



Results Assessment of a Behavioural Change Approach for Clean Cooking in rural Cambodia

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Abbreviations

ABC	Advanced Biomass Cookstove
BCC	Behavioural Change Communication
CAPI	Computer-Assisted Personal Interviewing
CC	Commune Council
CCWC	Commune Council for Women and Children
EnDev	Energising Development
GESI	Gender and Social Inclusion
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HH	Households
KII	Key Informant Interviews
LPG	Liquefied Petroleum Gas
ODF	Open Defecation Free
PLWD	People Living with Disability
RTE	Real-Time Evaluation (Company)
RVO	Rijksdienst Ondernemend Nederland
SEI	Stockholm Environment Institute
SFV	Smoke Free Village
SNV	Netherlands Development Organisation

1. Executive Summary

In rural Cambodia, 79%¹ of households still use solid fuels for cooking. This stands in marked contrast to Cambodia's impressive extension of the electric grid, which now reaches most villages.

Cambodia also has ample availability of LPG and propane as alternative fuels to biomass. Using solid fuels to cook, like wood in traditional stoves, has a negative impact on health; each year, close to 4 million people die prematurely from illness attributable to household air pollution². It also burdens women and children's livelihoods and impacts the environment.

Under the energy-access programme Energising Development (EnDev), SNV in Cambodia introduced the Smoke Free Village (SFV) initiative under the project 'Clean and Improved Cooking in the Mekong Region'. The SFV initiative aims to collectively change cooking behaviours with the purpose of replacing solid fuels (such as wood) with smoke free alternatives (like electricity, biogas, gasifiers, and others). At the time of reporting, the disseminated messages in the campaign encompass four key clean cooking behaviours:

- Behaviour 1 - keeping children away from smoke while cooking;
- Behaviour 2 - cooking in a well-ventilated space;
- Behaviour 3 - drying firewood before cooking; and
- Behaviour 4 - investing in clean cookstoves and fuels.

To independently assess the results after nine months of implementation, Real-Time Evaluation (RTE), a social research company, collected qualitative and quantitative field data. This data was analyzed by SNV for this report.

At the time of the survey, June-September 2021, the SFV campaign involved 178 villages across four provinces in Cambodia, covering 36,000 households with an estimated population of 150,000 inhabitants. The first villages joined the campaign in August 2020, and the latest joined in April 2021. The campaign specifically involved women-led households, poor households, and people living with disabilities (together categorised as Gender and Social Inclusion [GESI] groups).

In total 410 households were surveyed. The survey targeted the main cook of each household. Of those, 309 had participated in at least one of the SFV activities (treatment group) while 101 households were part of a control group, unexposed to SFV. In addition, 54 interviews were held with key informants, including local authorities, school directors, health centers, and shop owners selling clean stoves and fuels.

The main findings of this report are the following:

- 1 28% of SFV recipients (84 respondents) purchased a combined total of 121 clean cookstoves (electric, gas, ABCs) after participating in SFV activities, with an average of 1.4 clean cookstoves per respondent.

¹ General Population Census by the Kingdom of Cambodia, Ministry of Planning, 2019

<https://www.nis.gov.kh/nis/Census2019/Final%20General%20Population%20Census%202019-Khmer.pdf>

² World Health Organisation: Household air pollution and health <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>

- 2 The share of electric cookers as the primary stove in the kitchen increased fastest, from 2% to 17% after the SFV initiative. Traditional stoves (those producing smoke) dropped in prevalence from 62% to 39%.
- 3 Although there are four different SFV activities, on average respondents were exposed to just one or two activities (1.8 on average).
- 4 GESI groups (poor, people living with disabilities, and women-led households), adopted the behaviors in similar rate as the total treatment group. Poor households saw clean cookstove ownership rising with 19% despite price barriers.
- 5 Members of the Commune Council for Women and Children (CCWC) and village authorities, responsible for carrying out SFV activities, were satisfied with the quality of support given by SNV. In addition, training materials were found to be adequate and suitable, even if there is room for improvements.

In conclusion, the SFV initiative has been effectively implemented to date. Even when respondents were not yet exposed to the full range of SFV behavioural change activities, it has already resulted in a significant uptake of clean cooking behaviours and reduction of the traditional stoves. This supports the theory that behavioural change communication activities, as practised under the SFV campaign, alleviate an important bottleneck in achieving the goal of ensuring access to affordable, reliable, sustainable and modern energy for all (Sustainable Development Goal 7).

2. Introduction

Project Background

SNV is implementing partner of the energy access platform Energising Development (EnDev)³, administered by GIZ and RVO. Since 2015, EnDev carries out programmes in Cambodia around cooking solutions and biodigesters, that increase access to modern energy, for social and economic development, as well as for environmental protection. In August 2020, it focussed increasingly on generating demand for clean cooking, by taking inspiration from the WASH approach of Community-led Total Sanitation. Based on this approach, it developed the Smoke Free Village (SFV) tools and methods to change cooking behaviours., SNV focussed increasingly on generating demand for clean cooking. By taking inspiration from the WASH approach of Community-led Total Sanitation, it developed the Smoke Free Village (SFV) tools and methods to change behaviours.

At the core of this approach are village-based Behaviour Change Communications (BCC) activities aiming to overcome barriers towards clean cooking and to make a lasting change in collective local cooking norms. There are no financial incentives provided to end users or to suppliers by the project, however local authorities receive a compensation for their services according to governmental standards. These activities involve suppliers who benefit from the demand created by SFV, leading to sales. The SFV BCC activities are organised by local authorities, specifically village chiefs (VCs) and members of the Commune Council for Women and Children (CCWC). CCWCs are subnational governmental bodies that represent commune citizens and focus on the welfare of women and children with networks reaching communities in the entire country.

The SFV approach was at the time of the survey implemented in four target provinces: Kampong Speu, Kampot, Siem Reap, and Battambang. Within those four provinces, it covered 22 communes and 178 villages - 36,000 households with about 150,000 people. These communes were selected based on previous – and positive – experience with SNV in WASH programmes where a Community-Led Total Sanitation approach was carried out, with a goal of becoming Open Defecation Free (ODF) at village level (then commune level, then district level, etc).

The SFV approach was first tested near the capital, Phnom Penh, and then initiated in Siem Reap (August 2020), Battambang (October 2020), Kampong Speu (December 2020) and finally Kampot (December 2020 and April 2021). Because of the different starting times in different provinces, households have been exposed to activities for different lengths of time. The theory of change is that after villagers have participated in SFV activities, this information will change their perception on clean cooking options. This, in turn, will encourage them to improve the kitchen environment and purchase a clean cookstove. Once they have these in hand, the project measures whether they transition to using those regularly, ideally ultimately dismissing their traditional wood cookstove.

Traditional stoves are commonly ceramic stoves that are made by artisans and available on the local market, designed for charcoal and woodfuel. Sometimes open fires are used for cooking, but this is less frequently observed. Cleaner options for solid fuel are Advanced Biomass Cookstoves (ABCs)/wood gasifiers, whereas clean stoves are any type of stove running on electricity or gas. With the rapid onset of rural electrification in Cambodia, and with already half of the power generated by renewables, electric cooking is actively promoted under

³ See more on www.endev.info

SFV. In the Annex a list is presented of the most common stove types, available on the Cambodian market. To trigger a clean cooking transition, four clean cooking behaviours (B1-B4) are highlighted during the SFV activities:

B1: Keep children away from smoke while cooking.

Avoid children's exposure to harmful emissions when cooking takes place. Children are often tasked with taking care of the fire, which is ignited with plastic or rubber, adding to the toxicity of the smoke.



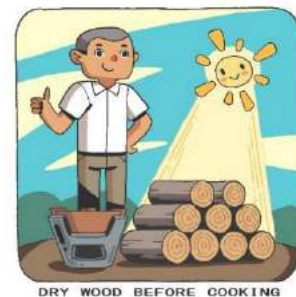
B2: Cook in a well-ventilated location.

Reducing the impact of high-emission levels by diluting the air flow in the kitchen is important, even when cooking on clean stoves. In many cases, cooking happens outside in well ventilated areas, but not always.



B3: Dry wood before cooking.

Improve the efficiency of fuelwood by reducing moisture content by proper drying of the wood. Especially in the rainy season, measures need to be taken to protect wood against inclement weather.



B4: Invest in clean cookstoves.

Drive interest in purchasing clean cookstoves and fuels such as electric stoves/cookers, LPG stoves, and Advanced Biomass Cookstoves. After purchase, the optimal usage still should be promoted, coupled with recommendations about the dis-adoption of traditional stoves.



3. Assessment Methodology

The social research company Real-Time Evaluation (RTE) used a research framework that included both treatment and control groups across the four target provinces. Subsequently, RTE delivered data to compare and measure changes in behaviour over the project period, as well as provide data for a trend analysis in comparison to the monitoring data of the programme. A mixed-method approach of interviews and group discussions was used, including household surveys and computer-assisted personal interviewing tools (CAPI).

Desk Review

RTE began the assessment with a desk review of key documents shared by SNV. Materials shared by SNV detailed the SFV approach description, including background documents of formative research; progress activity reports; BCC materials and facilitation guides; SFV participant lists; and the internal database on the adoption of the four SFV behaviours in the target provinces. The desk review made RTE familiar with the concepts and overall approach, and to shape the design of the assessment’s sampling and research methodology.

Assessment Design: Sample Size for Household Survey

The assessment employed a household survey (with treatment and control groups) and Key Informant Interviews (KIIs) of relevant SFV stakeholders (see Table 3.1). RTE calculated the sample size of 309 households (at a 95% confidence level and with a 5.52% margin of error).

In total, 410 households were interviewed by RTE, of which 309 households had been exposed to the Smoke Free Village activities and 101 households served as a control group. In each household, only one person (the primary cook) was interviewed. Nearly all respondents were female (95% treatment, 100% control group), with a mean age of 48.2 years among treatment households and 44.7 in the control group. Most of those interviewed had an education level below primary school. Households had on average 5 inhabitants, with 80% of surveyed households having children under 15 years of age at home and 50% having pre-schoolers (under 5).

Table 3-1 Summary of data collection sample sizes

Type of Interviewees	Survey	KII
Households in treatment group	309	
Households in control group	101	
Local authorities		31
Suppliers of clean cookstoves and fuels		7
School directors		12
Health centre staff		4
Total	410	54

Households in the treatment group were randomly selected from the SFV participant lists. Control group households were selected from districts neighbouring the target districts, where no SFV activities took place. To ensure comparable data between the treatment and control groups, the control group had similar geographical and demographic characteristics to the target districts yet, most importantly, they had no previous exposure to SFV.

Lastly, the KIIs were conducted among selected local authorities, suppliers of clean cookstoves and fuels, school directors, and health centre staff.

Table 3-2 Household survey - Sample sizes for treatment and control groups

Provinces / District	Total HHs in selected areas	HHs surveyed in District	Of which in Treatment	Of which in Control
Siem Reap / Puok District	3288	156	156	0 ¹
Battambang / Bavel District	4468	152	77	75
Kampong Speu / Basedth District	1564	51	38	13
Kampot / Banteay Meas District	4238	51	38	13
Total HHs		410	309	101

Note: ¹ Due to COVID-19 restrictions in Siem Reap at the time of the field research, RTE was unable to collect control data. A decision was made to include additional control group households in Battambang Province.

Gender and Social Inclusion groups

The household survey also targeted households identified as ID Poor (Level 1 or 2)⁴, households with at least one person living with a disability (PLWD, based on abridged Washington Group Questions)⁵, and households led by women. Sample sizes for these vulnerable groups had a similar share of households as Cambodia Population Census data (2019).

Location

The map below shows the location of households approached in the survey, in the four provinces where Smoke Fee Village are active: Kampot, Kampong Speu, Battambang, and Siem Reap.



Figure 1 Location of the survey

⁴ Households deemed by the government to be extremely poor (Level 1) or moderately poor (Level 2). For more: <https://www.idpoor.gov.kh/about/process>

⁵ For more information: <https://www.washingtongroup-disability.com/>

Smoke Free Village Activities

The Smoke Free Village activities include the training of the local authorities to become able to execute the four behavioural change communication-activities: Village Meetings, Smoke Free Village Days, Cooking Fairs and Door-to-Door visits. Based on the survey and key informant interviews the following findings can be shared.

The project begins by training local authorities based on a signed formal working agreement between SNV and the Commune Council for Women and Children. Over half a day, local authorities are introduced to SNV and its projects, as well as to the rationale of the SFV approach and its objectives. In a subsequent full-day training session they are introduced to the different BCC materials that they can use to deliver the SFV approach, as well as the sequence of activities associated with each material.



Figure 2 Community dialogue triggered by puzzle games

An important part of the training is the monitoring and the updates of logbooks, used to track various relevant parameters (such as behaviours followed and stove and fuel types at households, among others). This is done on a monthly basis, based on which SNV can generate reports that are shared with the village chiefs.

Interviews by RTE with the local authorities revealed that the training they received by SNV was clear and easy to follow from the start, and training materials appropriately designed.

Village meetings form the cornerstone of the SFV approach. In village meetings, a participatory approach is followed: Participants are introduced to a puzzle game in which they match incomplete photographs together that depict different cooking environments (smoke from cooking, clean cookstoves, protecting fuelwood) in the kitchen. Villagers identify their households on a map that is created by their group and, using a colour code, indicate the type of cookstove they commonly use. An average of six village meetings occurred over a lapse of one year per village.

The SFV Day activity is an annual time event in each commune that takes place at the local school and typically involves 70–100 students. Throughout the day, students and parents from the school, as well as from neighbouring villages, compete by painting murals reflecting on clean cooking practices to increase awareness of clean cooking behaviours among children.

The SFV Cooking Fair is a separate activity that happens during the same week as the SFV Day. The purpose of this activity is to provide a clean cooking experience for 50 – 100 households participating in the event.

Finally, monthly Door-to-Door Visits round out the activities of the SFV approach. Each round of visits reaches between 15 and 20 different households in each village. Local authorities visit the households in person and present materials to describe and explain the four clean cooking behaviours.

Door-to-Door Visits and Village Meetings allow authorities to engage directly and individually with households to demonstrate how clean cooking behaviours can be achieved at home and enabled them to share experiences of clean cooking.

Local authorities reported some challenges when conducting the different activities. In particular: due to COVID-19 restrictions travel and gatherings were sometimes impossible to execute according to plan and needed to be postponed.



Figure 3 Education about Clean Cooking at schools

Another difficulty expressed by local authorities was that some participants in the SFV activities, mainly older ones, proved reluctant to accept that smoke exposure has an impact on health. Data gathering for the logbooks was for some (mainly elder) authorities a challenging task, because of illiteracy and unfamiliarity with tables and figures. However,

nearly 90% of authorities argued that the activities were effective in encouraging clean and smoke-free cooking.

Local authorities deploying the SFV activities made use of BCC materials provided for the different activities. These included the logbook, stickers for champion families, and the door-to-door tool (a flip book). When asked, all the local authorities interviewed found these materials informative and effective. The visual depiction of smoke-free cooking with its positive messaging, informed people in an intuitive and helpful manner. Furthermore, every local authority interviewed stated that the friendly images showing the impacts of smoke on health, for both adults and children, were easier to comprehend by households than text and theory.

RTE found that households not exposed to BCC materials (control groups) were more concerned about what a clean cookstove cannot do, rather than on the negative impact of traditional stoves. This underscored the value of the BCC materials deployed: those materials present the benefits and convenience of a clean cookstove (thus countering perceptions that it cannot do the same thing as traditional stoves) AND clarified the negative impacts of traditional cookstoves.

The interviews with local authorities delivered recommendations to improve the materials. To make it easier to buy a clean cookstove it was recommended to better indicate the closest location of shops where to buy clean stoves and fuels. Another recommendation was to structure the BCC materials along problems and solutions, so that people can follow-up accordingly.

Participation and Exposure

Table 4.1 presents an overview of the households exposed to each of the four different SFV activities. A limited number of respondents (21) were exposed to all activities, yet on average, the exposure level was 1.8 activities per respondent, with Village Meetings the most experienced one.

Table 3-3 Participation at Smoke Free Village Activities

Smoke Free Village Campaign Activities		
SFV Activities	Respondents (N=309)	%
Village Meetings	283	92
SFV Day	46	15
Door-to-Door Visits	120	39
SFV Cooking Fair	80	26

Knowledge, Perceptions, and Attitudes

The most remembered activities among respondents were Village Meetings (74% of those who attended this activity found it the most memorable) and the Cooking Fair (63% of those who attended this activity found it the most memorable). Respondents found these activities memorable due to the positive experience in being involved and because they gaining knowledge to improve their cooking behaviour.

The survey indicated also that respondents who participated in the SFV activities showed significantly higher understanding of the negative health impacts of cooking smoke compared to the control group. This was measured by the number of people who saw smoke as a 'negative consequence' from cooking with traditional stoves. Health concerns were listed by 86% of respondents in the SFV group as their main driver to change towards cleaner cooking behaviours in contrast with only 40% in the control group.

Changing cooking behaviours does not happen overnight, and most households explained that they required at least six months to change their clean cooking behaviours. Change was driven by expectations to achieve the following benefits: cooking without smoke and health risks (88%), faster cooking (70%), easier cooking (61%), and fuel/money savings (27%).

76% of end-users with a clean cookstove, experienced positive impacts such as time savings, between 30 and 60 minutes per day. Few households experienced money savings and all of them found clean cookstoves to be more convenient than traditional stoves.

Primary cookstoves

To achieve an actual impact on livelihoods and environment, clean cookstoves are supposed to replace the traditional stoves. Having a clean cookstove in the kitchen (as measured by Behaviour 4) does not mean that the cook will also use it, nor that the traditional stove will be abandoned.

Therefore, after buying new clean cookstoves, cooks must also get used to a new way of cooking and become self-motivated to maintain this new practice. To identify this transition towards clean cooking practice under the campaign, the primary stove, the stove most used, has been the main metric to analyse this change.



Figure 4 Small Restaurant switching to electric cooking

As seen in the figure below, 62% of respondents before SFV used a traditional cookstove as their primary stove whereas this dropped to 39% after exposure to SFV. The changes for clean cookstoves as primary stoves are mirrored in opposite direction, with 35% before SFV using a clean cookstoves as their primary cookstove against 60% after SFV.

Electric cookers saw the most substantial increase, as its share of primary cookstoves raised from 2% before SFV and 2% in the control group, to 17% of households being exposed to SFV.

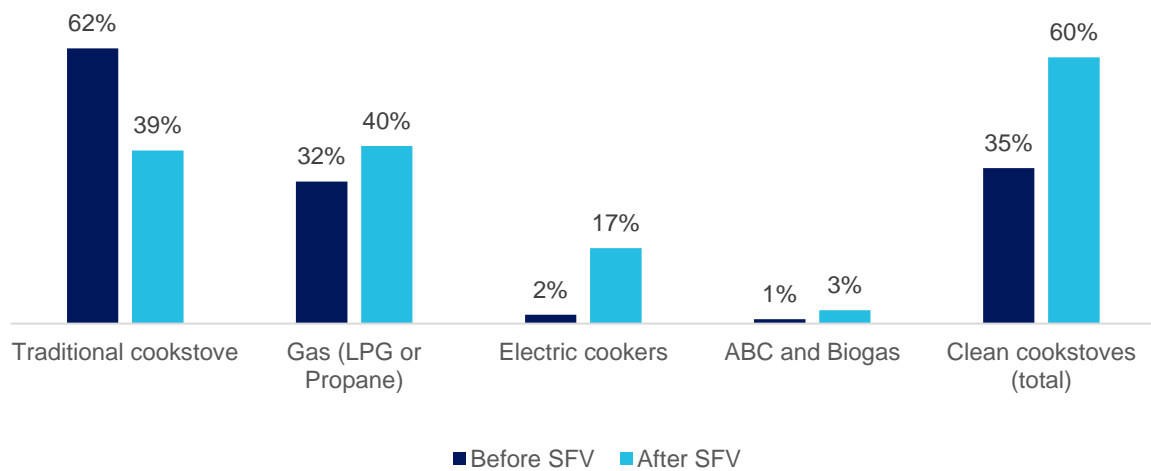


Figure 5 Primary stove usage: Treatment group before and after SFV exposure

The comparative analysis of the control group shows very similar changes, confirming that changes when those exposed to SFV are compared to households outside of SFV, which points to an attribution of SFV towards this trend.

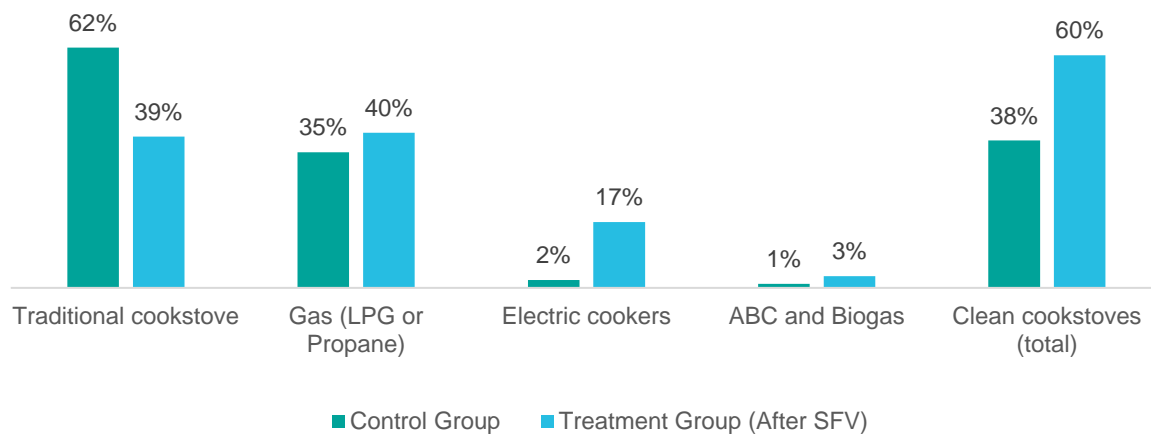


Figure 6 Primary stove usage: Control group and treatment group after SFV exposure

4. Gender and Social Inclusion

The survey data were differentiated against GESI groups: families registered as poor, female led households and households with people living with disabilities (PLWD). ID poor households are inclusive of female-led households and of households with PLWD.

The survey data did not provide a large enough sample for a Control group of GESI households, therefore only the Before and After situation is analysed.

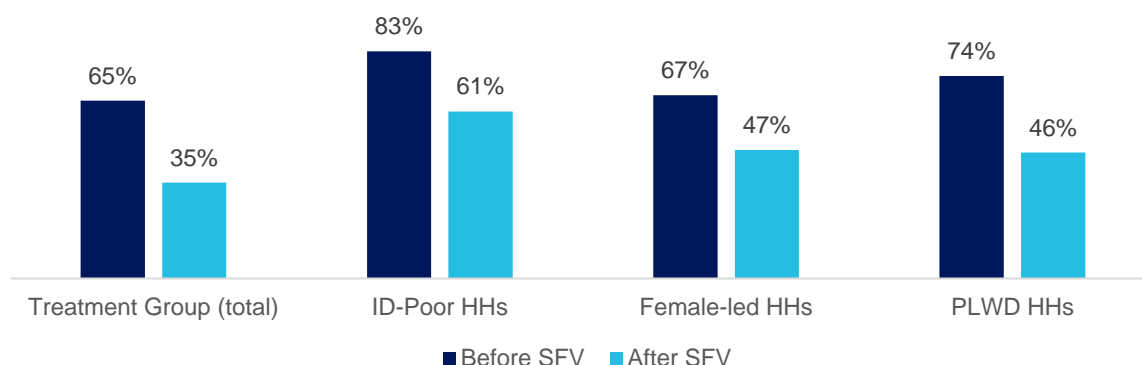


Figure 7 Prevalence of Traditional Cookstoves

As expected, the ID Poor households showed a much higher reliance on traditional stoves as their primary stove than the total group. (65% against 83%). This confirms that poorer households are more dependent on solid fuels which is likely explained by the pricing barrier. On the other hand, female led households showed quite similar usage of traditional stoves (67%) whereas this was higher for PLWD (74%).

The reduction of primary traditional cookstoves use was for the treatment group 30% points⁶, against ID poor 17% points. Poor households had a slower response to SFV exposure, but it disproves the notion that ID poor households are unable to change cooking habits. Female led households using traditional stoves dropped with 20% points and PLWD 28%.

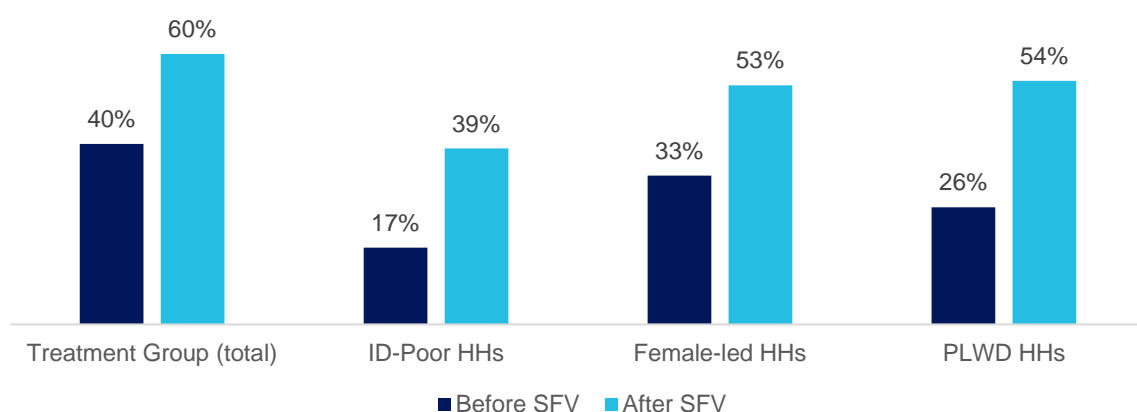


Figure 8 Prevalence of Clean Cookstoves

⁶ A percentage point is the unit for the arithmetic difference of two percentages.

5. Case studies



Figure 9 Cook using a propane gas cookstove

Ms. Bun, married and has two children (4 and 11 years old); she lives with five family members, including one nephew; she has lived in the village for around seven years

What she says ...

“The activities changed some of my cooking behaviours. Previously I had only used wood and always asked the children to help me with cooking. That has changed.

I now use an electric cooker and a small gas stove, so I don't need the children to look after the fire and I'm no longer concerned about the impact of smoke on their health. I made the decision to change to a clean stove myself; however, I still discussed it with my husband before buying it.

The challenge of changing my behaviour was that the price of the clean stove was a bit expensive, while our family budget is limited. That's why we can only use the small gas stove right now. But we'll buy the big one when we have enough money.

I think the change has been good because our health isn't damaged, we save time and money, and we keep our kitchen clean as well. I will continue to use these behaviours to improve our health, keeping our children away from smoke.”



Supplier of Clean Cookstoves and fuels in a treatment village

Figure 10 Shop owner selling electric cooker to female customer

Mr. Him, married and has three children (1, 5, and 7 years old)

What he says ...

“I have run a medium-sized business with my wife for five years now, located near the pagoda and around one kilometre from the district office. I sell all types of stoves, including small gas, big gas, electric cookers and kettles, blenders for fruit and coffee, ABC stoves, grill stoves, and stove replacement parts.

I studied and understood the impact of smoke on health, and many people now understand and support clean stoves, so the use of clean stoves has increased. That’s when we started to collaborate with Vision Fund to help people have access to instalment payments for the big gas stoves.

People from different locations, including restaurant owners and chefs, come to my shop. I normally get very busy before Khmer New Year and Pchum Ben.

COVID-19 did have some impact on my business by affecting customers’ sources of income due to loss of employment. During COVID-19 we allowed people to buy on credit or through instalment plans.

I attended the commune meetings about SFV, the quarterly meetings with SNV, and the Village Meetings to talk about the impact of gas stoves. I wanted to disseminate information about the benefits and maintenance of gas stoves, as well as the impact of smoke on health.

I think the events were very useful as they made people gain more understanding of clean stoves and the impact of smoke. In addition, it helped us sell more products than before.”



Figure 11 Commune Council for Women and Children explaining clean cooking behaviours

Ms. Chheng, deputy village chief; married and has four children (two women aged 26 and 36, and two men aged 29 and 31) living with son-in-law and two grandchildren also live in her household

What she says ...

"I was born in this village and have lived here all my life. I've worked in this position for around 17 years. I first joined the SFV initiative when I was selected by the village chief and commune to be a village representative. In addition, I joined the activities because I see that the SFV approach can raise health awareness and make people understand the impacts of cooking smoke, which can cause lung disease. Clean stoves also help make cooking faster and more convenient than before, and they keep the house clean.

I think some people are interested and others are not. The people who were interested in the activities joined and were informed about smoke impact and the benefits of clean stoves—time and money savings, faster cooking, and ease of use. The people who were not interested in the project activities did not care about smoke as they did not believe in its negative impact. They think that the price of clean cookstoves remains expensive and have no ability to buy them. After attending one activity, they did not want to continue. Additionally, they were concerned and afraid to use gas stoves due to the risk of explosion.

We faced some difficulties engaging villagers as some of them are busy and do not have time. Others thought that the content was not useful and even somewhat repetitive. Several people claimed that they have been using wood and charcoal for years and haven't experienced any impact on their health.

I believe SFV activities are effective in changing some cooking behaviours among people. Those who changed them see the usefulness and benefits of practising these behaviours, such as health improvements, avoiding diseases, and having an easier time cooking.”

6. Recommendations for improvement

As part of the assessment study for the Smoke Free Village campaign, RTE provided a list of recommendations that were derived from their field observations and data analysis. These recommendations come from feedback received from SFV stakeholders, like local authorities, as well as stove suppliers and end users.

BCC Activities and Materials

While the illustrations currently used in the BCC materials highlight the positive effects of adopting the four clean cooking behaviours, RTE recommended the following:

- Photos showing men and women making decisions together to change cooking behaviours (for example, husbands rearranging the kitchen and gesturing to children to stay away from the stove, husband and wife looking at various clean cookstove models, etc.). This would confirm evidence from the survey that nearly half of treatment group households made a joint decision to change their cooking behaviours.
- Promote empowerment and inspiration by showcasing photos of people whom the villagers know (neighbours, the village chief) purchasing a clean cookstove.
- Provide clear messaging on the location and contact details of nearby clean cookstove shops so that participants are aware that they have access to clean stoves and fuels.

GESI groups






- Special subsidies could be considered for seniors to facilitate their transition, given their higher risk of respiratory illness.
- Women-led households had the lowest average of practiced clean cooking behaviours across GESI groups. As many women cannot leave children unattended while cooking, emphasis should be placed on how using clean stoves can minimise impacts on children who may be present during cooking.

7. Annexes




7.1 Stove types

There are a few common types of stoves (traditional and clean) observed⁷ among households that are participating in the SFV campaign as described below. Often more than one stove is prevalent in the kitchen, with Lao stove being the most popular in rural Cambodia.

Table 7-1 Stove type description

Stove Name	Photo	Description
Traditional (Lao) Stove		Made from ceramic and a metal coating holding insulation material. This is the most widespread traditional stove used in Cambodia and retails for \$2 USD (basic) to \$6 USD (improved).
Advanced Biomass Cookstove (ACE)		Advanced gasifier biomass stove, produced in a factory in Siem Reap province. This technology saves fuel and reduces smoke. It retails for \$115 USD.
Advanced Biomass Cookstove (Prime)		Advanced gasifier biomass stove, imported from Indonesia by CQC. Higher efficiency than traditional stoves, with a cost ranging between \$ 65-75 USD.
Small LPG		Small, portable LPG stove that uses a rechargeable LPG bottle (250 g). Stove costs are \$ 12 – 15 USD; LPG bottle: \$ 1 USD; one-time refill: \$ 0.25 USD). Over-usage of bottles leads to incidents of explosion.
Big LPG		Double burner stoves that can use LPG. Imported from Vietnam, China, and Thailand. Widely available on local markets. Price ranges widely from \$50 to \$200 USD.

⁷ E-cookers such as hot plates or induction plates are promoted in the campaign, but they constitute a marginal share of e-cookers present in households (under < 1% of all electric cookers). Rice cookers make more than 95% of all e-cookers.

E-cooker (Kettle)		Electric kettle imported from Vietnam, China, and Thailand. \$ 5 to \$15 USD, available virtually everywhere (city, town, urban markets). Cooking wise, it is used for noodles and instantaneous soups.
E-cooker (Rice Cooker)		Electric rice cooker, mostly imported from Thailand and China. Cheaper brands, with smaller models' retail for \$15 USD while higher quality is \$50 USD. Widely available.
Induction or infrared single plate		Sold through social enterprises from \$45 to \$80 USD
Induction double plate		Sold by social enterprises against \$220 USD with pots and pans, including PAYGO service.

7.2 Ratio of Clean Cookstove Uptake After SFV Participation

Internal monitoring from the logbooks showed that in total 15,280 household members have participated in SFV and that 12,191 new clean cookstoves were purchased among these households, which is a remarkable 80%. To independently verify this high ratio, RTE took a sample to in Sasar Sdam commune in Siem Reap province. This data showed that out of 955 households had participated in at least one SVF event, and that 714 new clean cookstoves had been purchased, which is 75%, confirming to a large degree the uptake ratio that was calculated from the project monitoring data.

7.3 Data Collection

Based on the terms of reference and consultation with project staff, the following data collection tools were developed for this assessment:

- KIIs with local authorities
- KIIs with suppliers of clean cookstoves and fuels
- KIIs with school directors
- KIIs with health centre staff
- Household survey for treatment group
- Household survey for control group

The tools are included as annexes to this report. All questionnaires were developed in English and once finalised were translated into Khmer and converted into a CSPro/KoBoToolbox electronic format so that CAPI could be used (via a tablet) by the RTE enumerators during data collection. The CAPI format was developed in both English and Khmer, but enumerators used the Khmer interface for data collection. The questionnaire was

designed to include quality controls such as logic checks, cross tabulations, and data checks so that only complete and validated data was entered and only skipped questions were left blank. The questionnaire was created and tested in August 2021. The field research took place in September 2021, while the data cleaning and analysis took place in October and November 2021. The report writing took place between December 2021 and January 2022.

7.4 Key Informant Interview Findings

School directors

All school directors (12) participated in at least one SFV activity, with the most common ones being the SFV Day (100%), Village Meetings (92%), and Cooking Fair (67%). Most of the school directors interviewed (10 out of 12) reported that frequent absences were a problem, with 20% of school absences attributed to respiratory health problems. Moreover, 83% of school directors reported that they believed most children would commonly tend the cooking fire at home. This suggests a direct exposure of children to indoor air pollution from a young age.

Quotes from School directors:

“Educating children about the effects of smoke will encourage parents to use smoke-free stoves.”

“Want to promote through students to reach parents, to reduce the use of firewood together for health.”

“Because smoke affects the health of children in particular and causes other diseases such as cancer, cough and eye pain.”

“As a child, he understands the effects of smoke while cooking, so he uses his knowledge to tell his parents to change their cooking habits.”

“Because the child is the child, the child is in direct contact with the smoke, if the child participates, the child knows the effects of the smoke, the child can tell the parents to change.”

[KIs with school directors]

Suppliers

Clean cookstove suppliers attended BCC events and provided information to participants on the effect that smoke has on personal health while cooking. Every supplier participated in at least one activity during the campaign.

All suppliers noticed an increase in clean cookstove sales as a result of the SFV campaign, with LPG stoves being the most popular product purchased by households, followed by e-cooker kettles.

Five out of seven suppliers were displaying materials in their shops provided by the campaign, and all of them encouraged SNV to continue promoting clean cooking behaviours in their respective villages.

Feedback obtained from suppliers included suggestions to obtain discounts from wholesalers or cookstove production companies, and to provide microfinancing or similar

financial support to assist villagers in overcoming economic barriers to the purchase of clean cookstoves.

Most households approximated their location to be within 5 kilometres of a shop that retails clean fuel and alternatives to traditional stoves.

7.5 Questionnaires: Control group

Data Collection Tool 6: Household Survey – Control Group

Screening: Respondent has NOT participated in or heard of SNV SFV activities and is the person primarily responsible for cooking in the household.

Personal Information

“I am going to ask you some general questions about yourself.”

#	Question	code	Answer
	Name		
	Phone number		
	Age		Number
	Gender	1	Male
		2	Female
	Position in household (In relation to the head of household)	1	Head of Household
		2	Spouse of head of household (husband/wife/partner)
		3	Son/daughter
		4	Son/daughter-in-law
		5	Grandchild
		6	Parent
		7	Parent-in-law
		8	Brother/sister
		9	Niece/nephew
		10	Other relative
		11	Not related
	Highest education lev	1	No formal school
		2	Incomplete primary
		3	Completed primary
		4	Incomplete lower secondary
		5	Complete lower secondary
		6	Incomplete upper secondary
		7	Complete upper secondary
		8	Higher than secondary
	Marital Status	1	Single
		2	Married
		3	Widowed
		4	Divorced
	Do you have an ID Poor Card	1	No
		2	Yes – Level 1
		3	Yes – Level 2
	Ethnicity.	1	Khmer
		2	Vietnamese
		3	Chinese
		4	Lao
		5	Cham

		6	Jarai
		7	Kachak
		8	Kavet
		9	Kreung
		10	Phnong
		11	Tumpoun
		12	Brao
		13	Other

Household Information. "I am going to ask you some general questions about your household."

#	Question	code	Answer
	How many people live in the household?		Number
	How many children (under 15 years) are in the household?		Number
	How many children (under 5 years) are in the household?		Number
	How many families are living in your house?		Number
	What is your family's main occupation/source of income?	1	Farmer
		2	Fishermen (fishing)
		3	Labor worker
		4	Own Business
		5	Government employee
		6	Private employee
		7	Organization employee
		8	Factory worker
		9	Driver/Mechanic
		10	Construction worker
		11	Animal raising
		12	Food Processor
		13	Housewife
		14	Househusband
		15	Student/vocation training staff
		16	Informal sector (tuk-tuk/moto drivers, taxi drivers, street vendors, and small restaurant workers)
		17	Unemployed
		18	Others (.....)
	In relation to any one of the following: seeing, hearing, walking, concentrating, self-care and communication, do any household member have <u>a lot of difficulty or can't do at all</u> ?	1	Yes
		2	No
	If yes, who?	1	Respondent
		2	Head of Household
		3	Spouse of head of household (husband/wife/partner)
		4	Son/daughter
		5	Son/daughter-in-law
		6	Grandchild
		7	Parent
		8	Parent-in-law
		9	Brother/sister
		10	Niece/nephew
		11	Other relative
		12	Not related
	If yes, choose the disability.	1	Seeing
		2	Hearing
		3	Walking
		4	Concentrating
		5	Self-care

Which people in your household are primarily responsible for cooking food? (buying, preparing and cooking food)?	1	Respondent
	2	Head of Household
	3	Spouse of head of household (husband/wife/partner)
	4	Son/daughter
	5	Son/daughter-in-law
	6	Grandchild
	7	Parent
	8	Parent-in-law
	9	Brother/sister
	10	Niece/nephew
	11	Other relative
	12	Not related
Cooking Practices		
<i>"I am going to ask you some general questions about your cooking practices in the household."</i>		
What cooking stoves do you own and are currently using at least twice a week? [Can choose multiple]	1	Small LPG
	2	Big LPG
	3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
	4	E-Cooker – Cooking plate
	5	E-Cooker – Kettle
	6	E-Cooker – Rice cooker
	7	Lao/ceramic stove
	8	Open fire
	99	Other
Are there cooking stoves that you are not using <u>now</u> , but you use it during another time of the year? [Can choose multiple]	1	Small LPG
	2	Big LPG
	3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
	4	E-Cooker – Cooking plate
	5	E-Cooker – Kettle
	6	E-Cooker – Rice cooker
	7	Lao/ceramic stove
	8	Open fire
	99	Other
When do you use these cookstoves?		Month of the year
[Skip logic: If Q20 answers any of 1,2,3,4,5,6 ask this question]		
Ask these two questions for each type for clean cook stove they own (max 3)		
Clean Cookstove #1 (specify) When did you buy the clean cookstove?	1	Less than 6 months
	2	7-12 months
	3	1-2 years
	4	2-4 years
	5	More than 4 years
Clean Cookstove #1 (specify) Why did you buy that clean cookstove?	1	Time savings
	2	Fuel savings
	3	Convenience
	4	Health
	5	Money Savings
99	Other	
Clean Cookstove #2 (specify) When did you buy the clean cookstove?	1	Less than 6 months
	2	7-12 months
	3	1-2 years
	4	2-4 years
	5	More than 4 years
Clean Cookstove #2 (specify) Why did you buy that clean cookstove?	1	Time savings
	2	Fuel savings
	3	Convenience

		4	Health
		5	Money Savings
		99	Other
	Clean Cookstove #3 (specify) When did you buy the clean cookstove?	1	Less than 6 months
		2	7-12 months
		3	1-2 years
		4	2-4 years
		5	More than 4 years
	Clean Cookstove #3 (specify) Why did you buy that clean cookstove?	1	Time savings
		2	Fuel savings
		3	Convenience
		4	Health
		5	Money Savings
		99	Other
	[Skip logic: ask everyone] What do consider your PRIMARY stove? [Can prompt and choose ONE]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		8	Open fire
		99	Other
	[Skip logic: ask everyone] How often do you use your PRIMARY stove?	1	Daily
		2	Almost Daily (More than 3 days per week)
		3	Less than 3 days per week
		4	A few times per month
		5	Almost never
	[Skip logic: ask everyone] What fuel do you use for the PRIMARY stove? [Can prompt and choose ONE]	1	Charcoal
		2	Cow Dung
		3	Electricity
		4	Sawdust
		5	Wood
		6	LPG
		99	Other
	[Skip logic: If Q30 answers 56 ask this question] How do you obtain your wood?	1	Collect
		2	Buy
		3	Both
	[Skip logic: ask everyone] Where is the kitchen located (used with the PRIMARY stove)?	1	(Inside) Within living area
		2	(Inside) Separate room
		3	Outside
		4	Under the house
		5	Other
	[Skip logic: ask everyone] What do you consider your SECONDARY stove? [Can prompt and choose ONE]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		7	Open fire
		8	Small LPG
		99	Other
	[Skip logic: ask everyone]	1	Daily

	How often do you use your SECONDARY stove?	2	Almost Daily (More than 3 days per week)
		3	Less than 3 days per week
		4	A few times per month
		5	Almost never
	[Skip logic: ask everyone] What fuel do you use for the SECONDARY stove? [Can prompt and choose ONE]	1	Charcoal
		2	Cow Dung
		3	Electricity
		4	Sawdust
		5	Wood
		6	LPG
		99	Other
	[Skip logic: ask everyone] Where is the kitchen located (used with the SECONDARY stove)?	1	(Inside) Within living area
		2	(Inside) Separate room
		3	Outside
		4	Under the house
		5	Other
	[Skip logic: ask everyone] Do you know any type of clean cookstove?	1	Yes
		2	No
	If yes, which ones?	1	LPG stove (big)
		2	LPG stove (small)
		3	Advanced Biomass Cookstove (models)
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		99	Others
	[Skip logic: ask everyone] When you cook at home, do you normally have your children in the kitchen while cooking?	1	Yes – all the times
		2	Yes – sometimes
		3	No
		4	No – Don't have children in HH
	If yes, why? [Can choose multiple]	1	Cannot leave children unattended/Need to watch the children
		2	Children help me with cooking
		3	Child is on my back/in my arms
		4	Child(ren) is near me in the kitchen
		5	Child(ren) is not in the kitchen but nearby
		99	Other
	If no, where are you children? [Can choose multiple]	1	In the living room
		2	In the bedroom
		3	In the garden/terrace (outside)
		4	At school
		5	Field/farm
		99	Other
	[Skip logic: ask everyone] When you cook at home, do you try to have windows/doors open /air flow available?	1	Yes – all the times
		2	Yes – sometimes
		3	Yes – the kitchen is outside
		4	No
	[Skip logic: ask everyone] How well ventilated is the area where you cook? [Enumerator can also observe the kitchen to confirm the answer]	1	No ventilation (door/entrance only, no windows)
		2	Poor ventilation (limited windows/openings)
		3	Average ventilation (gaps between top walls and roof)
		4	Adequate ventilation (sheds with no walls, big windows, openings)
		5	Fully ventilated (outdoors)
	[Skip logic if Q42 answer is 4, ask this question] Why?	1	Cannot relocate the kitchen
		2	Enclosed kitchen (cannot add more ventilation)
		3	Cooking with plenty of ventilation kills the fire

		4	Weather impacts (rain/wind/etc.)
	[Can choose multiple]	99	Other
	[Skip logic: ask everyone] Do you use wood as fuel for cooking? [Behaviour 3]	1	Yes
		2	No
	If yes, where do you store the wood for cooking at home? [Enumerator can also observe the kitchen to confirm the answer]	1	Inside
		2	Outside
		99	Other
	If yes, do you protect your wood from the weather (rain)? [Behaviour 3]	1	Always
		2	Very often
		3	Sometimes
		4	Rarely
		5	Never
	[Skip logic: If Q47 answer is 4 or 5, ask this question] Why is this? [Can choose multiple]	1	No space to keep wood undercover
		2	Do not have material to cover the wood
		3	Do not think it is necessary/Don't care
		99	Other
	[Skip logic: ask everyone] Are you wanting to invest/buy clean cookstoves?	1	Yes
		2	Maybe/Not sure
		3	No
	[Skip logic: If Q49 answer is 2 or 3, ask this question] If no or not sure/maybe, why? [Can choose multiple]	1	Clean cookstove is expensive
		2	Clean cookstove is not available
		3	Spare part or fuel of clean cookstove are not available
		4	I don't know how to use clean cookstove
		5	The taste of food of clean cookstove is not good
		6	Clean cookstove is difficult to carry and move
		7	Willing to buy but I have no money for it
		8	Willing to buy once I have money for it in foreseeable future
		9	Need more convincing that this is needed
		10	My husband or family don't allow me
		11	Fear of explosion LPG or electrocution (E cookers)
		99	Other
	[Skip logic: ask everyone] Do you know where to buy clean cookstoves?	1	Yes
		2	No
	If yes, how far away is the closest shop?	1	Within my village
		2	Less than 5kms
		3	5-10kms
		4	11-20kms
		5	More than 20kms
	[Skip logic: ask everyone] Considering your current income, the cost of a clean cookstove for you is:	1	Very expensive
		2	Expensive
		3	Adequate
		4	Affordable
		5	Very affordable
[All remaining questions: ask everyone]			
<u>Knowledge, Attitude and Perception (KAP)</u>			
<i>"I am going to ask you some general questions about your understanding of smoke free cooking."</i>			
	Do you or your children have any respiratory/breathing problems within the last three months?	1	Yes
		2	No
	If yes, what kind of problems?	1	Cough
		2	Difficulties breathing
		3	Pneumonia

		4	Tuberculosis
		99	Other
	How do you think smoke from a cooking stove effects your health and children's health?	1	Has a positive impact
		2	Has a negative impact
		3	Neither positive nor negative
		77	Don't know/Not sure
	When you think about the smoke produced by your cooking stove, do you think that it is:	1	Very bad for your health
		2	Bad for your health
		3	No impact to health
		4	Good for your health
	[Can prompt and choose ONE]	5	Very good for your health
	What health problems do you think that this smoke could cause?	1	Cough
		2	Difficulties breathing
		3	Eye problems
		4	Headache
		5	Cancer
		77	Don't know/Not sure
		99	Other
	How did you learn about these health problems?	1	TV
		2	Radio
		3	Internet
		4	Newspapers
		5	Family
		6	Friends
		7	Neighbours
		8	Workshops
		9	Health workers
		10	Pagoda
		99	Other
	How concerned are you about the impacts on your health from cooking smoke?	1	Very concerned
		2	Concerned
		3	Somewhat concerned
		4	A little concerned
		5	Not concerned
	How concerned are you about the impacts on your children's health from cooking smoke?	1	Very concerned
		2	Concerned
		3	Somewhat concerned
		4	A little concerned
		5	Not concerned
	How can you protect (yourself/your children) from the negative health effects of cooking smoke?	1	Keep children way from smoke
		2	Using fan
		3	Shielding fire
		4	Wearing a face cover/mask
		5	Cooking in a room with open windows/doors
		6	Use cleaner fuels (gas/electricity)
		7	Have a separate room for cooking
		77	Don't know/Not sure
		99	Other
	What kind of cooking fuel do you find less harmful/safer for your health? And most harmful/dangerous?		Wood
			Charcoal
			Kerosene
			LPG
			Electricity
	Would you like to change your current primary cooking fuel	1	Yes

		2	No
		3	Undecided/Not sure
	If yes, which one? [Can prompt and choose ONE]	1	Charcoal
		2	Cow Dung
		3	Electricity
		4	Sawdust
		5	Wood
		6	LPG
		99	Other
	If yes (want to change primary cool fuel), why would you want to switch your primary fuel? (Choose main reason) [Can prompt and choose ONE]	1	Cleaner
		2	Safer
		3	Cheaper
		4	Easier to use
		5	Saves time (convenient)
		99	Other
	Has COVID-19 impacted your access to clean stoves or fuels?	1	Yes
		2	No
		3	Undecided/Not sure
	If yes, how?	1	LPG fuel/stoves became difficult to reach/inaccessible (travel impacts)
		2	Clean stoves became difficult to reach/inaccessible (travel impacts)
		3	Impacted on job leading to lower disposable income to purchase cleaner fuels (income impacts)
		99	Other
		77	Do not know/Not sure
Decision Making			
<i>"I am going to ask you some general questions about decision making in the household."</i>			
	[If they own a clean cookstove or know about clean cooking Q19 & Q34] Who in your family/household was the first to talk about the topic of clean cooking?	1	Respondent
		2	Wife
		3	Husband
		4	Other male
		5	Other female
	Who would/did make the decision on whether to change to clean smoke-free cooking behaviours?	1	Male
		2	Female
		3	Both
	In your opinion, do you think men and women share equally the process of making this decision?	1	Yes
		2	No
		77	Don't know/Not sure
	Have you heard of any clean cooking campaigns/advocacy activities before?	1	Yes
		2	No
		77	Don't know/Not sure
	If yes, can you describe it?		Open

7.6 Questionnaires: Treatment group

Data Collection Tool 5: Household Survey – Treatment Group

Screening - two criteria required:

Respondent must have participated in at least one of the four SFV activities (#1-4)

Which SFV project activities have you participated in?	1	Door to Door Visit
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[Can prompt and choose multiple]	2	Smoke Free Village Day [School painting or local authority speech]
	3	Cooking Fair
	4	Village Meeting
	5	Have received SFV Champion Certificate
	6	SFV Community Dialogues – Stories
		without an ending

The respondents are primarily responsible for cooking in the household.

Note: Ensure that the use of the “99: Other” option is truly different than the other existing options (as often people are just rephrasing one or more of the given options).

Personal Information

“I am going to ask you some general questions about yourself.”

#	Question	code	Answer
	Name		
	Phone number		
	Age		Number
	Gender	1	Male
		2	Female
	Position in household (In relation to the head of household)	1	Head of Household
		2	Spouse of head of household (husband/wife/partner)
		3	Son/daughter
		4	Son/daughter-in-law
		5	Grandchild
		6	Parent
		7	Parent-in-law
		8	Brother/sister
		9	Niece/nephew
		10	Other relative
		11	Not related
	Highest education level	1	No formal school
		2	Incomplete primary
		3	Completed primary
		4	Incomplete lower secondary
		5	Complete lower secondary
		6	Incomplete upper secondary
		7	Complete upper secondary
		8	Higher than secondary
	Marital Status	1	Single
		2	Married
		3	Widowed
		4	Divorced
	Do you have an ID Poor Card	1	No
		2	Yes – Level 1
		3	Yes – Level 2
	Ethnicity.	1	Khmer
		2	Vietnamese
		3	Chinese
		4	Lao
		5	Cham
		6	Jarai
		7	Kachak
		8	Kavet
		9	Kreung
		10	Phnong
		11	Tumpoun
		12	Brao
		13	Other
Household Information			
<i>“I am going to ask you some general questions about your household.”</i>			
	How many people live in the household?		Number
	How many children (under 15 years) are in the household?		Number
	How many children (under 5 years) are in the household?		Number
	How many families are living in your house?		Number
	What is your family's main occupation/source of income?	1	Farmer
		2	Fishermen (fishing)
		3	Labor worker
		4	Own Business

		5	Government employee
		6	Private employee
		7	Organization employee
		8	Factory worker
		9	Driver/Mechanic
		10	Construction worker
		11	Animal raising
		12	Food Processor
		13	Housewife
		14	Househusband
		15	Student/vocation training staff
		16	Informal sector (tuk-tuk/moto drivers, taxi drivers, street vendors, and small restaurant workers)
		17	Unemployed
		18	Others (.....)
	In relation to any one of the following: seeing, hearing, walking, concentrating, self-care and communication, do any household member have <u>a lot of difficulty or can't do at all</u> ?	1	Yes
		2	No
	If yes, who? [Can choose multiple]	1	Respondent
		2	Head of Household
		3	Spouse of head of household (husband/wife/partner)
		4	Son/daughter
		5	Son/daughter-in-law
		6	Grandchild
		7	Parent
		8	Parent-in-law
		9	Brother/sister
		10	Niece/nephew
		11	Other relative
		12	Not related
	If yes, choose the disability. [Can choose multiple]	1	Seeing
		2	Hearing
		3	Walking
		4	Concentrating
		5	Self-care
	Which people in your household are primarily responsible for cooking food? (buying, preparing and cooking food)?	1	Respondent
		2	Head of Household
		3	Spouse of head of household (husband/wife/partner)
		4	Son/daughter
		5	Son/daughter-in-law
		6	Grandchild
		7	Parent
		8	Parent-in-law
		9	Brother/sister
		10	Niece/nephew
		11	Other relative
		12	Not related
	What cooking stoves do you own and are currently using at least twice a week? [Can choose multiple]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		8	Open fire
		9	Electronic stove
		10	Biogas stove
		99	Other
	Are there cooking stoves that you are not using <u>now</u> , but you use it during another time of the year? [Can choose multiple]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		8	Open fire
		9	Electronic stove
		10	Biogas stove
		99	Other
	When do you use these cookstoves?		Month of the year
SFV Activities			
<i>"I am going to ask you some general questions about your participation in SFV activities."</i>			
	Which SFV project activities have you participated in? [Can prompt and choose multiple]	1	Door to Door Visit
		2	Smoke Free Village Day [School painting or local authority speech]
		3	Cooking Fair
		4	Village Meeting
		5	Have received SFV Champion Certificate
		6	SFV Community Dialogues – Stories without an ending
		99	Other
	If yes, how many times have you participated in those activities? [Add number to activity]	1	Door to Door Visit (#)
		2	Smoke Free Village Day [School painting or local authority speech] (#)
		3	Cooking Fair (#)
		4	Village Meeting (#)
		99	Other (#)
	If yes, which SFV project activities do you remember the most? [Can prompt and choose ONE]	1	Door to Door Visit
		2	Smoke Free Village Day [School painting or local authority speech]
		3	Cooking Fair
		4	Village Meeting

		5	Have received SFV Champion Certificate
		6	SFV Community Dialogues – Stories without an ending
		99	Other
	Why do you remember this activity the most? [Can prompt and choose multiple]	1	Was the only activity I attended
		2	I had a positive experience
		3	It's easy to remember the activity
		4	I purchased clean cooking stove at or soon after the activities
		5	I learned something new about smoke from cooking and its impact on health
		99	Other
	If participated in an SFV activity, what is your general opinion of the campaign?	1	Like it very much
		2	Like it
		3	Neither like or dislike
		4	Dislike
		5	Do not like it all
	If participated in an SFV activity, do you think the activity was very effective in persuading/changing people's cooking behaviours?	1	Very effective
		2	Effective
		3	Not sure/neutral
		4	Ineffective
		5	Very ineffective
	How important do you think the SFV campaign is for your community?	1	Very important
		2	Important
		3	Moderately important
		4	Slightly important
		5	Not important
	Do you remember the four cooking behaviours that the SFV campaign talked about? [Do NOT prompt Note: To remember correctly means to describe the core concept and use key words (children, smoke, ventilation, etc...)]	1	Behaviour 1: Children away from smoke while cooking [Remembered correctly]
		2	Behaviour 1: Children away from smoke while cooking [Remembered but not correct wording]
		3	Forgot Behaviour 1
		4	Behaviour 2: Cook in a well-ventilated location [Remembered correctly]
		5	Behaviour 2: Cook in a well-ventilated location [Remembered but not correct wording]
		6	Forgot Behaviour 2
		7	Behaviour 3: Dry wood before cooking [Remembered correctly]
		8	Behaviour 3: Dry wood before cooking [Remembered but not correct wording]
		9	Forgot Behaviour 3
		10	Behaviour 4: Invest in clean cookstoves [Remembered correctly]
		11	Behaviour 4: Invest in clean cookstoves [Remembered but not correct wording]
		12	Forgot Behaviour 4
	Do you feel that achieving a smoke-free house makes you:	1	More admired in your community
		2	Less admired in your community
		3	No difference
		77	Do not know/not sure
	Have you spoken to other people about the SFV campaign?	1	Yes
		2	No
	If yes, who have you spoken to? [Can prompt and choose multiple]	1	Family members in the household
		2	Family members outside the household
		3	Neighbours
		4	Friends
		5	Cookstove sellers
		99	Other
Cooking Practices			
<i>"I am going to ask you some general questions about your cooking practices in the household."</i>			
	Which of the four smoke free behaviours did you practice BEFORE you participated in an SFV campaign activity? [Can prompt and choose multiple]	1	Behaviour 1: Children away from smoke while cooking
		2	Behaviour 2: Cook in a well-ventilated location
		3	Behaviour 3: Dry wood before cooking
		4	Behaviour 4: Invest in clean cookstoves
	Which of the four smoke free behaviours did you practice AFTER you participated in an SFV campaign activity? [Can prompt and choose multiple]	1	Behaviour 1: Children away from smoke while cooking
		2	Behaviour 2: Cook in a well-ventilated location
		3	Behaviour 3: Dry wood before cooking
		4	Behaviour 4: Invest in clean cookstoves
	[Skip logic: If Q34 answers any of 1,2,3,4, ask this question] Why did you change this behaviour? [Can prompt and choose multiple]	1	Worried about the damage to the health of the household members
		2	It was easy/convenient to change this behaviour
		3	My neighbour/friend was also changing their behaviour
		4	I could afford to change this behaviour
		5	[Add more options after testing and day 1]
		99	Other
	[Skip logic: If Q34 answers any of 1,2,3,4, ask this question] How long after attending the SFV activity did you change this behaviour?	1	Within 1 month
		2	2-3 months
		3	4-6 months
		4	Over 6 months
	[Skip logic: If Q34 answers any of 1,2,3,4, ask this question] What were the benefits of changing this behaviour? [Can prompt and choose multiple]	1	Less smoke /better for health
		2	Faster cooking
		3	Easier cooking
		4	Uses less fuel/save money (long term)
		5	[Add more options after testing and day 1]
		99	Other
	[Skip logic: If Q34 answers any of 1,2,3,4, ask this question] What were the drawbacks/challenges of changing this behaviour?	1	Costs of buying/upkeeping clean cooking
		2	Time spent (driving to shops to buy fuel)

	[can prompt and choose multiple]	3	Inconvenience [mismatch cooking practices/dishes]
		4	[add more options after testing]
		99	other
	[Skip logic: If Q34 answer is 4, ask this question] Which clean cooking stoves did you buy after the attending the SFV activities? [Can choose multiple]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		99	Other
	[Skip logic: If Q34 answer is 4, ask this question] How did you finance this new clean cookstove? [can prompt and choose multiple]	1	Own money
		2	Took loan – microfinance or bank
		3	Took loan – from private lender
		4	Tong Ting
		5	Friends/neighbours support
		6	Governmental covid support
		99	Others
	[Skip logic: If Q34 answer is NOT 1, ask this question] You said that you don't keep children away from smoke while cooking. Why did you not change this behaviour? (Behaviour 1) [Can choose multiple]	1	Cannot leave children unattended/Need to watch the children
		2	Children help me with cooking
		3	No children living in the household (idea of this behaviour not being necessary)
		99	Other
	[Skip logic: If Q34 answer is NOT 2, ask this question] You said that you don't cook in a well-ventilated location. Why did you not change this behaviour? (Behaviour 2) [Can choose multiple]	1	Cannot relocate the kitchen
		2	Enclosed kitchen (cannot add more ventilation)
		3	Cooking with plenty of ventilation kills the fire
		4	Weather impacts (rain/wind/etc.)
		99	Other
	[Skip logic: If Q34 answer is NOT 3, ask this question] You said that you don't dry the wood before cooking. Why did you not change this behaviour? (Behaviour 3) [Can choose multiple]	1	No space to keep wood undercover
		2	Do not use wood anymore (hence no need to practice behaviour)
		3	Not a priority/does not care
		99	Other
	[Skip logic: If Q34 answer is NOT 4, ask this question] You said that you don't want to invest/buy clean cookstoves. Why did you not change this behaviour? (Behaviour 4) [Can choose multiple]	1	Clean cookstove is expensive
		2	Clean cookstove is not available
		3	Spare part or fuel of clean cookstove are not available
		4	I don't know how to use clean cookstove
		5	The taste of food of clean cookstove is not good
		6	Clean cookstove is difficult to carry and move
		7	Willing to buy but I have no money for it
		8	Willing to buy once I have money for it in foreseeable future
		9	Need more convincing that this is needed
		10	My husband or family don't allow me
		11	Fear of explosion LPG or electrocution (E cookers)
		99	Other
[Skip logic: If Q19 answer is 1 or 2, ask this question] "After attending the SFV activities..."			
	Did your monthly usage of butane change?	1	More
		2	Unchanged
		3	Less
		77	Don't know/Not sure
	Did your monthly usage of LPG change?	1	More
		2	Unchanged
		3	Less
		77	Don't know/Not sure
[Skip logic: If Q19 answer is 4,5, 6 or 9, ask this question] "After attending the SFV activities..."			
	Did your monthly usage of electricity change?	1	More
		2	Unchanged
		3	Less
		77	Don't know/Not sure
[Skip logic: If Q19 answer is 7 or 8, ask the next 3 questions] "After attending the SFV activities..."			
	Did your monthly usage of wood change?	1	More
		2	Unchanged
		3	Less
		77	Don't know/Not sure
	How did you obtain your wood?	1	Collect
		2	Buy
		3	Both
	Did your monthly usage of charcoal change?	1	More
		2	Unchanged
		3	Less
		77	Don't know/Not sure
	[Skip logic: ask everyone] What was your most used fuel for cooking BEFORE your participation in SFV activities? [Can prompt and choose ONE]	1	Wood
		2	LPG
		3	Electricity
		4	Charcoal
	[Skip logic: ask everyone] What was your most used fuel for cooking AFTER your participation in SFV activities? [Can prompt and choose ONE]	1	Wood
		2	LPG
		3	Electricity
		4	Charcoal
	[Skip logic: ask everyone] Have you used wood or charcoal for cooking in the house in the last six months?	1	Yes
		2	No
The answers from Q19/20 should be used to populate the answers options for the two questions below.			
	[Skip logic: ask everyone] What would you have considered your PRIMARY stove BEFORE your participation in SFV activities? [Can prompt and choose ONE]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove

		8	Open fire
		9	Electronic stove
		10	Biogas stove
		99	Other
	[Skip logic: ask everyone] What would you have considered your SECONDARY stove BEFORE your participation in SFV activities? [Can prompt and choose ONE]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		8	Open fire
		9	Electronic stove
		10	Biogas stove
		99	Other
	[Skip logic: ask everyone] What do you consider your PRIMARY stove AFTER your participation in SFV activities? [Can prompt and choose ONE]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		8	Open fire
		9	Electronic stove
		10	Biogas stove
		99	Other
	[Skip logic: ask everyone] What do you have considered your SECONDARY stove AFTER your participation in SFV activities? [Can prompt and choose ONE]	1	Small LPG
		2	Big LPG
		3	ABC (Advanced Biomass Cookstoves) – ACE/Prime
		4	E-Cooker – Cooking plate
		5	E-Cooker – Kettle
		6	E-Cooker – Rice cooker
		7	Lao/ceramic stove
		8	Open fire
		9	Electronic stove
		10	Biogas stove
		99	Other
	[Skip logic: If Q34 answers any of 1,2,3,4, ask this question] How much time do you save in cooking each day because of the changed behaviours showed in the SFV campaign?	1	More than 60 minutes
		2	30 to 59 minutes
		3	Less than 30 minutes
		4	No time saving (unchanged)
		5	Spend more time cooking
	[Skip logic: ask everyone] Do you know where to buy clean cookstoves?	1	Yes
		2	No
	If yes, how far away is the closest shop?	1	Within my village
		2	Less than 5kms
		3	5-10kms
		4	11-20kms
		5	More than 20kms
	[Skip logic: ask everyone] Considering your current income, the cost of a clean cookstove for you is:	1	Very expensive
		2	Expensive
		3	Adequate
		4	Affordable
		5	Very affordable
[All remaining questions: ask everyone]			
<u>Knowledge, Attitude and Perception (KAP)</u>			
<i>"I am going to ask you some general questions about your understanding of smoke free cooking."</i>			
	How do you think smoke from a cooking stove affects your health and children's health?	1	Has a positive impact
		2	Has a negative impact
		3	Neither positive nor negative
		77	Don't know/Not sure
	What health problems do you think that this smoke could cause?	1	Cough
		2	Difficulties breathing
		3	Eye problems
		4	Headache
		5	Cancer
		77	Don't know/Not sure
		99	Other
	How can you protect (yourself/your children) from the negative health effects of cooking smoke? [Do NOT prompt. Can choose multiple]	1	Keep children way from smoke
		2	Using fan
		3	Shielding fire
		4	Wearing a face cover/mask
		5	Cooking in a room with open windows/doors
		6	Use cleaner fuels (gas/electricity)
		7	Have a separate room for cooking
		77	Don't know/Not sure
		99	Other
	If you still own a traditional stove, are you willing to discard it and buy a smokeless stove?	1	Yes
		2	No
		77	Don't know/Not sure
	If yes, why [Can prompt and choose multiple]	1	Reduce smoke/better for health
		2	Save time
		3	Convenient/Practical
		99	Other
	If no, why [Can prompt and choose multiple]	1	Too expensive
		2	Not a priority
		3	Still need it for my cooking
		99	Other
<u>Decision Making</u>			
<i>"I am going to ask you some general questions about decision making in the household."</i>			
	Who in your family/household was the first to talk about the topic of clean cooking?	1	Respondent
		2	Wife

		3	Husband
		4	Other male
		5	Other female
	Were any family members not supportive on changing cooking behaviours?	1	Yes
		2	No
	If yes, who?	1	Wife
		2	Husband
		3	Other male
		4	Other female
	Who would/did make the decision on whether to change to clean smoke-free cooking behaviours?	1	Male
		2	Female
		3	Both
	In your opinion, do you think men and women share equally the process of making this decision?	1	Yes
		2	No
		77	Don't know/Not sure
	To improve the SFV campaign, do you have any suggestions?		Open
	Is there anything you want to tell me about this campaign?		Open

7.7 Statistical and Qualitative Analysis

Table 7-2 Key demographics of participants

Response	Treatment Group (N = 309)		Control Group (N = 101)		Statistical Significance * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$
	Freq	Percentage	Freq	Percentage	
Region					
<i>Battambang</i>	77	24.9%	75	74.3%	
<i>Kampong Speu</i>	38	12.9%	13	12.9%	
<i>Kampot</i>	38	12.9%	13	12.9%	
<i>Siem Reap</i>	156	50.5%	0	0%	
Gender**					
<i>Female</i>	293	94.8%	101	100%	** Control group households had a higher share of female participants ($M = 100\%$, $SD = 0$) than treatment group households ($M = 95\%$, $SD = 0.22$), $t(408) = 2.34$, $p = 0.0098$.
<i>Male</i>	16	5.2%	0	0%	
Age*					
<i>Mean</i>	48.2		44.7		* Control group households were younger ($M = 44.7$, $SD = 13.7$) than treatment group households ($M = 48.2$, $SD = 13.5$), $t(408) = -2.27$, $p = 0.0118$.
<i>SD</i>	13.5		13.7		
<i>18–29</i>	28	9.1%	16	15.8%	
<i>30–44</i>	96	31.1%	37	36.6%	
<i>45–64</i>	150	48.5%	41	40.6%	
<i>65+</i>	35	11.3%	7	6.9%	
Education**					
<i>No formal school</i>	91	29.5%	24	23.8%	** Control group households had on average a slightly higher education level ($M = 1.73/7$, $SD = 1.66$) than treatment group households ($M = 1.32/7$, $SD = 1.44$), $t(408) = 2.38$, $p = 0.0088$.
<i>Incomplete primary</i>	137	44.3%	39	38.6%	
<i>Complete primary</i>	20	6.5%	3	3.0%	
<i>Incomplete secondary</i>	45	14.6%	28	27.7%	
<i>Complete secondary</i>	14	4.5%	5	5.0%	
<i>Higher than secondary</i>	2	0.7%	2	2.0%	
Marital status					
<i>Single</i>	7	2.3%	8	7.9%	

<i>Married</i>	240	77.7%	73	72.3%
<i>Divorced</i>	13	4.2%	7	6.9%
<i>Widowed</i>	49	15.9%	13	12.9%
Inhabitants				
<i>Mean</i>	5.05		5.39	
<i>Min–Max</i>	1–12		1–13	
<i>S.D.</i>	2.01		2.13	
<i>Children < 15 years</i>	240	77.7%	81	80.2%
<i>Mean</i>	1.53		1.56	
<i>Children <5 years</i>	137	44.3%	55	54.5%
<i>Mean</i>	0.63		0.70	
ID Poor Status*				
<i>Non-ID Poor</i>	240	77.7%	88	87.1%
<i>Level 1 – ID Poor¹</i>	26	8.4%	2	2.0%
<i>Level 2 – ID Poor²</i>	43	13.9%	11	10.9%
* Control group households had a lower proportion of ID Poor households ($M = 12.9\%$, $SD = 0.34$) than treatment group households ($M = 22.3\%$, $SD = 0.42$), $t(408) = -2.07$, $p = 0.0196$.				
Female headed				
<i>Female headed</i>	95	30.7%	23	22.8%
<i>Non-female headed</i>	214	69.3%	78	77.2%
PLWD HHs				
<i>Households with PLWD</i>	50	16.2%	13	12.9%
<i>Households without PLWD</i>	259	83.8%	88	87.1%
Clean stove ownership (Before SFV)				
	156	50.5%	58	57.4%

¹ Households deemed by the government to be extremely poor.
Households deemed by the government to be moderately poor.

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Table 7-3 Key indicators disaggregated by age

Variable	Treatment (N = 309)				
	18–29 years % (N = 28)	30–44 years % (N = 96)	45–64 years % (N = 150)	>65 years % (N = 35)	Total % (N = 309)
ID Poor					
<i>Households</i>	25%	19%	20%	40%	22%
Drivers of behavioural change					
<i>Health</i>	69%	86%	86%	94%	86%
<i>Convenience</i>	31%	44%	49%	28%	44%
Primary stove					
<i>Before / After SFV</i>					
<i>Lao stove</i>	43% / 25%	59% / 33%	65% / 40%	71% / 57%	62% / 39%
<i>Small LPG</i>	36% / 50%	10% / 24%	12% / 21%	14% / 26%	14% / 25%

<i>Big LPG</i>	14% / 14%	23% / 32%	17% / 25%	9% / 11%	17% / 25%
<i>Electric stove</i>	0% / 4%	4% / 6%	1% / 9%	3% / 3%	2% / 7%
Owns clean cookstove					
<i>Before / After SFV</i>	64% / 82%	58% / 74%	45% / 71%	40% / 51%	50% / 71%
Primary fuel					
<i>Before / After SFV</i>					
<i>Wood</i>	39% / 29%	57% / 27%	64% / 40%	60% / 34%	59% / 34%
<i>LPG</i>	50% / 61%	33% / 53%	27% / 45%	29% / 40%	31% / 48%
<i>Charcoal</i>	7% / 4%	7% / 10%	7% / 10%	11% / 23%	8% / 11%
<i>Electric</i>	4% / 7%	2% / 9%	2% / 8%	0% / 3%	2% / 7%
Most memorable activities					
<i>Village Meetings</i>	61%	67%	64%	83%	67%
<i>Cooking Fair</i>	29%	15%	17%	9%	16%
<i>Door-to-Door Visits</i>	7%	18%	15%	9%	14%
Behaviours followed					
<i>Before / After SFV</i>					
<i>B1</i>	39% / 64%	42% / 75%	38% / 69%	26% / 51%	38% / 69%
<i>B2</i>	29% / 82%	42% / 77%	48% / 78%	37% / 66%	43% / 77%
<i>B3</i>	36% / 71%	43% / 72%	53% / 79%	63% / 80%	50% / 76%
<i>B4</i>	57% / 75%	28% / 66%	37% / 63%	17% / 43%	34% / 62%
Total behaviours followed					
<i>Before / After SFV</i>					
<i>0</i>	18% / 7%	26% / 8%	20% / 8%	20% / 9%	22% / 8%
<i>1</i>	32% / 4%	27% / 5%	23% / 7%	37% / 17%	27% / 7%
<i>2</i>	29% / 11%	23% / 18%	28% / 13%	23% / 23%	25% / 15%
<i>3</i>	14% / 46%	15% / 26%	20% / 31%	20% / 29%	18% / 31%
<i>4</i>	7% / 32%	9% / 43%	9% / 41%	0% / 23%	8% / 39%

Table 7-4 Key indicators disaggregated by Gender and Social Inclusion group

Variable	Treatment (N = 309)			
	All Groups % (N = 309)	Women-led HHs % (N = 95)	ID Poor HHs % (N = 69)	PLWD HHs % (N = 50)
Drivers of behavioural change				
<i>Health</i>	86%	85%	84%	83%
<i>Convenience</i>	44%	45%	36%	41%
Primary stove				
<i>Before / After SFV</i>				
<i>Lao stove</i>	62% / 39%	63% / 45%	74% / 57%	72% / 44%
<i>Small LPG</i>	14% / 25%	15% / 23%	9% / 23%	10% / 24%
<i>Big LPG</i>	17% / 25%	14% / 19%	7% / 9%	12% / 22%
<i>Electric stove</i>	2% / 7%	3% / 9%	1% / 6%	4% / 4%

Owns clean cookstove				
Before / After SFV	50% / 71%	46% / 68%	32% / 51%	42% / 70%
Primary fuel				
Before / After SFV				
Wood	59% / 34%	63% / 36%	68% / 42%	74% / 34%
LPG	31% / 48%	28% / 44%	19% / 30%	22% / 52%
Charcoal	8% / 11%	6% / 16%	13% / 23%	2% / 10%
Electric	2% / 7%	2% / 4%	0% / 4%	2% / 4%
Most memorable activities				
Village Meetings	67%	64%	77%	62%
Cooking Fair	16%	14%	13%	24%
Door-to-Door Visits	14%	17%	9%	12%
Behaviours followed				
Before / After SFV				
B1	38% / 69%	39% / 64%	41% / 77%	40% / 72%
B2	43% / 77%	42% / 69%	46% / 81%	48% / 84%
B3	50% / 76%	50% / 78%	57% / 86%	62% / 84%
B4	34% / 62%	31% / 53%	22% / 51%	40% / 70%
Total Behaviours followed				
Before / After SFV				
0	22% / 8%	23% / 9%	25% / 3%	10% / 6%
1	27% / 7%	24% / 6%	20% / 4%	30% / 6%
2	25% / 15%	28% / 23%	29% / 22%	30% / 6%
3	18% / 31%	17% / 33%	17% / 38%	20% / 36%
4	8% / 39%	7% / 28%	9% / 33%	10% / 46%

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