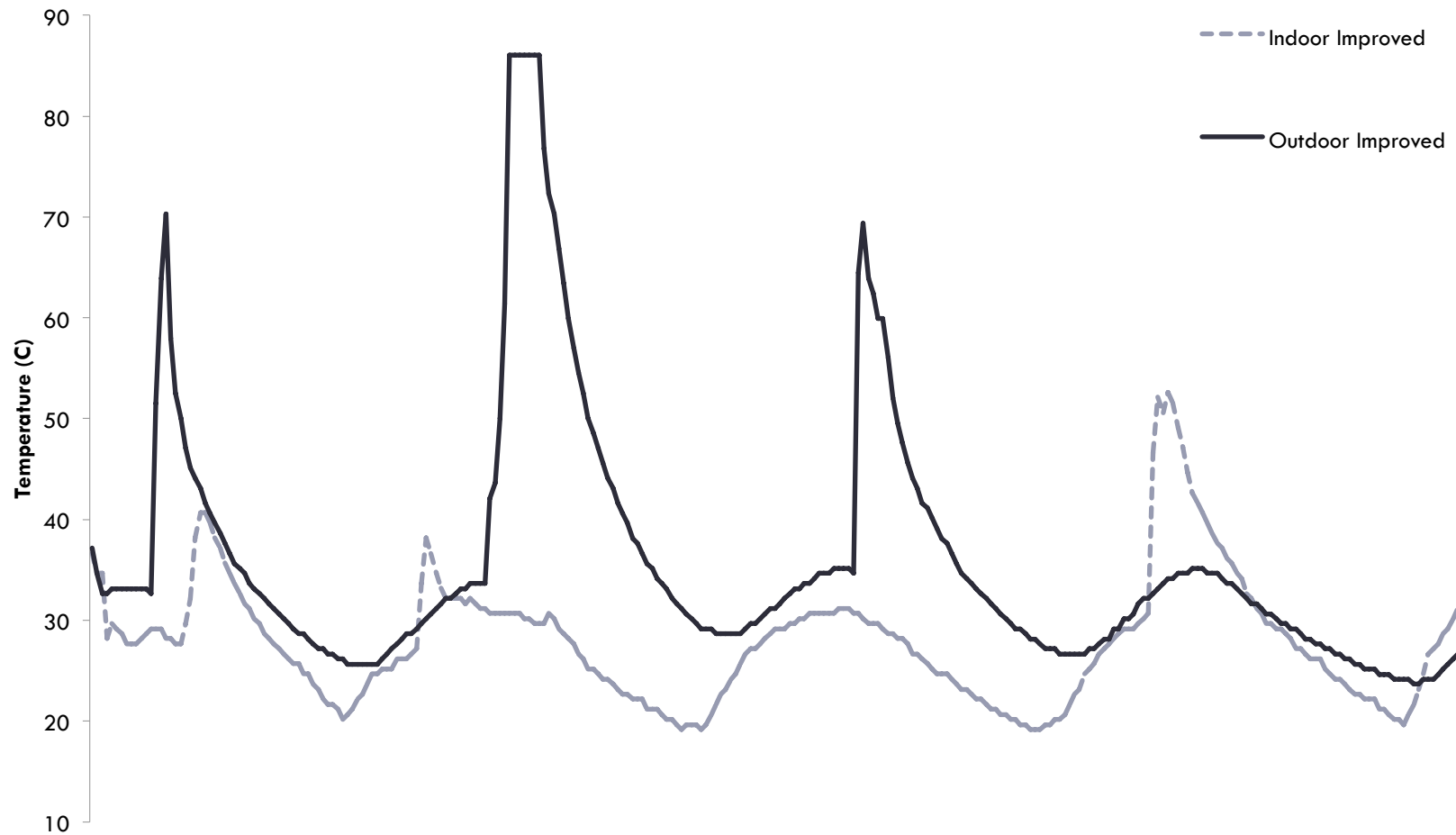


Interpreting stove usage monitor data

- Not so obvious...

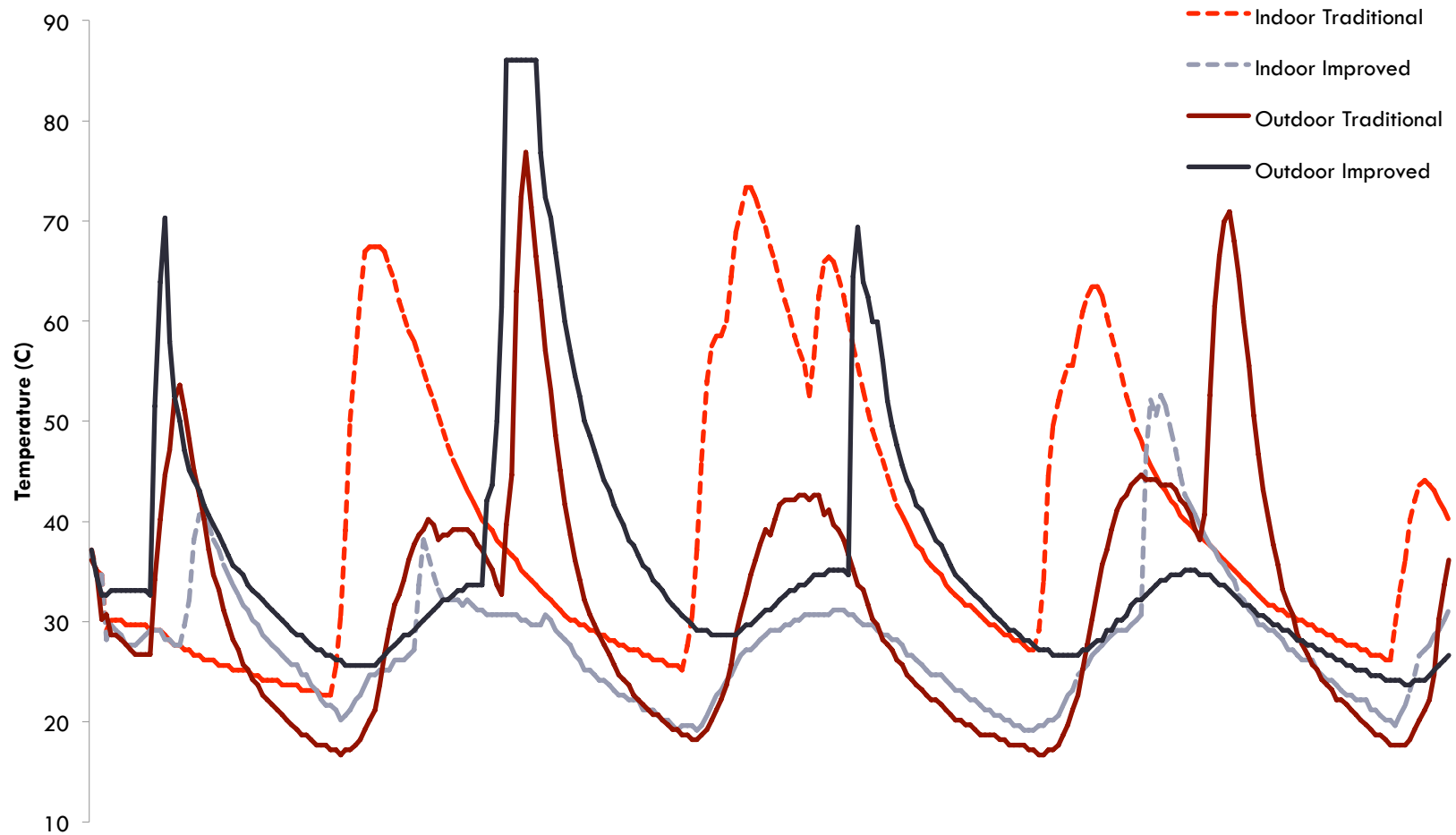


Dynamics of multiple stove use



Three and a half days of activity represented

Dynamics of multiple stove use



Three and a half days of activity represented

Indicators of stove uptake

- **ADOPTION** 80% of new stoves
- **USAGE** new stoves on average used $\sim 1/2$ of all days
- **SUBSTITUTION** mixed evidence
 - Fewer traditional stoves per household
 - But more time spent cooking on traditional stoves
- **MAINTENANCE** $\sim 1/2$ of observed new stoves still in use after 8 months – but 25% broken

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- Selective trials

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 - Qualitative methods

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Thank you

- Faculty input
 - David Levine
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