# IMPACT EVALUATION OF INYENYERI RWANDA

## Adoption and Sustained Use (R5-2016)

Motivating households to adopt new cooking energy systems is a major challenge for mitigating household air pollution (HAP), improving human well-being and reducing the environment and climate impacts associated with HAP. Despite decades of effort by the natural resource community, wide-spread adoption of cleaner cooking technologies is limited. With new information on the scope and scale of the health burden associated with HAP, and the role that HAP plays in regional and global climate change, the global community has renewed efforts to catalyze adoption and sustained use of cleaner cooking energy systems. While several factors motivate adoption, there are also numerous barriers to adoption and sustained use.

### Research Question

*What factors act as drivers and barriers to adoption and sustained use of the Inyenyeri household energy system?*

Using a structured household survey at baseline (N=1,462 households) we collected data on several factors hypothesized to act as drivers or barriers to adoption and sustained use of cleaner cooking energy systems including:

- Household and cook demographics
- Household socioeconomic status
- Household expenditure patterns
- Cooking environment and preferences
- Knowledge about health, environment and climate impacts of cooking
- Rates of time preference (i.e. how much the household decision maker and cook value having something now vs. later)
- Time use and labor allocation
- Social capital and networks of household decision makers and cooks
- Relationship between household decision maker and cook

We also used stove use monitors (SUMs) to objectively measure use of stoves in the household for a sub-sample of 180 households. We use these temperature loggers to monitor the 2 most commonly used stoves for 4 weeks at baseline. We monitor stove use at baseline and for each of the 4 subsequent visits to households to better understand how respondents use newly adopted stoves, for how long and for what types of activities, and household decision making around stove stacking (i.e., using multiple stove technologies within a household).


**Figure 1: Mimi Moto improved cook stove with stove use monitor (SUM) (in yellow circle)**

### Knowledge about health, environment and climate impacts

There are considerable differences in awareness of health, environment and climate impacts when the main respondent (i.e., person with decision-making authority about food and cooking) is the primary cook (N=775) vs. when the primary cook does not have decision making authority (N=687) (Fig 2). Respondents who were aware of the negative impacts of biomass fuels and traditional technologies generally cited using cleaner fuels and stoves as the most important action they could take to reduce impacts. Eighty-five percent of main respondents believe that some stoves produce less smoke than others, and 88% believe that some fuels produce less smoke. Using cleaner fuels and stoves were identified as strategies for reducing impacts.

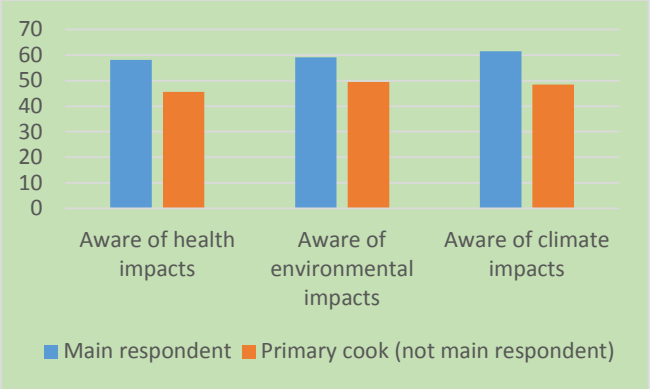


**Figure 2: Knowledge about impacts of HAP**

## Most desired attributes of stoves

We asked respondents to cite the best and worst attributes of their most commonly used stove and fuel. Percentages reported reflect first and second ranked priorities. Our results are most indicative of households using fixed or portable charcoal stoves and charcoal.

### *Best attributes of stoves*

- Speed of cooking (52.4%)
- Cost of stove (22.9%)
- Ability to cook all foods (21.6%)
- Smoke produced by stove (19.8%)
- Cost of fuel (12.5%)

### *Best attributes of fuel*

- Speed of cooking (46.1%)
- Cost of fuel (43.8%)
- Convenience and availability (36.6%)
- Smoke produced (32.2%)
- Taste of foods (13.9%)

### *Worst attributes of stoves*

- Safety/danger (32.6%)
- Durability (23.6%)
- Smoke produced by stove (22.2%)
- Speed of fuel (11.8%)
- Maintenance of stove (11.1%)

### *Worst attributes of fuel*

- Cleanliness (67.2%)
- Cost of fuel (32.5%)
- Safety/danger (30.2%)
- Smoke produced (22.6%)

## Objectively measuring stove use (SUMs)

SUMs provide us with real time data on how households are using their stoves. Figure 3 illustrates that the second stove (SUM #2) was not used during the 24-hour monitoring period. Fig. 3 also illustrates that most personal carbon monoxide exposures (blue line) are attributed to cooking.

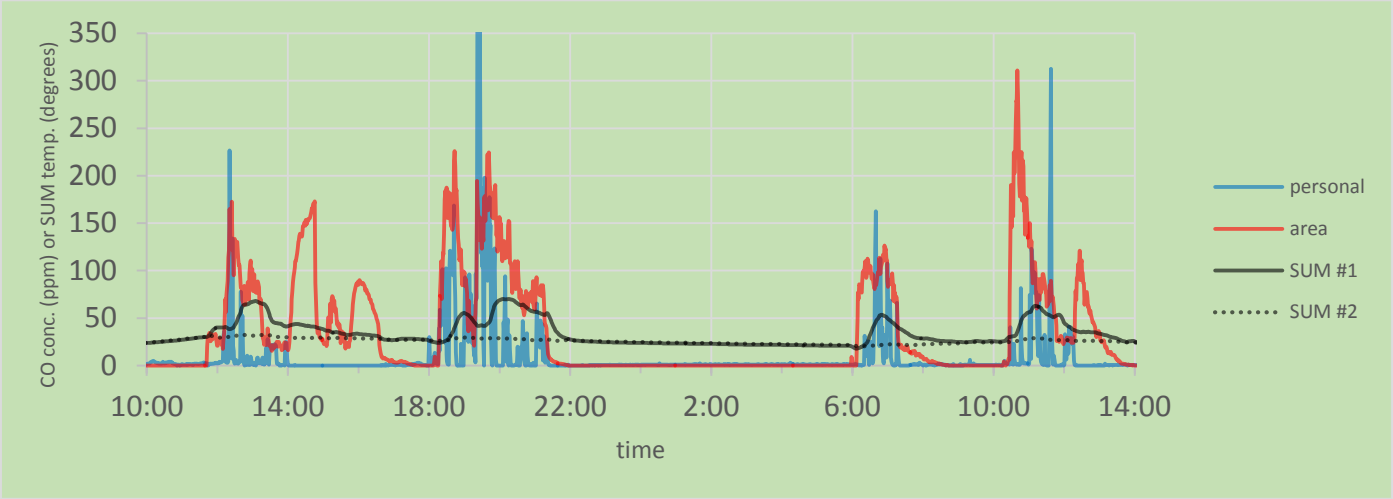


**Figure 3: Personal and area carbon monoxide concentrations and SUM temperatures for two stoves**

**Next steps:** Our next round (Wave 2) of data collection will take place May-July 2016 when we revisit our sub-sample of 180 households. Wave 2 will have an explicit focus on drivers and barriers to adoption and sustained use. Our study will include a series of qualitative interviews, personal exposure monitoring, stove use monitoring and a short version of the *Health, Poverty and Cooking (HPC)* survey.

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