



THE GLOBAL LPG PARTNERSHIP

BOTTLED GAS FOR BETTER LIFE MICROFINANCE PROGRAM REPORT

October 2019



Bottled Gas For Better Life has been made possible by the generosity of the following donors:



1. Introduction

Bottled Gas For Better Life is a new LPG microfinance program established and promoted by the Global LPG Partnership (GLPGP) and partners in Cameroon and Kenya. The program was piloted for the first time in Southwest Cameroon in 2017. It supports microfinance lending operations, including provision of loan capital, to facilitate equipment purchase (double burner stove, cylinder and accessories) by lower income households, to help them adopt liquefied petroleum gas (LPG) for clean cooking.

A number of pilots have been initiated (Table 1).

	Cameroon			Kenya
	Phase I	Phase IA	Phase II	Phase I
Households	150 registered	50 registered	507 registered	69 registered
Location	One community in South West Cameroon	One community in South West Cameroon	10 communities across Centre, Littoral, South West, North West, West regions of Cameroon	One community in Nyandarua County
Project period	March - October 2017	November 2017 - May 2018	April 2018 - July 2019 (Delays due to civil disorder in certain regions of Cameroon)	August 2018 – March 2019
Status	Complete	Complete	Complete	Complete

TABLE 1: BOTTLED GAS FOR BETTER LIFE PILOT PROJECTS

2. Cameroon

2.1 Program Design and Initial Results

2.1.1 Summary of Phase I (first-ever pilot) – 150 households

The pilot took place in 2017 in Batoke, a coastal village of Southwest Cameroon. GLPGP’s Cameroonian implementing partners in the pilot phase included LPG marketer Glocalgaz and microfinance institution (MFI) Mutuelle Financière des Femmes Africaines (MUFFA). Participants self-selected and were not screened for credit risk because it was uncertain what the demand would be initially, and loans were interest-free for piloting purposes. As LPG microfinancing is brand new in Cameroon and there were unknown risks involved, the MFI partner required GLPGP to advance the funds to be loaned to loan recipients. Funding for this was provided by donors. GLPGP also handled most field operations, such as community sensitization and loan repayment collection.

The breakdown of costs to participants (in Central African Francs, or CFA), in comparison to the subsequent pilots conducted in other communities (Phases IA and II), is shown in Table 2. A total of 150 households made initial security deposits of 7,500 CFA (US\$13.50), followed by six equal monthly payments for full repayment of the remaining loan capital.

Item	Phase I (cost in CFA)	Phase IA (cost in CFA)	Phase II (cost in CFA)
12.5kg Gas cylinder	18,500	18,500	18,500
Gas: initial fill (12.5 kg)	6,500	6,500	6,500
Double burner stove	20,000	20,000	18,000
Regulator	3,500	3,500	3,500
Gas hose	1,500	1,500	1,500
Equipment	50,000	50,000	48,000
Loan amount including interest	50,000 (interest-free)	50,000 (interest-free)	51,600 (1.25% monthly interest)

TABLE 2: LPG-START UP EQUIPMENT LOAN COST TO CAMEROONIAN PARTICIPANTS IN THE THREE PHASES

2.1.2 Phase IA – 50 households

Following Phase I in Batoke, an additional 50 households in Buea, Southwest Cameroon were offered interest free loans in the amount of CFA 50,000 (US\$90) (Table 2), to cover the purchase costs of a double-burner stove, a filled 12.5kg LPG cylinder, a regulator and a hose. The purpose was to test repayment rates if households were selected and screened for credit suitability by the financial institutions, unlike in Phase I, when the loan recipients had self-identified interest. Some of the repaid loan capital from Phase I was used to help capitalize the loan payments in this phase.

Loans were issued in November 2017 and repaid by May 2018. Households made initial security deposits of 8,333 CFA (US\$15), followed by six equal monthly payments.

2.1.3 Phase II – 507 households

A second expansion program in multiple communities across five regions (see Figure 1) was launched in April 2018. It involved a larger group of program partners including a new LPG marketer, Tradex, and a new MFI, MC2. Glocalgaz and MUFFA which had participated in Phase I also continued working with GLPGP. This second phase included a phased approach, community by community, across urban, peri-urban and rural areas (see Table 3). Community sensitization and participant registration commenced in mid-April. Civil unrest in two Anglophone regions of Cameroon slowed registrations considerably and forced GLPGP to reassign some loans to new communities in unaffected areas. The civil unrest also delayed subsequent loan repayment collections in affected communities. However, a renewed marketing push by GLPGP and its Cameroonian partners in July 2018 doubled the number of registered households within a month.

The MFIs, rather than GLPGP, are responsible in this phase for all field operations. This includes assessing the creditworthiness of interested households, a key differentiator from Phase I, although community sensitization has been a shared task. Interest in the amount of 1.25% per month is charged on each loan to ensure longer term commercial viability for the MFIs involved.

Site visits and LPG usage and safety training were organized by GLPGP in collaboration with the local MFI branches. 507 households registered and received LPG equipment. 29% of households re-paid the loan fully in three repayment cycles or less, 46% in four repayment cycles or less and 94% in five cycles or less.

Program partners had agreed to limit the number of existing LPG users to about 30% of all loan recipients, since the main goal was to catalyze LPG adoption by non-users. A number of existing LPG users,

particularly in urban and peri-urban communities where LPG use was already common, who wanted the microloan to purchase new or better equipment, therefore were turned away to allocate more loans to new LPG users.

Sensitization and education plays a crucial role in getting non-LPG users interested in the microfinance program. Non-LPG users are more likely to adopt LPG if they are aware of the benefits of LPG, how to cook local dishes using LPG, and the health hazards of continuing to cook with charcoal, firewood and kerosene. Education focused on household economic decision-making is also important. A woman who was interviewed after a Bottled Gas For Better Life sensitization event stated: ***“I can use a [12.5kg] bottle of gas for one month and a half. I will not regret it, because if I calculate the charcoal or the firewood [I'd use], it will be more expensive than the gas I'm using.”*** LPG usage per capita among this group of microfinance participants who attended the sensitization event was high, suggesting sustained and near-exclusive use of LPG. More attention to educating users about the cost advantages of LPG compared to other fuels is likely to encourage – beyond initial adoption – more sustained use of LPG over time.

Buy-in from community leaders has also proven important. In Phase I, support from the Chief of Batoke village, a strong advocate for the program, was instrumental in encouraging families to register for the microloan. In Phase II, local leaders are recruited as “LPG champions” ahead of the public awareness raising events. GLPGP also works with the Chiefs to recruit the local town criers to spread awareness about the program.

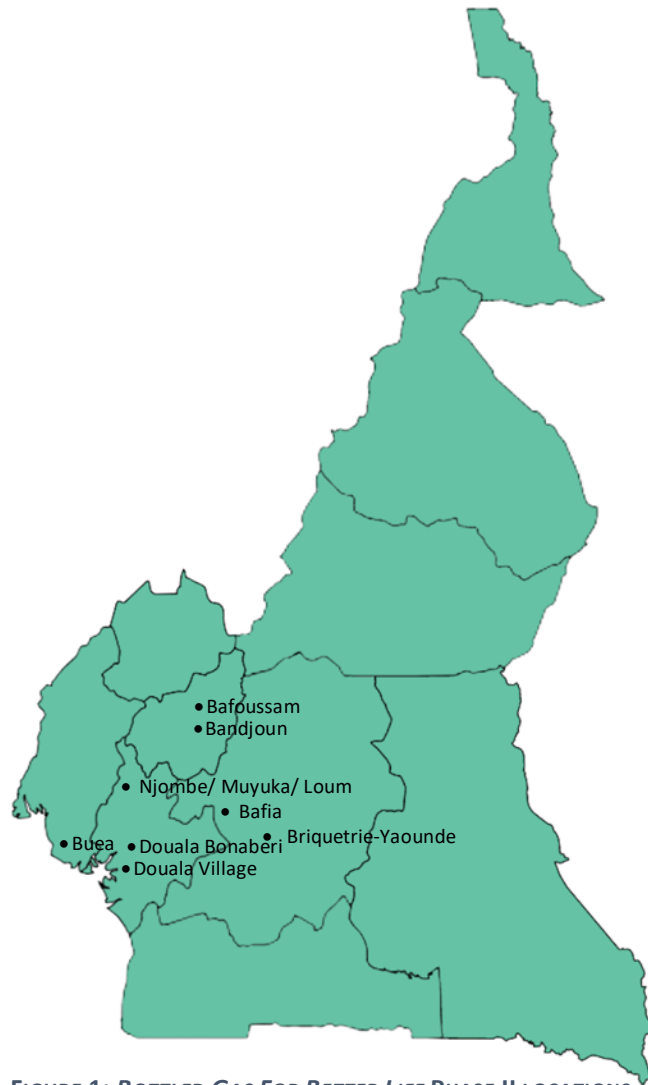


FIGURE 1: **BOTTLED GAS FOR BETTER LIFE PHASE II LOCATIONS IN CAMEROON**

Region	Community	Type	MFI	LPG Company	Households Registered ¹
Littoral	Douala Bonaberi	Urban	MUFFA	GLOCALGAZ	34
	Douala Village	Urban	MUFFA	GLOCALGAZ	25
	Njombe	Peri-urban	MC2	GLOCALGAZ	64
	Loum	Mixed	MC2	GLOCALGAZ	30
South West	Tiko	Peri-urban	MUFFA	GLOCALGAZ	0 (due to civil unrest)
	Buea	Peri-urban	MUFFA	GLOCALGAZ	8
	Muyuka	Peri-urban	MC2	GLOCALGAZ	29
North West	Njinikom	Rural	MC2	TRADEX	0 (due to civil unrest)
Centre	Bafia	Rural	MC2	TRADEX	39
	Briquetrie-Yaounde	Urban	MUFFA	TRADEX	100
West	Bandjoun	Rural	MC2	TRADEX	68
	Bafoussam	Urban	MUFFA	TRADEX	110
Total Loans					507

TABLE 3: BOTTLED GAS FOR BETTER LIFE PHASE II COMMUNITIES, PARTNERS AND HOUSEHOLDS REGISTERED

2.2 Monitoring & Evaluation

Since 2016, GLPGP has been partnering with the Department of Public Health and Policy at the University of Liverpool, UK and Douala General Hospital, Cameroon, which are jointly studying enabling factors to support large-scale population shifts from traditional polluting fuel use to LPG for cooking. This includes testing initiatives designed to help households make the switch, especially in poorer, peri-urban and rural communities.

2.2.1 Phase I evaluation

As part of the LACE studies, the researchers conducted an independent evaluation of *Bottled Gas for Better Life* Phase I, carrying out household surveys with beneficiary households before and after they received their LPG equipment. They also measured Household Air Pollution (HAP) exposure (kitchen emission concentrations and personal exposure in primary cooks). During both the baseline survey and six-month follow-up, they surveyed an additional 500 households (beyond the loan recipient group) in the pilot community and 500 households in a nearby control village. Data from non-recipients were compared with those who received the microloan, to help determine the effectiveness of the loan scheme in driving LPG adoption as well as



Equipment distribution in Douala, April 2018.

¹ As at September 21, 2018. Almost all these households have received the LPG equipment.

health benefits. Key results from this independent study showed²:

- A high level of loan repayment (94%) and LPG usage;
- Reductions in HAP personal exposure (fine particulate matter which contribute to respiratory illnesses and pneumonia in children) due to LPG adoption;
- Reductions in self-reported health symptoms and burns in women and children;
- Ongoing LPG usage by borrowers after the initial cylinder, as measured through refill purchases;
- Wider LPG community adoption beyond the microloan recipient group. The program was so popular that nearby communities wanted to replicate it; Glocalgaz independently initiated a similar program with plantation workers.

Main results:

- The beneficiary sample covered a range of socio-economic status, with 24% earning below the national monthly average household income of 50,000 CFA (US\$90). Only 38% owned their own property and 45% rented their homes.
- Most households repaid the loan (89%), although 41% reported difficulty making repayments. The main reasons for delays in payments are reported below.

Why delays	No.	%
Family problems	4	7.1
Financial problems	9	16.1
Health (own or child)	16	28.6
Work problems	12	21.4
Bereavement	3	5.4
Travel	9	16.1
Other	3	5.4

TABLE 4: REPORTED DELAYS IN MAKING REPAYMENTS (N=56 OUT OF 110)

- Amongst program participants, primary fuel used shifted from wood (75%) and other biomass (15%) to LPG (79%) after the loan period, although no household yet used LPG exclusively. In comparison, almost no change in polluting fuel usage was observed in a control community where the microloan was not offered.

² Pope et al. (2018). The Bottled Gas for Better Life Pilot: An Evaluation of the First Microfinance Initiative in Cameroon to Support Households Switch from Solid Fuel to LPG for Cooking. ISES-ISEE 2018 Abstract Book. Addressing Complex Local and Global Issues in Environmental Exposure and Health.

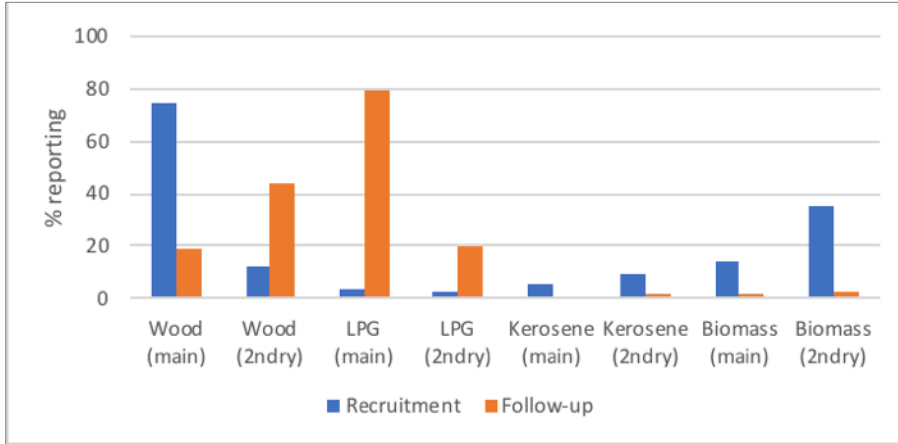


FIGURE 2: PRIMARY AND SECONDARY FUELS REPORTED BY PROGRAM PARTICIPANTS

- Levels of PM_{2.5}, responsible for most of the disease related to household air pollution, were reduced significantly. Exposure in primary cooks was recorded to be below the World Health Organisation’s (WHO) indoor air pollution interim target I (WHO-IT1 of 35 ug/m³), which confirmed LPG’s health protective role.
- Significant reductions in headaches (46% to 9%), eye problems (66% to 8%), cook burns (25% to 3%) and child burns (9% to 0%) were also observed after families adopted LPG through the loan program.
- Changes in perceptions of LPG by loan recipients over the loan period are shown in the chart below. These results indicate that future iterations of the program need to address the need for education on cooking local dishes using LPG, as well as the affordability of LPG refills.

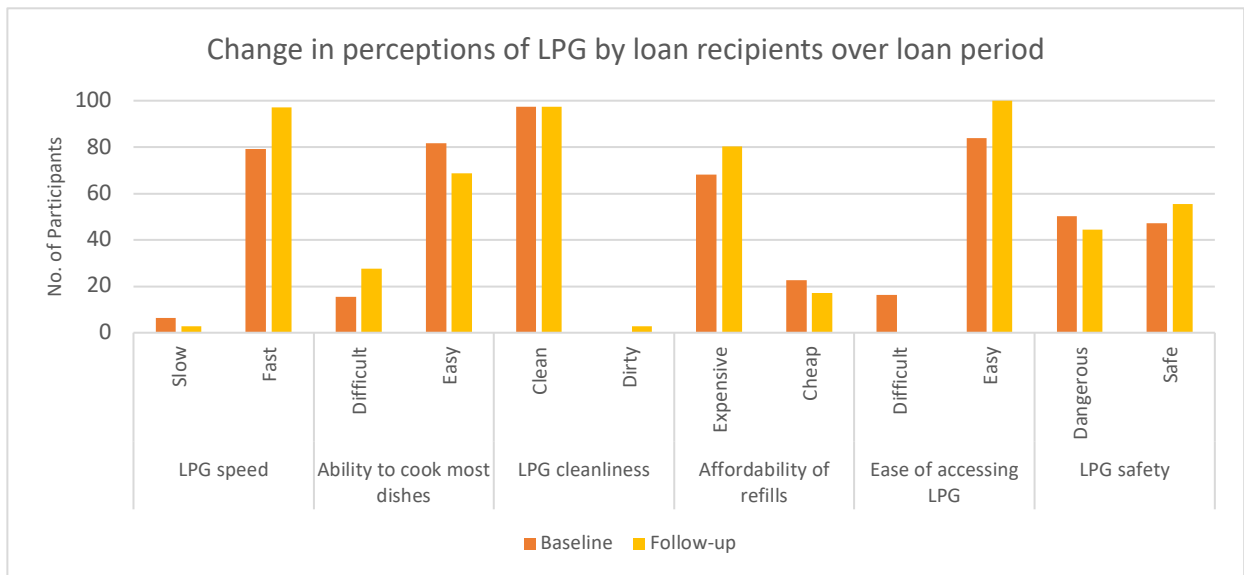


FIGURE 3: CHANGE IN PERCEPTIONS OF LPG BY PROGRAM PARTICIPANTS OVER LOAN PERIOD

Key results from 20 face-to-face qualitative interviews conducted with loan recipients include:

- Most reported using their gas stoves every day, some up to three times a day.
- Interviewees reported preferring cooking with their gas stove (to a three-stone fire) due to a

faster cooking speed, and it being cleaner and easy to use.

- Both loan recipients and non-recipients found gas cheaper than firewood if calculated according to the time the fuel lasted.
- Interviewees reported planning to continue using LPG after the loan was repaid.
- Most non-recipients of the loan reported that if they had taken the loan, they would have been able to pay it back on time.

2.2.2 Phase Ia evaluation

Key highlights on loan performance and LPG usage are as follows.

- By the end of the loan period, 95% of the loaned capital had been repaid.
- 43 out of 50 households (86%) completed repayments (Figure 4), with 38 (76%) of the total households completing repayments in under six months (Figure 5).
- Violent civil disorder broke out in the South West region of Cameroon towards the end of the loan period,³ preventing the remaining seven households from completing repayments. The unrest also delayed loan collections for some households.

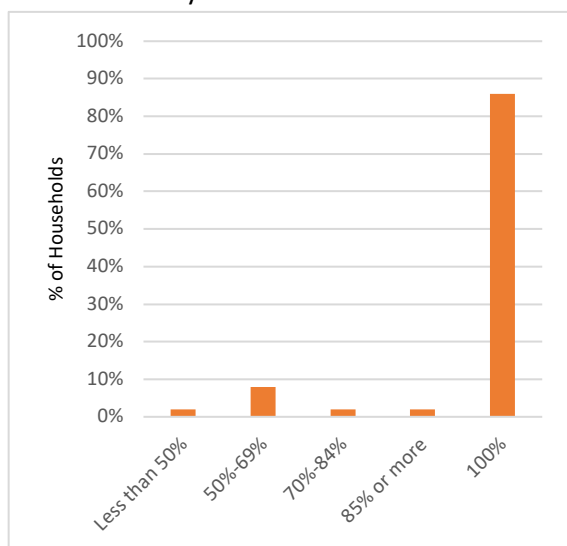


FIGURE 4: LOAN AMOUNT RE-PAID AFTER 6 MONTHS (N=50)

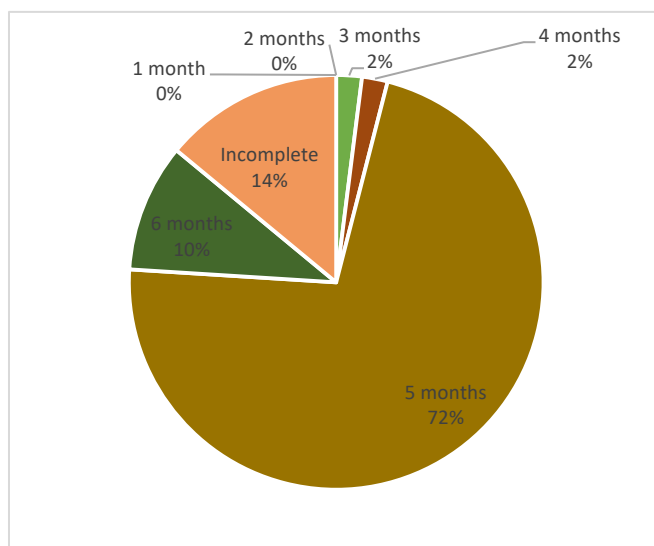


FIGURE 5: MONTHS TO COMPLETE LOAN REPAYMENTS (N=50)

- Overall LPG usage by participating households over the six-month period was reported at an annualized rate of 19kg/capita per year⁴. This is nearly five times the current national average in Cameroon of 4kg/capita per year.
- 50% of households had an annualized LPG consumption of 20kg/capita or more (Figure 6). Around 25kg/capita generally indicates sustained primary use of LPG for cooking.

³ See: <https://www.theguardian.com/global-development/2018/may/30/cameroon-killings-escalate-anglophone-crisis>

⁴ Methodology: Number of cylinder refills purchased during loan period multiplied by 12.5(kg) / Loan period in months multiplied by 12. An alternate methodology was used in earlier reports, which included the initial cylinder fill. The average consumption calculated this way was 22.9kg/capita/year. This is likely an overestimate, because not all customers would have fully used the final cylinder refill by the end of the loan period.

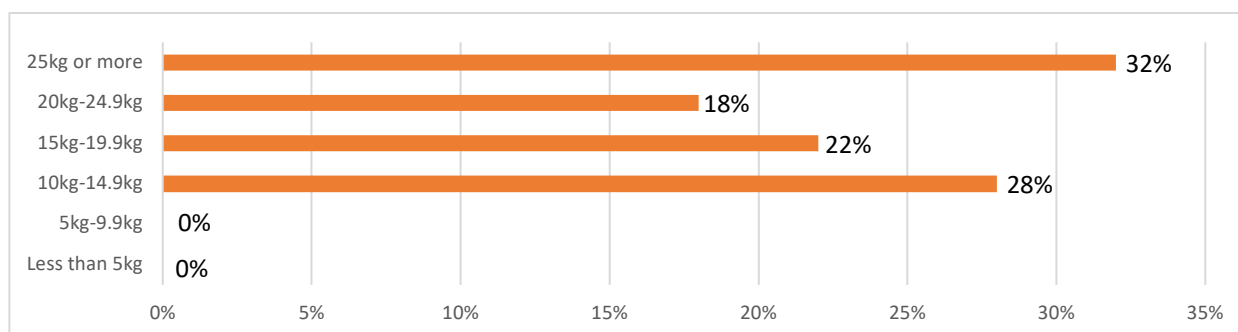


FIGURE 6: HOUSEHOLDS' ANNUALIZED LPG CONSUMPTION IN KG/CAPITA (N=50)

- Households sampled that consumed more LPG had a smaller household size (average of 4). It can be inferred that the households consuming more LPG used it for the majority or all of their cooking needs, while those consuming less LPG added it to their existing cooking fuels (fuel stack).
- Households purchased an average of 4.3 cylinder refills (12.5kg each) over the loan period, with almost 50% of households having purchased either 5 or 6 refills during the loan period.
- Interestingly, some households continued purchasing refills in the months in which they missed loan repayments. Six out of the seven households that did not re-pay the full loan amount had an average annual LPG consumption of 20kg per capita or more. This suggests that the households were unable to manage making both loan repayments and LPG refill purchases, and prioritized the latter.

2.2.2 Phase II survey results

Baseline survey data collection was conducted for Phase II using a brief survey questionnaire adapted from the survey used by the University of Liverpool in its Phase I evaluation. Baseline surveys were administered by the MFI staff prior to participants' receiving their new LPG equipment.

Results from 493 households (97% of total loan recipients) are summarized below.

- 46% of participants surveyed (n=227) live in urban areas, 23% (n=113) in peri-urban areas and 31% (n=153) in rural areas.
- The most common occupations of those registering for the loan were small business employees (41%) (e.g. who work in a shop) and government employees (e.g. doctors, teachers) (15%). Smaller groups included shop owners (12%), day laborers (11%) and farmers (5%).
- Households of different income quintiles registered for the loan, with 43% falling in the monthly household income range of CFA 101,000-200,000 (US\$88-US\$173) (Figure 7). 40% of households have a monthly household income range of US\$89-176, or about US\$0.57-1.13 per capita per day, well below Cameroon's average per capita income in 2018 of US\$4.18 per day⁵.
- 57% of participants reported having taken a loan before.
- Wood was the primary cooking fuel used (50% of participants, n=245), followed by LPG (22%, n=107), charcoal (12%, n=60), kerosene (8%, n=41) and sawdust (8%, n=37) (Figure 8).
- Wood was by far the most common primary fuel used in rural areas (73%, n=111) and peri-urban areas (54%, n=61). In urban areas, the most common primary fuels were wood (32%, n=73) and LPG (27%, n=61).

⁵ World Bank data: <https://data.worldbank.org/country/cameroon>

- 78% of participants (n=386) paid for their primary fuels, including for wood (37%, n=143) (see Figure 9).

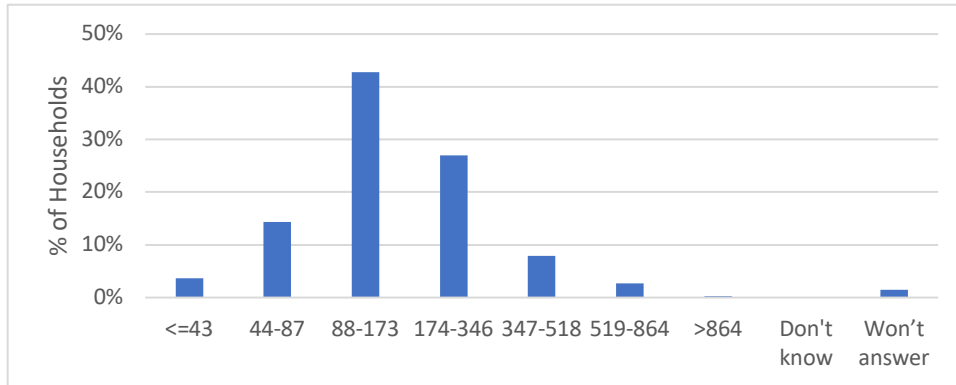


FIGURE 7: MONTHLY HOUSEHOLD INCOME (US\$) (N=492)

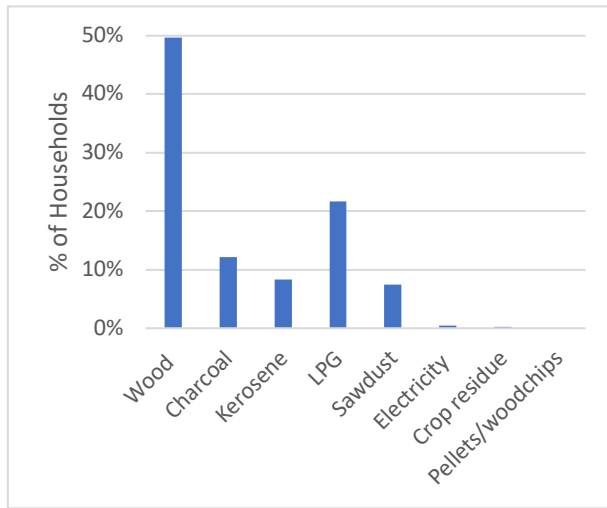


FIGURE 8: PRIMARY COOKING FUEL USED (N=493)

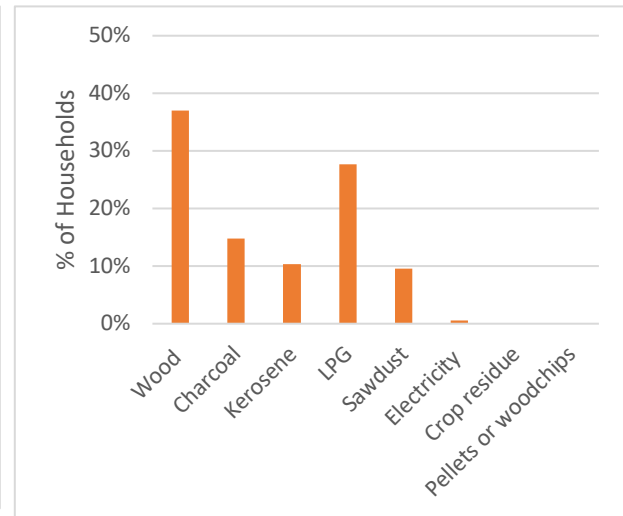


FIGURE 9: PRIMARY COOKING FUEL PAID FOR (N=386)

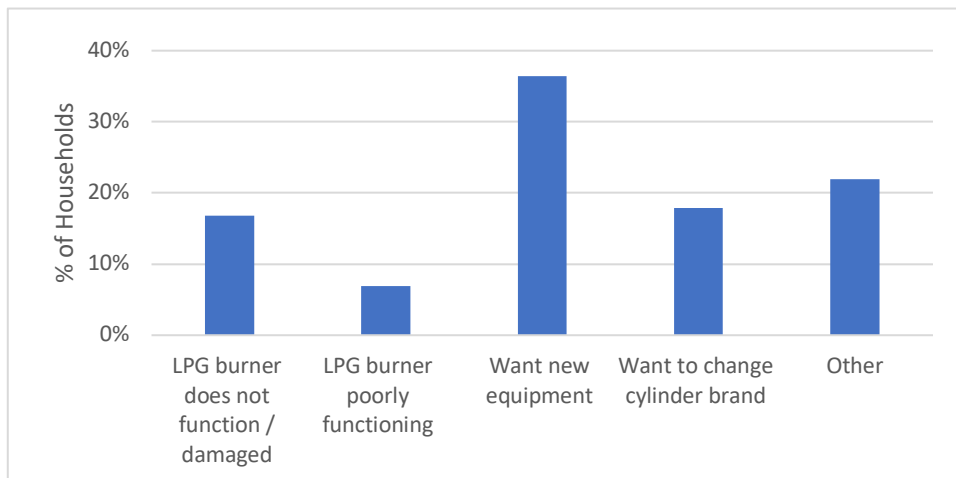


FIGURE 10: EXISTING LPG USERS' REASON FOR REQUESTING LOAN (N=173)

Existing LPG users who requested the loan did so primarily because they wanted new LPG equipment through the loan (36%, n=63) (Figure 10).

- Of the 173 existing LPG users, 32% (n=55) lived in urban areas, 37% (n=64) in peri-urban areas and 25% (n=43) in rural areas.
- At baseline, participants whose primary cooking fuel was wood (50% of all participants) reported spending an average of 3.2 hours cooking all meals in a typical day – including lighting a fire. Those whose primary fuel was LPG (22% of participants) spent an average of 2.7 hours cooking all meals daily.

Follow-up surveys were conducted with 496 participants after the completion of loan repayments. Key findings are as follows:

- 91% (n=453) reported time savings from switching to LPG. The extra time was used mainly for rest (59%, n=268) and for work or business (21%, n=94).
- 97% (n=483) of respondents were still using LPG six months after initial adoption. However, the level of secondary fuel use remained high, at 71% (n=351). The secondary fuels were mainly firewood (49%, n=172) and charcoal (35%, n=124) (Figure 11). Most respondents using a secondary fuel reported using it once or twice a week (59%, n=203) (Figure 12).

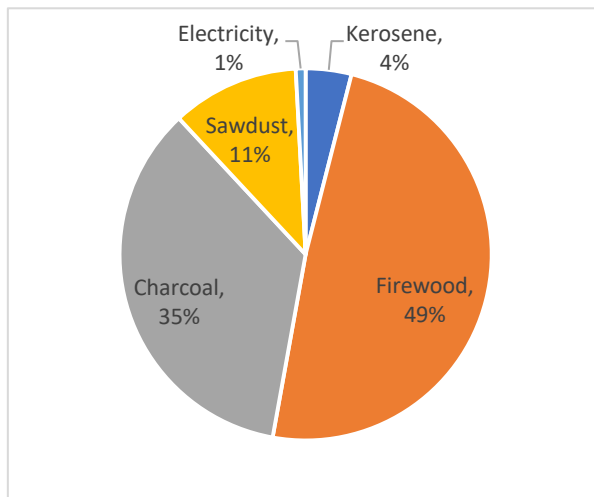


FIGURE 11: REPORTED SECONDARY FUEL USE (N=354)

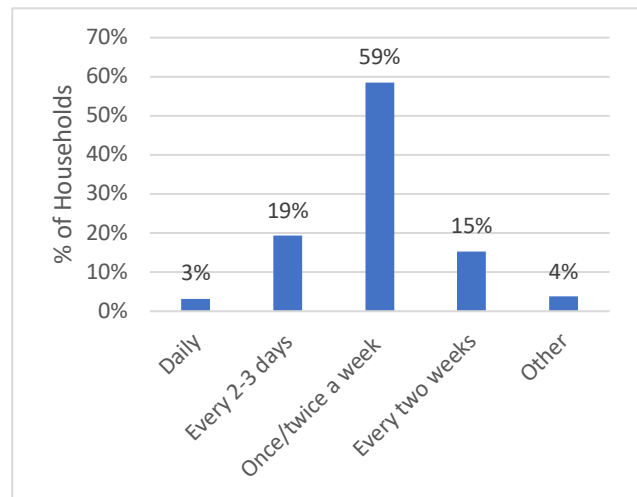


FIGURE 12: FREQUENCY OF SECONDARY FUEL USE (N=347)

- Average LPG consumption was calculated at 21kg/capita/year. Only 31% (n=154) reported difficulty paying for refills.
- 11% of the loan recipients paid for the equipment up front and 46% were able to fully re-pay in 4 months or less (Figure 13).

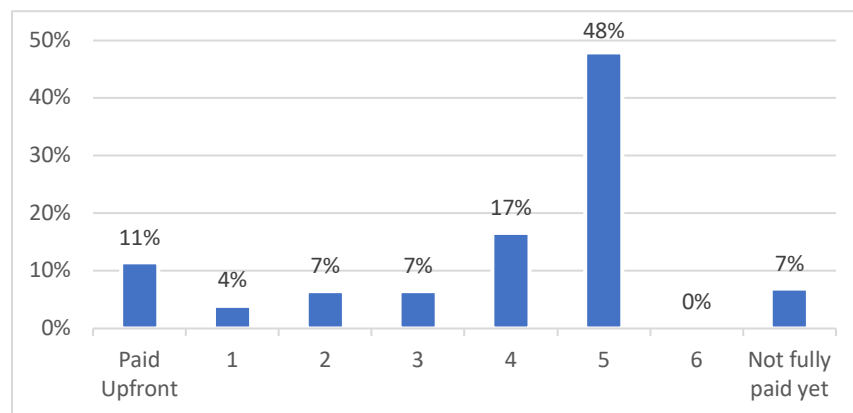


FIGURE 13: MONTHS TAKEN TO REPAY LOAN FULLY (N=507)

3. Kenya

3.1 Program Design

With Equity Bank as the financial partner and the National Oil Company of Kenya (NOCK) as the operational partner, the microfinance pilot program was launched in August 2018, targeting 150 households, to encourage household switching to LPG from biomass and kerosene for cooking. The equipment package offered included a double burner stove, a filled 13kg LPG cylinder and accessories. An informal “table banking” organization, the Socio-Economic Mobilisation Agency (SEMA)⁶, also financed some of their members to acquire the LPG equipment.

A key criterion was to select an MFI that would likely be able to make LPG loans a part of its regular lending portfolio, and serve a large population across all regions of Kenya over time. Equity Bank is the largest bank in Kenya, with prior experience with financing LPG equipment for households, and has grown its customer base largely by serving “base of the pyramid” customers. Equity Bank was also able to provide the loan capital with a partial risk guarantee from GLPGP (unlike in Cameroon where GLPGP provided the loan capital).



Mwananchi Gas package with cylinder and single burner.

Bottled Gas For Better Life in Kenya was designed to complement NOCK’s Mwananchi Gas⁷ project, in which 6kg LPG cylinders with single burners on top (see image at right) were made available at a discount to low-income Kenyans. It is part of the national policy goal of 35% of the population using LPG for cooking by 2030 to reduce reliance on charcoal and kerosene. 31% of urban households and 3% of rural households consumed LPG as a primary fuel and 9% and 5%, respectively, consumed LPG as a secondary fuel in 2016 according to data from the 2018 Kenya Integrated Household Budget Survey.

Unlike NOCK’s Mwananchi Gas program, *Bottled Gas For Better Life* encouraged participants to use larger 13kg cylinders and double burner stoves to encourage more exclusive use of LPG for cooking, as well as to address reported problems with the 6kg cylinder/single burner package offered through Mwananchi Gas.

The selected community was Magumu village in Nyandarua county. A large proportion of residents cooked with charcoal prior to the program. This area was not served by the Mwananchi Gas project. The microloan program participants received loans to cover the purchase of LPG equipment, which cost 9,900 KES (US\$98). Households paid a refundable security deposit of 2,706 KES (US\$26.78) on average, followed by six equal monthly loan repayments. The loan carried a market interest rate of 1.083% per month on the declining balance, with principal and interest payments to be made monthly over a six month period. Those who applied for the loan through Equity Bank were subject to an application process and credit check, while SEMA applicants were also subject to a screening process taking into account their existing loans and savings. Ineligible households under Equity Bank’s existing lending policies could be approved for the microloan on the condition of a co-guarantee with other households in the same village.

As mobile banking is a well-established practice amongst Kenyans, customers had the option to make monthly loan repayments and purchase LPG refills using the Bank’s mobile money platform. This was intended to minimize “leakage” from participants purchasing gas refills from illegal fillers, which remains

⁶ SEMA is registered as a social welfare organisation, and conducts the business of table banking. Members save and borrow money from their own revolving fund, in a group set-up, under a Project Coordinator who ensures members follow the agreed rules, are disciplined and all benefit. A typical group has 15 members, from one village and with a common economic activity such as farming or small-scale trading.

⁷ See: <http://nationaloil.co.ke/gas-yetu-the-mwananchi-gas/>

common practice in Kenya.⁸ A 13kg gas refill cost 1,900 KES (US\$18.81). A small retail outlet with LPG cylinders was installed in the pilot community as part of the program to facilitate access to refills.

GLPGP, NOCK and Equity Bank jointly organized an awareness-raising event in a central shopping mall in Magumu on July 28, 2018. Local women were recruited to demonstrate cooking Kenyan delicacies using LPG stoves (including *githeri*, a slow-cooking staple meal that many Kenyans perceive can only be cooked with charcoal or firewood). Equity Bank staff explained the loan selection process and repayment terms; the branch manager was well versed in the local dialect and was able to explain the financing scheme. GLPGP and its partners had publicized the event through women's groups, churches, and schools.

A small number of attendees at the event expressed interest in purchasing the LPG equipment via a



Cooking demonstration in Magumu on July 28, 2018.



Bottled Gas For Better Life in Nyandarua County, Kenya.

“layaway plan”, paying in installments without taking out a loan but only receiving their LPG equipment upon completion of full payment. This group eventually either chose to take a loan or not to participate in the program.

69 households registered for the program, of whom 15 purchased the equipment on a cash basis without taking the loan. 35 took the offer from Equity Bank (including the 15 who paid up-front in cash) and 34 took the same package through SEMA. Not all the loan recipients took loans for the full cost of the equipment (9,900 Ksh); some paid for a portion of the equipment kit cost up front in cash and took correspondingly smaller loans. There was also community interest in LPG for heating, which the program partners agreed to explore for a future microfinance pilot.

Equity Bank reported that 7 applicants were not granted a loan. Four were rejected because the applicant had other Equity Bank loans in arrears, and the remaining three because either the applicant or co-applicant failed the Bank's vetting process. SEMA, on the other hand, registered 74 members who were interested in obtaining the equipment on loan. Only 34 were able to receive the equipment by December

⁸ However, the LPG price charged by NOCK's local distributor was competitive in the selected community.

2018 due to SEMA's funding constraints. The remaining 40 SEMA members were therefore put on a waiting list.

Some potential reasons for relatively slow and lower take-up of the loan offer in the pilot community are that (i) LPG was already quite diffused in the community; (ii) the area is a mountainous one and need for heating the home was reported for five months a year (cooking with biomass was found to be used as the main source of heating in the colder months); (iii) the program was promoted primarily among existing customers/members of Equity Bank and SEMA (which is only a portion of the total population in the area); (iv) the detailed loan formalities and processing required by Equity Bank's standard banking procedures may have discouraged registration. These will be discussed in more detail in the following section.

The microfinance program created policy momentum early on. The Woman's Representative for Nyandarua County, the Governor of Nyandarua County, a Member of Parliament, a member of County Assembly, and the Chief of Administration were engaged and expressed support for the program.

3.3 Monitoring & Evaluation

GLPGP, in partnership with the University of California, Berkeley, USA, received a grant from the London School of Economics (LSE)/ International Growth Center (IGC) to fund M&E activities relating to the microloan program in Kenya.

The team conducted a main cross-sectional face-to-face survey with all 69 program participants and selected non-participants who were exposed to the LPG program messaging, followed by two telephonic follow up surveys with program participants only. The team also surveyed a convenience sample of 149 households, selected from among pedestrians in the Magumu area.



Equipment delivery in Magumu on August 23, 2018.

The main survey was conducted in March 2019, about an average of 22 weeks after participants received the equipment. The survey collected data relating to demographics, cooking habits, and fuel use in the home. The first and second phone follow-up surveys were conducted in May and June 2019, about 29 weeks and 32 weeks after participants received the equipment, respectively. The two follow-up surveys were administered primarily to collect information about loan repayment and expenditures on LPG refills.

Participants' characteristics

- The median program participant had a monthly income between 15,001 Ksh and 25,000 Ksh (US\$ 146-243). 86% reported seasonality of income.
- The most common sources of livelihood were farming (55%) and self-employment (44%).

Program take-up

- Program take-up was driven by existing LPG users seeking to upgrade their LPG experience rather than new LPG users. 75% of loan recipients (n=51) had used LPG for cooking in their home prior to this program. Among those loan recipients who had previously used LPG, the most common reasons for registering for the program were to acquire a new (additional) burner or to change cylinder sizes (some respondents wished to upgrade to the larger 13kg cylinder) (Figure 14).

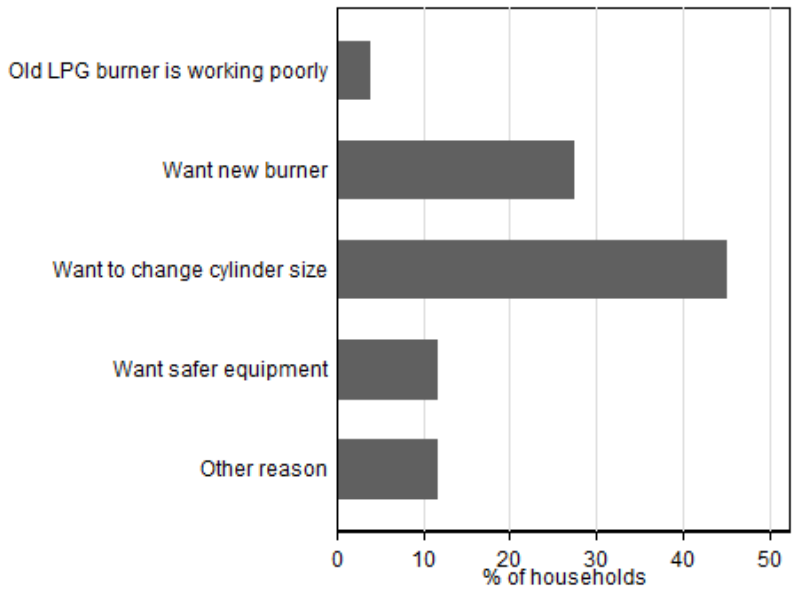


FIGURE 14: EXISTING LPG USERS' REASON FOR REQUESTING LOAN (N=51)

- Those who had been exposed to the LPG program messaging but chose not to participate cited many reasons including already having LPG equipment (23%) and not having enough cash (16%). Anecdotally, it was said that rains and flooding contributed to a lack of funds during this time across the region, and a few households were also said to be wary of the loan offer due to prior experiences where other banks had raised the interest rate after a loan had been approved.
- Among 149 respondents in the convenience sample, 24% (n=35) had heard of the program. The most common reasons given for not participating were: not having enough cash (23% of respondents), having inadequate information about the program (23% of respondents), and already having LPG equipment (14% of respondents).

LPG Adoption and Sustained Use

- 7.5 months after the program launch, the vast majority of participants (88%) used a 13 kg cylinder. The program appeared to increase usage of LPG as the primary cooking fuel (Figure 15). However, 7.5 months after the intervention, 84% of participants still used their old stove. The most common secondary fuel used was charcoal, followed by wood, and 14% reported collecting fuel for free.

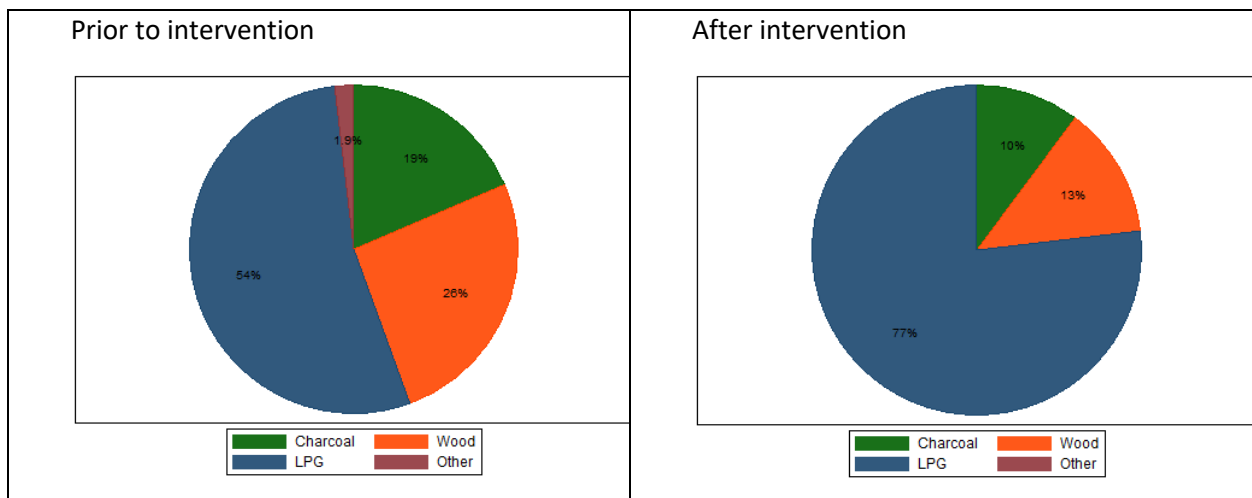


FIGURE 15: SELF-REPORTED PRIMARY FUEL USE (N=69)

- Program participants reported wood, charcoal, and LPG as secondary fuels at higher rates after receiving LPG equipment, suggesting that the intervention increased the number of fuels that households routinely used for cooking. It could be inferred that while they desired to use LPG, participants were unable to use it exclusively for reasons such as cost or being unable to cook certain dishes to their satisfaction using LPG.
- On average, participants used LPG for an average of 1.37 hours per cooking event, as compared to an average of 1.60 hours for the household's next most-common cooking fuel.
- Average LPG consumption was calculated at 11.2 kg/capita/year. In 2016, average LPG use by among urban LPG users was 18.7 kg/capita/year, and 10.5 kg/capita/year for rural LPG users⁹. 42% of respondents who had purchased at least one refill said that paying for refills was difficult.
- On average, respondents reported traveling 49 minutes (round-trip) and spending 115 Ksh (US\$ 1.10) on travel to obtain a refill. However, when asked about reasons why they do not consume more LPG, they rarely cited travel costs. Rather, the most common constraint was the cost of the LPG refills.
- Perceptions about the cost of refills were mixed, with near equal numbers finding it cheaper than expected (46%) versus finding it more expensive than expected (43%). However, many households did find refills to be more available than expected (46% as compared to 17% who found it less available than expected). This suggests that the experience of using LPG may affect knowledge and perceptions about its costs and benefits.
- Most program participants perceived cooking with LPG as faster than expected (92% of households), easier than expected (85%), cleaner than expected (85%), and safer than expected (87%).

Loan repayments

- Among 54 loan recipients, 93% had fully repaid 7.5 months after the program launch. According to Equity Bank, the convenience of mobile money encouraged better loan repayment practices and high repayment rates.
- 6% of loan recipients reported difficulty in making timely repayments (citing inadequate income) and 4% reported having to delay repayments.

Health impact

- 68% of participants self-reported improved health since starting to use the LPG equipment. This compares to 58% of non-participants who reported improved health in the preceding six months. Frequently cited areas of change in health linked to cooking include discomfort in the chest and in the eyes.
- Only 3% of beneficiaries reported experiencing burns while cooking with the new LPG equipment (one instance of touching the open flame, and two instances of a hot pot falling over). This compares to 7% of beneficiaries who reported experiencing burns when asked to think about the period prior to receiving the LPG equipment.

⁹ 2018 Kenya Integrated Household Budget Survey

4. Future *Bottled Gas For Better Life* Program Enhancements In Sub-Saharan Africa

Bottled Gas for Better Life continues to increase the adoption of LPG among low income households, the visibility of LPG for clean cooking in Cameroon and Kenya, as well as GLPGP's partners' profiles as socially responsible organizations. Other prospective countries where the program may be launched include Ghana and the Democratic Republic of Congo (DRC).

Data from *Bottled Gas For Better Life* is still emerging. Complete results will allow GLPGP to more fully assess scalability and impact. There are already indications that our Cameroonian and Kenyan program partners see the program's strong potential for replicability and scalability. The initial pilot partners in Cameroon agreed to an almost five-fold expansion of the program after seeing positive results from Phase I. After the Kenya program launch in August 2018, Equity Bank partnered with a different LPG company in a separate program to provide first-time LPG users with loans to buy filled 6kg or 13kg cylinders, or a 6kg cylinder and single-burner stove package. Both Equity Bank—the largest retail bank in Kenya—and the new LPG supplier have a nationwide presence, indicating potential for further expansion of LPG microfinancing in Kenya. In addition, SEMA indicated the intention to organize the purchase of equipment for those members who were put on a waiting list due to SEMA's lack of loan capital, as well as for new applicants in the pilot area.

The longer-term objective remains to prove the concept of LPG microfinancing in order to help catalyze and develop a successful nationwide program. Such a program should be supported by local financial institutions fully responsible for loan funding and collections on a commercially sustainable basis, incorporating an LPG loan product within their regular lending portfolios.

Bottled Gas For Better Life has garnered interest not only from households but also from small businesses in the food service sector. A future phase of the program may involve providing business microloans for the purchase of LPG for commercial use. Loans to micro and small enterprises (SMEs) should constitute a lower risk lending activity to MFIs than household lending, since the LPG is used for an income-generating purpose. Many micro-entrepreneurs and small business owners in Cameroon, Kenya, and across Sub-Saharan Africa already belong to organized credit and savings groups.

There is also an opportunity to expand the program through creating synergies with other energy services. GLPGP has received extensive interest from companies in the off-grid solar energy sector to collaborate on delivering LPG for cooking and solar home systems as a bundle to customers, either via microfinancing schemes and digital repayments, or potentially using early-stage Pay-As-You-Go technologies.

As the program expands, more data will be aggregated for cross-country comparisons. More in-depth household surveys including, wherever possible, measurements of personal exposure in samples of households before and after LPG adoption, will be considered. Opportunities for acquiring data necessary for a rigorous cost-effectiveness analysis of LPG use will also be explored.