

Assessment report on Pressure Cooker Use and LPG Refill Cycle Adjustment



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Executive Summary

1. Since 2018, the International Organization for Migration (IOM) and the UN High Commissioner for Refugees (UNHCR) have been engaged in a crucial initiative, providing Liquid Petroleum Gas (LPG) to nearly 190,000 households of Rohingya refugees residing in the Teknaf and Ukhiya refugee camps. This effort aims to ensure a stable supply of cooking fuel while reducing the demand for firewood from the already stressed forests in the region. The impact of this initiative has been significant, leading to an 80% decrease in the demand for firewood, thus playing a pivotal role in the conservation of the surrounding forests, as highlighted in the IUCN report of 2019.
2. A substantial quantity of LPG is required to maintain this supply, posing a significant operational challenge and accounting for a considerable portion of the funds allocated for refugee support. Recognizing the need for efficiency in LPG usage, a strategic project was initiated. In 2020, UNHCR distributed pressure cookers in two selected camps and conducted a pre-pilot study to gauge the impact on gas consumption in collaboration with IUCN. Following this, in 2022, the pilot phase of the project was launched, providing pressure cookers to nearly 6,000 households in camp 4 extension and camp 27.
3. During the distribution of pressure cookers, tailored solutions were implemented to meet needs of different household groups. Households consisting of 1-3 members received a 5-liter pot each, 4-5-member households received a 6-liter pot, 6-7-member households received a 6.5-liter pot, and households with 8 or more members were provided with a 7-liter pot each.
4. The initiation of this study coincided with the pilot phase of introducing pressure cookers within refugee camps, marking a significant step toward optimizing LPG usage. The primary objective was to scrutinize the impact of this pioneering initiative on LPG savings, offering valuable insights that can inform comprehensive strategies for widespread implementation across the camps.
5. The primary objective of this study is to delve deep into the dynamics of pressure cooker adoption within refugee households and analyze the resultant increase in Liquid Petroleum Gas (LPG) fuel efficiency. In understanding these intricacies, the research aims to shed light on aspects that contribute to improving cooking methods and sustainable resource management within refugee camps.
6. A total of 1,070 randomly selected households (of them 529 treated, 541 control) were monitored for 14 days regarding their food habit, cooking style, pressure cooker use and LPG consumption in this study in 4 refugee camps.
7. Based on the analysis of data, the study concludes that a new refill cycle may be implemented for families with pressure cookers to reap the benefit of LPG savings. Under

this, it has been proposed that families of 1-3 members would require a refill every 52 days, while slightly larger families comprising 4-5 members would extend the interval to 46 days. For families of 6-7 members, the refill cycle was adjusted to 38 days, while those with 8-9 members would need a refill every 32 days. Families with more than nine members would replenish their supply every 28 days, ensuring a more efficient and targeted distribution approach.

8. However, implementing these revised refill strategies demands a cautious approach, primarily due to the existing low adoption rates of pressure cookers within the refugee community. To bridge this awareness gap, comprehensive awareness campaigns must accompany the distribution of pressure cookers. Focusing on smaller families, which constitute the majority in the refugee community, becomes imperative. The study's field observations unveiled a significant lack of familiarity, particularly among women, regarding pressure cooker usage. To promote adoption, innovative approaches such as introducing 'cooking champions' within the community, individuals proficient in utilizing pressure cookers, can serve as role models. Simultaneously, the introduction of fresh, enticing recipes tailored specifically for pressure cooker cooking can enhance its appeal and encourage families to embrace this efficient cooking method.
9. The study also unearthed a concerning trend: the emergence of clandestine LPG markets among refugee families. This not only raises environmental concerns due to potential leakages but also poses reputational risks for organizations like UNHCR and IOM. To address these risks effectively, vigilant monitoring and regulation of these secondary LPG markets are imperative, ensuring the allocated resources are utilized for their intended purpose.
10. Furthermore, this study emphasized the need to cater to specific challenges and requirements faced by vulnerable groups within the refugee community. Families with special needs, particularly those with small children, necessitate tailored solutions while managing the supply of LPG. Additionally, understanding seasonal patterns of fuel use, especially during winter when the demand for boiling water surges, is pivotal. While the current study did not delve into this aspect, future research endeavors should account for these fluctuations to provide a more holistic understanding of the situation.
11. In essence, this study's comprehensive insights underscore the challenges in introducing pressure cookers within refugee communities. By addressing these challenges through a carefully planned approach, organizations can navigate the complexities, optimize resource utilization, and ensure a positive impact on the environment and the lives of refugee families, fostering a sustainable and efficient cooking ecosystem within the camps.

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1.1 Introduction

Since 2018, the International Organization for Migration (IOM) and the UN High Commissioner for Refugees (UNHCR) have been engaged in a crucial initiative, providing Liquid Petroleum Gas (LPG) to nearly 190,000 households of Rohingya refugees residing in the Teknaf and Ukhiya refugee camps. This effort aims to ensure a stable supply of cooking fuel while reducing the demand for firewood from the already stressed forests in the region. The impact of this initiative has been significant, leading to an 80% decrease in the demand for firewood, thus playing a pivotal role in the conservation of the surrounding forests, as highlighted in the IUCN report of 2019.

Continued provision of LPG is indispensable due to several factors. Firstly, there is a scarcity of alternative cost-effective fuels to meet the substantial demand arising from the over one million refugees. Secondly, the refugees in Cox's Bazar face limitations in generating income or moving outside their localities, restricting their ability to purchase fuel from local markets. Thirdly, the provision of LPG not only addresses the cooking needs but also aligns with the government and refugee assistance organizations' critical priority of safeguarding the adjacent forest ecosystems.

To maintain this supply, a substantial quantity of LPG is required, posing a significant operational challenge and accounting for a considerable portion of the funds allocated for refugee support. Recognizing the need for efficiency in LPG usage, a strategic project was initiated. In 2020, UNHCR distributed pressure cookers in two selected camps, and conducted a pre-pilot study to gauge the impact on gas consumption in collaboration with IUCN. Following this, in 2022, the pilot phase of the project was launched, providing pressure cookers to nearly 6,000 households in camp 4 extension and camp 27.

During the distribution of pressure cookers, tailored solutions were implemented to meet needs of different household groups. Households consisting of 1-3 members received a 5-liter pot each, 4-5-member households received a 6-liter pot, 6-7-member households received a 6.5-liter pot, and households with 8 or more members were provided with a 7-liter pot each.

This innovative approach not only optimizes LPG consumption but also represents a step towards sustainable refugee support, ensuring the efficient use of resources while addressing the vital energy needs of the Rohingya community in a manner that aligns with environmental conservation efforts.

1.2 Objective of the Research

The primary objective of this study is to delve deep into the dynamics of pressure cooker adoption within refugee households and analyze the resultant increase in Liquid Petroleum Gas (LPG) fuel efficiency. In understanding these intricacies, the research aims to shed light on aspects that contribute to the overall improvement in cooking methods and sustainable resource management within refugee camps.

The study will focus on achieving the following specific objectives:

i. Estimate average LPG Consumption per Day per Household (HH):

Calculate and analyze the daily LPG consumption on a per household basis. This data will provide essential insights into the typical usage patterns, allowing for a comprehensive understanding of the fuel needs within refugee households.

ii. Evaluate potential fuel and cost savings for households with Pressure Cooker (treated) and without pressure cookers (control)

Conduct a comparative analysis between regular users of pressure cookers and those who do not use them. By examining fuel and cost savings, the study aims to highlight the economic advantages associated with pressure cooker usage, providing valuable information for both users and non-users.

iii. Provide recommendations on refill cycle adjustments based on family size

Utilize survey findings to propose recommendations on altering the refill cycle. By considering the actual family size, these recommendations will be tailored to optimize the LPG distribution process, ensuring that households receive timely refills based on their specific needs.

iv. Suggest delivery approaches for refill cycle adjustments:

Recommend efficient delivery methods for implementing the adjusted refill cycles. This involves proposing logistical strategies that guarantee a smooth transition, considering factors such as transportation, storage, and timely distribution to refugee households.

v. Identify pertinent observations and recommendations for fuel-efficient practices

Identify additional noteworthy observations derived from data collection and analysis. Based on these insights, provide further recommendations to enhance fuel-efficient practices among the refugee population. These recommendations will encompass a wide array of aspects, including cooking items using PC, awareness programs, and community engagement initiatives.

By addressing these specific objectives, the study aims to offer a comprehensive analysis of LPG usage patterns, evaluate the impact of pressure cooker adoption, and provide actionable recommendations to improve fuel efficiency and cost-effectiveness within refugee communities.

2.1 Research Design

In this study, a randomized control trial (RCT) strategy is employed to gather survey data, ensuring scientific methods for analysis. The control group comprises households from camps 4 and 26 that did not receive pressure cookers, serving as a benchmark against which the effects of pressure cooker adoption can be measured. Conversely, the treatment group includes households from camps 4-extension and 27 that had already received pressure cookers between October and December 2022, forming the experimental group for this study.

The research unfolds in three distinct stages, each building upon the insights gained from the previous one, creating a comprehensive and nuanced understanding of the topic. Here's a breakdown of the stages:

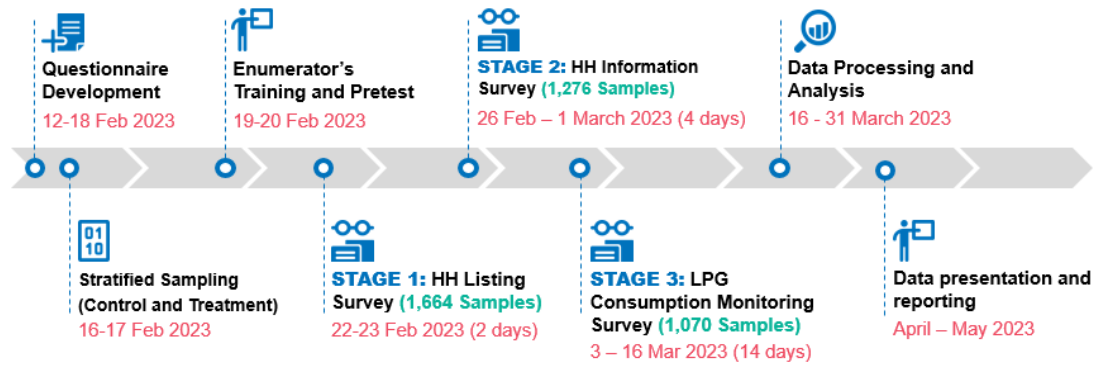
Stage 1: The initial phase involves a randomized listing exercise of 1,664 refugee households, conducted between February 22 and 23, 2023. A team of 46 enumerators undertakes a door-to-door visit in selected refugee camps. These enumerators meticulously verify the household sizes, a critical factor considering potential disparities between the actual number of individuals in a household and the information recorded in ProGres, the registration system. Enumerators diligently cross-check these details and document their findings, ensuring accurate and reliable data collection.

Stage 2: Building upon the foundation laid in Stage 1, the study progresses to the second phase. This stage involves a brief survey administered to 1,276 refugee households, aiming to capture essential socioeconomic indicators. These indicators provide vital contextual information, shedding light on the socio-economic backgrounds of the households. This stage serves as a crucial bridge between the initial household enumeration and the more focused consumption monitoring survey, ensuring a comprehensive understanding of the households' dynamics. Enumerators collected basic household and cooking-related data from 1,276 households between February 26 and March 1, 2023, which were selected from the 1,664 households previously listed.

Stage 3: The final and most intensive phase encompasses a 14-day LPG consumption monitoring survey conducted among 1,070 refugee households randomly selected from the 1,276 randomly selected households over the course of 14 consecutive days, from March 3 to March 16, 2023. Also, they maintained a logbook of each visit to each household. This phase delves into the daily consumption patterns, and tracking the usage of Liquid Petroleum Gas (LPG) for cooking purposes. The data collected during this stage offers granular insights into the actual usage of LPG, providing valuable information on the impact of pressure cooker adoption on fuel consumption. This phase, being the most intensive, offers a detailed view of the behavioral changes within households following the introduction of pressure cookers.

The culmination of these stages, characterized by meticulous planning, diligent data collection, and rigorous analysis, ensures that the study provides not only a snapshot but a detailed, multi-dimensional understanding of the dynamics of pressure cooker adoption and its implications on LPG usage within the refugee communities. The stages and the detailed time line for the study is presented in Figure 1

Figure 1: Research Design by Stages



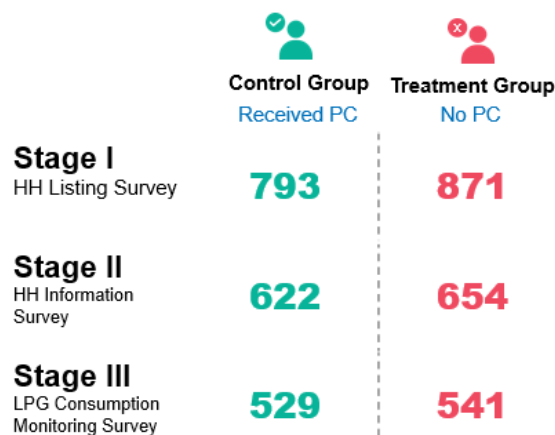
Source: IUCN Pressure Cooker Pilot Survey, 2023

2.2 Sample size

The study aimed to understand pressure cooker (PC) usage behavior across various household sizes, from single-member households to those with 10 or more members. Initially, 1,600+ households were randomly selected from the UNHCR database for Stage 1, intending to identify 793 households with pressure cookers (treated households) and 871 without (comparison households). Discrepancies between registration data and field observations led to the exclusion of certain households.

In Stage 2, 1,276 households were approached (622 control, 654 treated), gathering essential information on cooking habits, food intake, and socio-economic demographics. For Stage 3, 1,100 households were intended for a 14-day monitoring period. However, due to relocation and other factors, 50 treated households couldn't be located, resulting in a final sample size of 1,070 (529 treated, 541 control) for the study's duration. The sample size at each stage of the study is shown in Figure 2.

Figure 2: Sample Sizes by Stages of Surveys

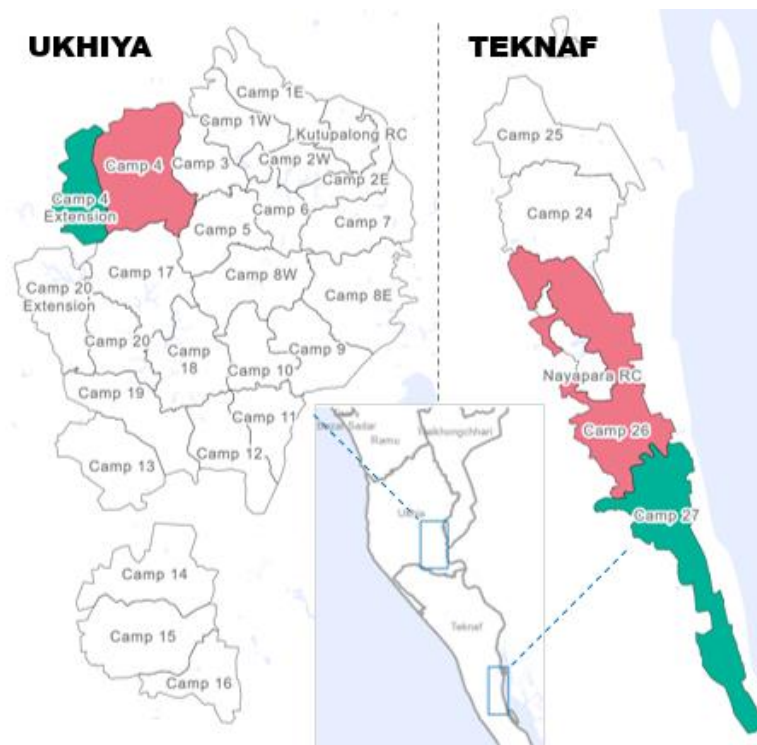


Source: IUCN Pressure Cooker Pilot Survey, 2023

2.3 Map of Survey Locations

Map 1 shows location of the camps where the survey was conducted.

Map 1: Location of Camps in the Study



Source: IUCN Pressure Cooker Pilot Survey, 2023

3.0 Descriptive Statistics: Survey Findings

This section highlights the results of descriptive analysis based on the survey findings:

3.1 Use of Pressure Cooker

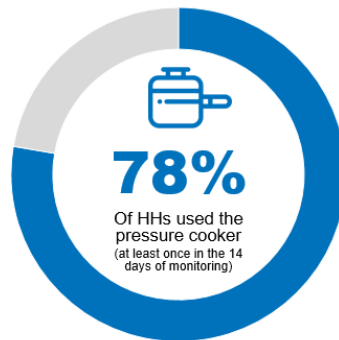
Percent of households used at least once in 14-days

In the treatment group, which encompassed refugee households located in camps 4 extension and 27, a total of 529 households were initially included. However, during the LPG consumption monitoring survey conducted in Stage 3, nine households could not be tracked back. Roughly two to three months before the initiation of the monitoring study, the remaining 520 households received pressure cookers as part of the intervention. Surprisingly, only 404 out of these 520 households reported using the pressure cookers at least once within the 14-day monitoring period.

It is noteworthy that during the survey period, none of the remaining 116 households in the treatment group utilized pressure cookers. This finding underscores a significant observation: within the treatment group, 77.3% of families embraced the use of pressure cookers, benefiting from the enhanced cooking efficiency and reduced fuel consumption. In contrast, the remaining 22.3% of households did not utilize pressure cookers during the monitoring period, indicating a potential disparity in the adoption rate despite the intervention.

This data illustrates a picture of pressure cooker adoption within the treatment group, shedding light on both the successes and challenges faced during the implementation of the intervention. Further analysis and exploration of the factors influencing this divergence in adoption rates could provide valuable insights for future interventions, aiming to enhance the adoption of energy-efficient cooking technologies within refugee communities.

Figure 3: User of Pressure Cooker (within treatment group)



Source: IUCN Pressure Cooker Pilot Survey, 2023

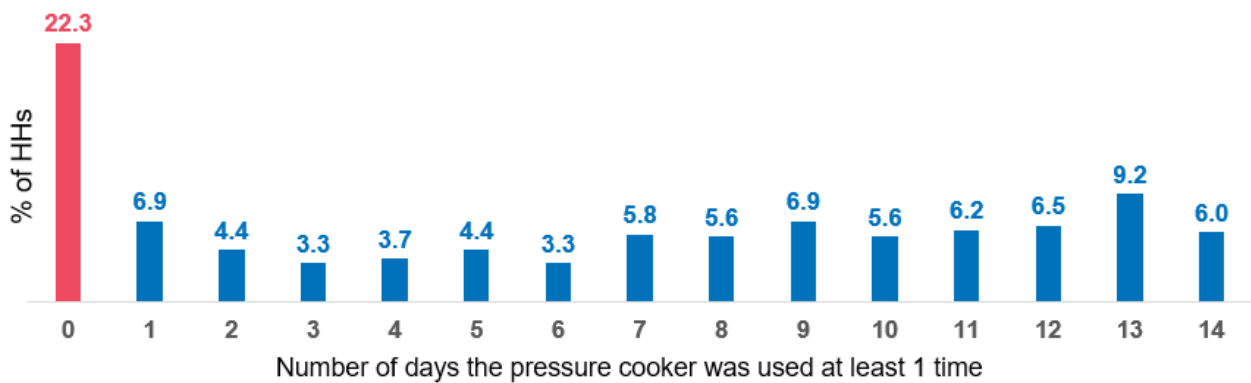
Percent of households used pressure cooker all 14-days

The data presented in Figure 4 provides a breakdown of pressure cooker usage patterns within the surveyed refugee households. Among the pressure cooker users, 6.0% of households utilized the pressure cooker consistently for the entire 14-day period, reflecting a disparity between the expected continuous usage and the actual adoption rate. Furthermore, 9.2% of households used the pressure cooker for 13 days, indicating a slightly higher but still relatively low rate of prolonged usage.

Investigating further into the statistics, 6.5% of households utilized the pressure cooker for 12 days, 6.2% for 11 days, and 5.6% for 10 days. These figures reveal a gradual decrease in usage duration, suggesting a decline in the consistency of adopting pressure cookers for daily cooking needs. This trend underscores a notable challenge: while pressure cookers were distributed with the intention of encouraging energy-efficient cooking practices, the actual utilization patterns indicate a lower-than-expected integration into the households' daily routines.

This discrepancy between the intended and observed usage highlights a potential gap in the implementation strategy or points to underlying barriers faced by the refugee households. Understanding these challenges is crucial for refining future interventions. It could involve addressing factors such as familiarity with pressure cooker usage, developing a compatible recipe, and incentivizing them to use it more frequently. By identifying and addressing these specific challenges, future initiatives can be better tailored to meet the needs and preferences of the refugee households, ensuring higher adoption rates and more sustainable energy-efficient practices in the long run.

Figure 4: Use of Pressure Cooker by Number of Days at HH level



Source: IUCN Pressure Cooker Pilot Survey, 2023

3.2 Use of Pressure Cooker by Family Size

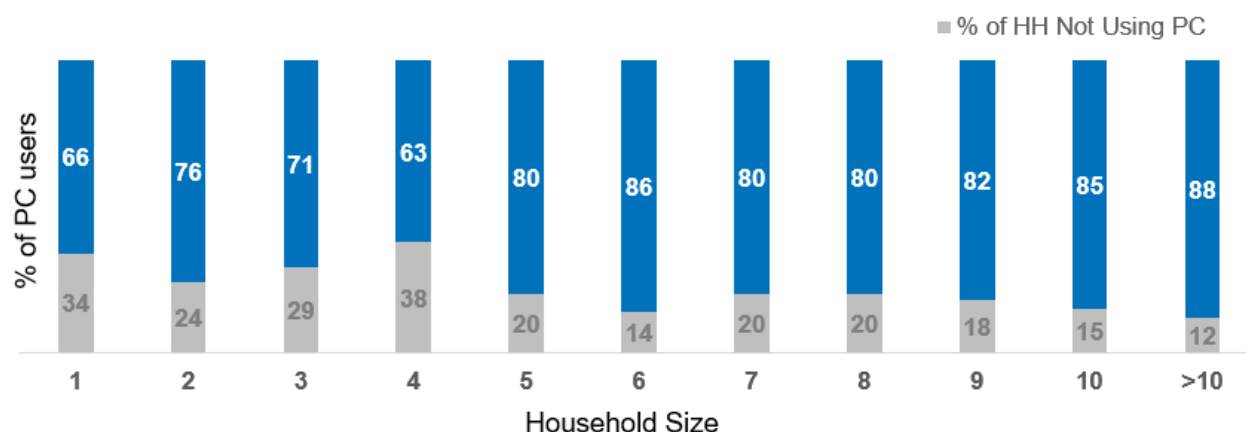
The analysis of pressure cooker usage patterns among refugee households reveals a striking trend, particularly concerning family sizes. Households with smaller family sizes, ranging from 1 to 4 members, exhibit significantly lower adoption rates of pressure cookers, as depicted in Figure 5. This observation underscores an intriguing dynamic in the context of household size and technology uptake within the refugee community.

Upon closer examination, a clear pattern emerges. In households with family sizes falling within the 1-4 members, there is a noticeable reluctance or challenge in integrating pressure cookers into their daily cooking routines. This could be attributed to various factors, such as limited awareness of the benefits of pressure cookers, presence of younger children in the family, or even presence of a special need person in the family. This might discourage them to make the transition from regular cooking habit to cooking with pressure cooker.

However, a compelling shift occurs when we explore households with larger family sizes, specifically those beginning with the 5-member bracket. Here, the percentage of people utilizing pressure cookers experiences a gradual and consistent increase. This intriguing trend suggests that as the size of the household expands, there is a growing inclination towards adopting pressure cookers as an essential cooking tool.

Understanding this correlation between household size and pressure cooker usage is pivotal for tailoring future interventions. Initiatives aimed at promoting energy-efficient cooking practices within refugee communities could focus on targeted awareness campaigns and training sessions specifically designed for smaller households. By addressing the unique challenges faced by these smaller families, such as potential misconceptions or lack of familiarity, it becomes possible to bridge the adoption gap and encourage a more widespread and consistent use of pressure cookers across all refugee households. This approach holds the key to promoting sustainable and efficient cooking practices across diverse family sizes within the refugee population.

Figure 5: Percentage of Pressure Cooker Users by Household Size Bracket



Source: IUCN Pressure Cooker Pilot Survey, 2023

3.3 Number of items cooked with pressure cooker

The analysis of pressure cooker usage among refugee households extends beyond the adoption rates and the study investigated into the number of items prepared using pressure cookers in comparison to other cooking methods. This approach is depicted in Figure 6, where the pressure cooker usage rate (%) signifies the percentage of items cooked in pressure cookers out of all items prepared by each household in a day.

To illustrate, consider a scenario where a refugee household cooks rice twice daily, but only once in a pressure cooker. In this case, the pressure cooker usage rate stands at 50%. This metric offers a comprehensive understanding of how frequently pressure cookers are utilized in the preparation of various meals within a household.

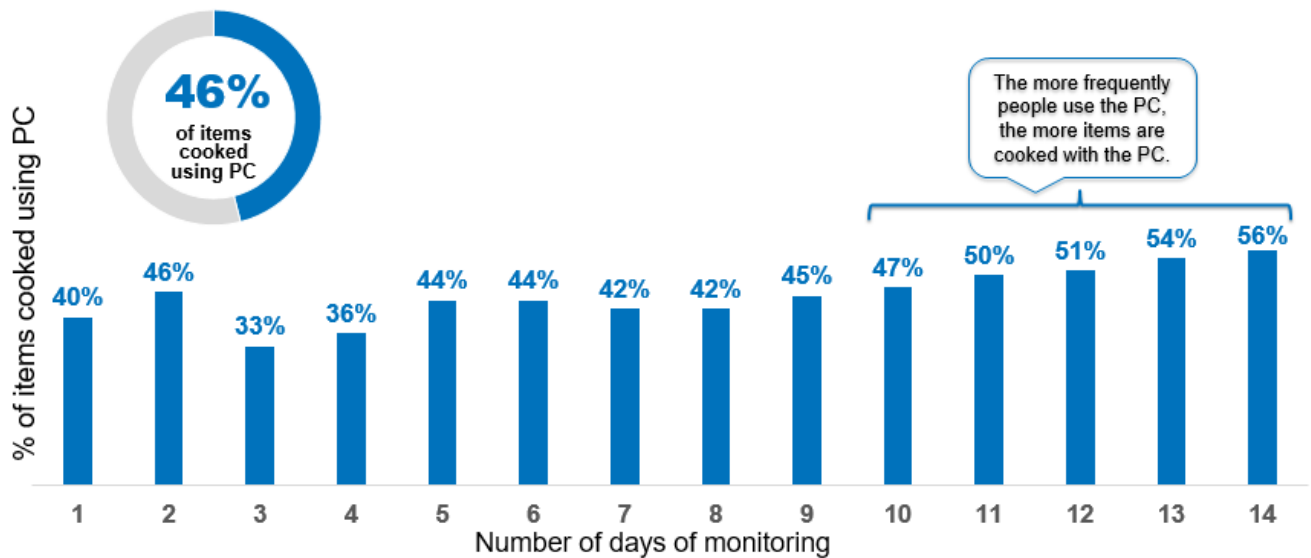
The study findings revealed a significant insight: 46% of all items cooked in refugee households are prepared using pressure cookers. This statistic underlines the pivotal role pressure cookers play in daily cooking activities, representing nearly half of the food items prepared within these households.

Furthermore, a compelling correlation emerges from the data: households that use pressure cookers more frequently tend to prepare a higher proportion of their meals using this technology. In other words, the more often people use pressure cookers, the greater the number of items cooked using this method – a reflection of familiarity and greater ease of using pressure cooker when they are used to it.

In essence, this data not only highlights the prevalence of pressure cooker usage but also underscores its versatility in culinary preparations. By recognizing that nearly half of the food items in refugee households are cooked using pressure cookers, it becomes evident that this kitchen tool is not just a novel addition but can be an integral component of their daily cooking routines. This understanding serves as a valuable foundation for future interventions,

emphasizing the importance of sustained usage and potentially expanding the catalogue of recipes that can be prepared using pressure cookers (Figure 6).

Figure 6: Pressure Cooker Utilization Rate (%) by Number of Days of PC Used



Source: IUCN Pressure Cooker Pilot Survey, 2023

3.4 Number of meals cooked per day

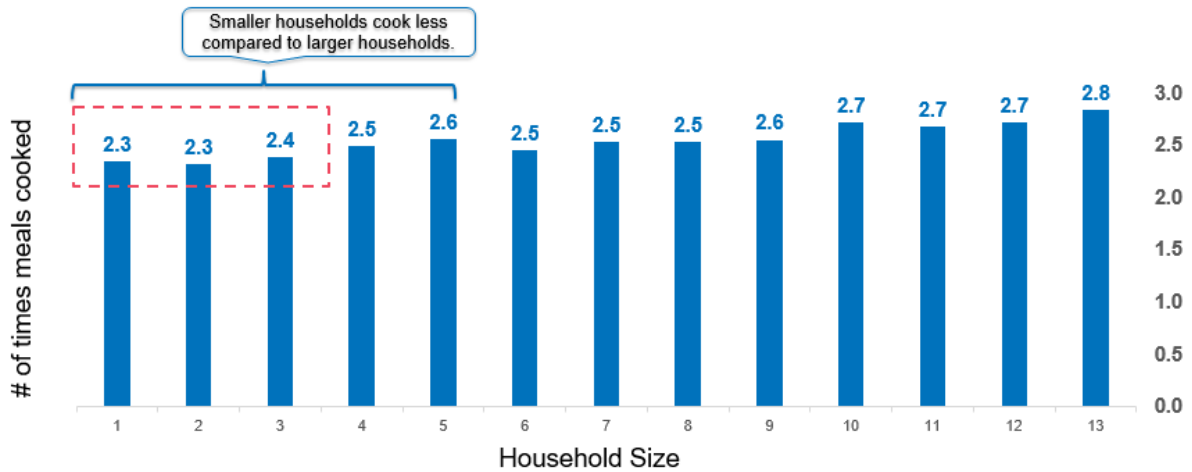
The frequency of daily meals prepared has a notable impact on fuel usage efficiency. The research examined cooking habits across various household sizes to assess this influence.

Firstly, the study reveals that smaller households, consisting of 1 to 3 family members, tend to cook meals approximately 2.3 to 2.4 times per day on average. As the family size increases, the frequency of cooking also rises. Larger households, specifically those with more than 10 members, cook more frequently, preparing approximately 2.7 to 2.8 meals per day. This gradual increase in the number of meals cooked daily corresponds with the growing size of the family, suggesting a direct correlation between family size and meal preparation frequency.

Furthermore, the study findings already emphasized another noteworthy observation: households with larger families exhibit a higher rate of pressure cooker usage each day. In other words, dwellings with comparatively more family members are more likely to utilize pressure cookers regularly in their daily cooking routines. This trend aligns with the notion that larger families have a greater demand for efficient and quick cooking methods, making pressure cookers an important tool to cater to their increased food preparation needs.

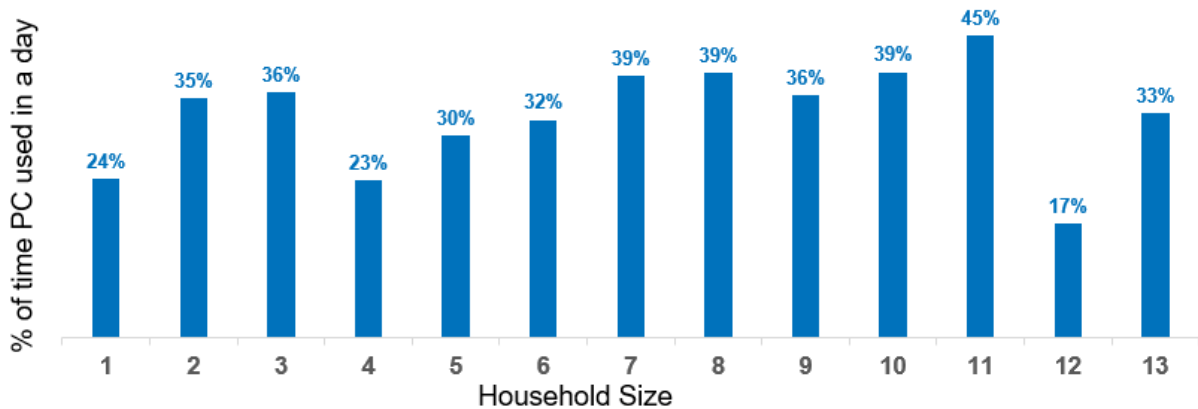
This information underscores the significance of considering family size as a crucial factor when designing cooking interventions or providing kitchen technologies like pressure cookers within refugee communities. Understanding these patterns not only aids in tailoring interventions to specific household needs but also highlights the potential benefits of promoting energy-efficient cooking practices, especially in larger families where the impact could be more significant in terms of both time and resource savings (Figure 8).

Figure 7: No of Meals cooked per day



Source: IUCN Pressure Cooker Pilot Survey, 2023

Figure 8: Pressure Cooker use rate (by meals) per day



Source: IUCN Pressure Cooker Pilot Survey, 2023

3.5 Income and food security status

Within the treatment groups, a diverse range of cooking practices emerged among refugee households. This diversity was categorized into three distinct type based on their pressure cooker usage pattern:

- (a) Non-Users (22.3%): A significant portion of households, comprising 22.3%, chose not to use pressure cookers at all in their cooking routines.
- (b) Irregular Users (39.2%): Another substantial segment, accounting for 39.2% of households, utilized pressure cookers intermittently, indicating inconsistent usage patterns.
- (c) Regular Users (38.5%): A notable proportion, 38.5% of households, exhibited consistent and regular use of pressure cookers in their daily food preparation activities.

A closer examination of these categories reveals intriguing insights, particularly concerning household incomes. The data presented in Table 1 showcases a distinct correlation between pressure cooker usage and household income levels within the treatment camps:

Non-Users: Families within treatment camps that opted not to use pressure cookers at all had an average household income of 2,694 taka.

Irregular Users: Household incomes for irregular pressure cooker users averaged at 2,860 taka. This group, characterized by sporadic pressure cooker usage, displayed a slightly higher income level than non-users, indicating a potential flexibility in their cooking methods.

Regular Users: Families within treatment camps who consistently utilized pressure cookers boasted a comparatively higher average household income of 3,524 taka. This group, exhibiting a consistent preference for pressure cookers, demonstrated a relatively better financial capacity, possibly enabling them to invest in and maintain regular use of this efficient cooking technology.

The observed relationship between household income and pressure cooker usage can be explained by the concept of opportunity cost of time. Opportunity cost refers to the value of the next best alternative that must be forgone when a decision is made. In this context, the opportunity cost of time pertains to the value that individuals place on their time and the activities they could engage in instead of spending a significant amount of it on cooking.

Households with higher incomes tend to have more opportunities for income-generating activities. When considering the time spent on cooking, these households might find it more rewarding to save time, allowing them to allocate it to more productive or enjoyable endeavors. Pressure cookers, known for their efficiency in reducing cooking time, become a valuable tool in this scenario.

In essence, families with higher incomes are likely to prioritize time-saving methods like pressure cookers in their daily cooking routines. By investing in such efficient cooking technologies, they can optimize their time, balancing the demands of daily food preparation with other valuable activities. This interpretation highlights the economic rationale behind the preference for pressure cookers among households with higher incomes, emphasizing the importance of time management and the opportunity cost associated with daily chores.

Table 1: Income and Food Consumption Score (FCS) within the treatment group

HH Type	HH Income (in taka)	HH Classification based on FCS		
		Acceptable (FCS \geq 42)	Borderline (28 $>$ FCS $>$ 42)	Poor (FCS \leq 28))
PC Non-users	2,694	21.9%	21.2%	43.8%
Irregular PC Users	2,860	39.8%	37.7%	43.8%
Regular PC Users	3,524	38.3%	41.2%	12.5%

Source: IUCN Pressure Cooker Pilot Survey, 2023

The Food Consumption Score (FCS) is a metric used by the World Food Programme (WFP) and other organizations to assess the quality and diversity of household diets. It provides a

numerical value based on the variety and frequency of different food groups consumed by a household over a specific period, usually the past seven days. This score is used to assess the food security situation of communities, identify vulnerable populations, and design targeted interventions to improve nutrition and overall food security.

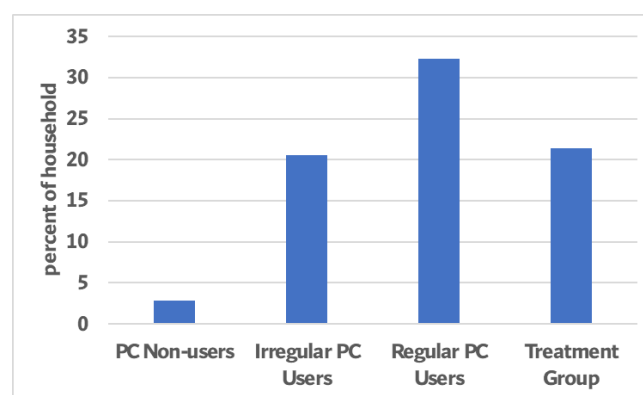
Using the Food Consumption Score (FCS), Table 1 categorizes households into three groups: a) acceptable, b) borderline, and c) poor. Interestingly, households regularly using pressure cookers tend to have better food stability. However, this observation is nuanced and requires in-depth analysis. It is important to note that wealthier households are generally less poor according to the FCS. This relationship is intricate; wealthier households can afford a more diverse range of foods, leading to higher FCS scores. The causality between FCS and pressure cooker use is not directly related; rather, it is influenced by the household's economic status and food variety.

Data reveals that while only 12.5% of these households had a poor Food Consumption Score (FCS) among the wealthier cohort, it is nearly 44% for households that irregularly or non-user of pressure cookers. Among households completely abstaining from using pressure cookers, only 21.9% are in the acceptable FCS score, whereas this number doubled for households utilizing pressure cookers.

3.6 Water Boiling Habit

Figure 9 provides a detailed insight into the usage patterns of pressure cookers within the treatment group households. On average, 21.4% of these households utilize pressure cookers to boil water, indicating a multifaceted role for this kitchen appliance beyond cooking meals. Interestingly, among irregular pressure cooker users, 20.6% have also used the pressure cooker for boiling water. This number significantly rises to 32.3% among frequent pressure cooker users, showcasing a higher tendency among this subgroup to utilize pressure cookers for water boiling purposes. Even among households that did not use pressure cookers for food preparation, around 2.8% reported using them to boil water.

Figure 9: Boiling of Water



Source: IUCN Pressure Cooker Pilot Survey, 2023

3.7 Fuel Choices for Cooking

Table 2 outlines the fuel usage patterns within refugee households. Despite receiving complimentary LPG supplies, the data reveals that approximately 9-18% of households utilize a second LPG gas cylinder. Several reasons were observed during field visits to explain this phenomenon. Firstly, some households prepare surplus food, either for selling purposes, catering to visitors like children (who are living in the same or different camps), or for their own commercial ventures, such as tea stalls or on-the-street food shops.

Additionally, the table indicates that almost a third of these families rely solely on one LPG cylinder. Intriguingly, nearly 40% of non-users also stick to one LPG cylinder, suggesting they might not urgently need to conserve LPG within the current refill cycle. However, a puzzling aspect arises: 68% of both treatment and control group households utilize both LPG and firewood for cooking. Field observations reveal two potential explanations: a) the current LPG refill cycle might not be sufficient for their needs, or b) there is a burgeoning resale market for LPG, encouraging households to sell their allocated LPG and supplement their cooking with firewood. This mixed fuel usage presents a complex scenario that warrants further investigation.

Table 2: Fuel for Cooking

Household	Additional LPG Cylinder	Only LPG	LPG + Firewood + Leaves/Twigs
Treatment Group	14.6	31.4	68.6
PC Non-users	8.6	40.5	59.5
Irregular PC Users	17.7	26.6	73.4
Regular PC Users	15	31	69
Control Group	16.7	31.3	68.7

Source: IUCN Pressure Cooker Pilot Survey, 2023

Fuel Choice by Household Size

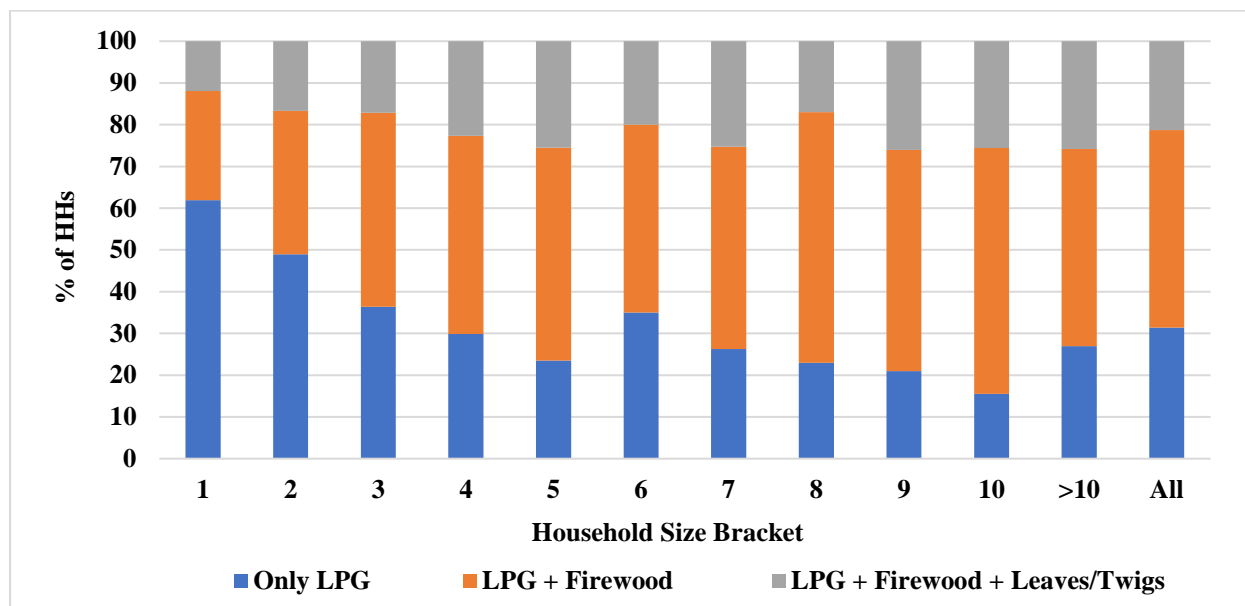
Figure 10 provides valuable insights into the diverse cooking fuel choices made by households based on their size. Notably, the data highlights a significant trend: in households with a single family member, a substantial 60% exclusively rely on LPG for cooking. However, as the household size expands, the reliance on LPG alone diminishes. For households with four or more members, this exclusive LPG usage drops below 30%, with the exception of households in bracket 6.

A closer examination of this trend reveals an interesting pattern: larger families tend to adopt a multifaceted approach to cooking fuel. In households with more than four people, the dependence on LPG alone decreases significantly. These families augment their cooking needs with a combination of LPG, firewood, leaves, and twigs.

This mix of fuel usage pattern underscores the complex dynamics at play within refugee households. Understanding these trends is pivotal for organizations and policymakers aiming to improve energy efficiency and promote sustainable cooking practices within these

communities. Tailoring interventions to accommodate the specific needs and challenges faced by families of different sizes is essential for the successful implementation of future initiatives.

Figure 10: Use of Cooking Fuel (% of HHs) by Household Size Bracket

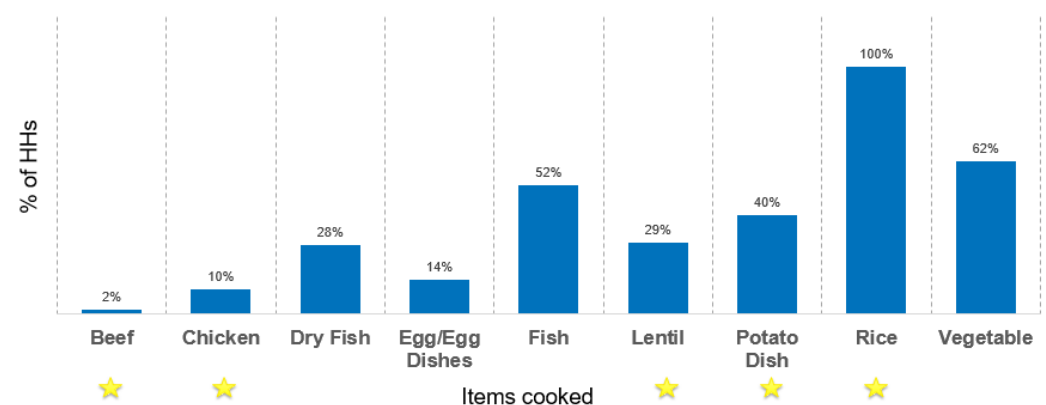


Source: IUCN Pressure Cooker Pilot Survey, 2023

3.8 Food Habit of Refugee Households

The choice of food items significantly influences the use of pressure cookers, as not all items can be efficiently cooked using this method. To better understand the dietary habits of refugee households, the survey included questions about the food items cooked a day before. The responses revealed that all households cooked rice, while 62% prepared vegetables, 52% cooked fish, and 28% cooked dry fish. Additionally, 40% of households mentioned preparing potato dishes, 14% cooked eggs or egg-based dishes, and 10% cooked chicken meat. A smaller percentage, 2%, mentioned cooking beef meat. This food diversity remained consistent across both treatment and control groups, highlighting the common dietary practices within the refugee community (see Figure 11).

Figure 11: Food Habit and Items of Food



Source: IUCN Pressure Cooker Pilot Survey, 2023

4.0 Results of RCT Estimations

To assess the impact of introducing pressure cookers, the study employed a randomized control trial, allowing for a comparison with a similar control group that did not receive the treatment. An essential observation was the significant role of the number of daily meals cooked in determining LPG usage. Upon the introduction of pressure cookers, there was a noticeable reduction in daily LPG consumption for households using pressure cooker. To quantify this effect, a panel regression analysis was conducted, and the outcomes are presented in Table 3.

The results indicate that, on average, treated households decreased their daily LPG usage by 0.03 kg, a change that proved to be statistically significant. Furthermore, the reduction in LPG consumption was influenced by the number of items cooked using pressure cookers, showing a decrease of approximately 0.076 kg per day for each additional item prepared. This underscores the importance of both the introduction of pressure cookers and the frequency of their use in effectively reducing LPG consumption among households.

Table 3: Panel Regression Results

	Fixed	Random	Random GLS
Use of LPG per day			
Treatment = 1 for HH with PC and 0 otherwise		-0.031** (-1.71)	-0.0356* (-1.55)
Rate of use of PC while cooking items (1 means 100% and 0 means 0%)	-0.0733*** (-2.64)	-0.0760*** (-2.89)	-0.0760*** (-4.24)
# of meals cooked in a day	0.0628*** -11.34	0.0618*** -11.4	0.0618*** -9.79
Other variables			
Constant	0.214*** -13.77	0.141*** -6.32	0.141** -2.04
Observations	12187	12187	12187
Log Lik.	-1218.8		
Chi-squared		666.8	629.9

4.1 Strategies for further reducing LPG use

The survey data reveals the most commonly consumed food items in refugee households, including rice (100%), vegetables (62%), fish (52%), potatoes (40%), and lentils (29%). Notably, pressure cookers can efficiently be used for cooking rice, potatoes, and lentils. Figure 12, Figure 13, and Figure 14 depict the cooking patterns of rice, lentils, and potatoes, respectively, categorized by household size.

Upon closer inspection of the diagrams, it becomes apparent that households with 3-7 members constitute the majority of the population. However, these families exhibit relatively low adoption rates of pressure cookers in their daily cooking routines compared to smaller or larger households. This discrepancy is a significant concern that needs to be addressed when implementing pressure cookers among refugee communities. Improving the adoption rates

among these mid-sized families could substantially decrease LPG consumption, leading to significant cost savings in financing LPG for refugees.

Figure 12: Current Use of PC for Cooking Rice by HH Bracket

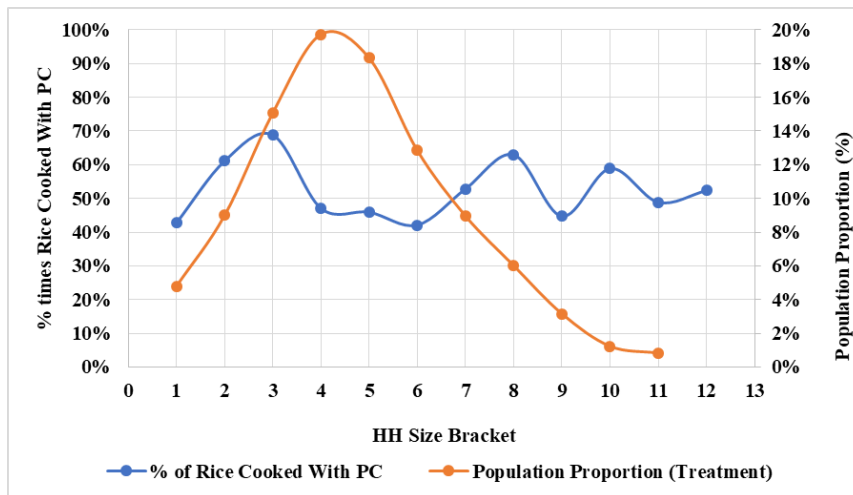


Figure 13: Current Use of PC for Cooking Lentil

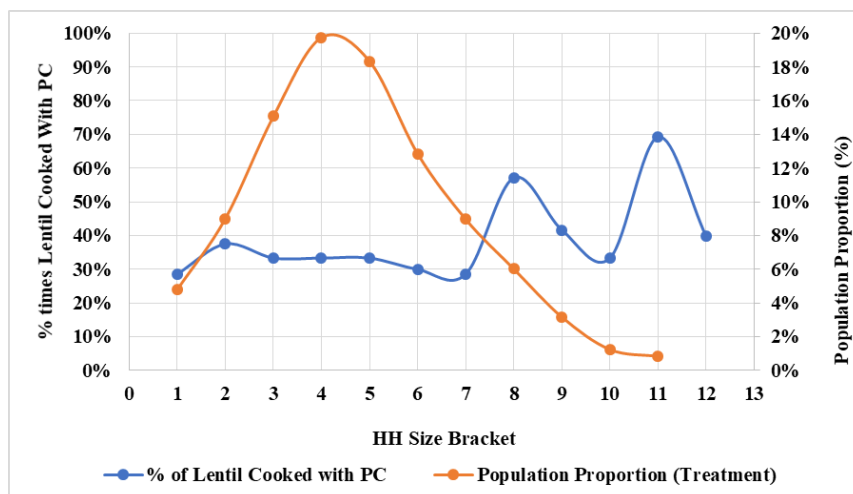
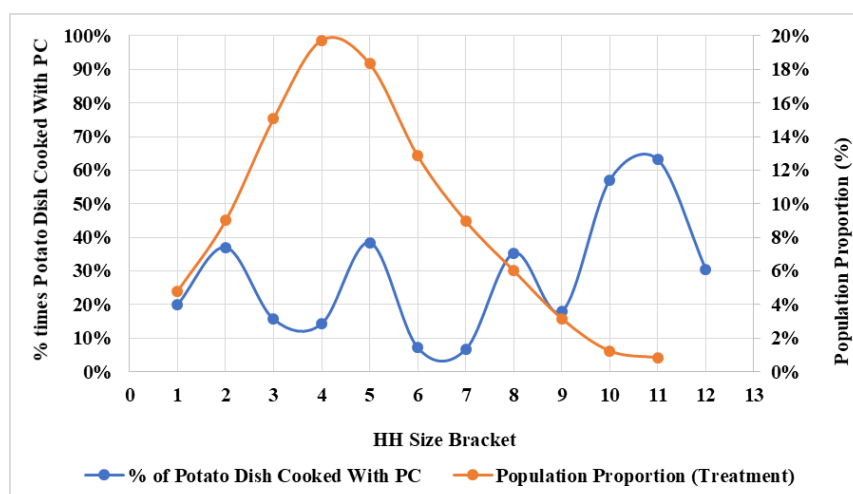


Figure 14: Current Use of PC for Cooking Potato Dishes

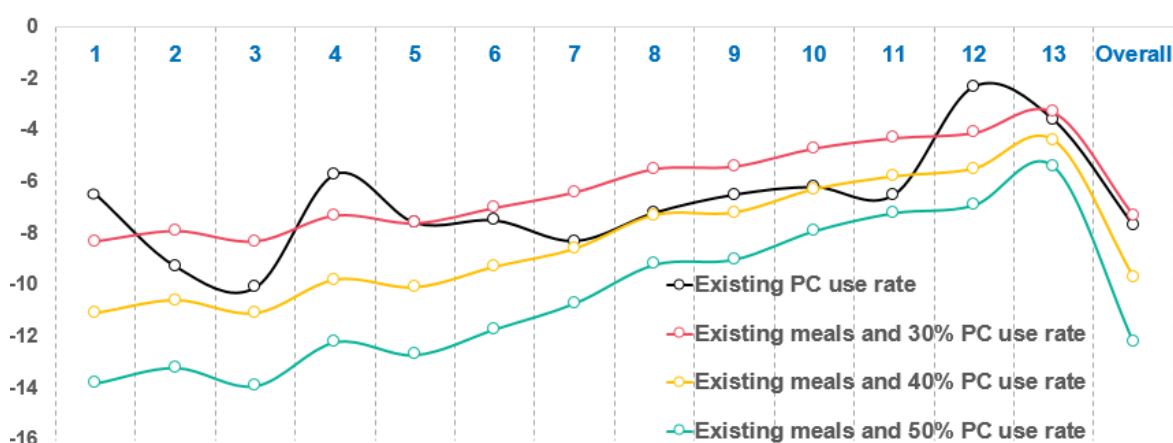


4.2 Estimates of LPG saving through pressure cooker use

Table 4 presents simulated results showcasing the potential LPG savings based on different adoption rates. Figure 8 indicated the current pressure cooker usage rates categorized by family size. Building on this information, Figure 15 and Table 4 demonstrate the potential LPG reduction achievable. If all families adopted pressure cookers at the rate observed in the treatment group, there could be a reduction of approximately 7.7% in LPG usage. However, the data reveals that gas savings vary across families.

Given the discussion earlier, it is evident that increasing the adoption rate is feasible if households receiving pressure cookers are provided additional incentives or awareness initiatives. To explore these scenarios, we simulated potential savings based on targeted adoption rates across all households. Table 4 illustrates that with a 40% adoption rate across all household sizes, a reduction of nearly 9.7% in LPG usage is possible. If the adoption rate increases to around 50%, the potential reduction escalates to 12.2%, and it further rises to approximately 14.6% with a 60% adoption rate.

Figure 15: LPG savings per day by HH size (current food consumption habit)



Source: Simulated results based on IUCN Pressure Cooker Pilot Survey, 2023

Table 4: Simulation of LPG savings with changes in use rate

Household size	Existing PC use rate	Simulated PC use rate		
		40%	50%	60%
1	-6.5	-11.1	-13.8	-16.6
2	-9.3	-10.6	-13.2	-15.9
3	-10.1	-11.1	-13.9	-16.7
4	-5.7	-9.8	-12.2	-14.7
5	-7.6	-10.1	-12.7	-15.2
6	-7.5	-9.3	-11.7	-14.0
7	-8.3	-8.6	-10.7	-12.8
8	-7.2	-7.3	-9.2	-11.0
9	-6.5	-7.2	-9.0	-10.8
10	-6.2	-6.3	-7.9	-9.5
11	-6.5	-5.8	-7.2	-8.6
12	-2.3	-5.5	-6.9	-8.3
13	-3.6	-4.4	-5.4	-6.5
Overall	-7.7	-9.7	-12.2	-14.6

Source: Simulated results based on IUCN Pressure Cooker Pilot Survey, 2023

5.0 Revision of the Refill Cycle

Considering the comprehensive findings from the pilot survey and the simulation results, it is evident that the introduction of pressure cookers presents a significant opportunity for cost-saving in LPG usage among refugee families. This potential saving needs to be translated into tangible cost reductions for organizations like UNHCR and IOM, which provide LPG to these families free of charge.

To effectively capitalize on this opportunity, a strategic approach involves revising the refill cycle based on different family sizes. By adjusting the refill intervals, less LPG would be required for the refugee camps as families adopt the use of pressure cookers. The simulation results have enabled the division of the refill cycle into five distinct categories, as outlined in Figure 16 and Table 5. These categories cater to families of varying sizes: households with 1-3 members would refill every 52 days, those with 4-5 members every 46 days, families with 6-7 members every 38 days, households comprising 8-9 members every 32 days, and families larger than 9 members every 28 days.

Figure 16: Refill Cycle by Household size

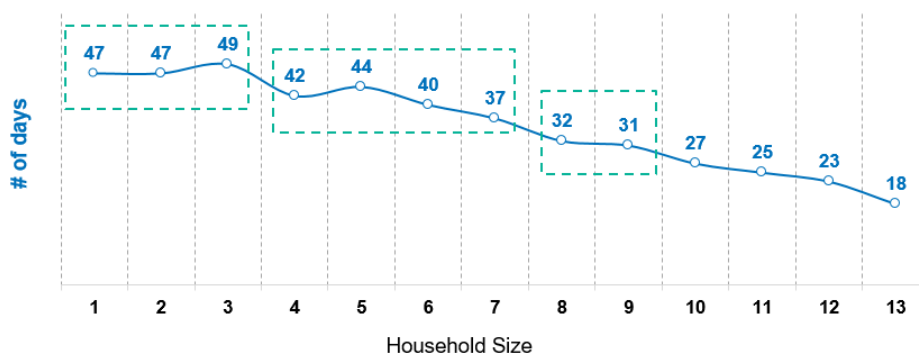


Table 5: Suggested refill cycle by household size

HH size	AS IS	Simulation Use rate of PC			Average	Suggested
		40%	50%	60%		
1	47.0	50.0	51.0	53.0	51.0	52
2	47.0	47.0	49.0	50.0	49.0	
3	49.0	50.0	52.0	53.0	52.0	
4	42.0	43.0	45.0	46.0	45.0	46
5	44.0	45.0	46.0	48.0	46.0	
6	40.0	41.0	42.0	43.0	42.0	38
7	37.0	38.0	38.0	39.0	38.0	
8	32.0	32.0	32.0	33.0	32.0	32
9	31.0	31.0	32.0	33.0	32.0	
10	27.0	27.0	28.0	28.0	28.0	28
11	25.0	25.0	25.0	25.0	25.0	
12	23.0	24.0	24.0	24.0	24.0	
13	18.0	18.0	19.0	19.0	19.0	

Source: Simulated results based on IUCN Pressure Cooker Pilot Survey, 2023

Implementing this tailored refill cycle is recommended to maximize the benefits derived from the introduction of pressure cookers among the recipient families. This strategic adjustment not only optimizes the usage of LPG but also translates into significant cost savings, aligning

with the overarching goal of promoting efficient and sustainable practices within refugee communities.

6.0 Conclusion and Recommendations

The initiation of this study coincided with the pilot phase of introducing pressure cookers within refugee camps, marking a significant step toward optimizing LPG usage. The primary objective was to scrutinize the impact of this pioneering initiative on LPG savings, offering valuable insights that can inform comprehensive strategies for widespread implementation across the camps. One of the pivotal outcomes of this study was the formulation of a refill cycle, tailored to meet the diverse needs of refugee families. Under this new system, families of 1-3 members would require a refill every 52 days, while slightly larger families comprising 4-5 members would extend the interval to 46 days. For families of 6-7 members, the refill cycle was adjusted to 38 days, while those with 8-9 members would need a refill every 32 days. Families with more than 9 members would replenish their supply every 28 days, ensuring a more efficient and targeted distribution approach.

However, the implementation of these revised refill strategies demands a cautious approach, primarily due to the existing low adoption rates of pressure cookers within the refugee community. To bridge this awareness gap, comprehensive awareness campaigns must accompany the distribution of pressure cookers. A particular focus on smaller families, which constitute the majority in the refugee community, becomes imperative. The study's field observations unveiled a significant lack of familiarity, particularly among women, regarding pressure cooker usage. To promote adoption, innovative approaches such as introducing 'cooking champions' within the community, individuals proficient in utilizing pressure cookers, can serve as role models. Simultaneously, the introduction of fresh, enticing recipes tailored specifically for pressure cooker cooking can enhance its appeal and encourage families to embrace this efficient cooking method.

Moreover, the study unearthed a concerning trend: the emergence of clandestine LPG markets among refugee families. This not only raises environmental concerns due to potential leakages but also poses reputational risks for organizations like UNHCR and IOM. To address these risks effectively, vigilant monitoring and regulation of these secondary LPG markets are imperative, ensuring the allocated resources are utilized for their intended purpose.

Furthermore, this study emphasized the need to cater to specific challenges and requirements faced by vulnerable groups within the refugee community. Families with special needs, particularly those with small children, necessitate tailored solutions while managing the supply of LPG. Additionally, understanding seasonal patterns of fuel use, especially during winter when the demand for boiling water surges, is pivotal. While the current study did not delve into this aspect, future research endeavors should account for these fluctuations to provide a more holistic understanding of the situation.

In essence, this study's comprehensive insights underscore the challenges involved in introducing pressure cookers within refugee communities. By addressing these challenges through a carefully planned approach, organizations can navigate the complexities, optimize resource utilization, and ensure a positive impact on both the environment and the lives of the refugee families, fostering a sustainable and efficient cooking ecosystem within the camps.