

Socioeconomic and energy access data at household level in Hilaweyn refugee camp and host communities



ALIANZA SHIRE

Energy access to refugees and host communities

Acknowledgements

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About Alianza Shire

Alianza Shire is a multi-stakeholder partnership which seeks to improve living conditions in the refugee camps and host communities by enhancing local capacity, creating livelihood opportunities and improving access to basic services through the cross-cutting impacts of access to energy. Formed in 2014, Alianza Shire is composed of three leading Spanish companies in the renewable energy and lighting sector - acciona.org, Iberdrola and Signify -, the Spanish Agency for International Development Cooperation (AECID), and the Innovation and Technology for Development Centre at the Universidad Politécnica de Madrid (itdUPM).

Between 2014 and 2017, Alianza Shire implemented a pilot project in the Adi-Harush refugee camp in the Shire area of northern Ethiopia, which was home to approximately 8.000 people. The project was focused on the improvement and extension of the electric grid in the camp, the connection of communal services and the installation of more than 4 km of public lighting.

After evaluating the results of the pilot project, the members of Alianza Shire decided to scale it up to nearby locations within Tigray. However, due to the armed conflict affecting security, the institutions and the lack of communications in the area, the project was reallocated to the refugee camps and host communities around Dollo Ado in the Ethiopian Somali region¹.

This intervention is carried out in close collaboration with different entities in Ethiopia: ZOA and Save Environment Ethiopia (SEE) as implementing partners, the United Nations Refugee Agency (UNHCR), the Refugees and Returnees Service (RRS), the line ministries and regional bureau, as well as the woredas (administrative divisions of Ethiopia, managed by a local government).

The main objective of the project is to improve living conditions in the refugee camps and host communities by enhancing local capacity, creating livelihood opportunities, and improving access to basic services through the cross-cutting impacts of access to energy; constituting a potential showcase for practical implementation of the Comprehensive Refugee Response Framework (CRRF).

¹ <https://alianzashire.org/en/new-shire-alliance-project/>

One of the specific objectives seeks to improve access to basic services in refugee camps by supplying sustainable energy to communal services and public lighting. The other specific objective, which this document addresses, is to create livelihood opportunities and improve the quality of life of refugees and host communities through capacity building, the creation of solar technology-based businesses and the distribution of solar home systems (SHS); encouraging employment and economic development.

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Summary

The objective of this report is to present the findings on energy access and population profiles based on data gathered through surveys conducted in the refugee camp and host communities of Hilaweyn, within the scope of the Alianza Shire project.

The study involved administering surveys to 500 respondents, comprising 250 residents of Hilaweyn Refugee Camp and 250 residents from the surrounding host communities. Data collection took place between April and May 2022. The survey included 231 questions categorized into 14 thematic clusters. Following the framework established by the master's thesis of Antonio de la Peña Calleja (2023), the indicators for household electricity access and cooking practices, as proposed by the Global Platform for Action on Sustainable Energy in Displacement Settings (GPA) (Bisaga, 2021), were calculated using the data obtained from the socioeconomic survey.

Collecting and analyzing disaggregated data posed significant challenges due to logistical constraints and the nuanced nature of the information. Ensuring data integrity while capturing the diversity of experiences in both refugee and host populations was crucial to obtaining a representative profile.

The survey highlighted gender disparities and inequalities related to energy access. Approximately 15% of household income is allocated to energy services such as phone charging, battery use, candles, and powering small electronic devices like radios.

Cooking tasks are predominantly performed by women, and the primary fuel used is firewood. Notably, 100% of respondents rely on non-clean cooking fuels, underscoring significant challenges in promoting sustainable and safe energy practices.

These results emphasize the urgent need for interventions that address energy poverty, gender inequality, and the reliance on unsustainable fuels. Further efforts are required to transition toward cleaner, safer, and more equitable energy solutions in displacement settings.

Introduction

CONCEPTUAL FRAMEWORK

Globally, nearly 95% of refugees lack access to electricity (GPA, 2022). The energy needs within displacement contexts are becoming increasingly complex due to the growing reliance on electrical appliances (Thomas, Rosenberg-Jansen et al., 2021). A study by Practical Action (2023) highlights that in Ethiopia and neighboring regions, limited energy access is particularly prevalent in informal settlements, where cost remains the primary barrier. These areas are predominantly inhabited by refugees and forcibly displaced populations. The lack of access to energy is intricately linked to factors such as extreme poverty, limited educational opportunities, and inadequate housing infrastructure (Practical Action, 2023).

Only 57% of households in Ethiopia have access to a source of electricity, with 33% connected to the grid and 24% relying on off-grid solutions. The National Electrification Program (NEP) in Ethiopia estimated in 2018 that only 37% of refugees had access to electricity for lighting and basic services (Sandwell et al., 2024). In this context, off-grid solar technologies represent the most feasible solution for meeting energy needs in refugee camps and host communities far from the main grid network.

Off-grid technologies offer affordability without requiring significant investment in large-scale infrastructure. Solar energy is not only more cost-effective compared to fuel-based solutions or grid expansion, but it also provides long-term reliability and sustainability (Norwegian Refugee Council, 2023). Consequently, Solar Home Systems (SHS) are emerging as a widespread off-grid solution, offering dependable energy access and addressing the needs of displaced populations efficiently (Yadav et al., 2019).

As previously stated, the main objective of the project has been to improve the living conditions in refugee camps and host communities by harnessing the cross-cutting impacts of energy. This approach focuses on enhancing local capacities, creating livelihood opportunities, and improving access to basic services, offering a tangible model for implementing the *Comprehensive Refugee Response Framework* (CRRF) in practice.

On one hand, the project aimed to enhance the availability and reliability of essential services within refugee camps through the provision of sustainable energy solutions, including the supply of electricity to communal services and the installation of street lighting systems. By ensuring reliable energy for critical services such as health centers, educational institutions, and public spaces, the project contributes to greater safety, security, and quality of life for refugees and host communities.

On the other hand, the intervention also focused on fostering economic resilience and self-sufficiency. Through targeted capacity-building programs, refugees and host community members received training in solar energy technologies. This knowledge transfer supports the creation of businesses centered on solar technologies, such as the sale, installation, and maintenance of Solar Home Systems (SHS). The distribution of SHS not only addresses immediate energy needs but also promotes entrepreneurship, employment, and local economic development.

By integrating sustainable energy solutions with capacity-building initiatives and economic empowerment, this project stands as a scalable model for addressing the complex challenges faced by displaced populations and host communities. The collaborative framework ensures that the intervention aligns with local needs and leverages international best practices, paving the way for a more resilient and self-reliant future for all stakeholders involved.

In pursuit of the final project objective—and acknowledging the significant gap in available energy access data (Rosenberg-Jansen & Haselip, 2021)—Alianza Shire undertook the collection of detailed data on energy access and associated resources to evaluate its performance effectively. This data collection initiative was designed to inform and support the implementation strategies of the Alianza Shire project, ensuring that interventions were grounded in empirical evidence.

The data gathered through the survey was also utilized to align with key indicators identified in the report *Mapping Indicators for Humanitarian Energy Access and the Decarbonisation of Operations* (Bisaga, 2021). This framework underscores the critical importance of robust data collection for the design and optimization of humanitarian interventions. Although the surveys were originally tailored to meet the specific objectives of the Alianza Shire project rather than GPA indicator requirements, the data nonetheless allowed for the calculation of several key GPA indicators. These calculations were rigorously conducted as part of Antonio de la Peña Calleja's (2023) master's thesis.

For a comprehensive and nuanced analysis, *Sex and Age Disaggregated Data* (SADD) was applied, enabling the extraction of data differentiated by sex and age. This approach facilitated an in-depth understanding of power dynamics, gender

roles, access to resources, and the constraints affecting different demographic groups (Maruzana et al., 2013). The insights derived from this disaggregated data are invaluable for designing interventions that are both equitable and context-specific, addressing the unique challenges faced by various segments of the population. Through these efforts, the Alianza Shire project not only contributed to its immediate objectives but also advanced the broader agenda of enhancing humanitarian energy access through data-driven, evidence-based strategies.

OBJECTIVE AND RESULTS

The objective of this report is to present the findings on energy access and population profiles derived from surveys conducted in the Hilaweyn refugee camp and surrounding host communities as part of the Alianza Shire project. Additionally, the report shares the indicators for household lighting and cooking access developed in line with those proposed by the Global Platform for Action on Sustainable Energy in Displacement Settings (GPA) (Bisaga, 2021).

METHODOLOGY

This document presents an analysis of the socioeconomic survey designed by acciona.org and executed by Alianza Shire's implementing partner, ZOA. The survey engaged a total of 500 participants, consisting of 250 residents from the Hilaweyn Refugee Camp and 250 individuals from the surrounding host communities. Data collection took place between April and May 2022.

The gender distribution of the survey participants revealed significant disparities. On average, 79% of respondents were female and 21% were male. In the refugee camp, the distribution was even more pronounced, with 90% female and 10% male respondents. In the host communities, the gender distribution was comparatively balanced, with 68% female and 32% male respondents. It is important to note that children and youth under 18 years of age were excluded from the survey, resulting in a limitation of this study.

The average age of female respondents was 35,74 years, while male respondents averaged 41,46 years. Household sizes also differed between the refugee camp and the host communities. In the Hilaweyn Refugee Camp, households averaged 8,31 people, whereas households in the host communities averaged 6,77 people.

The survey² comprised a comprehensive set of 231 questions, organized into 14 distinct thematic clusters. These clusters were designed to capture a wide range of socioeconomic variables, providing a detailed understanding of the living conditions, energy access, and demographic characteristics of both refugee and host community populations.

- Basic data
- Location
- Interviewed people information
- Household information
- Habits and education
- Economic aspects
- Building materials
- Current energy use
- Lighting
- Electric appliances
- Level of satisfaction
- Energy for cooking
- Safety
- Final remarks

The data collection process involved conducting interviews with potential users and recording responses via smartphones. The gathered information was subsequently uploaded to the KoboToolbox platform, an open-source tool for data collection and management. This process resulted in the generation of a comprehensive Excel spreadsheet containing all survey questions and corresponding responses, which was then used for data analysis and processing.

During the data analysis phase, a few inconsistencies were identified in the collected data. These errors were rectified by ensuring coherence in the responses. For instance, in some cases, the total number of individuals reported in a household (categorized by males, females, male children, and female children) exceeded the stated household size. Additionally, discrepancies were found where the reported total household income did not align with the sum of incomes from various economic activities. Despite these challenges, the incidence of errors was minimal, affecting fewer than 3% of the interviews conducted.

Finally, leveraging the findings of Antonio de la Peña Calleja's master's thesis (2023), indicators of household electricity and cooking access proposed by the *Global Platform for Action on Sustainable Energy in Displacement Settings* (GPA) (Bisaga, 2021) were derived and calculated using the socioeconomic survey data. These indicators provide valuable insights into energy access conditions within the surveyed communities, supporting evidence-based interventions and strategies.

² If there is an interest in obtaining the complete survey, please send an e-mail to comunicacion.itd@upm.es

Results of the socioeconomic survey

This section presents the data obtained from the socioeconomic survey, categorized by the various thematic sections. The primary focus is on economic factors associated with household energy expenditures and access to energy resources.

The analysis highlights key insights into how households allocate financial resources toward energy services, such as electricity, cooking fuels, and other related expenditures. Additionally, the findings address the accessibility and reliability of household energy sources, offering a comprehensive view of the energy needs and challenges faced by both refugee camp inhabitants and host community members.

ECONOMIC ASPECTS

The primary income-generating activities in both the refugee camp and host communities are agriculture (54,4%) and small businesses (18,3%). A higher percentage of people in the refugee camp are engaged in agriculture compared to the host communities, while business ownership is slightly more prevalent in the host communities. Additionally, 50% of families in the refugee camp report a secondary income-generating activity, primarily in agriculture, whereas only 18% of families in the host communities report a secondary income activity, also mostly related to agriculture.

In terms of family roles, the primary income-generating activity is mostly carried out by fathers (63%), followed by mothers (33%). Notably, in the refugee camp, income generation is more evenly distributed between fathers (51%) and mothers (43%). In contrast, in the host communities, fathers are responsible for the main economic activity in 75% of the families.

TOTAL INCOMES AND EXPENSES

The average income in the host communities (7.055 ETB) is approximately double that of the refugee camp (3.442 ETB). This income disparity is mirrored by the differences in expenses, with host communities spending an average of 6.918 ETB compared to 3.481 ETB in the refugee camp. The distribution of these expenses is illustrated in Figure 1 for the refugee camp and Figure 2 for the host communities.

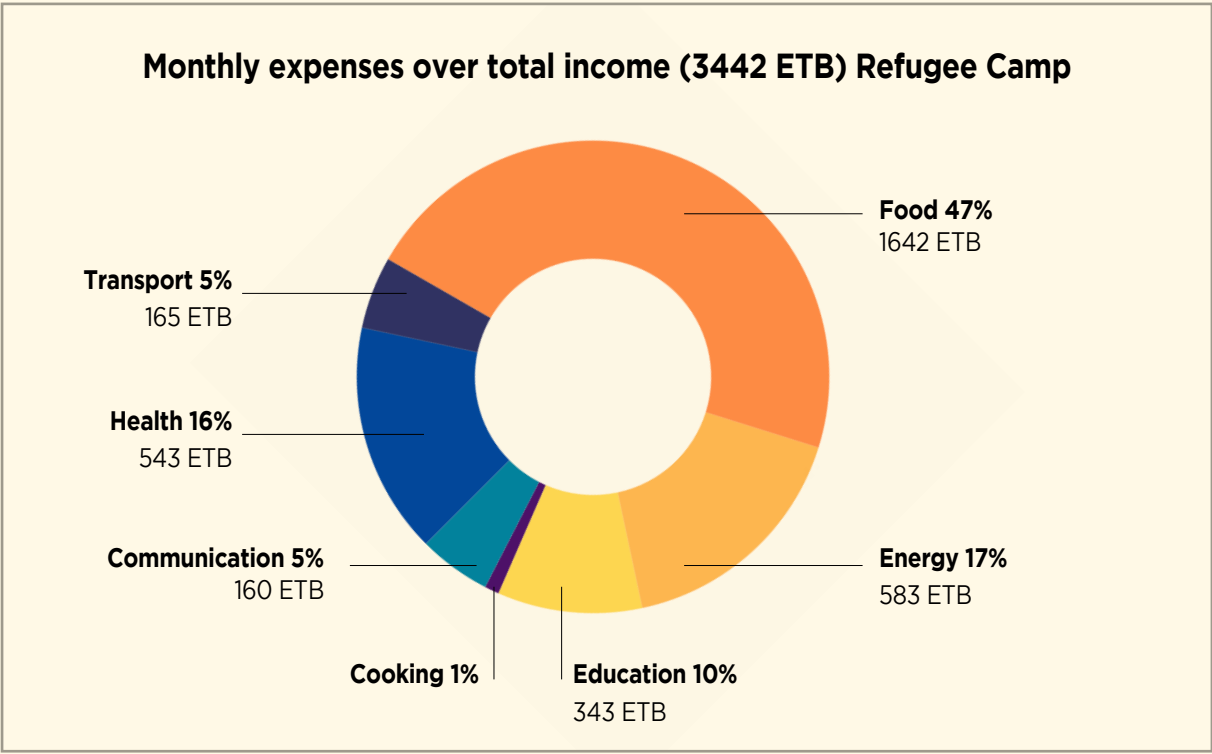


Figure 1: Refugees monthly expenses.

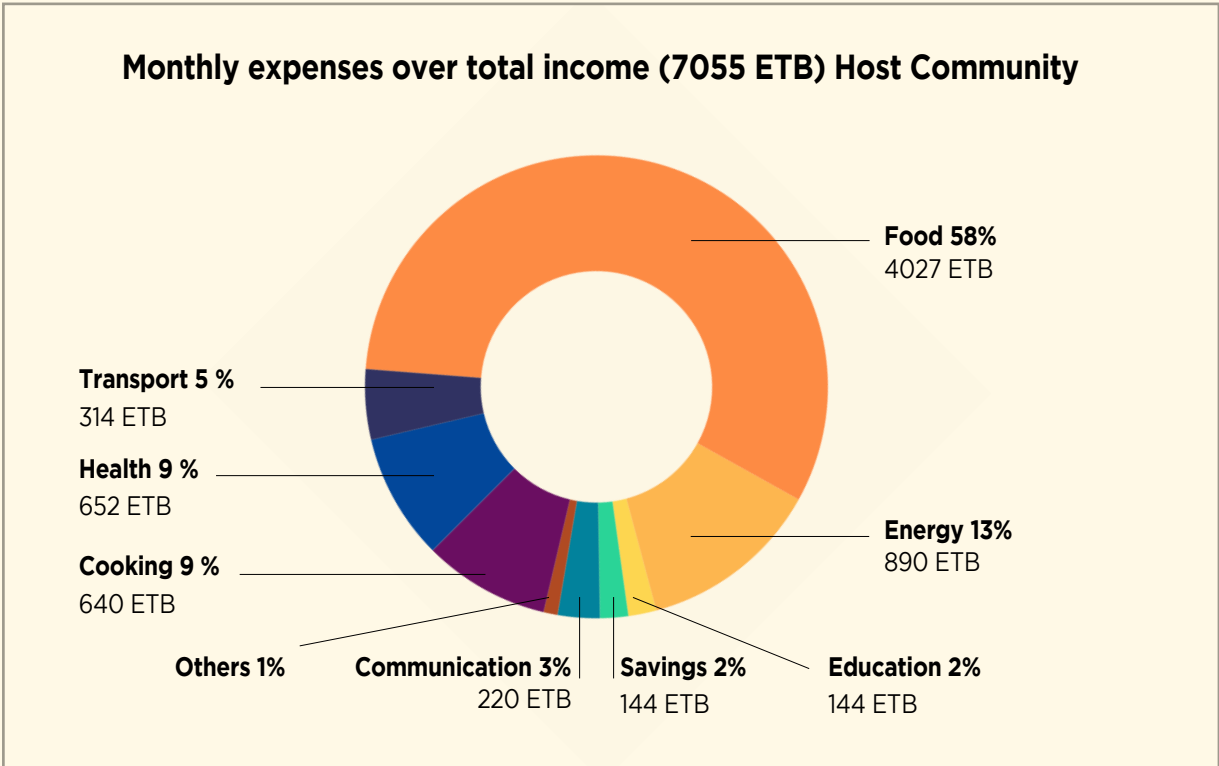


Figure 2: Host communities monthly expenses.

Households in the host communities allocate a larger portion of their income to food, spending 58% of their income compared to 47% in the refugee camp. Conversely, expenses for education and health are relatively lower in the host communities, accounting for 2% and 9% of income, respectively, compared to 10% and 16% in the

refugee camp. Energy expenses, which encompass the purchase of batteries, candles, and mobile phone charges, as well as fuel for cooking, constitute around 15% of the income in both the host communities and the refugee camp.

CURRENT ENERGY USE

HOUSEHOLD LIGHTING

Less than 0,8% of the surveyed households have access to electricity. Figure 3 below illustrates the energy sources used by households without electricity access. Among the 498 respondents, 418 reported using battery-operated torches as the main source of lighting in their homes. Additionally, 68 participants stated that they had no lighting source, 4 used candles, 4 relied on solar lanterns, 3 used phone lanterns, and 1 household employed both a solar lantern and a battery-powered torch.

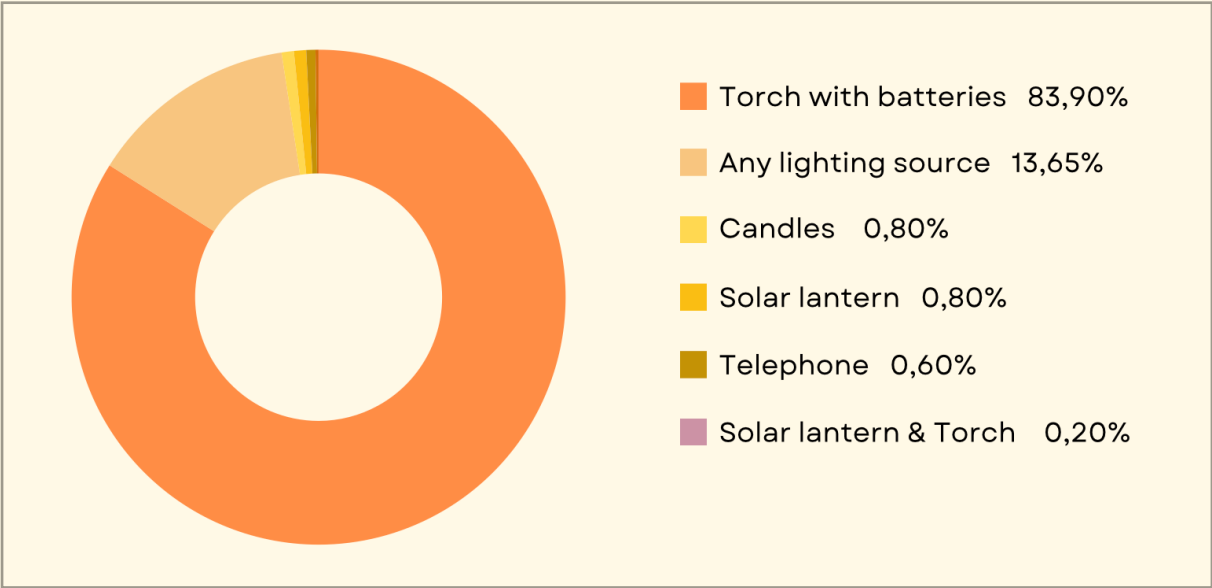


Figure 3: Sources of energy used for household lighting.

On average, each household possesses 7 battery-operated torches, 1,2 solar lanterns, and 2,5 candles. The majority of solar lanterns are distributed as donations. These solar lanterns are charged an average of 5,6 times per week.

Table 1 presents the economic data related to the costs of batteries and candles, disaggregated by refugee camp and host communities. In the refugee camp, there are more battery-operated torches (234) compared to the host communities (188). However, the host communities purchase more batteries per month, resulting in a higher expenditure.

	TORCH WITH BATTERIES			CANDLES		
	Number of batteries/month	Battery cost (ETB/unit)	Total expenses	Number of candle/month	Candle cost (ETB/unit)	Total expenses
REFUGEE CAMP	19,5	10,48	182,16	0,08	10	0,8
HOST COMMUNITIES	29,66	10,56	267,67	0,08	7,5	1,4

Table 1: Counting and expenditure of batteries and candles in the refugee camp and host communities.

Table 2 outlines the number of cell phones and the associated charging costs, broken down by refugee camp and host communities. Most of these cell phones are charged at local markets.

	Average number of cell phones in the shelter/house	Average number of charges per week for each cell phone	Average price for each charge (ETB)	Average total monthly expenditure (ETB)
REFUGEE CAMP	2,3	3,55	9,8	341,55
HOST COMMUNITIES	2,96	4,29	9,8	557,25

Table 2: Number of cell phones and average spending on cell phone recharges in the refugee camp and host communities.

In addition to mobile phones, households also report using other energy-dependent devices, such as radios, fans, and televisions, as detailed in Table 3.

DEVICES AT THE HOUSEHOLD THAT NEED ENERGY	
RADIO	141
FAN	47
TV	3
REFRIGERATOR	3
LAPTOP	1

Table 3: Number of devices at the household that need energy.

The monthly expenditure on these devices is an average of 59,04 ETB in the refugee camp and 63,62 ETB in the host communities. These figures represent a significant portion of household income, amounting to 17% of the total income in the refugee camp and 13% in the host communities.

The energy used for these devices primarily comes from three sources: 70,3% of the devices rely on batteries, 21% are powered by diesel generators or solar grids, and 8,7% are charged through solar off-grid systems.

A considerable 95% of students use battery-operated torches for studying, with male children dedicating an average of 1,6 hours per day and female children 1,74 hours. When asked whether the current lighting meets educational needs, 95,2% of respondents in the refugee camp and 99,6% in the host communities indicated that it does not, citing insufficient lighting as the primary issue. Furthermore, 98,8% of individuals expressed dissatisfaction with the existing energy sources for educational purposes, primarily due to the lack of lighting or its inadequate quality.

This data highlights the significant energy-related challenges faced by households, particularly in terms of access to reliable and sufficient lighting for both daily tasks and educational activities.

ENERGY ACCESS FOR COOKING

The survey results reveal clear gender inequalities in cooking responsibilities between men and women, with women and daughters predominantly taking on the cooking tasks. In the refugee camp, 91,6% of cooking duties are handled by women and daughters, while in the host communities, the figure rises to 97,6%. These figures underscore the gendered division of labor, where cooking is overwhelmingly a female-dominated task.

Table 4 (for the refugee camp) and Table 5 (for host communities) further break down these results, showing the specific roles and distribution of cooking responsibilities between men and women. These findings are consistent with broader trends in many displacement contexts, where women are not only responsible for domestic chores like cooking but also face higher energy burdens due to the reliance on inefficient cooking methods such as firewood (UNHCR, 2021; FAO, 2020).

Responsible for cooking in the shelter/house in the Refugee Camp	Number of persons	% of persons
MOTHER	136	54,4%
MOTHER & DAUGHTER	91	36,4%
FATHER	18	7,2%
DAUGHTER	2	0,8%
TOTAL	608	100%

Table 4: Person in charge of cooking in the household in the refugee camp.

Responsible for cooking in the shelter/house in the Host Communities	Number of persons	% of persons
MOTHER	201	80,4%
DAUGHTER	27	10,8%
MOTHER & DAUGHTER	6	6,4%
FATHER	3	1,2%
TOTAL	608	100%

Table 5: Person in charge of cooking in the household in the host communities.

In households within the refugee camps and host communities, cooking is primarily fueled by firewood and charcoal, as they lack access to clean and modern energy solutions. The use of these fuels is detailed in Table 6, which shows the percentages of respondents using each type of fuel. A significant number of households report using both firewood and charcoal for cooking, reflecting the limited energy options available to them.

Energy sources often used for cooking	Number of shelters	% of shelters
FIREWOOD	428	76,29%
CHARCOAL	133	23,71%
TOTAL	561	100%

Table 6: Most commonly used fuels for cooking.

Interestingly, the monthly expenditure on firewood and charcoal is minimal, particularly in the refugee camp, where most households gather firewood themselves, typically from the surrounding bush. This self-sourcing results in negligible financial costs. However, in host communities, the situation is different, with households spending an average of 639,71 ETB per month to purchase fuel, while refugee camp residents spend only 45,92 ETB per month on fuel for cooking. This expenditure disparity is indicative of the varying access to natural resources between the two communities. The collection of firewood is largely a time-consuming task, with respondents dedicating an average of 242 minutes (around 4 hours) per week to gathering it. In many cases, this responsibility falls on women and children, further highlighting the gendered nature of energy access. Table 7 provides more specific data on who is responsible for this collection within households.

Responsible of collecting firewood in the shelter/house	Number of persons	% of persons
MOTHER	45	67,18%
SON	17	25%
DAUGHTER	4	5,88%
FATHER	2	2,94%
TOTAL	68	100%

Table 7: Person in charge of collecting firewood in the household.

Another critical issue is the high level of smoke produced during cooking, with nearly 100% of respondents reporting smoke inside their homes during these activities. This smoke, primarily generated from the use of traditional biomass fuels such as firewood and charcoal, poses significant health risks. According to the World Health Organization (WHO), household air pollution from burning solid fuels is linked to severe respiratory illnesses, eye irritation, cardiovascular diseases, and even cancer (WHO, 2022).

The project team gathered information on the incidence of respiratory and eye issues within households. While only 7,94% of respondents reported experiencing respiratory or eye issues, this figure might not fully reflect the actual health impact of traditional cooking methods, especially considering the widespread use of firewood and charcoal.

The low perception of health problems contrasts with scientific evidence, which consistently highlights the dangers of household air pollution caused by solid fuel combustion. Many respondents may not link their respiratory or eye discomfort directly to smoke exposure, leading to underreporting. Moreover, health issues related to air pollution often develop gradually, making it harder for individuals to recognize the cause and frequent exposure to smoke may lead to the normalization of symptoms, resulting in a reduced perception of the problem. A lack of access to healthcare services may prevent proper diagnosis of these conditions. Given the significant gap between the reported perception and established scientific evidence, more in-depth research is needed to understand the true extent of these health issues.

The project team also collected data on the incidence of respiratory and eye diseases associated with cooking, revealing that almost all reported cases were experienced by women and children, particularly daughters (66,67% of cases). A significant portion of the cases (15,87%) was linked to the smoke generated by firewood and charcoal use. Furthermore, the survey also inquired about recent cooking accidents, providing additional insight into the safety risks posed by current cooking practices. These findings reinforce the need for clean cooking solutions to improve health and safety outcomes

in these communities, which is consistent with global studies showing the harmful effects of biomass cooking on health (World Health Organization, 2016).

ACCIDENT WHILE COOKING IN THE LAST MONTHS IN EACH SHELTER/HOUSE	
Yes	3,08%
No	96,92%

Table 8: Incidence of accidents in the kitchen.

SECURITY AND SAFETY

The responses gathered from the survey on security reveal notable concerns regarding safety both inside and outside the households in the refugee camps and host communities. A total of 200 participants responded to questions about security outside their shelters, with 81,5% of them being women, while 259 participants, 76,8% of whom were women, answered questions about security inside their shelters.

When asked about security outside their shelters, the majority of respondents expressed concerns. Approximately 36% of participants felt somewhat safe, while 30,5% felt quite safe, and 22% felt somewhat unsafe when walking in their localities at night. A significant 88,5% of respondents highlighted that they did not feel safe at night in their communities due to a lack of lighting, which creates uncertainty about potential risks and threats.

On the other hand, when participants were asked about the security inside their shelters, the responses were even more concerning. A substantial 49,8% reported feeling quite unsafe inside their shelters, primarily due to inadequate lighting. In fact, 52,7% of these respondents mentioned the lack of lighting as the reason for their insecurity. Only 11,6% of respondents felt somewhat safe inside their shelters, suggesting a widespread issue with safety and security within the living spaces in both refugee camps and host communities.

Indicators

Thanks to the information collected in the socioeconomic survey and the master's thesis of Antonio de la Peña Calleja (2023), it was possible to calculate certain GPA indicators from the Mapping Indicators for Humanitarian *Energy Access and the Decarbonisation of Operations* document (Bisaga, 2021). These indicators include those related to **Energy for Household Electricity** and **Household Cooking**, covering both Core Indicators and those specific to **Global Data Needs** and **Project Data Needs**.

Out of the 108 indicators disaggregated by gender, the following were calculated:

- **100% of the Core Indicators**
- **100% of the Global Data Needs**
- **83% of the Project Data Needs**
- **40% of the Indicator/Data Points**

The specific indicators were calculated for the refugee camp, focusing on the 250 surveys conducted. To ensure gender disaggregation, only households led by men or women were considered, excluding those with shared leadership. This resulted in 116 households led by women and 100 households led by men being included in the calculation.

The complete list of the 36 indicators calculated is included in **Annex I** of the report. These findings provide valuable insights into energy access disparities within the refugee camp and host communities, offering a basis for future interventions to improve energy access and related services.

The information collected from the surveys was used to calculate the Average Household Monthly Spend on Electricity. Antonio de la Peña Calleja (2023) derived this indicator using the following formula:

$$\frac{(\text{batt week} \times \text{batt price} \times 4,33) + (\text{No. phones} \times \text{charge week} \times \text{charge price} \times 4,33) + \text{other}}{\text{Exchange rate}}$$

- **Batt Week** refers to the number of batteries used per week.
- **Batt Price** is the price per battery.
- **No. phones** represents the number of mobile phones in the household.

- **Charge week** is the number of phone charges per week.
- **Charge price** is the price per phone charge.
- **Other** includes other monthly electricity-related expenses (such as powering small devices like radios or fans).
- **The exchange rate** applied is 1 USD = 51.01 ETB (as of 01/04/2022).

By calculating each of these factors, the average monthly household expenditure on electricity can be determined, providing a clearer understanding of the financial burden related to energy consumption in these households. This calculation is vital for assessing energy access and planning interventions to reduce costs in refugee camps and host communities.

The results of this calculation are part of the broader effort to evaluate energy needs and expenditures in the context of refugee camps, contributing to more informed, data-driven decisions for energy provision and humanitarian aid.

Gender-disaggregated data for the **Key Indicators** related to **Global Data Needs** and **Project Data Needs** for household electricity access, is derived from the surveys conducted in the refugee camp, offering a detailed breakdown of energy consumption behaviors and expenditures, differentiated by gender.

This information reveals any disparities in energy access and use between men and women, which is critical for understanding how energy provision impacts different members of the household, particularly in refugee settings where women often bear the responsibility for household management and energy-related tasks.

Gender-disaggregated data for the calculated **Key Indicators** related to **Global Data Needs** and **Project Data Needs** for household cooking, presents insights into the energy consumption patterns for cooking, highlighting how different gender groups (male and female-headed households) use cooking fuels and the associated costs.

Conclusions

Data collection, especially disaggregated data, is critical for establishing baselines, designing interventions, and conducting monitoring and impact assessments in humanitarian contexts (Peña Calleja, 2023). While organizations like the UNHCR provide valuable information about refugees and forcibly displaced populations, there is a significant data gap specifically regarding access to energy in these contexts. As identified by the GPA, this lack of data presents a challenge to the humanitarian sector (Rosenberg-Jansen & Haselip, 2021). To address this, the GPA encourages stakeholders to collect specific data and develop indicators. This report contributes to filling that gap by making the information gathered in this particular case accessible to the humanitarian community.

Working with data in such settings presents several challenges, including both the collection process and the subsequent analysis of the data in a disaggregated form. The lack of standardized methodologies for these types of data collection complicates the process. The decision to calculate the GPA indicators was made after finalizing the survey design and data collection, which meant some indicators were either difficult to calculate or could not be calculated at all. This highlights the importance of designing surveys with the analysis and standardization of collected data in mind, ensuring that future data collection efforts are more streamlined and effective (Peña Calleja, 2023).

The results of the survey on energy access in refugee camps and host communities reveal significant gender inequalities and challenges in energy access. Despite a high number of female-headed households and a majority of women being interviewed, the statistics highlight the prominence of male roles in key areas such as income management, access to education, and cooking. For instance, 63% of households report that the father is the main income generator, while 35% of children who have higher education are typically male, followed by 29% who are fathers. Additionally, cooking responsibilities are largely attributed to women, but a small percentage of fathers are involved in this task, particularly in the refugee camp.

Energy expenditures are substantial, with households spending approximately 15% of their income on energy services, including phone charging, batteries, and candles. The average monthly energy expenses are \$11,33 in the refugee camp and \$17,33 in

the host communities³. However, access to lighting remains insufficient, especially for students, with 95% of children relying on battery-powered torches for study, which do not meet their lighting needs. Male children study an average of 1,6 hours per day, while female children study 1,74 hours.

Regarding cooking fuels, women are primarily responsible for cooking, and most households rely on firewood, which incurs a low financial cost but contributes to significant health risks. The average monthly expenditure on firewood is \$0,89 in the refugee camp and \$12,43 in the host communities. In addition to the economic burden, firewood collection takes up significant time, with mothers spending an average of 4 hours per week gathering fuel. This is compounded by the health risks associated with using traditional cooking fuels, with 7,94% of respondents reporting respiratory issues and 15,87% linking these health problems to smoke exposure from cooking. The results underscore the importance of transitioning to more efficient and cleaner cooking technologies to reduce respiratory diseases and improve overall quality of life in refugee camps and host communities (UNHCR, 2020).

The security situation in both refugee camps and host communities is concerning, with respondents feeling unsafe due to the lack of lighting in public spaces and within their shelters. 88.5% of respondents in the refugee camp feel unsafe at night, citing inadequate lighting as a primary concern. Similarly, 52.7% of individuals feel unsafe inside their homes due to a lack of lighting, indicating a need for improved lighting solutions to enhance safety and security.

These findings underscore the need for targeted interventions that address the specific energy access and security needs of both women and men. Solutions should aim to reduce the health impacts of cooking with traditional fuels and improve safety through reliable lighting systems. Gender-sensitive approaches, ensuring that both men and women benefit equally from energy access initiatives, are essential for promoting equitable development in refugee and host communities (UNHCR, 2020; Practical Action, 2023).

³ The exchange rate between ETB and dollar taken into account is that of April 15, 2022.

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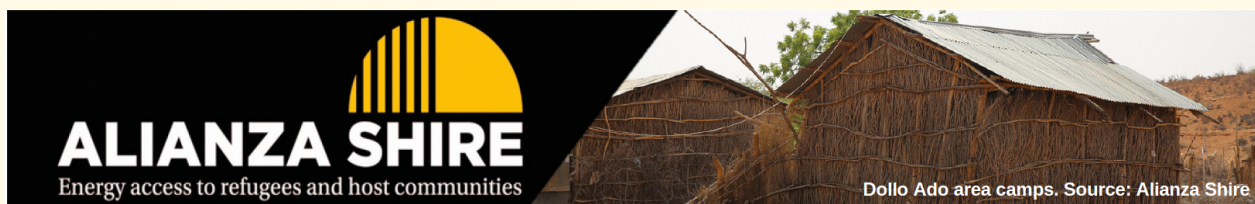
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Annexs



HILAWEYN REFUGEE CAMP - HOUSEHOLD ELECTRICITY INDICATOR

CORE INDICATORS

Energy Needs Location	Key indicator for Access to Energy (Global Baseline)	Key indicator for Intervention Assessment (Project Development)	Key indicator for Reducing Inequality and Emissions (Leave No-One Behind)
HOUSEHOLD ELECTRICITY 	Proportion of Persons of Concern (PoC) population with access to electricity (on or off-grid) (Access %) ¹	Type of electricity in households with access (grid, mini-grid, SHS, solar lantern, standalone diesel, shared diesel, other) (Technology %) ²	Average household monthly spend on electricity (Spend \$) ³
	2,40% Women 1,72 % Men 0,00%	Shared diesel generator: 33% SHS: 17% Solar lantern: 50%	\$ 11,57 Women S 11,05 Men S 12,61
HOUSEHOLD COOKING 	Proportion of PoC population with primary reliance on clean fuels and technology for cooking (Access %)	Type of primary cooking fuel (firewood, animal dung, charcoal, LPG, biogas, other) (Technology %)	Average monthly spends on cooking fuels and cooking technologies (Spend \$) ⁴
	0% Women 0 % Men 0 %	Firewood: 85,94% Charcoal: 26,71%	\$ 0,90 Women \$ 0,62 Men \$ 0,25

KEY INDICATOR(S) FOR GLOBAL DATA NEEDS

Key Indicator (s) for Global Data Needs	
Proportion of PoC population with access to electricity (on or off-grid) (Access %)	Renewable energy share in total final PoC energy consumption
2,40% Women 0 % Men 0%	67%

KEY INDICATOR(S) FOR PROJECT DATA NEEDS

Key Indicator (s) for Project Data Needs		
Type of electricity in households with access (grid, mini-grid, SHS, solar lantern, standalone diesel, shared diesel, other) (Technology %)	Average household monthly spend on electricity (Spend \$)	Proportion of average household monthly spend on electricity (% of total spend)
Solar Lantern: 50 % Diesel generator: 33 % SHS: 17 %	\$ 11,57 Women: \$ 11,05 Men: \$ 12,61	16,92% Women: 18,29% Men: 15,49%

KEY INDICATOR(S) FOR PROJECT DATA NEEDS

Indicator / Data point	Metric / classification			
ELECTRICITY USES	TOTAL	Women	Men	
1. Host population households (within 20km) with access to electricity (on or off-grid) ⁵	Access (%)	1,20%	1,11%	0,77%
2. Access to household electricity supply (Tier 0, 1,2 ,3 ,4 or 5)	Tiers (%)	Tier 0: 97,6% Tier 1: 1,2% Tier 2: 0,4% Unknown:0,8%		
3. % of households with access to a renewable source of electricity ⁶	Renewable electricity source (%)	1,60%	0,86%	0,00%
4. What is the capacity of primary electricity source in households with access? (maximum capacity)	Capacity (W)	70W (SHS), diesel generator ¿?		
5. Accidents caused by the electricity supply in the household in the last 12 months	Accidents (Yes/No and number)	Yes, 70 (estimation from 2 accidents in 6 months among 250 shelters)		
6. Hours of electricity (per 24hrs) in households with access	Number (hours)	1 to 7		
7. Hours of electricity available at night	Number (hours)	1 to 5		
8. Average total duration of all electricity outages or blackouts (over 24hrs) [where applicable]	Number (hours)			
9. What is the main method of households to access electricity? (distribution, buy at a market buy from a private supplier etc.)	Access (method)	Buy at a market		
10. Availability of grid-alternative electricity solutions in the location (Yes/No and details)	Availability	No		
11. Does the current level of electricity provision meet all the electricityrelated needs? (Yes, all/Yes, most/No, only few)	Needs	No		
12. Electricity-dependent appliances used [list all] (e.g. radio, fan, TV, computer/laptop, iron, hair clipper, fridge, etc.)	Appliances (current)	Radio, Fan, TV		

Indicator / Data point	Metric / classification			
ELECTRICITY USES	TOTAL	Women	Men	
13. Power consumption of each appliance (in Watts) [list all functioning appliances]	Power consumption (Watt)	Radio (10W) Fan (50W), TV (100W)		
14. Electricity-dependent appliances not currently used but wanted in the future [list all] (e.g. radio, fan, TV, computer/laptop, iron, hair clipper, fridge, etc.)	Appliances (future)	Radio, Fan, TV, Laptop, Fridge		
15. Electricity use per capita [in electrified population]	kWh/capita			
16. Electricity use per household [in electrified households]	kWh/household			
17. Primary source of lighting (grid, mini-grid, SHS, solar lantern, battery, torch, candle, kerosene lantern, firewood, standalone diesel, shared diesel, other)	Technology (%)	Torch with batteries: 94% Rechargeable torch: 1,2% Candels: 0,8% None: 4% Other: 2,4%		
18. Number of households with access to distributed lighting-only or multipurpose electricity products (e.g. solar lanterns, SHSs or similar)	Number (of households) Or % of households with distributed products	1,20%	0,40%	0,00%
19. Expected lifespan of the distributed lighting-only or multi purpose electricity product	Lifespan (years)			
20. Average monthly household spend on lighting ⁷	Spend (\$)	\$4,11	\$3,58	\$4,89
21. Proportion of average household monthly spend on lighting (% of total spend)	% of total spend	6,09%	5,93%	6,01%
22. [if purchased up front] Total cost of the primary lighting source (if a handout then 0)	Price (\$)			
23. [if purchased up front] Total cost of the primary electricity source (if a handout then 0)	Price (\$)			
24. Unit price paid for electricity (\$) per kWh [where applicable]	Unit price (\$/kWh)	—	—	—
25. Price paid for litre of fuel (\$) (diesel, petrol, other) for electricity generation [where applicable]	Unit price (\$)			
26. Method of payment for electricity (e.g. mobile money (MoMo), vouchers, cash, do not pay, other)	Method (payment)	Cash		

Source: Alianza Shire April 2022

Indicator / Data point	Metric / classification			
ELECTRICITY USES	TOTAL	Women	Men	
27. Availability of repair services for primary electricity solution, community capacity or SME businesses offering repair services?	Repair options (Qualitative answer)	Existing energy cooperatives and electronic business with enough technical skills to maintain and repair electric and electronic devices.		
28. What are the positive impacts of access to electricity?	(Positive) impact. Qualitative answer / List (e.g. less indoor smoke, less eye irritation, fewer respiratory problems, ease of doing things/chores, improved work/study environment, improved feeling of safety, etc.)	Improve safety feeling as well as allows to work longer periods (no need to close the business or finish the daily labour before down. Also lightning improve the quality time for studying at home.		
29. What are the negative impacts of lack of access to electricity?	“(Negative) impact Qualitative answer / List (e.g. indoor smoke, eye irritation, respiratory problems, difficulty in performing chores, harmful work/study environment, feeling of lack of safety, etc.)”	Most reported negative impact is the fear generated by the lack of lightning. People feel afraid to walk around during the night and also feel unsafe at the shelter due to the darkness. Other negative impacts reported are attacks and assaults, animal bites (mostly snakes) and thieves.		
30. % of individuals of households reporting feeling safe at night as a result of lighting	Households (%)	52,76%	75,71%	28,13%
31. Population with access to information technology (% radio, % TV, % internet)	Access (%)	Radio: 34,8% TV: 0,4%		
32. Population with access to mobile phone	Access (%)	98,80%	98,28%	99,00%
33. Type of mobile phone in population with access to mobile phone (cell, feature, smartphone)	Technology (%)			

Source: Alianza Shire April 2022

Indicator / Data point	Metric / classification			
ELECTRICITY USES	TOTAL	Women	Men	
34. Average weekly number of mobile phone charges (per phone) in population with access	Charging (frequency)	3,60	3,59	3,48
35. Average weekly spends on mobile phone charging per person in population with access ⁸	Spend (\$)	\$0,19	\$0,18	\$0,19
36. Average weekly spend on mobile phone credit (airtime) per person in population with access ⁹	Spend (\$)	\$0,38	\$0,29	\$0,43
37. Population with access to mobile money (MoMo) [where relevant]	Access (%)	5,60%	4,31%	8,00%
38. Population with access to other financial services (e.g. MFIs, savings groups, etc.)	Access (%)	2,4%	3,45%	1,00%
39. What do households think about electricity access, why is it important to them?	Qualitative answer			
40. What types of solutions and electricity methods do households suggest?	Qualitative answer	Street-lightning, mini-grid and SHS		
41. CO2 emissions per household [in electrified and unelectrified households]	Emissions (t/ household)			

Source: Alianza Shire April 2022

AVAILABLE DATA

General considerations: The solution selected to achieve at least a certain degree of data disaggregation was to divide the shelters led by women and men, using the question “Which is the family role of the person who manages the incomes of the shelter/house”. The possible answers to this question were: Mother, Father, Daughter, Son, Other, or any combination of them. To better capture who leads the shelter, for gender disaggregation only the data of those who exclusively answered ‘Mother’ or ‘Father’ were considered. For general values all available data were used (250), for disaggregated indicators the data shown below.

AVAILABLE DATA	
Women	Men
116	100

NOTES

1. Proportion of Persons of Concern (PoC) population with access to electricity (on or off-grid) (Access %): Directly measure from answers to question “Which electricity source do you have in your shelter/house?” plus the people reporting to be owners of Solar Solutions as lighting source in question “Please select which lighting source(s) do you use?”.
2. Type of electricity in households with access (grid, mini-grid, SHS, solar lantern, standalone diesel, shared diesel, other) (Technology %): May not be representative numbers since only 6 households reported electricity access among 250 surveys.
3. Average household monthly spend on electricity (Spend \$): This indicator has been calculated as:

$$\frac{(\text{batt week} \times \text{batt price} \times 4,33) + (\text{No. phones} \times \text{charge week} \times \text{charge price} \times 4,33) + \text{other}}{\text{Exchange rate}}$$

bat week: Number of batteries purchased per week.

No. phones: Number of phones per shelter.

charge week: Number of charger per week per phone.

charge price: Price per one phone charge.

other: Other electricity monthly expenses reported.

Exchange rate: 1USD=51,01ETB (01/04/2022)

Weekly values multiplied by 4.33 since they are the average weeks per month.

4. Proportion of average household monthly spend on electricity (% of total spend): Average total spend 68,39\$/month; 60,42\$/month (Female led shelter), 81,40\$/month (male led shelter).
5. Host population households (within 20km) with access to electricity (on or off-grid) (Access %): Directly measure from answers to question “Which electricity source do you have in your shelter/house?” plus the people reporting to be owners of Solar Solutions as lighting source in question “Please select which lighting source(s) do you use?”.
6. % of households with access to a renewable source of electricity: 3 Solar lanterns and 1 SHS.
7. Average monthly household spend on lighting: As 94% of the population report torch with batteries as lighting source, the price paid for lighting has been simplified to the price paid per batteries/month. This simplification neglects the population without access and price paid per lighting through other technologies and does not consider that the batteries may be used for other purposes as radios or small devices.
8. Average weekly spends on mobile phone charging per person in population with access: 8,3 people per shelter considered in this calculation.
9. Average weekly spend on mobile phone credit (airtime) per person in population with access: 8,3 people per shelter considered in this calculation.

References: This indicators are the ones proposed by the Global Platform for Action (GPA) at their document *Mapping Indicators for Humanitarian Energy Access and the Decarbonisation of Operations*:

BISAGA, I. and ROSENBERG-JANSEN, S. (2021) *Mapping Indicators for Humanitarian Energy Access and the Decarbonisation of Operations*. GPA Working Paper 2021. UNITAR, Geneva Switzerland.

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