

Annex 4a

Evaluation of Clean Cooking Behavior Change Communication Interventions: Mediae, Kenya Quantitative Results Summary



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1. Overview

The behavior change communication (BCC) campaign under evaluation was a home makeover TV & radio show, *Shamba Chef*, featuring a range of fuels and technologies and promoting clean cooking and nutrition. Thirteen weekly episodes of *Shamba Chef* aired on TV and radio, in English and Swahili. Four episodes featured modern wood burning stoves; seven modern charcoal burning stoves; two LPG stoves. Running from September 2017 and until December 2017 the BCC campaign reached an estimated 5 million people.

For more information on the BCC campaign please see <https://www.cleancookingalliance.org/market-development/demand-creation/campaign/shamba-chef-kenya.html>

This document presents the results from the **Mediae Kenya** baseline and endline rapid surveys (N=1,715). Baseline data (N=855) were collected in February 2017. Endline data (N=860) were collected in January 2018. Endline respondents had approximately 5 months of potential exposure to the BCC. The reasons for the delay between baseline and endline surveys are discussed in the separate document Annex 1.

The evaluation assessed the effects of the BCC exposures on **7 key outcomes**: (1) awareness of improved biomass stoves and LPG stoves, (2) positive attitudes and knowledge towards new cookstoves from visual aid A, (3) intention to purchase a visual aid A stove within the next month, (4) aspiration to use LPG for cooking, (5) purchase of improved biomass or LPG stoves within the 5 month BCC exposure period, (6) aspiration to own an improved biomass or LPG stove, and (7) aspiration to use LPG more than currently is used now.

Exposure to the BCC was explored through various metrics: (1) a summed exposure to all Mediae-related BCC materials based on self-reported frequency of seeing/hearing/experiencing each one, (2) individual BCC *Shamba Chef* materials J (TV) and M (radio) as their own exposure, and (3) a sum of all reported sources of exposure for knowing about improved biomass stoves (e.g., friends, family, radio, TV, webisode, etc.). Multivariable regression models assessed the impact of each exposure on each outcome, while adjusting for potentially relevant covariates, such as age, sex, education, and socioeconomic status, as well as other variables that could be related to the outcomes and exposures, such as stove use and media use.

The following report offers a top line summary of the study results. Section 2 presents the full descriptive statistics with comparisons between the two time points for demographic and socioeconomic characteristics, stove use, media use, and awareness of and attitudes to clean cooking. Section 3 provides the results from the descriptive analysis of the 5 outcomes. Section 4 describes the exposure to the BCC campaign materials. Section 5 presents detailed tables on the outcomes of the multivariable analysis. Finally, a discussion summarizing the report and an overall conclusion is presented in Section 6.

2. Descriptive Data

The respondent was involved in the decisions of purchases of larger household items and cooked at least 3x per week. This could have led to two members of the same household (HH) being involved in the survey in cases where the cook was not involved in decision making.

Sample selection was designed to reflect the target audiences of the Mediae BCC campaign in terms of area, socio-economic class, age of the cook, and fuel use patterns.

As defined by the BCC intervention target population, both surveys focused on upper low to middle income groups as defined by the Living Standard Measure¹ (LSM) groups 4-8 (equivalent scores 71-186) and those that lived in rural, peri-urban and urban locations.

Demographic and socioeconomic characteristics

The sample included respondents from urban, peri-urban, and rural areas, with rural being the lowest representation at baseline (17%) and endline (14%). Age groups of the respondents was fairly evenly distributed. The majority of respondents were female, at 91% for baseline and 86% for endline. Most respondents spoke English or Swahili, with only about 20% speaking another local language. Over half of the respondents had at least some secondary education or higher at baseline (58%) and endline (62%). Most respondents were married at both time points.

About 56% and 63% of respondents had paid work outside the home at baseline and endline, respectively). The LSM values were similar between two time points, with a mean of 115 (SD 31.5) at baseline and 120 (SD 35.2) at endline. The average number of people eating an evening meal in the household, excluding infants, was the same at both time points at 3.6 people (SD 2).

Table 1: Demographic and Socioeconomic Information

Variable	Response	BASELINE (N=855)		ENDLINE (N=860)	
		Freq.	Percent	Freq.	Percent
Area of residence (area)					
1	Urban	391	46%	336	39%
2	Peri-urban	322	38%	403	47%
3	Rural	142	17%	121	14%
	Chi-sq p=0.001				
Age group (age_group)					
1	Under 23 years	0	0%	0	0%
2	23-25	242	28%	266	31%
3	26-30	234	27%	230	27%
4	31-35	120	14%	143	17%
5	36-40	109	13%	88	10%
6	41-45	64	7%	48	6%
7	46-50	86	10%	85	10%

¹ http://www.integrafrica.com/index.php?q=con,7,SSA_LSM The LSM divides the population in to 17 LSM groups, 17 (highest) to 1 (lowest)

		BASELINE (N=855)		ENDLINE (N=860)	
	Chi-sq p=0.17				
Sex (section A) (sex)					
1	Male	78	9%	117	14%
2	Female	776	91%	743	86%
	Chi-sq p=0.004				
Sex of decision makers in household – if different from the main cook					
1	Male	10	45%	10	91%
2	Female	12	55%	1	9%
	Missing n=1682				
Language conducted for survey					
1	English	424	50%	272	32%
2	Swahili	238	28%	405	47%
3	Other local language	193	23%	183	21%
	Chi-sq p<0.0001				
Education of the respondent					
1	None, primary incomplete, primary complete	360	42%	326	38%
2	Some secondary or higher	495	58%	532	62%
	Chi-sq p=0.08				
Education of the primary earner					
1	None, primary incomplete, primary complete	443	52%	456	53%
2	Some secondary or higher	408	48%	401	47%
	Chi-sq p=0.63				
Marital status					
1	Married	605	71%	559	65%
2	Single, separated, divorced, widowed, living together	250	29%	297	35%
	Chi-sq p=0.02				
Paid work outside the home					
1	Yes	480	56%	542	63%
2	No	375	44%	318	37%
	Chi-sq p=0.004				
LSM group					
4	71-88	193	23%	193	22%
5	88-103	146	17%	143	17%
6	104-120	209	24%	127	15%
7	121-153	172	20%	199	23%

		BASELINE (N=855)		ENDLINE (N=860)	
8	154-186	135	16%	198	23%

Table 2: Total people eating an evening meal in the household (excluding infants)

Response		BASELINE (N=855)	ENDLINE (N=860)
	Mean (SD)	3.6 (2.0)	3.6 (1.9)
Anova p=0.78			

Stove use patterns

About 65% of respondents owned two or more stove types at both time points. At endline, primary stove types were reported as LPG (20%), an improved biomass stove as promoted by the BCC (0.6%), and all other stove types, such as traditional, charcoal, 3-stone, or kerosene (79%). At endline, 234 respondents (39%) had an LPG stove in working order. Very few people (24, 3%) had ever owned a modern cookstove like those in Visual Aid A (see appendix) as promoted by the BCC.

Table 3: Stove and Fuel Use

	Baseline (N=855)		Endline (N=860)	
Variable	Freq.	Percent	Freq.	Percent
Ownership of more than 1 stove type in working order (any other stoves)				
Yes, I own 2 or more stove types	559	65%	571	66%
No, I own only 1 stove type	296	35%	289	34%
Chisq p=0.66				

Table 4: Stove and Fuel Types

Variable	Response		Baseline (N=855)	Endline (N=860)
Primary stove type				
1	LPG	Freq.	110	174
		Col. Percent	13%	20%
2	Improved biomass stove promoted by the BCC	Freq.	2	5
		Col. Percent	0.2%	0.6%
3	All other stove types (e.g., traditional, charcoal, 3-stone, kerosene, etc)	Freq.	743	681
		Col. Percent	87%	79%
Fishers exact test p<0.0001				
Current ownership of any LPG stove in working order				
1	Yes, I own an LPG stove in working order	Freq.	n/a	234

Variable	Response		Baseline (N=855)	Endline (N=860)
		Col. Percent	n/a	39%
2	No	Freq.	n/a	362
		Col. Percent	n/a	61%
Filtered out n=264 who had never heard of LPG before the survey (filter F1_LPGinfo)				
Ever owned a modern cookstove like these in visual aid A (owned_mod)				
1	Yes	Freq.	23	24
		Col. Percent	3%	3%
2	No	Freq.	812	827
		Col. Percent	97%	97%
Chisq p=0.93				

*N/A means that the question was not asked at baseline

Attitudes and perceptions towards new cookstoves

There were 4 agreement items about attitudes towards clean cookstoves asked at baseline. Results are shown in Table 5 below. Overall, it appears that there is moderately strong agreement with the 4 items. Approximately one-third of the baseline sample had strong agreement that that traditional stoves were bad for health, new cookstoves use less fuel to save time and/or money, new cookstoves would make the kitchen smart/modern, and that they had a desire to share information about clean cooking.

Table 5: Self-reported attitudes towards modern kitchens and modern stoves at baseline: filtered to those who know about the BCC promoted cookstoves prior to the survey (n=565)

Statement		Strongly agree	Agree	Disagree	Strongly disagree	Don't know
F6. Traditional cooking stoves are bad for my health and that of my family	freq	148	343	43	24	7
	percent	26.19	60.71	7.61	4.25	1.24
F7. The new cookstoves like these [show visual aid A] use less fuel which saves you money and/or time.	freq	201	327	13	1	22
	percent	35.64	57.98	2.30	0.18	3.90
F8. The new cookstoves like these [show visual aid A] would make my kitchen smarter and more modern.	freq	195	342	10	3	14
	percent	34.51	60.53	1.77	0.53	2.48
F9. I would like to help tell people in my community about	freq	164	376	11	1	12

Statement		Strongly agree	Agree	Disagree	Strongly disagree	Don't know
the importance of cleaner, more efficient cooking	percent	29.03	66.55	1.95	0.18	2.12

Table 6 below describes attitudes and perceptions at endline towards the BCC promoted cookstoves (as shown in visual aid A – see appendix) through 12 questions, filtered to those who knew about the new cookstoves prior to the survey. Several questions only had a moderate percentage who strongly agreed, such as new cookstove use little fuel (27%), reduce smoke (29%), are easily accessible (17%), will last for years (20%). Other items showed a higher percentage of strong agreement, such as new cookstoves save money on fuel (46%), are faster and save time (35%), and keep the kitchen clean (42%). About a third of the sample strongly agreed that new stoves can reduce health symptoms, such as coughing or watery eyes (35%).

Table 6: Self-reported attitudes towards modern kitchens and modern stoves at endline: filtered to those who know about the BCC promoted cookstoves prior to the survey (n=611)

Statement		Strongly agree	Agree	Disagree, strongly disagree	Don't know
F4.1 New cookstoves like these [show visual A] is the modern cooking method that uses little fuel	Freq	167	427	9	8
	Percentage	27.33%	69.89%	1.47%	1.31%
F4.2 A new cookstove like these [show visual A] is better than a traditional cook stove because it saves money on fuel .	Freq	283	306	9	12
	Percentage	46.39%	50.16%	1.48%	1.97%
F4.3 A new cookstove like these [show visual A] is better than a traditional cook stove because it saves time due to faster cooking .	Freq	216	361	19	15
	Percentage	35.35%	59.08%	3.11%	2.45%
F4.4 A new cookstove like these [show visual A] is better than a traditional cook stove because it reduces smoke .	Freq	179	382	27	22
	Percentage	29.30%	62.52%	4.42%	3.60%
F4.5 A new cookstove like these [show visual A] is better than a traditional cook stove because it keeps your kitchen clean .	Freq	254	335	8	14
	Percentage	41.57%	54.83%	1.31%	2.29%
F4.6 I know where to get a new cookstove like this [show visual aid A] somewhere easily accessible to me	Freq	105	384	91	31
	Percentage	17.18%	62.85%	14.90%	5.07%
F4.7 Using new cook stoves such as these [show visual aid A] have a warranty and last for years	Freq	120	316	56	119
	Percentage	19.64%	51.72%	9.20%	19.48%

Statement		Strongly agree	Agree	Disagree, strongly disagree	Don't know
F4.8 Using new cook stoves such as these [show visual aid A] reduces health issues such as coughing and watery eyes	Freq	212	359	15	24
	Percentage	34.75%	58.85%	2.50%	3.93%
F4.9 Buying new cook stoves such as these [show visual aid A] is easy because I can get loans through chamas, saccoes or KWFT bank loans.	Freq	125	255	91	140
	Percentage	20.46%	41.73%	15.00%	22.91%
F4.10. New cook stoves such as these [show visual aid A] are a modern solution for a modern kitchen.	Freq	127	445	25	14
	Percentage	20.79%	72.83%	4.10%	2.29%
F4.11. A modern man should buy a cook stove such as these [show visual aid A] to take care of his family.	Freq	162	405	33	10
	Percentage	26.56%	66.39%	5.41%	1.64%
F4.12. When I think of new cook stoves such as these [show visual aid A], I think they make cooking quicker, safer, cleaner and at half the cost.	Freq	221	365	9	16
	Percentage	36.17%	59.74%	1.50%	2.62%

Media use

Use of TV and radio were high in both baseline and endline samples, and internet use was relatively low (10% baseline, 18% endline). Most respondents had a mobile phone that was not a smart phone (75% baseline, 65% endline), and less than a third used social media (14% baseline, 26% endline).

Table 7: Sources of information

Variable	Response		Baseline (N=855)	Endline (N=860)
Do you ever watch TV (watch_tv)				
1	Yes	Freq.	678	703
		Col. Percent	79%	82%
2	No	Freq.	176	157
		Col. Percent	21%	18%
Chisq p=0.21				
Do you ever listen to the radio (listen_radio)				
1	Yes	Freq.	720	650
		Col. Percent	84%	76%
2	No	Freq.	135	210
		Col. Percent	16%	24%
Chisq p<0.0001				

Variable	Response		Baseline (N=855)	Endline (N=860)
Do you ever use the internet on a computer or smartphone (internetuse)				
1	Yes	Freq.	88	157
		Col. Percent	10%	18%
2	No	Freq.	767	703
		Col. Percent	90%	82%
Chisq p<0.0001				
Do you have a mobile phone (mobile_phone_use_r)				
1	Yes, smart phone	Freq.	180	261
		Col. Percent	21%	30%
2	Yes, not smart phone	Freq.	643	558
		Col. Percent	75%	65%
3	No	Freq.	32	40
		Col. Percent	4%	5%
Chisq p<0.0001				
Do you use social media such as Facebook, What's App (social_media)				
1	Yes	Freq.	117	224
		Col. Percent	14%	26%
2	No	Freq.	738	636
		Col. Percent	86%	74%
Chisq p<0.0001				

3. Univariable analysis of five main outcomes

Awareness of improved biomass stoves by the BCC was already fairly high at baseline (66%) and increased to 71% at endline (chi-sq p=0.03) (Table 8). At endline 69% of the sample already was aware of benefits related to cooking with LPG stoves (Table 9).

Table 8: Outcome 1a. Change in awareness of improved biomass stoves (as seen in visual aid A- see appendix)

Before this survey had you heard, seen or been told any information about new cookstoves such as these? (Visual Aid A)		Baseline (N=854)	Endline (N=858)
1	Yes	565 (66%)	610 (71%)
2	No	289 (34%)	248 (29%)
Chi-sq p=0.03			

Table 9: Outcome 1b. Change in awareness of LPG stoves

F6. Before this survey had you heard, seen or been told any information about any benefits related to cooking with LPG stoves?		Baseline (not asked in baseline survey)	Endline (N=858)
1	Yes	n/a	596 (69%)
2	No	n/a	262 (31%)

At the time the baseline survey was conducted, the key messages of the Mediae campaign were not yet finalized. Therefore, generic questions on attitudes to modern and/or clean cook stoves were used. Whereas in the endline survey the questions exploring attitudes were very much aligned with the key messages in the Shamba Chef shows. This created a situation where the endline survey did not have any questions related to attitudes on modern and/or clean cook stoves that were similar enough to those used at baseline to allow a comparison between these time points. For example, questions on fuel, time, and money savings were all broken into individual questions at endline. For this reason, all comparisons to assess the impact of the BCC on the attitudes to cleaner cooking in the target population are between the exposed and unexposed groups.

A series of 12 questions asked about attitudes related to the types of modern cookstoves shown in visual aid A (see appendix 1). These 12 items included agreement that modern stoves used less fuel, saved money, saved time, reduced smoke, had a cleaner kitchen, were accessible, had a warranty for years, reduced health issues, loans are available, offered a solution for a modern kitchen, males could purchase, and overall were quicker/safer/cleaner/cheaper. There was a moderate level of respondents who said they “strongly agreed” with the items, with a mean of 3.6 (SD 3.4) for the sum total (Table 10). As a dichotomous variable, 74% of the sample had one or more items with a response of strong agreement (Table 11)

Table 10: Outcome 2a. Changes in positive attitudes towards “new cookstoves like these [Visual Aid A]” as a continuous variable

F4.1-F4.12 Questions of Knowledge and attitudes towards “new cookstoves like Visual Aid A”	Baseline Not asked	Endline (N=607)
2a. Sum total of ‘strong agreement’ with 19 items F4.1 through F4.12 (continuous)	n/a	Mean 3.6 (SD 3.4) Min 0; max 12

*Attitudes towards visual aid A stoves included 12 items: less fuel, saves money, saves time, reduces smoke, cleaner kitchen, accessible, warranty for years, reduces health issues, loans are available, solution for a modern kitchen, male can purchase, overall quicker/safer/cleaner/cheaper.

Filtered to those who had heard of modern stoves before the survey (missing n=250)

Table 11: Outcome 2b. Positive attitudes as a dichotomous variable

F4.1-F4.12 Questions of Knowledge and attitudes towards “new cookstoves like visual aid A”	Baseline Not asked	Endline (N=607)
2b. Sum total of ‘strong agreement’ with 12 items F4.1 through F4.12 (dichotomous) 0 zero ‘strong agreement’ 1 one or more items with ‘strong agreement’	n/a	160 (26%) 447 (74%)

*Attitudes towards visual aid A stoves included 12 items: less fuel, saves money, saves time, reduces smoke, cleaner kitchen, accessible, warranty for years, reduces health issues, loans are available, solution for a modern kitchen, male can purchase, overall quicker/safer/cleaner/cheaper.

Filtered to those who had heard of modern stoves before the survey (missing n=250)

Contrary to what we expected following the BCC, there was a decrease of intention to purchase a modern stove within the next month, with 19% at baseline and 10% at endline (Table 12).

Table 12: Outcome 3. Intention to purchase “a cookstove like this [Visual Aid A] within next month
BCC: Mediae, Kenya Baseline & Endline

F5. Are you planning on buying a cookstove like this in the next month? [Visual Aid A]		Baseline (N=565)	Endline (N=608)
1	Yes, within the next month	108 (19%)	59 (10%)
2	No, yes but not in a month, don't know	457 (81%)	549 (90%)
Chisq p<0.0001			

* Filtered to those who said 'yes' to seeing/knowing of these stoves before survey

Aspirations to use LPG for cooking were high (86% of the 343 that did not currently own an LPG stove), although actual purchase of an LPG stove during the BCC exposure period of 5 months was relatively low (25/188, 13%) (Table 13 and 14). When respondents were asked what stove type they would choose if they could have any, 255 (30%) said the BCC promoted biomass stoves, and 414 (49%) said LPG, with the remaining listing a different stove type. Among those who owned an LPG stove, 38% wanted to use LPG more than they currently did.

Table 13: Outcome 4. Aspiration to use LPG for cooking among those who do not currently own LPG

Would you like to use LPG for your cooking?	Baseline (not asked at baseline)	Endline (N=343)
1 Yes	n/a	296 (86%)
2 No	n/a	47 (14%)

* Filtered to those that said 'no' to LPG ownership.

Outcome5a: 'Purchase of an improved biomass stove within the BCC exposure period' not shown as a table. A total of 17 respondents had purchased the promoted biomass stove, but only one respondent had purchased it within the past 5 months of BCC exposure.

Table 14: Outcome 5b. Purchase of an LPG stove within the BCC exposure period

Time owned LPG stove	Baseline (no BCC exposure)	Endline (N=188)
LPG purchased within past 5 months (BCC exposure period)	n/a	25 (13%)
LPG purchased more than 5 months ago (outside of BCC exposure period)	n/a	163 (87%)

*Baseline data excluded because respondents had not yet been exposed to any BCC material.

Filtered to those who had bought an LPG stove and had 'months_ago_new' purchase info

Table 15: Outcome 6a. Aspirations to own an improved biomass stove

B100. What stove type would you have if you could have any?	Baseline (N=849)	Endline (N=843)
1 BCC promoted improved biomass stove (stove responses 9-24, 26-28)	319 (38%)	255 (30%)
2 All other stoves	530 (62%)	588 (70%)
Chisq p=0.002		

*refused or don't know responses coded as missing

Table 16: Outcome 6b. Aspirations to own LPG stove²

B100. What stove type would you have if you could have any?	Baseline (N=849)	Endline (N=843)
1 LPG (stove response 6)	98 (12%)	414 (49%)
2 All other stoves	751 (88%)	429 (51%)
Chisq p<0.0001		

*refused or don't know responses coded as missing

Table 17: Outcome 7. Aspirations to increase use of LPG

F9. Would you like to use LPG for your cooking more than you do now?	Baseline (not asked)	Endline (N=233)
1 Yes	n/a	88 (38%)
2 No	n/a	145 (62%)

* Filtered to those who said 'yes' to LPG ownership

4. Exposure to the BCC campaign materials

Exposure to the Mediae BCC materials for Shamba Chef was 57% for materials J (Shamba Chef TV) and/or M (Shamba Chef radio) combined. Individually, 47% of the sample had seen Shamba Chef TV once or more, and 30% of the sample had heard Shamba Chef radio once or more. No other materials were considered in analysis since this report is limited to Mediae-related data only.

Table 18: Exposure 1. Frequency of exposure to both Shamba Chef BCC materials combined – Endline data only

Variable	Response	Freq.	Percent (%)
How frequently have you heard BCC materials J and/or M before today- Shamba chef TV/radio?			
1	One or more times	426	57%
2	Never	320	43%

Table 19: Exposure 2. Frequency of exposure to individual BCC materials.

Variable	Response	Freq.	Percent (%)
2a. How frequently have you seen visual aid J (see appendix) before today- Shamba chef TV?			
1	One or more times	311	47%
2	Never	354	53%
2b. How frequently have you heard audio aid M (see appendix) before today- Shamba chef radio?			
1	One or more times	225	30%
2	Never	521	70%

² This differs from table 13 as they were two separate questions: Table 13 is 'would you like to use LPG for cooking?' and Table 16 is 'what stove type would you have if you could own any, with LPG just one of many options, but coded into LPG vs. other.

Table 20: Exposure 3. Sum of exposure to all possible sources of information related to new stove marketing for improved biomass stoves from Visual Aid A (see appendix).

3a. Sum of all reported sources of exposure	Baseline (N=562)	Endline (N=609)
Total number of sources of exposure	Mean 1.5 (SD 0.9)	Mean 1.5 (SD 0.8)
Missing n=544 who had not known about visual aid A stoves before survey		
3b. Dichotomized: Sum of all reported sources of exposure	Baseline (N=562) Freq (%)	Endline (N=609) Freq (%)
1 one source of exposure	372 (66%)	387 (64%)
2 two or more sources of exposure	190 (34%)	222 (36%)
Chisq p=0.34		

* Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A- see appendix)?”

5. Regression Model Results

Covariates and model selection

All outcomes were dichotomous, therefore logistic regression models were utilized. Variables that were potentially related to the outcomes and exposures were assessed in crude (i.e., unadjusted) analyses. This included demographic and socioeconomic characteristics, stove use, media use, and agreeableness to the BCC materials. Variables with suggestive evidence of associations with the outcomes (i.e., p-value ≤ 0.10) were then included in full logistic regression models to adjust for their potential effects. Full models were reduced by covariates with the highest p-values, while assessing changes in effect and precision of the exposure on the outcome.

There were 7 key outcomes assessed in the multivariable logistic regression models with each exposure of interest: (1) awareness of improved biomass stoves and LPG stoves, (2) positive attitudes and knowledge towards new cookstoves from visual aid A, (3) intention to purchase a visual aid A stove within the next month, (4) aspiration to use LPG for cooking, (5) purchase of improved biomass or LPG stoves within the 5 month BCC exposure period, (6) aspiration to own an improved biomass or LPG stove, and (7) aspiration to use LPG more than currently is used now. The full details of odds ratios (OR), 95% confidence intervals (CI), and p-values of each final model can be reviewed in the tables below.

Final summaries of the adjusted logistic regression models for each outcome report odds ratios (OR), 95% confidence intervals (CI), and p-values.

Table 21: Outcome 1a. Increased awareness of improved biomass stoves

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value)¹
1. Dichotomous variable: total number of exposures to combined materials J and M 1 one or more times ² 2 never (ref)	(N=738) 4.4 (2.8 to 6.9; p<0.0001)

<p>2. Frequency of exposure to individual BCC materials (J, M).²</p> <p>*****</p> <p>2a. material J: Shamba Chef TV</p> <p>1 one or more times²</p> <p>2 never (ref)</p>	<p>(N=658)</p> <p>3.2 (1.5 to 6.9; p=0.004)</p>
<p>2b. material M: Shamba Chef Radio</p> <p>1 one or more times²</p> <p>2 never (ref)</p>	<p>(N=738)</p> <p>1.5 (0.9 to 2.4; p=0.09)</p>
<p>3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A).</p> <p>Dichotomized: Sum of all reported sources of exposure</p> <p>1 source of exposure (reference)</p> <p>2 or more sources of exposure</p>	<p>All responses have same response due to filtering based on the outcome of interest.</p>

¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

Table 22: Outcome 1b. Increased awareness of LPG stoves

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value)¹
<p>1. Dichotomous variable: total number of exposures to combined materials J and M (ad_frequencieJM_exposed)</p> <p>1 one or more times²</p> <p>2 never (ref)</p>	<p>(N=738)</p> <p>1.3 (0.9 to 1.9; p=0.21)</p>
<p>2. Frequency of exposure to individual BCC materials (J, M).²</p> <p>*****</p> <p>2a. material J: Shamba Chef TV (ad_frequencieJ_exposed)</p> <p>1 one or more times²</p> <p>2 never (ref)</p>	<p>(N=657)</p> <p>1.2 (0.8 to 1.9; p=0.29)</p>
<p>2b. material M: Shamba Chef Radio (ad_frequencieM_exposed)</p> <p>1 one or more times²</p> <p>2 never (ref)</p>	<p>(N=738)</p> <p>1.2 (0.8 to 1.8; p=0.46)</p>
<p>3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r)</p> <p>1 source of exposure (reference)</p> <p>2 or more sources of exposure</p>	<p>(N=601)</p> <p>2.0 (1.3 to 3.1; p=0.002)</p>

¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

Table 23. Outcome 2b. Positive attitudes as a dichotomous variable (12 agreeableness, F4.1-12)

Filtered to those who had heard of modern stoves before the survey (missing n=250)

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value) ¹
1. Dichotomous variable: total number of exposures to combined materials J and M (ad_frequencieJM_exposed) 1 one or more times ² 2 never (ref)	(N=600) 0.7 (0.4 to 1.0; p=0.06)
2. Frequency of exposure to individual BCC materials (J, M). ² ***** 2a. material J: Shamba Chef TV (ad_frequencieJ_exposed) 1 one or more times ² 2 never (ref)	(N=598) 0.5 (0.4 to 0.8; p=0.004)
2b. material M: Shamba Chef Radio (ad_frequencieM_exposed) 1 one or more times ² 2 never (ref)	(N=600) 1.4 (0.9 to 2.2; p=0.09)
3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r) 1 source of exposure (reference) 2 or more sources of exposure	(N=599) 1.1 (0.7 to 1.6; p=0.81)

*Attitudes towards visual aid A stoves included 12 items: less fuel, saves money, saves time, reduces smoke, cleaner kitchen, accessible, warranty for years, reduces health issues, loans are available, solution for a modern kitchen, male can purchase, overall quicker/safer/cleaner/cheaper.

¹Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

NOTE: Despite significance of p-values for these models, the results are in the opposite direction as anticipated for combined materials JM and material J. For example, greater BCC exposure did not make respondents more likely to have strong agreement with the 12 positive attitude items. Only material M alone seemed to have a borderline impact on positive attitudes

Table 24. Outcome 3. Intention to purchase “a cookstove like this [Visual Aid A- see appendix]”

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value) ¹
1. Dichotomous variable: total number of exposures to combined materials J and M 1 one or more times ² 2 never (ref)	(N=601) 1.5 (0.8 to 2.9; p=0.25)
2. Frequency of exposure to individual BCC materials (J, M). ² ***** 2a. material J: Shamba Chef TV 1 one or more times ² 2 never (ref)	(N=599) 1.2 (0.7 to 2.3; p=0.51)
2b. material M: Shamba Chef Radio 1 one or more times ² 2 never (ref)	(N=601) 1.1 (0.6 to 2.0; p=0.75)

<p>3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r)³</p> <p>1 source of exposure (reference) 2 or more sources of exposure</p>	<p>(N=1162) 0.6 (0.4 to 0.8; p=0.002) (Despite significance of p-value, OR not in the expected direction)</p>
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¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

³ Also explored final models with ‘survey’ as a covariate since data were collected at both time points
Filtered to those who said ‘yes’ to seeing/knowing of these stoves before survey

Table 25. Outcome 4. Aspiration to use LPG for cooking among those who do not currently own LPG

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value)¹
<p>1. Dichotomous variable: total number of exposures to combined materials J and M</p> <p>1 one or more times ² 2 never (ref)</p>	<p>(N=342) 1.1 (0.6 to 2.3; p=0.75)</p>
<p>2. Frequency of exposure to individual BCC materials (J, M).²</p> <p>*****</p> <p>2a. material J: Shamba Chef TV</p> <p>1 one or more times ² 2 never (ref)</p>	<p>(N=295) 0.9 (0.4 to 1.9; p=0.78)</p>
<p>2b. material M: Shamba Chef Radio</p> <p>1 one or more times ² 2 never (ref)</p>	<p>(N=342) 1.2 (0.6 to 2.5; p=0.55)</p>
<p>3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r)</p> <p>1 source of exposure (reference) 2 or more sources of exposure</p>	<p>(N=248) 1.1 (0.5 to 2.4; p=0.79)</p>

¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.
Filtered to those that said ‘no’ to LPG ownership

‘Outcome 5a. Purchase of an improved biomass stove within the BCC exposure period’ presented descriptively only. A total of 17 respondents had purchased the promoted biomass stove, but only one respondent had purchased it within the past 5 months of BCC exposure. Not enough of a cell count to warrant full multivariable analyses.

Table 26. Outcome 5b. Purchase of an LPG stove within the BCC exposure period

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value)¹
1. Dichotomous variable: total number of exposures to combined materials J and M (ad_frequencieJM_exposed) 1 one or more times ² 2 never (ref)	(N=176) 1.2 (0.4 to 3.4; p=0.78)
2. Frequency of exposure to individual BCC materials (J, M).² ***** 2a. material J: Shamba Chef TV 1 one or more times ² 2 never (ref)	(N=156) 0.7 (0.2 to 1.9; p=0.44)
2b. material M: Shamba Chef Radio 1 one or more times ² 2 never (ref)	(N=176) 5.6 (1.7 to 18.8; p=0.006) (Interpret with caution due to relatively low cell counts; unstable.)
3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r) 1 source of exposure (reference) 2 or more sources of exposure	(N=150) 0.5 (0.1 to 1.6; p=0.23)

¹Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

Filtered to those who had bought an LPG stove and had ‘months_ago_new’ purchase info

Table 27. Outcome 6a. Aspirations to own an improved biomass stove

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value)¹
1. Dichotomous variable: total number of exposures to combined materials J and M (ad_frequencieJM_exposed) 1 one or more times ² 2 never (ref)	(N=724) 2.0 (1.4 to 2.9; p=0.0001)
2. Frequency of exposure to individual BCC materials (J, M).² ***** 2a. material J: Shamba Chef TV (ad_frequencieJ_exposed) 1 one or more times ² 2 never (ref)	(N=643) 1.6 (1.1 to 2.3; p=0.01)

2b. material M: Shamba Chef Radio (ad_frequencieM_exposed) 1 one or more times ² 2 never (ref)	(N=724) 1.5 (1.1 to 2.2; p=0.02)
3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r)³ 1 source of exposure (reference) 2 or more sources of exposure	(N=1144) 1.1 (0.8 to 1.4; p=0.56)

¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

³ Also explored final models with ‘survey’ as a covariate since data were collected at both time points
Refused or don’t know responses coded as missing

Table 28. Outcome 6b. Aspirations to own an LPG stove

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value)¹
1. Dichotomous variable: total number of exposures to combined materials J and M 1 one or more times ² 2 never (ref)	(N=724) 0.7 (0.5 to 0.9; p=0.02) (Despite significance of p-value, OR not in the expected direction)
2. Frequency of exposure to individual BCC materials (J, M).² ***** 2a. material J: Shamba Chef TV 1 one or more times ² 2 never (ref)	(N=643) 0.7 (0.5 to 1.0; p=0.05) (Despite significance of p-value, OR not in the expected direction)
2b. material M: Shamba Chef Radio 1 one or more times ² 2 never (ref)	(N=724) 0.8 (0.6 to 1.2; p=0.26)
3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r)³ 1 source of exposure (reference) 2 or more sources of exposure	(N=1144) 0.9 (0.7 to 1.2; p=0.37)

¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline.

³ Also explored final models with ‘survey’ as a covariate since data were collected at both time points.
Refused or don’t know responses coded as missing

Table 29. Outcome 7. Aspirations to use increase use of LPG

Exposures of interest	Multivariable (adjusted) model: (Number of observations used) Odds ratio (95% CI, p-value) ¹
1. Dichotomous variable: total number of exposures to combined materials J and M 1 one or more times ² 2 never (ref)	(N=229) 0.6 (0.3 to 1.2; p=0.16)
2. Frequency of exposure to individual BCC materials (J, M).² ***** 2a. material J: Shamba Chef TV 1 one or more times ² 2 never (ref)	(N=197) 0.6 (0.3 to 1.2; p=0.13)
2b. material M: Shamba Chef Radio 1 one or more times ² 2 never (ref)	(N=229) 1.0 (0.5 to 2.0; p=0.93)
3. Sum of exposure to all possible sources of information related to new stove marketing. Filtered to those said “yes” to the question, “F1. Before this survey had you heard, seen or been told any information about new cookstoves such as these (visual aid A). Dichotomized: Sum of all reported sources of exposure (stoves_exposure_sum_r) 1 source of exposure (reference) 2 or more sources of exposure	(N=188) 0.7 (0.3 to 1.4; p=0.28)

¹ Full models were adjusted for the exposure of interest plus 12 covariates: socioeconomic status (LSM score), area (urban, peri-urban, or rural), education, age, sex, marital status (married vs. all else), use of TV, radio, internet, mobile phone, and social media, and ownership of two or more stove types. These covariates were selected based on their crude associations with the outcome (p<=0.10). The adjusted effects of the exposure on the outcome did not vary in effect measure or precision based on inclusion or removal of these covariates, therefore, the full models are presented.

² Exposure data only available from Endline survey, question not asked in Baseline. Filtered to those who said ‘yes’ to LPG ownership

6. Results Summary and Conclusions

Regression model results

In brief, exposure to materials J and M had a strong impact, independent of other factors, to awareness of improved biomass stoves (OR 4.4; 95% CI 2.8 to 6.9; p<0.0001), and aspirations to own an improved biomass stove (OR 2.0; 95% CI 1.4 to 2.9; p=0.0001). Exposure to material J on TV seemed to have a stronger influence than the radio material M. Receiving information about modern stoves from two or more sources impacted greater awareness of LPG stoves (OR 2.0; 95% CI 1.3 to 3.1; p=0.002). All other outcomes did not seem to be influenced by the main exposures.

Conclusions

This mixed sample of urban, peri-urban, and rural respondents had fairly high exposure to the BCC Shamba Chef materials J (TV) and/or M (radio), at 57% of the total sample. At endline, 234 respondents (39%) owned an LPG stove in working order, although 264 respondents had never heard of LPG before the endline survey. Very few people (24, 3%) had ever owned a modern cookstove like those in Visual Aid A as promoted by the BCC. There was a moderate level of positivity towards modern cookstoves. Aspirations to use LPG for cooking were high, although actual purchase of an LPG or improved biomass

stove during the BCC exposure period of 5 months was low. Of the 7 key outcomes assessed in multivariable models, the two materials J and M strongly impacted awareness of improved biomass stoves and aspirations to own a biomass stove. More sources of info about modern stoves influenced greater awareness of LPG stoves. Overall, it seems the BCC materials had an impact on awareness and aspirations, possibly with the TV campaign having a stronger impact than the radio material. However, actual change in behavior to buy a promoted stove type or intention to buy one in the next month was not impacted by the campaign.

7. Appendix

The visual aids used to assess the participants exposure to and recall of the BCC materials are listed below and copies of those that were printed materials are provided in the following pages.

Visual aid A	This visual aid was used as a resource to avoid asking leading questions referring to 'improved stoves', while still making it clear which types of stoves were the target of the questions.
Visual aid J	TV clip from Shamba Chef (available on request)
Visual Aid M	Audio radio clip form Shamba Chef (available on request)

Visual Aid A

