

SAVING  
LIVES  
CHANGING  
LIVES



## Introducing LPG cooking in Chad

### Findings and implications for resilience

In 2022, with support from the Swedish International Development Cooperation Agency (SIDA), the World Food Programme (WFP) introduced Liquid Petroleum Gas cooking in humanitarian settings in Eastern Chad. LPG kits were distributed to households and enterprises such as restaurant and street food vendors, in both refugee camps and host communities. Kiosks selling and refilling gas cylinders were established to ensure reliable supply in camps, while towns were already served by commercial distributors from the oil and gas industry. Interested in the implications that access to clean cooking may have on people's livelihoods, WFP conducted an evaluation two months after the delivery of the kits. Findings indicate a high rate of adoption among households and enterprises, with minimal impacts on the existing local diet and cooking routine. The main barriers to LPG use were found to be fuel supply and cost.

The negative implications of traditional

biomass cooking are particularly felt in Eastern Chad, an environment prone to droughts and advanced desertification, where access to clean cooking is still limited to only about three percent of the population. This is reflected in the absence of clean cooking solutions on the market, particularly in remote regions.

After thorough assessments, LPG was selected for this context as the best solution among several alternatives for its benefits on health, the environment, its existing presence in the field as well as being a convenient and efficient technology in terms of time spent cooking and labour.

The intervention was conducted in three refugee camps (Touloum, Milé and Kounoungou) and three towns (Iriba, Guereda, and Amdjarass) in the provinces of Wadi Fira and Ennedi Est in eastern Chad. The delivery model was market based, with incentives aimed to tackle the up-front cost barrier and



promote adoption of LPG kits (comprising of a burner, a stand, and full gas cylinder), provided in-kind. Beneficiaries were then expected to refill at their own expense. Commercial activities in the host community, such as restaurants, consuming large amounts of firewood, were included in the project, also recognizing their importance in showcasing and promoting adoption to the wider population.

	Cylinder	Locations	Number of LPG kits distributed
Households	6 kg	Camps (Touloum, Milé, Kounougou)	5,326
			38
Enterprises	12 kg	Towns (Iriba, Amdjarass, Guereda)	62
Total		ALL LOCATIONS	5,426

To ensure continuation, it was important to create a direct link between LPG retailers and end users. To this end, while towns were already served by LPG retailers, it was also necessary to set up sales outlets in camps. A differentiation in the segment of beneficiaries selected (households and enterprises) is important to foster systemic change, as communities are made of both service receivers (individuals and households) and service providers (the vendors but also the restaurants).

## CLEAN COOKING AND RESILIENCE

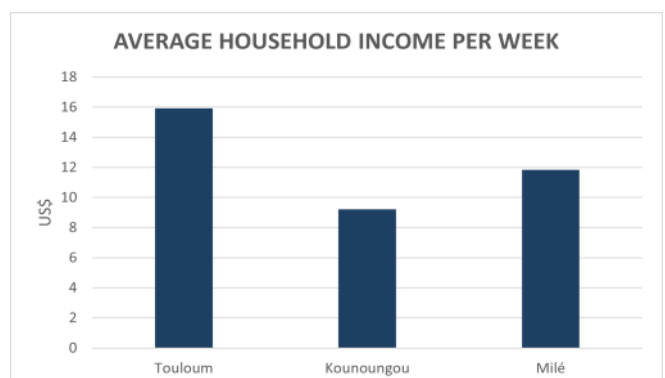
Lack of research on how access to clean cooking can contribute to strengthening resilience at both the household and community level in displacement settings, has motivated WFP to survey households and other sector stakeholders after the introduction of LPG, with key research questions around adoption and sustainability. **Resilience** can be defined as the **ability of people, organizations and countries to cope with shocks and stresses**. Understanding what factors are key

to build resilience lies at the nexus between the humanitarian and development sectors. The six impact pathways evaluated by this study were: nutrition, health, food security, environment, livelihood strategies, and vulnerability.

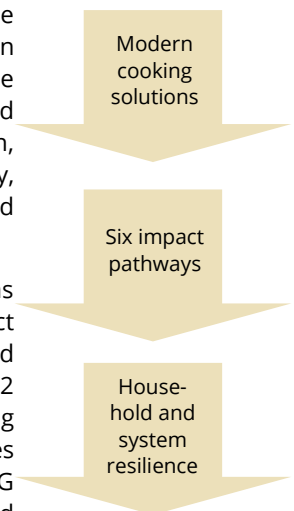
The evaluation survey was carried out among project beneficiaries in September and October 2022. A total of 832 surveys were conducted among 766 households, 61 enterprises (small restaurants), and 5 LPG vendors randomly selected among all the interested parties.

There is a difference in household income levels across camp locations, which may somewhat influence their ability to purchase fuel.

Interviews were directed to the cooks preferably, 96% in household (HH), mostly women between 20 and 50 years old, with no (61%) or primary (20%) formal education,

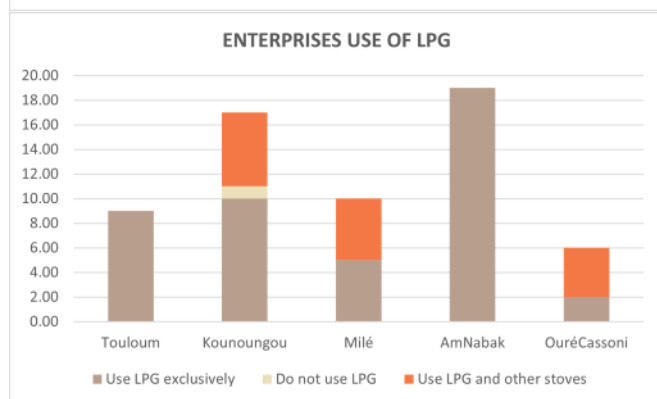
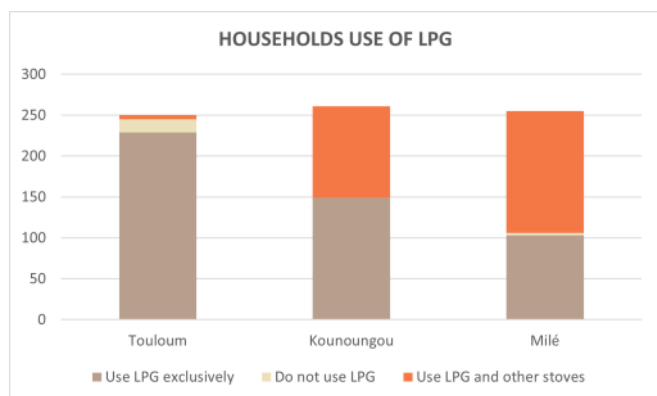


cooking every day for 7/8 people on average, about half of them being children. For enterprises such asv restaurants, 97% of respondents were cooks, in the same age range as households but predominantly men (64%), with higher education levels (only 22% without formal education, 21% primary, 36% secondary and 7% college). The size of the enterprises varied from only one person to



19 people in one case, but were on average made up of four staff. Consequently, the meals served were on average about 50, but ranged from 10 up to 200, with reported average revenues of US\$ 70 per week but ranging from US\$3 to over US\$300.

## ADOPTION



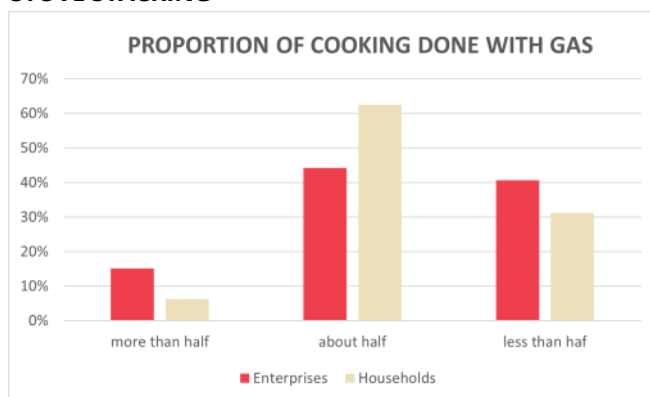
Every single household (HH) and enterprise (EN) reported using the gas kit when they first received it and most continued to use it either exclusively or in combination with three stone fires. 97.5% (HH) and 95% (EN) respectively were still using it at the time of this survey. 63% (HH) and 74% (EN) used it for all their cooking, whilst 35% (HH) and 25% (EN) also used other stoves. Of the 19 households over 766 who discontinued, 3 had repair issues, 9 affordability and 7 refilling, but no-one said that they did not like the gas kit or were not able to use it.

Virtually every respondent (99.5% HH, 98% EN) found the technology easy to use perhaps also thanks to the training received by a large percentage (96.5% HH, 92% EN). The most valued attributes of gas cooking were the absence of smoke (75% HH, 74% EN), speed (67% HH, 75% EN) and ease of use (60% HH, 48% EN).

However, difficulties in recharging the cylinder were reported by over 80% of respondents and many households also signalled issues with vendors not filling bottles fully. Perceived unsafety constituted an issue for about 20% HH, 26% EN and concerns around affordability were raised by 10% HH and 20% EN. A good majority of end users (78% HH & EN) had already refilled the cylinder by the time the survey was carried out. For the ones using LPG exclusively, the bottle had lasted on average for 21 HH and 19.7 EN days (regardless of the bottle size - i.e. 6 or 12 kg) potentially indicating that bottle sizes were correctly matched to the needs of the end user. For those using also other fuels in addition to LPG, the duration was

of 20 HH<sup>1</sup>, 21 EN days. Out of 766 HH, only 21 reported problems with the kit, and 4 out of 61 enterprises, which the majority solved by taking it to the recharging station for repair. This shows that the link between end users and suppliers was successfully built by the intervention as intended.

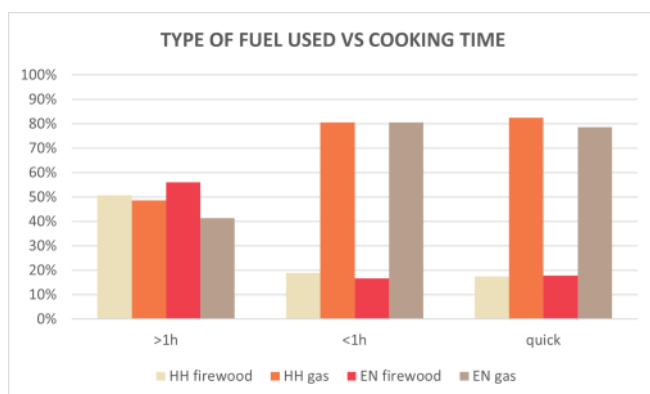
## STOVE STACKING



The most common type of alternative stove used by the 285 HH and 16 EN who were practicing stove stacking, was the three stone fire (42% HH, 74% EN), then traditional or improved stoves (25% HH, 11% EN) used with firewood or to a much lesser extent charcoal (9% HH, 26% EN). Among the "stacking cooks", 15% HH and 6% EN used LPG for over half of their cooking, another 44% HH and 63% EN for about half and the remaining 41% HH and 31% EN less than half.

Households prepare diverse dishes with a variety of ingredients, ranging from legumes (beans, lentils), vegetables (okra), cereals (such as rice, wheat, maize, millet), peanuts, meat (camel, beef, chicken), milk, tea, coffee. Common dishes include soups, porridge, sauces and stews. Dishes that take about one hour or less to cook are overwhelmingly prepared with gas, however firewood is preferred for meals that take longer, indicating that gas might be perceived as more expensive or that the burden of lighting a fire with biomass is not worth the effort for the quicker dishes.

## FUEL SUPPLY



Most people purchased gas using cash in kiosks at the camps or in town. Overall, about 60% thought firewood was the easiest fuel to access (66% HH, 69% EN), while gas came second for 30% of respondents, again indicating remaining issues with the supply chain. This is reflected in relatively low refill rates among all users in all locations. All five vendors surveyed identified the rising price of gas as being a barrier to gas supply. The reason for these

1. To notice that households using LPG only reported in average longer duration than those using both LPG and firewood, which indicates data inconsistency

difficulties were linked to security concerns, lack of gas, lack of transportation means and lack of cylinders on the market.

### IMPACTS

**Costs:** The cost of gas cylinders reported varied substantially between locations. The five vendors interviewed in Kounoungou and Milé reported an average selling price of US\$ 4.5 for a 6 kg LPG bottle and US\$ 10.6 for 12 kg. Independent verification gave consistent information (6kg: US\$ 4.8-5.6 regular, US\$ 6.4 in case of scarcity, US\$ 4 purchasing in bigger town centres; 12kg: US\$ 10.4 - 12).

**US\$ 4.5**

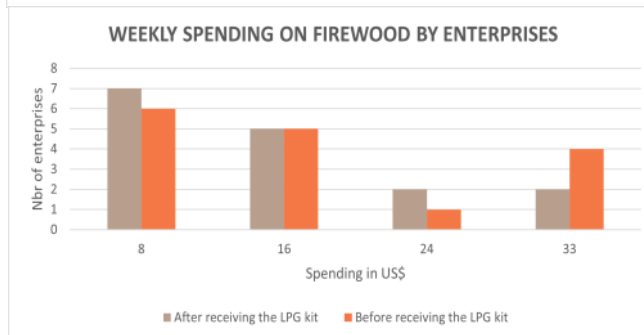
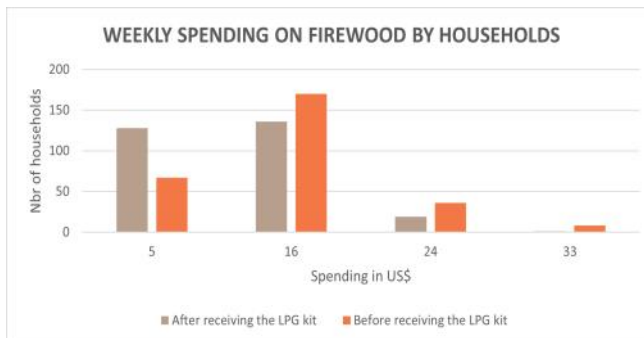
Cost of 6kg LPG refill according to vendors

**US\$ 10.6**

Cost of 12kg LPG refill according to vendors

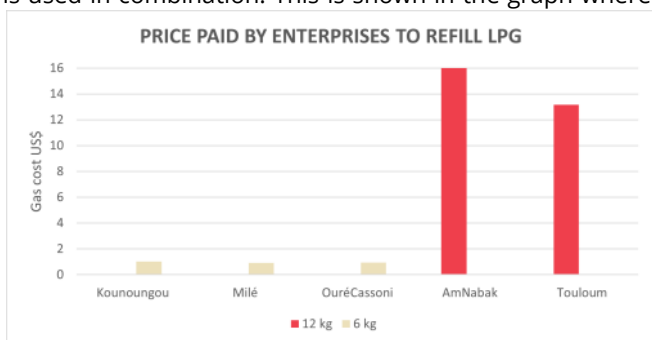
However, the gas expenditures provided by enterprises were different (about US\$ 1 for the 6 kg bottles).

Only a few end users acquire fuel on credit (3% HH, 13% EN). The expenditure on firewood has decreased after the introduction of the LPG kit, for both households and enterprises practicing stove-stacking, confirming that LPG is used in combination. This is shown in the graph where



the cost of LPG as given by both vendors and enterprises, to get to a weekly spending on LPG of US\$ 1.5 or 0.3, with savings from US\$ 4.4 or US\$ 5.6 depending on the source considered (vendors or enterprises).

The following graph goes further by comparing the average weekly revenues (as reported by interviewees) with spending per week on firewood (as reported) and spending on LPG (estimated). From these rough calculations LPG would seem to be substantially cheaper than firewood.



more respondents fall in the lower expense categories after the introduction of LPG. The vast majority of households (83%) and enterprises (94%) reported that the gas kit will save them money. The rough calculation reported in the table below takes into account the weekly expense on firewood incurred by households prior to the intervention, the reported duration of a bottle of LPG and

#### COMPARISON BETWEEN WEEKLY SPENDING ON FIREWOOD (FROM BASELINE) AND LPG

Firewood Spending / week before LPG (US\$)	<b>5.9</b>	Average lasting of a LPG bottle (days)	<b>20.7</b>
Cost of LPG bottle according to vendors (US\$)	<b>4.5</b>	Cost of LPG bottle according to enterprises (US\$)	<b>1</b>
Spending on LPG / week (US\$) - vendors	<b>1.5</b>	Spending on LPG / week (US\$) - enterprises	<b>0.3</b>
Savings / week — vendors	<b>4.4</b>	Savings / week — enterprises	<b>5.6</b>

**Time:** Both households and enterprises reported significant time savings in terms of fuel collection and cooking times. The time saved on cleaning pots, utensils and clothes stained by char and the smell of smoke should also be factored in.

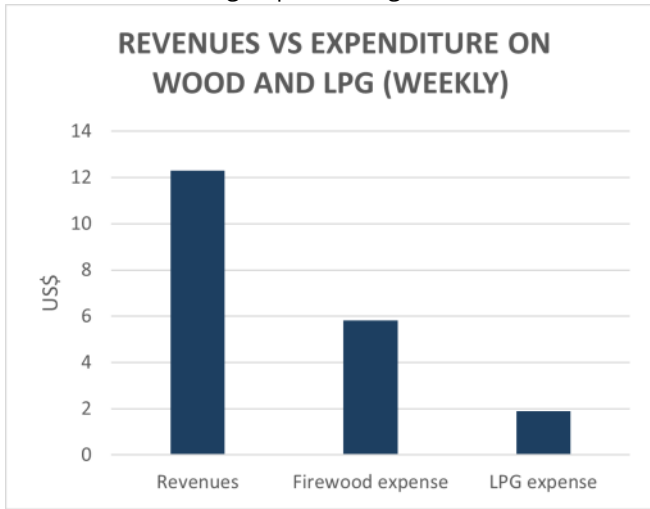
**Health:** Almost 80% of households, and 72% of enterprises reported having much less indoor smoke since receiving the LPG kit.

**Coping strategies:** Only one percent of households and

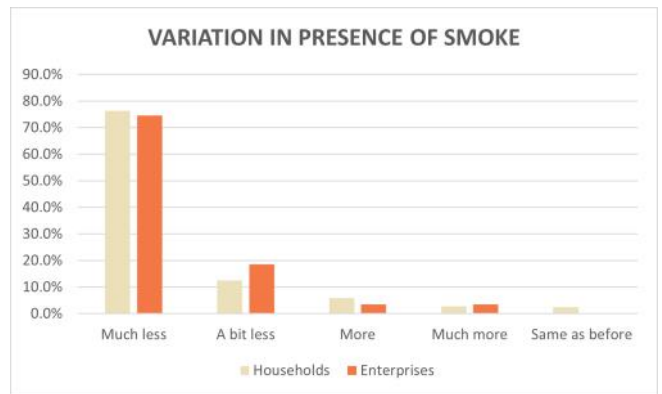
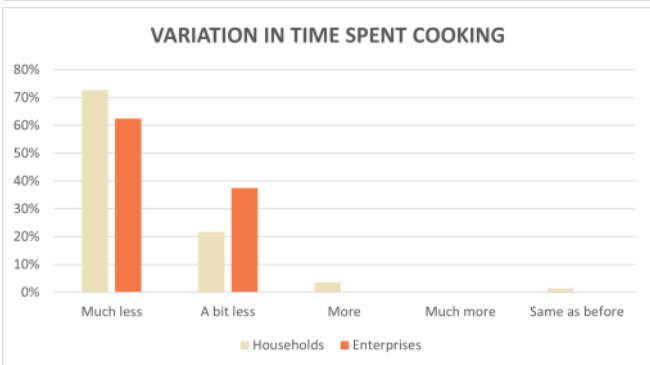
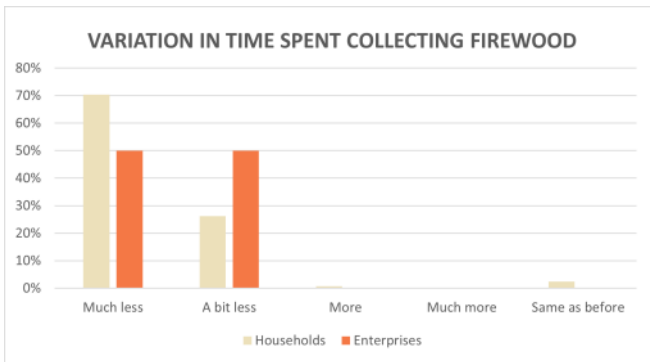


Households and enterprises showed high adoption rates of LPG and overwhelmingly reported being satisfied with the kit. However, supply shortages and challenges with access and affordability led to low refill rates among users, who often temporarily reverted to cooking with biomass when they ran out of gas.

six percent of enterprises reported not being able to cook when they run out of fuel. Instead, the vast majority reverted to collecting or purchasing firewood.

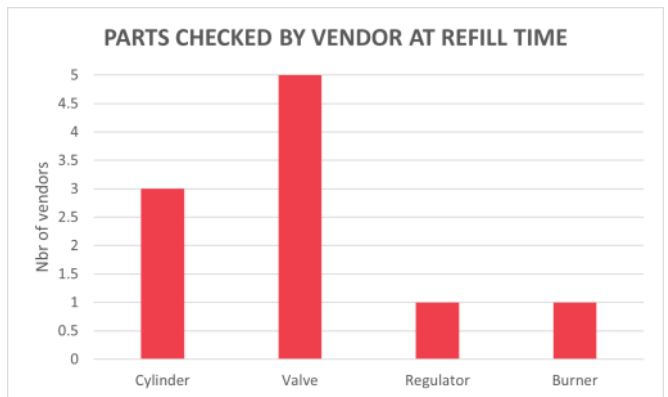


**Nutrition:** Overall, households and enterprises did not significantly increase or decrease the amount of food cooked or the types of meals.



**Sustainability:** Evidence from the evaluation shows promising trends, including LPG's ability to displace biomass, retain local diets and menus, save valuable time for households and improve indoor air quality. These aspects are usually important for influencing adoption. Another important factor to ensure continued use, is the ability to repair the technology. Results in this area seem encouraging. End users went to vendors to solve issues with their kits. All vendors except one said they were providing training and instructions on how to safely use the gas burner, all of them sold spare parts and checked the valve when refilling. However, only one out of five offered repair services, something that would need to be addressed. In addition, supply is one significant hurdle to overcome. All vendors reported having difficulties with rising gas prices, their own supplier and gaps in delivery.

Further diffusion of modern cooking solutions in Eastern Chad should aim to address these challenges and ideally broaden the focus by exploring cooking alternatives to LPG such as electric cooking.



**CLIMATE AND DISASTER RISK REDUCTION UNIT**

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