Quantifying and measuring climate, health and gender co-benefits from clean cooking interventions

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August 6th, 2020

Project activities: Field Study on Quantifying and Measuring Climate, Health and Gender Co-Benefits from Clean Cooking Interventions

- Select project implementer
- Review methodologies
- Design field study to tech methodologies
- Test methods with field study
- Report results and recommendations

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Implementing partner selection

- Competitive process:
  - Technology considerations
    - Low emissions fuel/stove technology (Tier 3 emissions or better)
    - Safe and durable
  - Programmatic considerations
    - Meet household cooking needs (high potential for displacement of traditional stoves)
    - Sustainable fuel supply
    - Focus on SSA
  - 13 applicants

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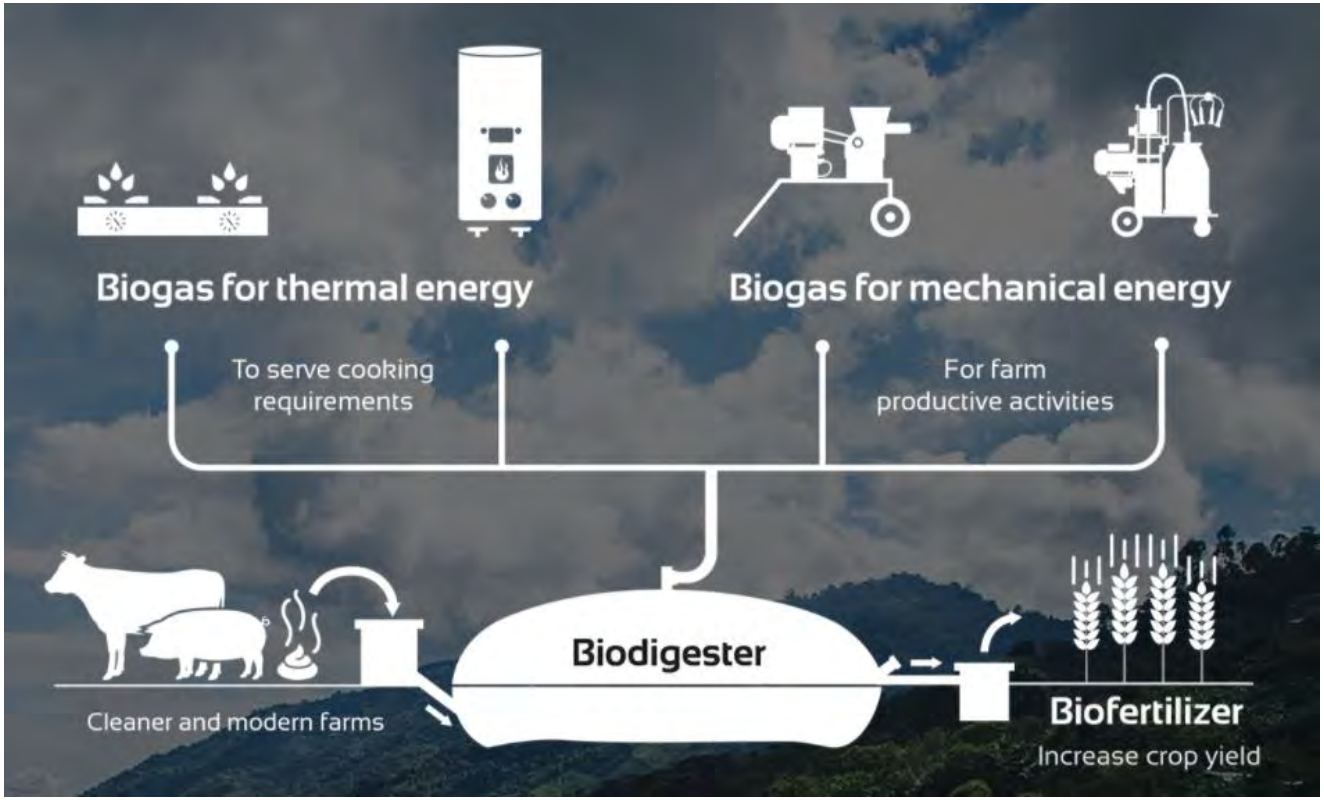
Selected partner

Manufactures, sells, installs and provides financing for biodigester systems for small and medium-scale farmers.

A choice of one or two burner stoves included in biodigester package.

2019 Ashden Award winner

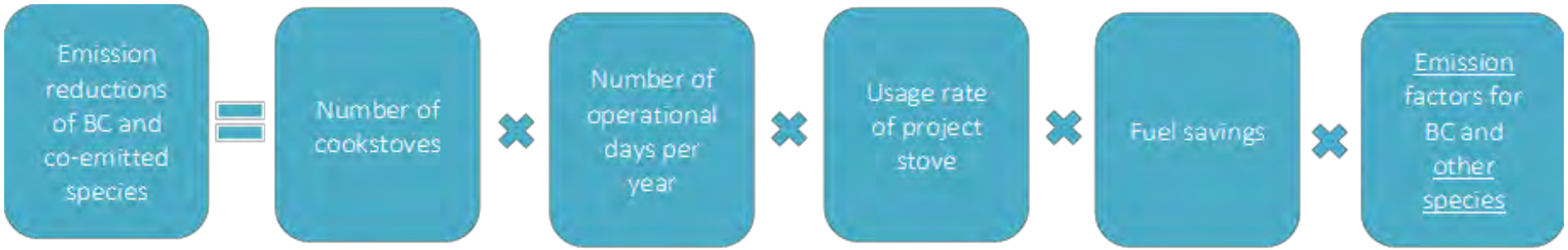


Methodology review

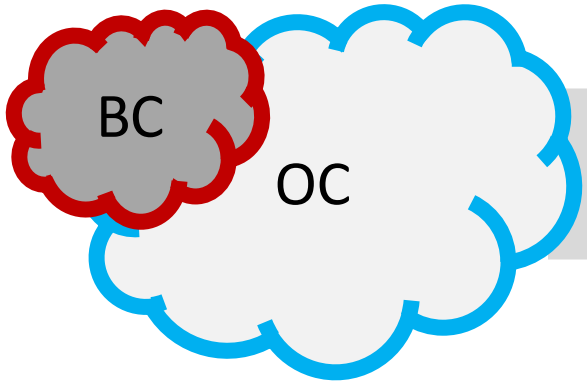
CRITERIA	PURPOSE
Cost Effectiveness	While the chosen methodologies and approaches will be robust and have environmental integrity embedded in their design, profitability for practitioners and users will be essential to their usefulness. Among others, the key determining factors of their cost-effectiveness include: (i) monitoring requirements, such as field or lab-based testing, surveys, and minimum sample size, and (ii) enabling infrastructure, including any needed monitoring expertise, availability of testing facilities across geographies, monitoring equipment costs, and other resources.
Scalability	Methodologies and approaches will be assessed for their potential to help projects and programs scale-up effectively.
Replicability	The reference methodologies and approaches should be replicable. Projects in different geographies, of different scales, and using a range of ECCH interventions should all be able to use these methodologies.
Robustness	The methodologies and approaches will be assessed for robustness for quantification and verification of the impact and whether they have been developed in consultation with a wide variety of stakeholders, including subject experts.
Compatibility	Ideally, application of the methodology should be compatible with methods for verifying other impacts.
Operational Feasibility	The operational feasibility of bringing the methodologies and approaches up to scale will be assessed.

Climate impacts (short-term)

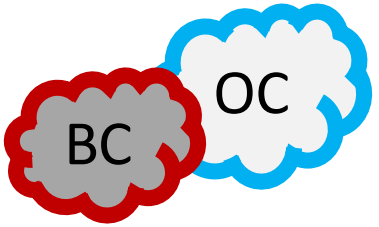
The Gold Standard methodology "Quantification of climate-related emission reductions of Black Carbon and Co-emitted Species due to the replacement of less efficient cookstoves with improved efficiency cookstoves"



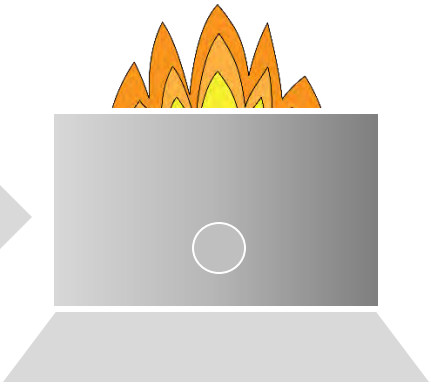
Factors affecting the warming impact from aerosol emissions



Emission factors for BC and OC



Displacing traditional stoves with new stoves changes:

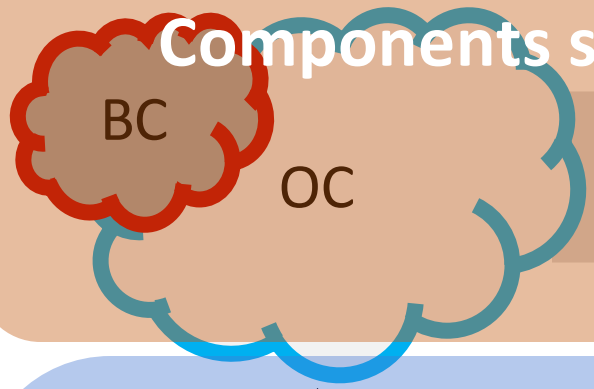


and fuel consumption

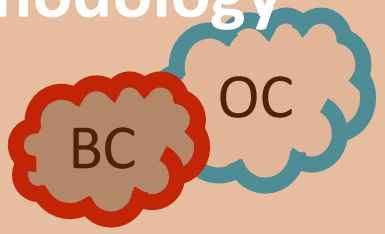
Other factors impacting climate forcing: Extent of displacement, geography, weather, modeling assumptions, co-emitted pollutants, brown carbon, fuel renewability, etc…

Factors affecting the warming impact from aerosol emissions

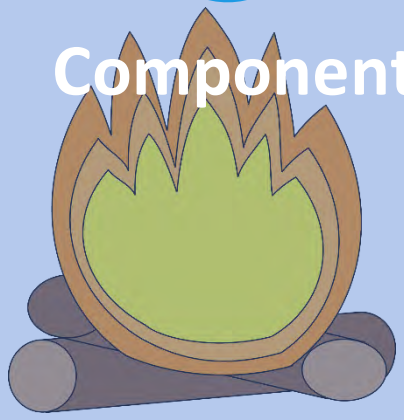
Components specific to black carbon methodology



Emission factors for BC and OC



Components of the standard carbon methodology



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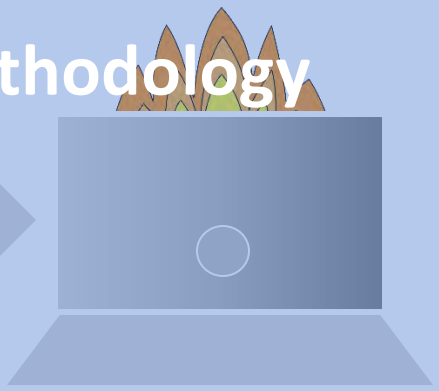

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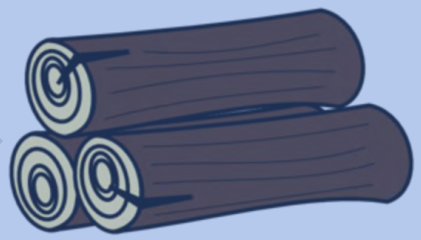

Other factors impacting climate forcing: Extent of displacement, geography, weather, modeling assumptions, co-emitted pollutants, brown carbon, fuel renewability, etc…

Methods for estimating emission factors

- Current: measure in the field (expensive/technical), or laboratory (accurate?) and adjust if needed based on a sample of simple concentration measurements.
- Recommendation for alternative approach: Use literature values from recent field studies (not available at time of original methodology development).
- We will compare the results of using both approaches.
- Use of technology-specific defaults could result in less-expensive monitoring and more accurate results

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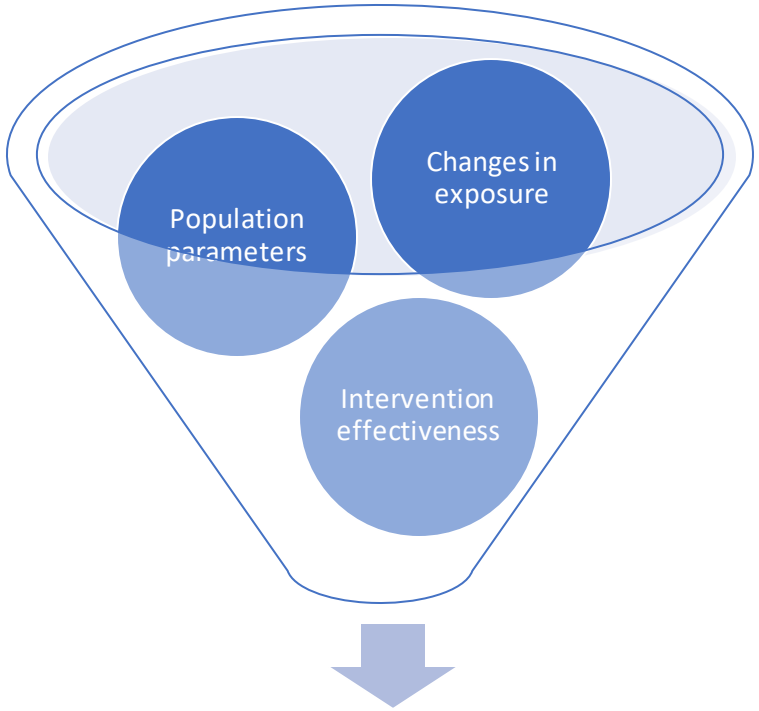
Health Methodologies
Dr. Sumi Mehta

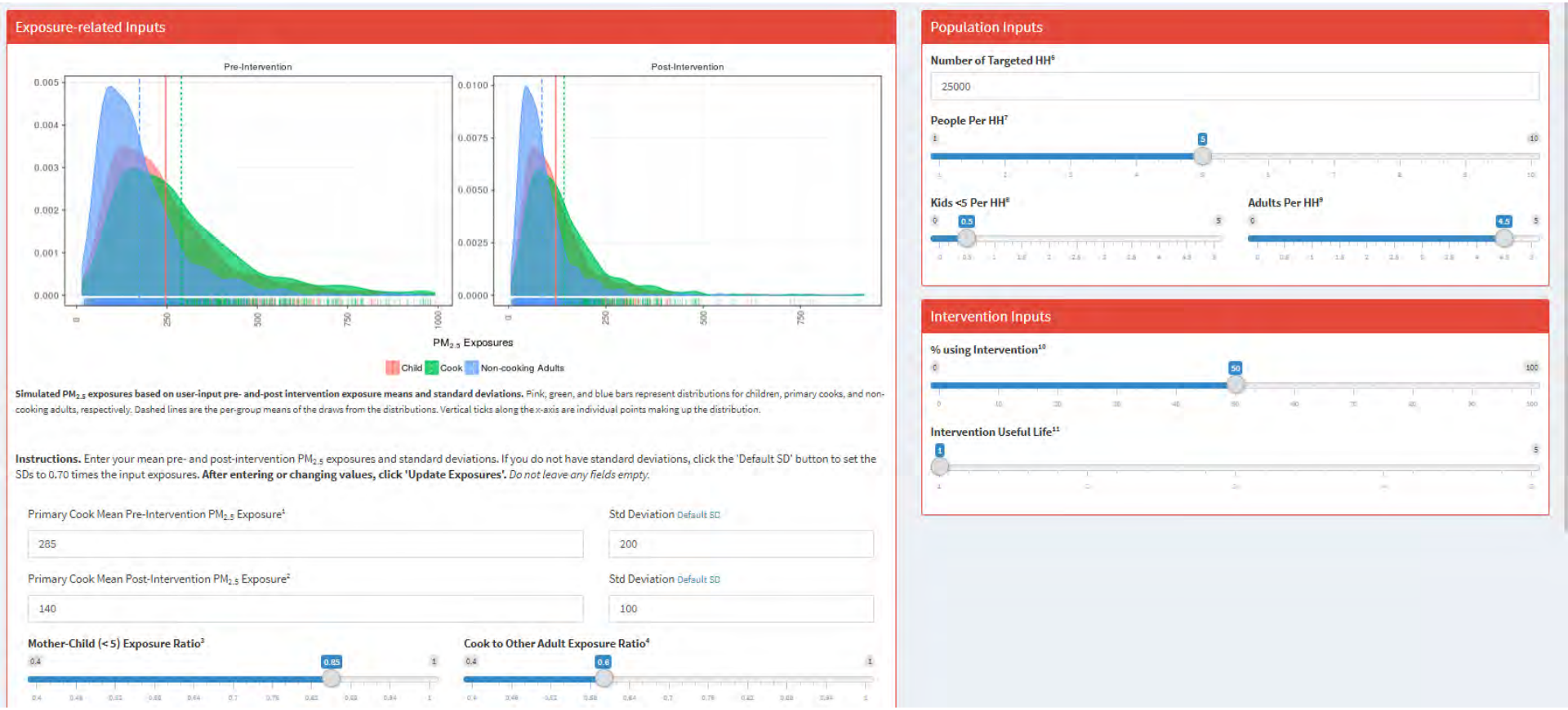
Despite widespread interest, only one methodology (Gold Standard) applied to date

Approach: estimate averted illness and death expected from reduced air pollution exposure



Methodology uses HAPIT tool to estimate impacts

https://householdenergy.shinyapps.io/hapit3/



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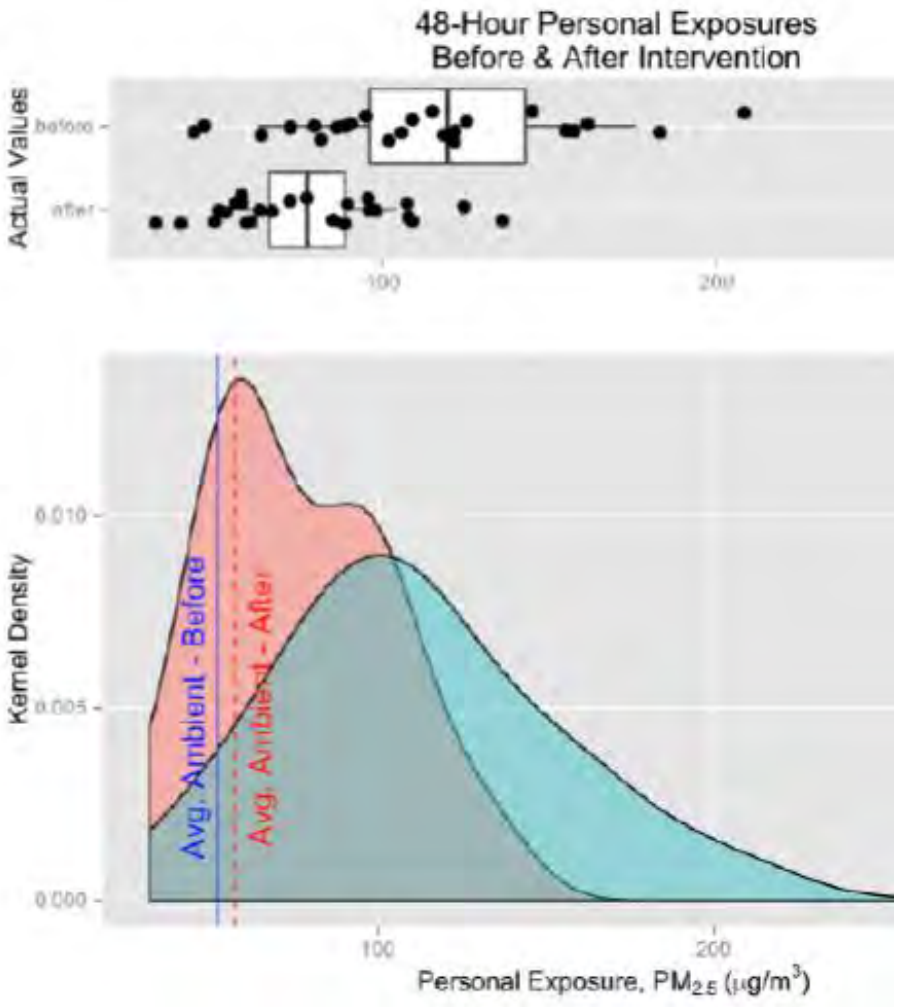
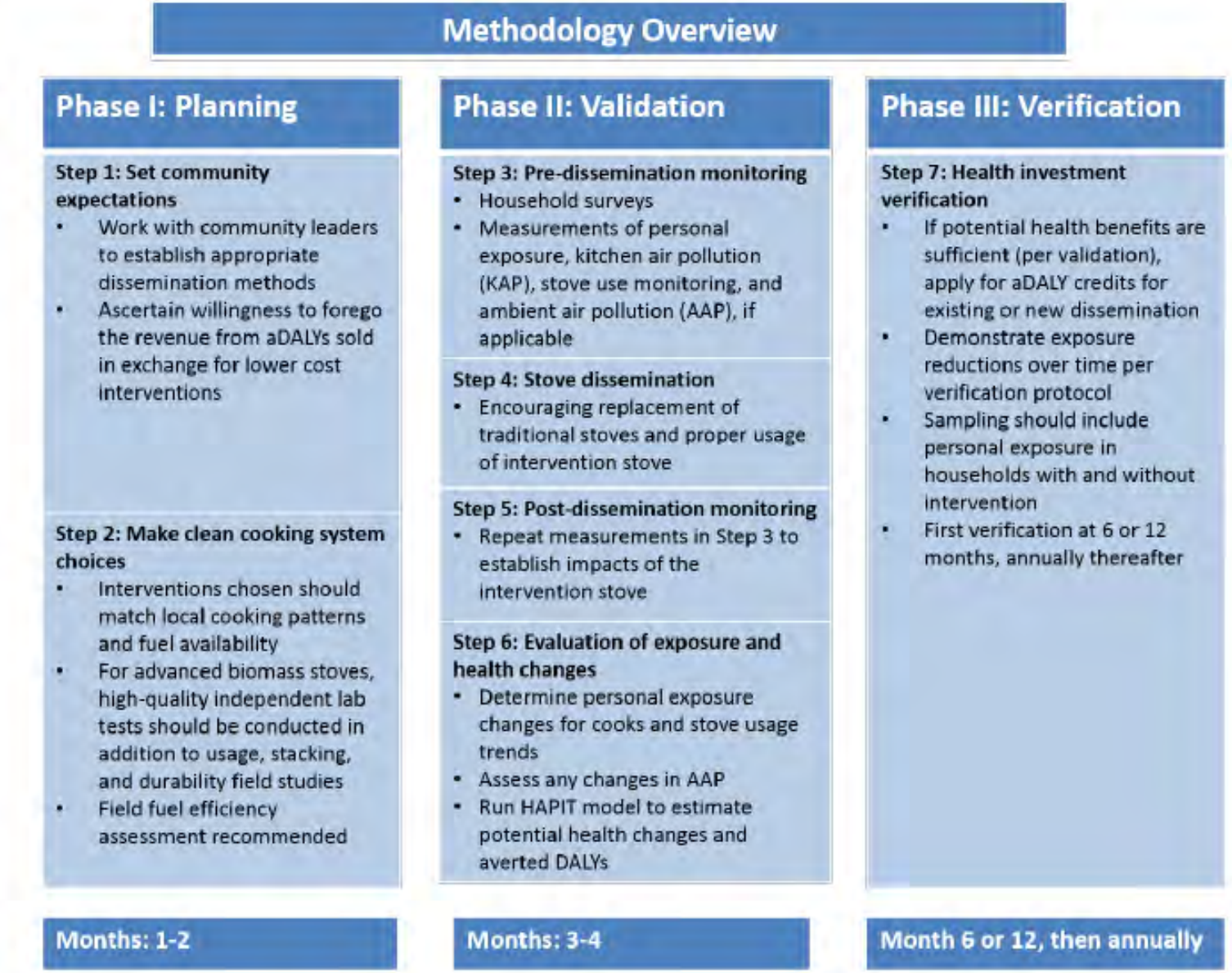
Lao PDR Case Study

Averted burden of disease calculated assuming $PM_{2.5}$ exposure reduced from 119 to 77 ug/m^3 in 25,000 households, no stacking, 3-year stove lifetime, and 75% usage



Source: Smith K.R et al 2015.

LAO PDR Case Study: Summary of Recommendations, by Phase



How Could Other Methodologies Be Applied to Measure Health Benefits of Clean Cooking Interventions?

Application Methodology Framework	Example of Application	Example of Application for ECCH Interventions
W+ health method	One project on food, fuel, and livelihoods includes focus on health benefits of no pesticide, clean water (nothing on air pollution)	Self-reported general health and problems due to air pollution (indoor and outdoor)
Reductions in personal exposure to $PM_{2.5}$	Health impact assessments for air pollution	Reductions in personal exposure to $PM_{2.5}$
Measures consistent with health sector and health systems performance	Increased use and quality of health services received	N/A: Measures are too distal from intervention
Measurement of change in health expenses	Water and sanitation interventions	Reduced household energy-related health expenditures
Measurement of direct health outcomes or changes in health-seeking behavior (health care facility-based measures)	Number of children immunized; number of women receiving antenatal care visits	Reduced visits to health care facility for respiratory illness; improved lung function
Self-reported health indicators and outcomes (based on validated questions, e.g., DHS)	Reduced diarrheal disease associated with improved water and sanitation	Reduced respiratory illness in young children

ADALYs methodology is resource intensive but remains the best option at present.

Criteria	ADALYs methodology	Personal exposure to $PM_{2.5}$	Measures consistent with health sector / health systems performance	Measurement of change in health expenses	Measurement of direct health outcomes / changes	Self-reported health indicators and outcomes
Cost-effectiveness	resource intensive	resource intensive	depends on the current capacity of the health system → can be cost-prohibitive	Inexpensive on a per household basis.	depends on the current capacity of the health system	inexpensive on a per household basis
Scalability	Yes	Yes	Yes	Yes	Yes	Yes
Replicability	Yes	Yes	Possibly	No	Yes	No
Robustness	Yes	Yes	No	No	No	No
Compatibility	Yes	No	No	No	No	No
Operational feasibility	best option at present → integrates exposure with epidemiologic evidence	most accurate risk indicator, but inconsistent with conventional health sector outcomes	not relevant to this sector	only feasible at an extremely large scale	only feasible at extremely large scale	unreliable measures, results highly influenced by external factors which are difficult to predict and quantify

Gender Methodologies
Dr. Joni Seager

Overarching goal

To improve the evidence base on the gendered dynamics of adoption of cleaner cookstoves:

- are there identifiable gender specific co-benefits?
- more specifically, can adoption of cleaner cookstoves contribute to/enhance gender equality & women's empowerment?

An audacious leap!

Common premise of established methodologies and literature:

gender co-benefits and women's empowerment might be leveraged by,

- time savings (relieving time poverty)
- reduction in drudgery associated with traditional cooking (primarily fuelwood collection)

Foundational proposition:

the improved cookstove might be an "index intervention" that produces time savings, which in turn, may enable and catalyze women's empowerment and gender equality

Established conceptual and methodological frameworks

METHODOLOGY	METHODOLOGY TYPE	ASSESSMENT APPROACH
Women Organizing for Change in Agriculture and Natural Resource Management (WOCAN)/ W+ methods	Framework & Measurement	Survey algorithm to convert measured results and outcomes to women's empowerment "credits" Requirements and guidelines to enable the design of project-specific monitoring and a quantification approach for gender claims
Gold Standard Gender Equality Requirements and Guidelines	Framework	Survey and other methods Requirements and guidelines to enable the design of project-specific monitoring and a quantification approach for gender claims
Clean Cooking Alliance and International Centre for Research on Women (ICRW) Social Measurement Impact System	Measurement & Framework	Survey by phone and/or in person Customized survey templates for both cookstove and fuel value chain and end users
The Women's Empowerment in Agriculture Index (WEAI)	Measurement index	Survey and provision for time diary

Mixed methods approach

Time saved:

quantitative/time trackers; qualitative self-reporting and survey

"So what?" of time savings and satisfaction (how women do or could use their time, probing for links to empowerment opportunities):

qualitative semi-structured interviews, focus groups

Reduction of "drudgery":

qualitative, semi-structured interviews, focus groups

Current state and changes to gendered dynamics of cooking and cooking technology:

qualitative, semi-structured interviews, focus groups

Contributions

- expand the currently thin field-based evidence base on gender co-benefits of improved cookstoves

- establish a foundation for specifically empowerment-focused longitudinal studies

Contributions

- engage with complexities of the global clean-cookstoves gender agenda:

  problem and priority definition;

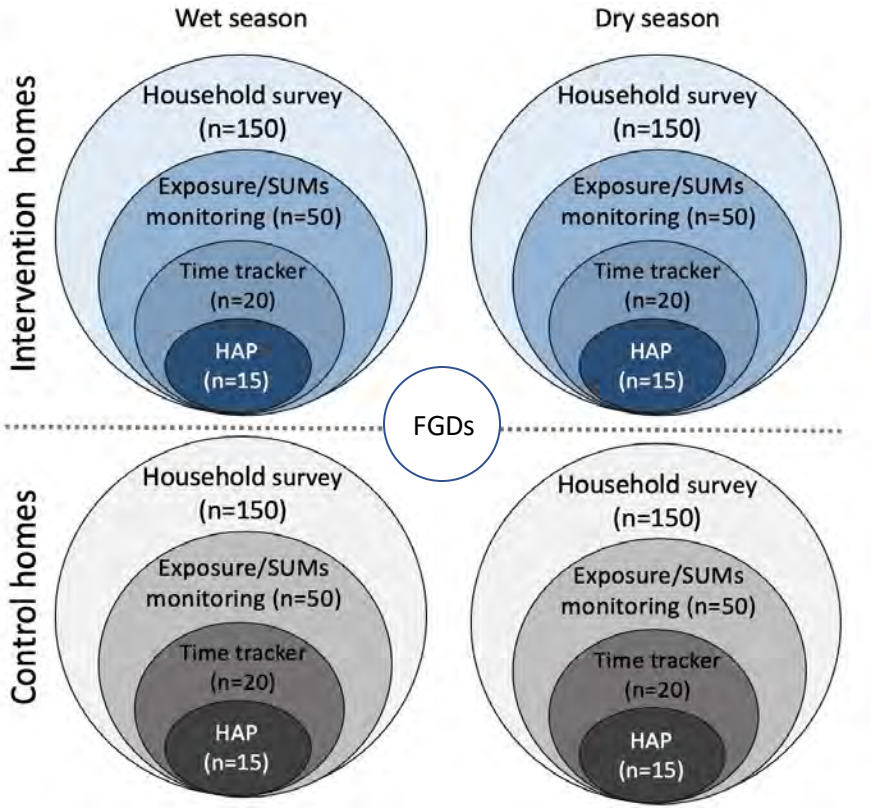
  contradictions in foregrounding improved domestic appliances as a pathway to women's empowerment;

  global investor monetization of women's unpaid labor as a solution for global problems.

Next steps
Dr. Michael Johnson

Field Testing

Aim: demonstrate the measurement and quantification process of the three co-benefits applying the methodologies and recommendations from the review process.



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Thank you