Evaluation of Behavior Change Communication Interventions in the Clean and Efficient Cookstoves and Fuel Sector

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Study Overview

This multi-project evaluation aims to evaluate the impacts of four initiatives selected by the Global Alliance for Clean Cookstoves to receive funding to implement a range of behavior change communication (BCC) interventions in Kenya, Nigeria, and, Bangladesh. The evaluation's primary goal will be to identify which BCC interventions support scale-up of clean and efficient cooking, to understand how and why they work, and ultimately to model their impact in the Alliance's key mission areas of health, environment, livelihood and gender. The evaluation will employ a quasi-experimental design[1] to examine the dose-response relationship between the intensity of exposure to the implemented BCC interventions and behavior changes over time, specifically cookstove purchase and adoption. Through multivariate regression modeling, we will examine the effects of variable levels of respondent exposure to each type of cookstove promotion on knowledge, attitudes, intentions as behavioral precursors, and on correct and consistent use of stoves.

The approaches that are expected to be used to evaluate the effectiveness and impact of the BCC interventions include population-based rapid surveys, in-depth interviews, observations, focus group discussions, and intensive stove use monitoring. The evaluation strives to maintain core elements across all projects to allow for cross-project comparison, while allowing flexibility so that each project evaluation is customized to the implementing consortium's needs and circumstances. Thus the study design presented here will likely be refined through the first few months of the program, as the implementing consortia complete their formative research and decide their intervention strategy.

Research Questions

1) Are the implemented BCC interventions effective in motivating people to purchase clean and efficient cooking technologies and fuels[2] and achieve sustainable and correct cookstove usage?

2) How much of the observed changes in behavior can be attributed to the BCC interventions implemented?

3) Is there a dose-response relationship between higher exposure to cookstove messages and the outcomes of cookstove purchasing and correct stove usage?

4) Were there aspects of the BCC intervention that were more effective than others? How does this vary by gender, income, and other demographic variables?

5) What are the impacts of the BCC interventions on relative progress towards the broader health, environment, gender, and livelihood goals?

Approach and Methods

The evaluation approach aims to collect robust data to answer the above research questions.

Effectiveness and Impact Assessment of BCC Interventions
Four key techniques will be used to characterize exposure and response to the BCC interventions to allow for assessment of impact.
- First, population-based 'rapid' surveys employed at multiple time points during the project, with approximately 1,000 respondents per survey period, to evaluate exposure to and impact of BCC interventions.

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[1] The quasi-experimental design to be implemented in this study is necessary as budgetary constraints limit a pure experimental design with a randomly assigned control group, and in some cases the use of mass media interventions inhibits the ability to establish an independent control group

[2] Note that the clean cooking solutions to be promoted through the BCC interventions are frequently referred to in this document simply as "stoves" or similar. We fully recognize that these solutions also involve fuels, changes in cooking practice, and design/performance trade-offs.

- In-depth Interviews will be used with a group of stove purchasers and a matched comparison non-purchaser group drawn from the rapid survey population during the mid-point and late intervention stages. These study interviews will explore determinants and barriers to purchasing and using new cooking technologies and fuels.
- Stove use monitoring will be conducted for 3-5 months on a subset of the purchaser and non-purchaser groups during the mid-point and late intervention stages. SUMS iButtons will be placed on all stoves in the selected households to provide an objective complete assessment of stove use patterns.
- Lastly, two qualitative methods will be implemented at the end of both the mid-point and late intervention monitoring periods: cooking event observation specific to the promoted stove type, and focus group discussions (FGD) conducted with stove purchasers to gain a deeper understanding of drivers and barriers to correct and consistent stove use.

It will be key to the evaluation project's success to ensure that the data collected specifically for the evaluation is augmented with the monitoring data (such as inputs and outputs) collected by the BCC implementing consortia. It will be an early project priority to collaborate with implementers to ensure all required data is collected without duplication.

Creation of a cookstove-messaging dosage index

Based on an underlying assumption that levels of BCC exposure will vary (by intervention, medium of exposure, natural variation etc.) and as a function of these varying levels of exposure, cookstove utilization outcomes measured will vary, the data collected using the above methods will allow for the creation a measure of intervention exposure, known as a cookstove-messaging dosage index (CMDI). A dose-response curve will in turn be calculated to determine effects of dosage on changes in cookstove behavioral predictors and usage (Shadish, 2001). Using data from the CMDI in conjunction with objective stove use monitoring, analysis will model intended BCC intervention effects on cookstove purchase and utilization, based on exposure. Regression models will be used to examine the dose-response relationship between BCC intervention exposure and cookstove purchase and usage.

Estimate of Impact in Various Arenas

Impacts for health, environment (climate and forest conservation) and gender/ livelihoods will be estimated by applying standard methodologies to evaluate relative impact. In most cases, the estimated impacts will be the sum of those from the different BCC interventions, as we suspect the granularity of attempting to differentiate by intervention will not be possible to achieve with any reasonable confidence.

- Relative health impacts will be assessed by the global measure of health impact, averted disability-adjusted life years (ADALYs). ADALYs are calculated using a combination of exposure and health modeling. Changes in exposure associated with the BCC interventions will be modeled and this in turn will then be used to estimate health impacts with the Household Air Pollution Impact Tool3 (HAPIT), which estimates aDALYs using integrated exposure-risk curves for several key chronic diseases and aggregates their impact.
- Relative climate impacts will be estimated using components of the Gold Standard Methodologies for quantifying long- and short-term impacts associated with household energy interventions. Both quantification methodologies will involve combining emissions performance, usage, and fuel consumption estimates
- The expected impact on the forests and woodlands will be assessed by comparing the spatial and temporal trend in woodfuel-driven degradation associated with the BCC interventions against the baseline scenario. Expected behavioral changes in cookstove use following different BCC interventions will be input into MoFuSS (Modeling Fuelwood Savings Scenarios) software[4], a dynamic model that simulates the spatio-temporal effect of woodfuel harvesting on the landscape vegetation and that accounts for savings in non-renewable woody biomass from reduced consumption.

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[3] https://hapit.shinyapps.io/HAPIT/ All potential BCC Fund countries have background health data required for HAPIT

[4] Ghilardi, A., Bailis, R., Mas, J.F., Skutsch, M., Elvir, J.A., Quevedo, A., Masera, O., Dwivedi, P., Drigo, R., Vega, E. (2016). Spatiotemporal modeling of fuelwood environmental impacts: towards improved accounting for non-renewable biomass. *Environmental Modelling and Software*. http://doi.org/Accepted for publication

- A standard methodology to assess relative impact on gender, livelihoods, and well-being is currently being developed by the Alliance in partnership with The International Centre for Research on Women. If available in time and deemed applicable to this project by the evaluation team, this methodology will be applied. Otherwise the team will adapt established livelihood and well-being measurement frameworks such as the Organization for Economic Cooperation and Development (OECD) framework for measuring well-being and progress (OECD 2013).

These modeled estimates will be made with several assumptions, and the uncertainty associated with the estimated impacts will be relatively large. Thus, while we believe there is tremendous value in estimating the relative progress towards various desired goals, we will present the modeled impacts in the proper context of their uncertainty.

Core Evaluation Team Roles and Contacts

Contact	Affiliation	Role
Michael Johnson, PhD	Berkeley Air	PI, cookstove performance assessment, health, and climate impact modeling
Kirstie Jagoe, MS	Berkeley Air	Development of data collection tools, support, and coordination for field studies.
Dana Charron, MBA	Berkeley Air	Evaluation study coordination
W. Douglas Evans, PhD	The George Washington University	BCC evaluation lead
Adrian Ghilardi, PhD	National Autonomous University of Mexico	Forestry impact modeling expert
Jonathan Rouse, MA	HED Consulting	Advisory expert on BCC and qualitative methods
Bonnie Young, PhD, MPH	Colorado State University	Sample design, statistical analysis

The contact point for this project is Michael Johnson, at mjohnson@berkeleyair.com with a cc: to Dana Charron at dcharron@berkeley.com and Kirstie Jagoe at kjagoe@berkeleyair.com.

The identity and contact of local field partners will be added as it becomes available.

Timeline

The timeline for key milestones for the evaluation project is as follows.
- By mid September 2016: Evaluation study design finalized in collaboration with the implementing organization and the Alliance.
- By end of Q1 2017: all baseline studies complete. The Berkeley Air team will coordinate these to ensure all are completed prior to BCC implementation.
- During Q3 and Q4 2017: all midterm evaluation studies complete.
- During Q1 and Q2 2018: all final evaluation studies complete.