



BASELINE SURVEY **REPORT**

MAY 2025

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ABBREVIATIONS

ANDE	Aspen Network of Development Entrepreneurs
EBAFOSA	East African Briquette and Fuelwood Suppliers Association
FLDL	Focus for Life Development Link
GKMA	Greater Kampala Metropolitan area
ICRW	International Center for Research on Women
IDI	In-Depth Interview
IRENA	International Renewable Energy Agency
IWMI	International Water Management Institute
KII	Key Informant Interview
NAWAD	National Association of Women's Action in Development
NGO	Non-Governmental Organization
STATA	Statistics and Data Analysis Software
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar



EXECUTIVE SUMMARY

This baseline report presents findings from a study conducted under the project titled: “Enhancing Women’s Involvement in Briquette Production and Marketing as an Alternative Clean Energy Source to Charcoal and Firewood in Uganda,” implemented by the National Association of Women’s Action in Development (NAWAD) with support from the Aspen Network of Development Entrepreneurs (ANDE). The project aims to improve women’s participation in clean energy through gender-inclusive briquette infrastructure and support systems.

The baseline survey, conducted in Greater Kampala Metropolitan Area (GKMA), focused on assessing women’s involvement in the briquette value chain—specifically in production, marketing, management, and decision-making. Using a mixed methods approach (quantitative and qualitative methods of data collection, a total of 51 respondents participated in the interviews, including enterprise owners, employees, and consumers.

KEY FINDINGS

The findings indicate that while women are engaged in briquette production, their participation remains constrained by several structural and socio-cultural barriers. Most women are involved in roles such as sorting, drying, and packaging, whereas men dominate in physically demanding tasks like mixing and operating manual machinery. Marketing and administrative roles are also male-dominated, although some women participate in customer engagement and enterprise management.

Access to appropriate technology remains a major barrier to women’s full participation. The heavy reliance on manual machines excludes many women from core production activities due to the physical energy required. Other barriers include limited access to capital, lack of training, poor marketing skills, and socio-cultural norms that restrict women’s mobility and decision-making authority.

Despite these challenges, the survey also revealed opportunities. There is strong community support for women’s involvement in clean energy, and many women have demonstrated resilience by taking on leadership roles, innovating marketing approaches, and serving as trainers within their enterprises. Enterprises with gender-sensitive infrastructure and support structures showed higher levels of female participation.

Based on the findings, there is need to scale up targeted interventions such as the deployment of mechanized and user-friendly briquette machinery, conduct gender-sensitive training programs, improve access to finance, and strengthen of support systems for women entrepreneurs. Additionally, the study reveals the need to promote women’s leadership in briquette enterprises as key to enhancing inclusive participation and empowerment of women economically.

Finally, this baseline establishes a foundation for monitoring progress throughout the project and provides valuable insights into how clean energy transition can be designed to be more inclusive, equitable, and sustainable.



1.0 INTRODUCTION

1.1 BACKGROUND

With support from the Aspen Network of Development Entrepreneurs (ANDE), a program at the Aspen Institute, the National Association for Women's Action in Development (NAWAD) is implementing a project on: "Enhancing women's involvement in briquette production and marketing as an alternative clean energy source to charcoal and firewood in Uganda." The 18 months research project started in October 2024 and run up to January 2026. The overarching goal of this research is to improve women's participation in clean energy production and marketing through the deployment of gender-inclusive briquette infrastructure and innovative support systems to increase availability and access to briquettes for cooking. This is very critical for Uganda's clean energy transition since the current briquette technology is largely labour intensive; a disadvantage to female gender, who as a result are denied an opportunity to fully participate in the briquette value chain. This situation undermines women's potential to contribute to socio-economic development through sustainable energy initiatives and hinders Uganda's progress toward a national clean energy transition. According to Clancy et al. (2012), women play a crucial role in influencing household energy choices and hence adoption and effective use of clean energy solutions.

This research addresses the question: "How can women's involvement in the briquette value chain be harnessed to reduce gender bias and increase their participation and pay in the sector?" It is anticipated that the deployment of gender-inclusive briquette infrastructure in both men and women-owned enterprises promotes equal opportunities for all and could be pivotal in answering this question. The labour-intensive characteristic of the current briquette technology in Uganda is a real bottleneck to women's involvement in large-scale production.

The main objectives of the project are;



1. Assess women's involvement in the briquette value chain.
2. Characterize potential alternative raw materials to charcoal dust with intent to recommend the most potential alternatives for briquette production.
3. Promote women's participation in briquette production through fabrication and deployment of gender-inclusive briquette infrastructure.
4. Strengthen capacity of briquette enterprises on the use of gender inclusive machinery and marketing of briquettes for increased competitiveness.

1.2 THE CONTEXT

Globally, women make up approximately 32% of the renewable energy workforce, with higher representation in administrative roles compared to technical and leadership positions (International Renewable Energy Agency, 2019). According to Aranda et al. (2023), women are underrepresented in the production of clean energy due to barriers associated with lack of access to finance, technical skills, and restrictive socio-cultural norms. Programs such as Solar Sister in sub-Saharan Africa have demonstrated the transformative power of empowering women as clean energy entrepreneurs. Through training and micro-financing, women become agents of energy access in their communities (ENERGIA, 2019). In Kenya and Bangladesh, clean energy enterprises that employed women in marketing roles achieved higher sales and better consumer feedback compared to those with male-only marketing teams (Practical-Action, 2018). Women also play a crucial role in influencing household energy choices and decisions and their understanding of household needs positions them uniquely to influence the adoption and effective use of clean energy solutions (Clancy et al., 2012).

1.3 THE BASELINE SURVEY

To address the project objectives, a baseline survey was conducted, primarily to meet the first objective: to provide information on the status of women's involvement in the briquette value chain and capacity gaps. The baseline survey was conducted in the Greater Kampala Metropolitan area (GKMA), including Kampala, Wakiso, Mpigi, and Mukono districts, to generate essential data to guide the selection of four (4) enterprises (3 women-owned and 1 male-owned) to participate in project implementation.

This report provides the findings of the baseline survey with data on the socio-demographics of the respondents, gender and briquette production, perceptions about women's involvement in briquette production, gender and participation in briquette marketing and distribution, availability and use of briquettes for cooking, management and administrative roles, and the business environment and support for women's empowerment. The report also provides the approach and methodology used for the baseline survey, as highlighted in section 2 below.

2.0 APPROACH AND METHODOLOGY

To assess women's participation in briquette production and marketing in Uganda, the baseline survey utilized both secondary and primary sources of data through comprehensive desk research and participatory research approaches using mixed methods. The baseline was informed by a mapping exercise that facilitated the identification of briquette enterprises in the study site. Below is an overview of the conceptual framework that guided the baseline survey process.

2.1 OVERVIEW OF THE APPROACH FOR THE BASELINE SURVEY

The baseline survey process involved four phases as illustrated in Figure 1 below:

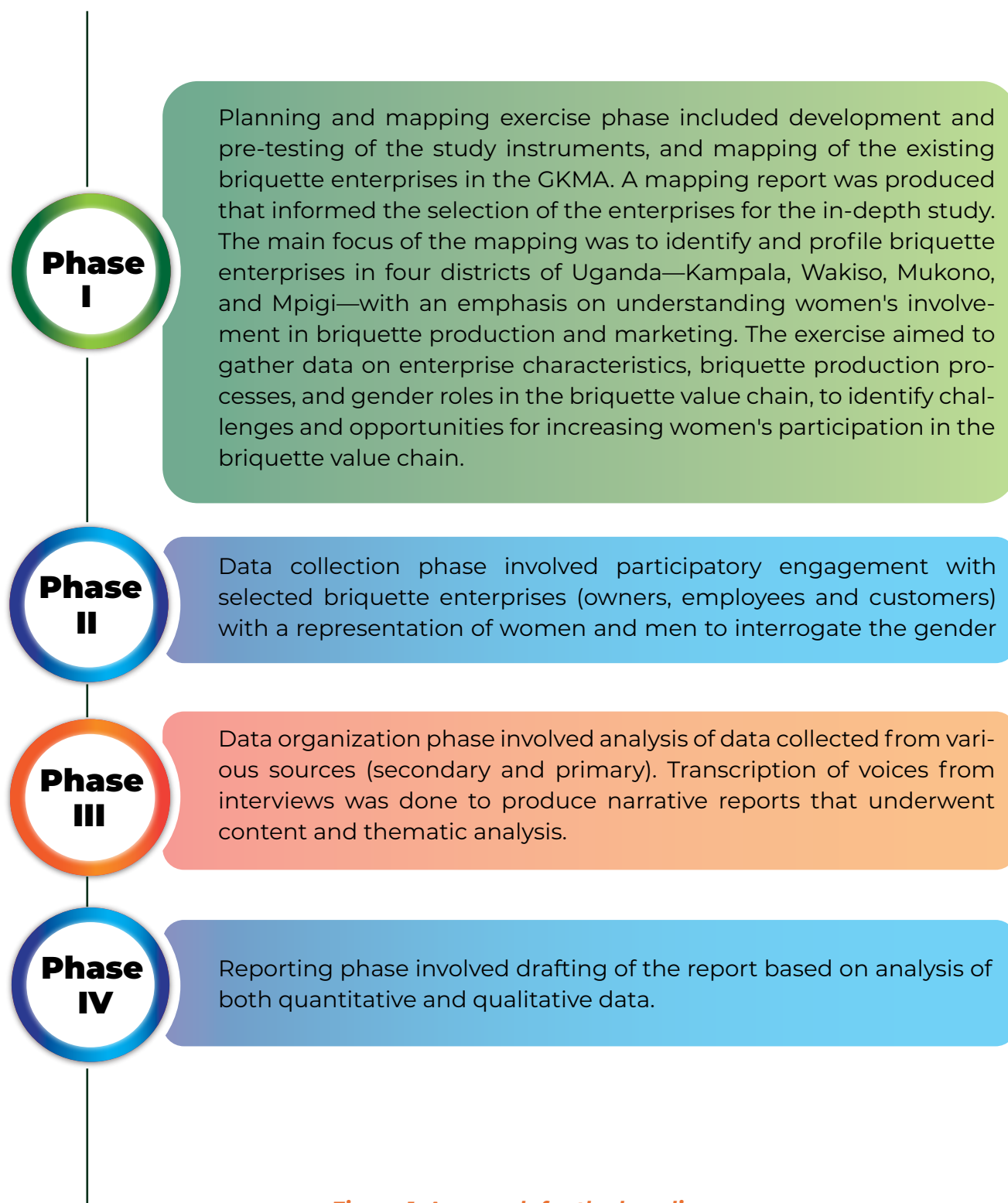


Figure 1: Approach for the baseline survey

2.2 SURVEY DESIGN

The baseline survey took a cross-sectional design with a mixed methods approach, which enabled the generation of both quantitative and qualitative data to inform the project interventions. The use of a mixed methods approach was essential for this study to allow for a comprehensive understanding of women's involvement in briquette production and marketing value chains. Quantitative data provided measurable indicators such as levels of participation, income, fuel usage patterns, and access to briquettes, which are critical for

identifying trends and establishing baselines for monitoring progress. However, these figures alone could not explain why certain patterns existed. Qualitative data filled this gap by offering rich, contextual insights into women's lived experiences, perceptions, motivations, and the gender-specific challenges they face within the briquette value chain. This approach enabled the study to not only assess the extent of women's participation but also uncover the social, cultural, and structural barriers affecting their involvement.

2.3 THE STUDY SITE

The study was conducted in the Greater Kampala Metropolitan Area (GKMA), which comprises 4 districts: Kampala, Wakiso, Mukono, and Mpigi. GKMA is Uganda's largest urban metropolitan area and serves as the country's political, economic, and industrial hub. The area hosts a significant proportion of the urban population and presents a mix of both peri-urban and rural settings. Geographically, GKMA lies in the central region of Uganda, surrounding the capital city, Kampala. It covers an estimated area of over 8,000 square kilometers and is home to more than 10 million people, accounting for nearly a quarter of Uganda's total population. The region is characterized by rapid urbanization, population growth, and increasing demand for energy, housing, and services.

From a demographic perspective, GKMA has a young population with a high proportion of working-age individuals. Women and youth form a substantial segment of the population, many of whom engage in informal and small-scale economic activities, including energy production, waste management, and small-scale trade.

Socio-economically, the region presents a dual economy. While parts of Kampala and Wakiso are highly urbanized with growing middle-income communities and industrial zones, much of Mukono and Mpigi retain semi-rural characteristics, where households still rely heavily on traditional biomass fuels for cooking. Informal settlements and low-income neighbourhoods dominate many parts of the metropolitan area, with limited access to clean and affordable energy.

GKMA was selected as the study site because the area has experienced significant urban growth for many decades and is currently the second-fastest-growing urban area in Eastern Africa. It is an industrial, commercial, and educational centre and vital to the country's economic growth. However, the urban growth of GKMA impacts the environmental

resources (Kasimbazi, 2020), where over 300,000 tons of charcoal is consumed annually (Tumuhimbise, 2021). Also, the cost of charcoal is highest in Kampala (Daily Monitor, 2023), which presents a business opportunity for cheaper and clean alternatives like briquettes. GKMA has been considered because it has a high and diverse population of small-scale briquette producers and consumers than any other part of Uganda. Additionally, being a major urban center, GKMA offers access to potential markets for briquettes and enables visibility of women's roles in clean energy innovation and entrepreneurship.

2.4 STUDY POPULATION AND SAMPLING

Enterprise owners and employees and briquette consumers provided the data. Participants included males and females of different socio-economic status from briquette enterprises in GKMA. Following a mapping exercise conducted prior to the survey, purposive sampling was used to select eight (8) participating enterprises out of 22 within the GKMA. A total of twenty-nine (29) participants, all of whom were employees, responded to the questionnaire. Additionally, 8 participants took part in Key Informant Interviews (KIIs), including 6 enterprise owners and 2 managing directors. Six (6) employees participated in In-depth Interviews (IDIs), while 8 consumers were interviewed using the Consumer Interview Guide. Overall, the baseline survey engaged a total of 51 respondents of which 25 were females and 26 were males.

2.5 DATA COLLECTION

Desk Review:

This involved comprehensive analysis of secondary data from existing literature of past studies conducted globally, regionally and in Uganda about clean energy, in particular briquette production. The review provided information on gender dynamics in the energy sector, challenges and opportunities for women's participation, available briquette technologies, policy frameworks, and best practices for promoting inclusive clean energy solutions.

Structured Interviews:

Quantitative data was collected through structured interviews using an electronic questionnaire with KOBO Collect software installed on Researchers tablets. KOBO Collect system enabled capturing of data in real-time while ensuring quality and correctness of data entry.

Key Informant Interviews:

KIIs were designed to capture information using a set of unstructured questions (Appendix A) to elicit participants' opinions about the involvement of women in the briquette value chain. Eight (8) KIIs were conducted with Briquette enterprise owners and directors (4 women and 4 men).

In-depth Interviews:

In-depth interviews were organized with 6 selected women employees . Interview guides were used to provide an in-depth understanding of the experiences, with a total of 29 employees (9 females and 20 males).

2.6 DATA ANALYSIS

STATA software version 15 was used to analyze quantitative data to generate frequencies and percentages on key variables of interest especially socio-demographic characteristics (age, sex, education, marital status), roles and tasks in briquette production, duration of employment, income levels, type of machinery used, involvement in marketing and distribution, participation in management or leadership roles, perceptions about women's involvement, and challenges faced by women in the briquette value chain. Qualitative interviews were transcribed and narrative reports produced that were later subjected to thematic analysis. Thematic analysis involved inductive and deductive coding of the transcripts to identify patterns of emerging themes around the gender roles/tasks in the briquette enterprise, involvement of women in briquette production and existing briquette infrastructure among others. Qualitative findings complement the quantitative findings with quotations used to present study participant voices. However, participants' names have been omitted from the quotations to maintain privacy and confidentiality.

2.7 STUDY LIMITATIONS

Access to respondents was occasionally constrained, particularly due to women's competing demands, many were balancing household responsibilities or working part-time, making it difficult to schedule interviews. As a result, there were relatively few female employees available for in-depth interviews, which limited the diversity of perspectives captured. Additionally, some participants were reluctant to disclose financial or sensitive business information, potentially affecting data accuracy. Logistical challenges such as poor road access and adverse weather in some areas also contributed to delays.

3. GENDER AND BRIQUETTE PRODUCTION IN UGANDA: INSIGHTS FROM THE DESK REVIEW

Uganda remains heavily reliant on biomass fuels such as charcoal and firewood for household energy needs. This dependence has environmental and health consequences, including deforestation and air pollution. In response, biomass briquettes have gained attention as a sustainable alternative. Importantly, involving women in the production and marketing of briquettes presents both a clean energy solution and an opportunity for women's empowerment. This literature review explores four thematic areas: gender and participation in clean energy production in Uganda, gender and participation in clean energy marketing, briquette production infrastructure in Uganda, and briquette utilization as an alternative to traditional fuels.

3.1 GENDER AND PARTICIPATION IN CLEAN ENERGY PRODUCTION

The shift to clean energy is recognized as an environmental necessity and also as a strategic development opportunity. Women's participation in the clean energy value chain, especially in biomass briquette production has gained momentum as a strategy to enhance livelihoods, mitigate climate change, and reduce reliance on traditional fuels such as charcoal and firewood.

Across Africa, women are leveraging briquette production to transform household energy needs into meaningful economic and environmental gains. In Nigeria, the Dapaya Women Cooperative supported by USAID's Rural Resilience Activity, acquired briquetting machinery and provided training, which enabled the group to scale production, improve incomes using Village Savings and Loan funding, and shift away from firewood reliance, reinforcing both climate resilience and women's empowerment (Mercy Corps, 2023). Similarly, in Kenya, a women's collective partnered with the International Water Management Institute (IWMI), to provide mechanized briquette production training that facilitated the group to transition from manual to machine-assisted

briquette production. This led to an increase in the daily output from around 360 to 1,300 briquettes, improved product quality, market and household incomes. In addition, the training helped strengthen the women's entrepreneurial skills, enabling them to better manage finances, scale their operations, and contribute more meaningfully to local clean energy solutions (International Water Management Institute, 2024).

Women's participation in clean energy production is increasingly recognized as a pathway for promoting gender equality, sustainable livelihoods, and climate resilience. When women are actively involved in producing clean energy such as through biomass briquettes, they not only gain economic opportunities but also become key agents of environmental sustainability in their communities. A compelling example is the "biomass briquette revolution" initiated by UN Women, where 30 women were mobilized to convert agricultural and household waste into clean-burning briquettes.

This initiative, implemented in Malawi, demonstrated how women's leadership in clean energy can simultaneously reduce deforestation and provide safer, more reliable cooking fuel, highlighting the transformative potential of gender-inclusive clean energy solutions (UN Women, 2024).

In Zambia, an 18-member women's group received briquette machines and capacity-building from the National Technology and Business Centre, which enabled them to earn consistent income, save collectively,

and reduce families' dependence on charcoal and firewood. This in turn addressed both gender-based economic inequality and environmental degradation (African Women in Media, 2024). These examples demonstrate that when women receive targeted support, technical training, equipment, finance, and market access, they can lead sustainable clean energy businesses. Briquette production thus emerges as a gender-responsive model for green job creation, women's economic empowerment, and environmental stewardship across diverse African contexts.

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Box 1: Examples of Briquette initiatives that support women in Uganda

The Buikwe Women Briquette Project trained 50 women in Makindu village to make briquettes from agricultural waste, reducing household fuel costs and indoor air pollution (CorpsAfrica, 2024)

The production and utilization of briquettes have positive economic implications. They are often more affordable than charcoal and can be produced locally, creating employment opportunities, especially for women and youth. For instance, initiatives in Wakiso District have trained individuals in briquette production, leading to income generation and community development. Additionally, organizations like Action for Rural Women's Empowerment (ARUWE) train women, including survivors of sexual and

gender-based violence, to produce and sell briquettes, empowering them economically while promoting clean energy alternatives (Tucci, 2023). Similarly, the Wakiso District Farmers Association (WADFA) helps local communities adopt briquette production as a livelihood option, reducing dependence on charcoal and firewood. These initiatives highlight how briquette utilization, as an alternative fuel source, supports local economic development, environmental conservation, and improved health outcomes by offering a cleaner, more sustainable cooking fuel.

Women's involvement in clean energy also yields multiple benefits, including economic empowerment through increased income from briquette sales and reduced household energy costs (Ferguson H., 2012). Many small-scale entrepreneurs involved in briquette production have been able to create consistent income streams, which is especially significant in rural areas where job opportunities are limited (UN Women, 2024). This is particularly significant in rural areas where job opportunities are limited. A report by the African Development Bank (2022), highlights that women constitute a notable portion of micro-entrepreneurs in the briquette value chain, despite the energy sector being traditionally male-dominated. According to the International Renewable Energy Agency [IRENA] (2020), briquette businesses often require manual labour for sourcing, drying, and pressing materials; thus, they generate employment for both skilled and unskilled workers, contributing to local economic development.

Initiatives like Ebapreneur Solutions in Wakiso District have demonstrated how briquettes can reduce household energy costs while promoting women's employment and entrepreneurship in clean energy markets (Miriam, 2023). Moreover, briquette use helps mitigate pressure on Uganda's forest reserves by offering a renewable fuel source, making it a component of strategies aimed at achieving energy sustainability and climate resilience.

Nabulo (2024), asserts that women's involvement in briquette production contributes to environmental sustainability with less dependence on wood fuel and charcoal for cooking, thus contributing to reduced deforestation. However, women face systemic challenges that constrain their participation in the clean energy sector, including; limited access to capital, technical training, and market opportunities (UN Women, IRENA, 2019). Many women are unable to secure financing due to lack of collateral, gender biases in financial institutions, and lower financial literacy especially in rural areas where banking infrastructure is minimal. Technical training opportunities are also insufficient as women are under-represented in Science, Technology, Engineering, and Mathematics (STEM) fields and often lack access to skill development programs that accommodate their specific needs.

Cultural and social norms such as expectations that women should prioritize household and care duties directly limit their participation in clean energy activities like briquette production by restricting their mobility and access to training and markets. For example, in a Ugandan case study with Green Heat Ltd, women reported missing sales training because of household burdens, and religious norms prevented them from engaging freely with male colleagues. Men in some communities also felt threatened when their wives earned more, which could deter women from pursuing entrepreneurial roles in the briquette value chain (Romania, Njenga, & Ruth, 2018). These gendered attitudes, where energy technology and decision-making are seen as male domains, exclude women from technical roles, collective leadership, and ownership in clean energy projects across Sub-Saharan Africa (Kelkar & Nathan, 2021). These norms not only deter women from engaging in the clean energy sector but also prevent them from becoming change agents in their communities. Moreover, women are largely underrepresented in leadership and governance roles in energy institutions, curbing their influence in shaping clean energy policies and strategies.

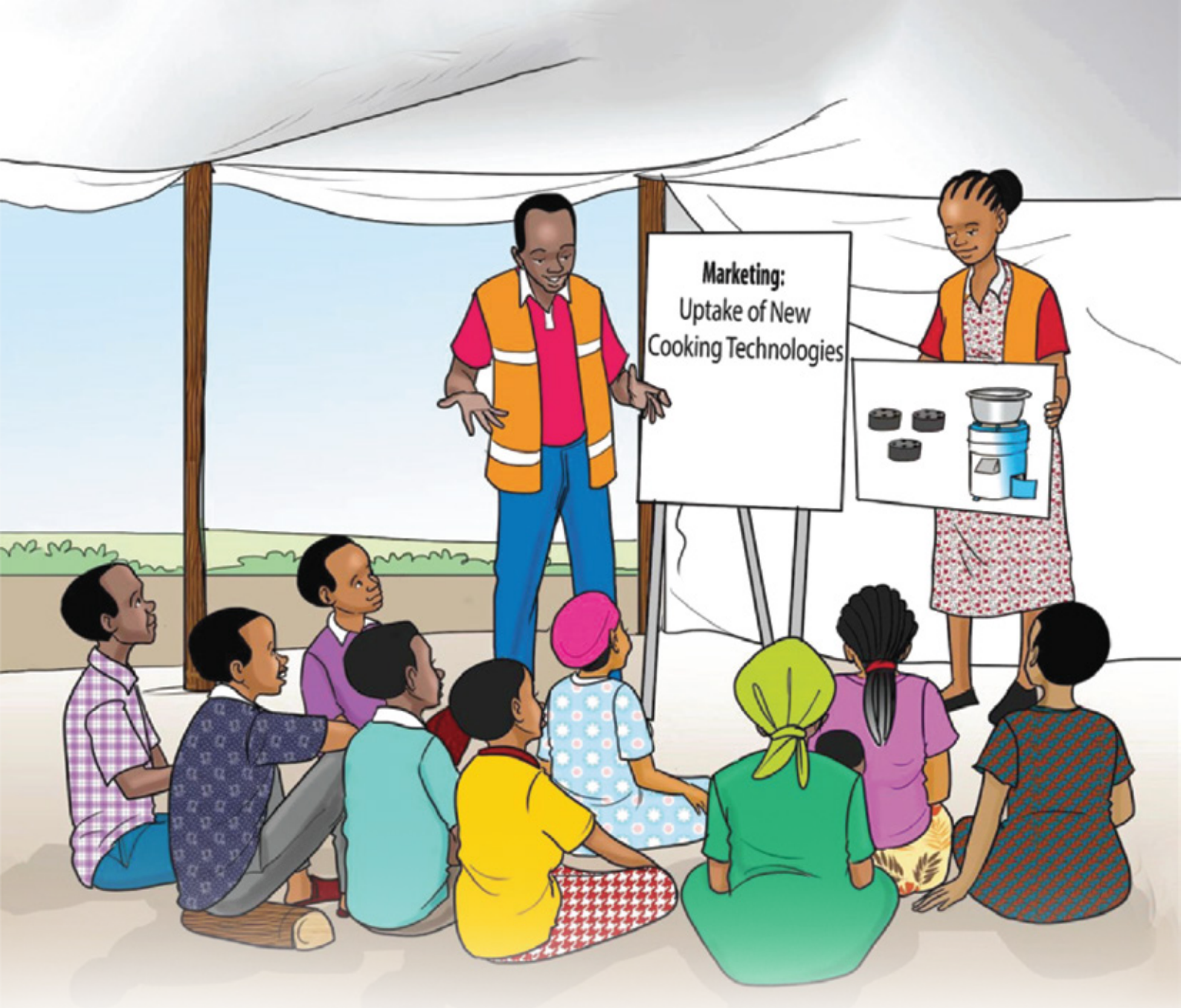
Whereas briquette making has the potential for incorporating both men and women in the production value chain, there are challenges that affect both sexes, especially females, and thus the need to assess them at each stage of the briquette value chain (Okello et al., 2018). Household responsibilities in the home are mostly a burden on women and this reduces the time they have available to participate in training and roles offered (Elasu et al., 2025; Okello et al., 2018). In some cases, cultural and religious patterns inhibit women from having direct contact with men outside the family so this also prevents women from becoming involved in ventures such as briquette production, marketing and selling. Therefore, understanding gender roles is important along the briquette value chain to take advantage of the opportunities, resources and strengths of both men and women. Having a gender-inclusive value chain promotes efficiency and competitiveness by promoting access to the best talent regardless of gender (Okello et al., 2018).

These barriers highlight the need for intentional, gender-inclusive interventions where women can be fully integrated into the clean energy transition and meaningfully benefit from its economic and social gains. Therefore, women's participation in clean energy production, especially briquette making in Uganda, presents a significant opportunity for advancing gender equality, environmental sustainability, and rural development. This calls for addressing existing barriers through targeted policy support, financial inclusion, and capacity-building to harness the full potential of women in clean energy transitions.

3.2 GENDER AND PARTICIPATION IN CLEAN ENERGY MARKETING

Women play a big role in the marketing of clean energy technologies, especially in regions where they are primary energy users and decision-makers within households. Women's involvement in clean energy marketing has been recognized as a catalyst for increased adoption of sustainable energy solutions. Initiatives like Solar Sister in sub-Saharan Africa have demonstrated that empowering women as clean energy entrepreneurs leads to broader community outreach and higher adoption rates of renewable energy products (ENERGIA, 2019). Marketing contributes to a big part of the success of clean energy products such as briquettes. Women are increasingly being recognized not only as users but as effective marketers of clean energy products. Additionally, research by ENERGIA (2019), highlights that women tend to outperform men in the marketing of clean energy products such as cookstoves and briquettes due to their strong community ties and trust networks.

Women's understanding of household needs allows them to position clean energy products like briquettes in ways that resonate with daily realities, making their involvement in marketing both strategic and impactful (Clancy et al., 2012). However, their representation and participation in energy marketing, particularly in the briquette sector remains limited in many contexts, including Uganda. Exploring gendered participation in clean energy marketing reveals both the structural barriers and transformative opportunities for inclusive development. These include limited access to markets, networks, capital and credit, inadequate marketing skills, and negative social cultural norms (African Centre for a Green Economy, 2023). In Uganda, rural women often lack access to transport and formal markets, restricting their ability to distribute or sell briquettes beyond their immediate



communities (Ferguson , 2012). Marketing requires investment in packaging, branding, and transportation yet many women in Uganda have limited capital to invest in such important marketing requirements. Access to financial services due to lack collateral (such as land or assets) for loans is a challenge (Rebecca, 2017). This is compounded by the discriminatory social and gender norms related to inheritance (Rebecca, 2017). As a result, women struggle to secure the funding needed for essential business activities, including marketing, packaging, and transportation. This financial exclusion restricts their ability to grow their enterprises, reach new markets, and compete effectively, thereby limiting both their economic empowerment and the broader adoption of clean energy solutions.

Studies indicate that traditional gender roles and patriarchal norms in many Ugandan communities discourage women from engaging in business outside the household, limiting their mobility and visibility in markets (Theeuwens et al., 2021). Therefore, even though a woman was availed an opportunity to market clean energy products, the roles attached

to women in some societies will definitely be a barrier. According to Enock (2014), cultural expectations about women's roles significantly restrict their freedom to participate in entrepreneurial ventures, especially those that operate outside the home. These norms not only limit women's access to markets and financial services but also undermine their confidence and visibility in the business sphere. As a result, even when women are trained in clean energy technologies, their ability to market products is suppressed by societal perceptions and the lack of supportive environments.

Evidence shows that women involved in briquette production faces significant challenges due to a lack of training in marketing skills, which severely limits their ability to scale their enterprises. Although they often excel at production, many lack expertise in strategic marketing, customer engagement, and digital outreach—skills essential to access broader market segments (Yustas et al., 2022). A review of briquette value chains found that deficiencies in promotion and marketing were among the top five hurdles inhibiting the growth of the sector. This gap in capacity-building restricts their growth potential, leaving their enterprises confined to local or informal markets.

According to the International Renewable Energy Agency (2019), with the right support systems, women can thrive as marketers, entrepreneurs, and change agents in clean energy. Consequently, strengthening training, financing, mobility, and market linkages will be crucial in enhancing women's visibility and profitability in briquette marketing.

To increase women's participation in clean energy marketing, it requires more than just inclusion but also gender-sensitive strategies that address the structural challenges women face. Studies have shown that when women are equipped with targeted training in areas such as marketing, negotiation, and business management, their ability to engage in energy markets improves significantly. Such training helps bridge existing skill gaps and builds the confidence needed to compete in male-dominated sectors.

Access to financial services, would enable them invest in packaging, branding, or transportation which are key elements of effective marketing. These further demand establishing women-friendly financing mechanisms, such as microloans or community savings schemes that do not demand collateral for women to access credit. Women need to access and use mobile technology to enable them to swiftly communicate business information and manage their supply chains more effectively (Kapinga, Montero, & Mbise, 2016). With access to real-time data on input and output prices, as well as information on potential buyers and sellers, mobile phones help women stay competitive in dynamic markets. Furthermore, mobile technology expands their reach, opening doors to both local and international markets. (Kapinga, Montero, & Mbise, 2016). Thus, enhancing women's participation in clean energy marketing is important for achieving broader energy access. It is therefore essential that barriers to women's participation are addressed as well as leverage on existing interventions to harness the potential of women as key drivers in the transition to clean energy. In addition, women face restricted access to markets and business networks, resulting in fewer opportunities to scale their enterprises or benefit from industry partnerships.

3.3 BRIQUETTE PRODUCTION INFRASTRUCTURE IN UGANDA

Briquette production in Uganda is characterized by a mix of small-scale, community-based operations and larger, more mechanized facilities. Many producers operate with limited resources, utilizing manual or semi-mechanized equipment, which affects the consistency and quality of the briquettes produced (Ferguson, 2012). However, there has been a growing interest in briquette production country-wide, driven by increasing demand for alternative fuels and support from various organizations. For instance, the Rwenzori United Group for Life Improvement (RUGLI) in Kasese has been instrumental in supporting and expanding bio-briquette production, turning maize and cassava by-products into fuel. This initiative not only provides an additional fuel source but also creates income-generating opportunities for local women (Rockflower, 2017).

In districts like Buikwe, Kampala (Bwaise) and Nakaseke, many community-led briquette initiatives continue to rely on basic infrastructure—such as drying racks, crushers, manual compactors, and rudimentary carbonizers. In Buikwe's Makindu village, Corps Africa supplied equipment like carbonizers, mixers, crushers, and solar driers to 50 women, enhancing both domestic and commercial briquette production (CorpsAfrica, 2024). Similarly, Nakaseke's model villages received briquette-making machines from Ndejje University's Energy Research and Development Centre, targeting groups that had previously struggled to meet demand due to equipment shortages (Wandera, 2021). Focus for Life Development Link (FLDL), a community-based organization in Bwaise, has improved its briquette production by acquiring advanced equipment, including

honeycomb machines and carbonizers, through support from MTN Uganda. This advancement has doubled their production capacity, enabling them to meet growing market demands and train more youths and women in briquette making (MTN, 2022). However, these improvements remain localized; many groups still operate without similar support and lack the equipment needed to scale production or broaden their market presence.

Urban centers such as Kampala and Mpigi have more advanced and semi-industrial facilities, where production is more structured. Companies like Agro Energy Briquettes Ltd and initiatives within large organizations such as Kenlon Industries have adopted mechanized processes, using presses, mixers, and carbonizing chambers to ensure consistency, efficiency, and scalability. Additionally, the integration of briquette production into existing industrial systems, such as sugar manufacturing and wastewater treatment plants, reflects innovation in utilizing waste for energy (Lugali et al., 2022).

Despite these advancements, challenges persist. Many producers lack access to consistent power, reliable transportation, and modern machinery. This limits their ability to scale operations, maintain consistent quality, and meet growing demand. Furthermore, inadequate maintenance and lack of technical training hinder the optimal use of available equipment (Ferguson, 2012). Most operations are community-based and rely on rudimentary tools and manual processes. In rural areas, women and youth groups frequently engage in small-scale briquette production using low-cost, locally available agricultural

waste materials such as maize cobs, banana peels, and charcoal dust. The production process often involves simple tools like hand presses or manual moulds, resulting in variable product quality and limited production capacity.

Many producers lack adequate equipment, hindering their ability to produce quality briquettes at scale. While larger producers can import machines, small-scale producers often cannot justify the cost, and locally made machines are not widely available. Additionally, there are production bottlenecks such that even when motorized briquetting machines are used, other stages like drying and carbonization become challenges. For instance, the drying process is dependent on available space, and current carbonization techniques are slow, limiting overall production capacity (WoodBriquettePlant.com, n.d). Access to finance further constrains these producers. Micro-entrepreneurs find it challenging to secure loans for equipment or business expansion due to lack of collateral, high interest rates, and limited financial literacy. Moreover, the limited availability of adequately sized premises and lack of private transport hinder both the drying process and access to broader markets (WoodBriquettePlant.com, n.d).

These challenges collectively limit the ability of briquette producers to scale operations, maintain consistent quality, and meet growing demand. To improve the existing infrastructure, continued investment is needed in affordable technology, local fabrication of briquette machines, and training programs to build technical skills. Establishing regional briquette hubs with shared machinery and drying facilities could also enhance productivity and quality across smaller producers. With strategic support, Uganda's briquette

infrastructure holds the potential to contribute significantly to clean energy access and sustainable livelihoods. Moreover, micro-entrepreneurs struggle to secure financing for equipment or business expansion, due to inadequate collateral, high interest rates, and low financial literacy. The lack of suitable premises and transport further impedes operations, restricting drying capacity and market reach. Finally, Musinguzi (2024), reports that gaps in technical expertise—particularly in equipment handling, carbonization methods, and quality control—are frequently linked to inconsistent briquette quality and inefficient production processes.

The briquette production infrastructure in Uganda has made progress in addressing women's specific needs and concerns, fostering their meaningful participation in this growing sector. Community-based initiatives such as those by Corps Africa in Buikwe, which provided carbonizers, mixers, crushers, and solar driers to 50 women, demonstrate how targeted support enhances women's access to essential equipment, overcoming barriers related to affordability and mobility. Similarly, Focus for Life Development Link (FLDL) in Bwaise has doubled its production capacity by acquiring advanced machinery through partnerships with MTN Uganda, enabling more women and youth to engage in training and income generation. These examples illustrate how the infrastructure promotes economic empowerment by creating accessible income opportunities close to women's homes, which aligns with their need for flexible work arrangements amid household and caregiving responsibilities. Moreover, the use of locally available materials such as maize cobs and cassava peels reduces production costs and reliance on scarce resources, making briquette making feasible for women micro-entrepreneurs.

Health and labour concerns central to many women's daily lives are also addressed through this infrastructure. Improved cookstoves and cleaner briquettes help reduce exposure to harmful smoke, lessening respiratory risks commonly faced by women responsible for cooking. Additionally, by offering alternatives to traditional firewood collection, briquette production alleviates the time and physical burden of fuel gathering, directly improving women's quality of life.

Nonetheless, challenges persist. Many women producers continue to operate with rudimentary tools and lack access to consistent technical training, modern machinery, and financial services tailored to their unique circumstances. Limited drying space and unreliable transportation further restrict their ability to scale production and expand market reach. These structural constraints underline the need for ongoing investment in affordable technologies, local fabrication of briquette machines, and the establishment of drying facilities. Strategic support from organizations like Ndejje University's Energy Research and Development Centre in Nakaseke, which supplied briquette-making machines to under-resourced groups, and the Rwenzori United Group for Life Improvement (RUGLI) in Kasese, which empowers women by converting agricultural by-products into briquettes, showcase scalable models for integrating women into the clean energy value chain.

In summary, while Uganda's briquette production infrastructure has begun to respond effectively to women's economic, health, and social needs, strengthening these efforts through gender-sensitive financing, expanded training, and improved infrastructure is vital. Doing so will not only enhance women's livelihoods but also contribute to broader clean energy access and sustainable development goals.

3.4 BRIQUETTES UTILIZATION AS AN ALTERNATIVE TO CHARCOAL AND FIREWOOD



Figure 2: Briquette as an alternative to Charcoal and firewood

In Uganda, over 90% of households rely on biomass fuels, primarily firewood and charcoal, for cooking and heating needs (Daily Monitor, 2023). This heavy dependence contributes significantly to deforestation and environmental degradation. However, Briquettes offer several environmental advantages over traditional fuels. They produce less smoke and particulate matter, leading to improved indoor air quality and reduced respiratory health issues among users. Additionally, the use of briquettes can mitigate deforestation by decreasing the demand for wood-based fuels. Studies comparing briquettes to traditional fuels indicate that briquettes are a viable alternative.

They have been found to produce less smoke and require less fuel for cooking.

However, user acceptance varies, with some consumers preferring the familiar characteristics of charcoal. Efforts to improve briquette quality and raise awareness about their benefits are essential for wider adoption (Oteu et al, 2024). The Ugandan government recognizes the potential of briquettes in its Renewable Energy Policy, aiming to reduce reliance on wood and charcoal. Supportive policies and investments in briquette production infrastructure are crucial for scaling up their use and achieving environmental sustainability goals (EBAFOSA-UGANDA, n.d.).

Despite recognition of their benefits, briquettes remain marginal in Uganda's household energy sources. According to the Uganda National Household Survey (2019/20), biomass fuels account for about 95% of household energy use—firewood is dominant in rural areas (86%) and charcoal in urban settings (70–78%), while briquettes lag far behind, constituting only a small fraction of total fuel use (Seruwagi & Bukenya, n.d). In contrast, targeted rural adoption demonstrates higher integration where support systems exist. A 2023 study by Nakiganda et al. across Isingiro, Masindi, and Mbarara found that between 50–67% of trained farmers; not only produced briquettes but also used them for cooking, over 93% reported household use. These initiatives yielded approximately UGX 6.7million (USD 1,800) in income within four months, and around 57% cited fuel cost savings (Nakiganda et al., 2023). This indicates that when technical training, community organization, and access to materials are provided, briquette utilization can be substantive.

Urban settings present a different picture. A survey in Kampala showed that conventional fuels still dominate: charcoal usage stood at 77.8% and firewood at 2.6%, with less than 10% using electricity or “other fuels” likely a mix of briquettes and LPG, indicating very low briquette uptake (Nzabona et al., 2021). Despite these urban shortcomings, institutional adoption is emerging: schools, restaurants, poultry farms, and hospitals have begun using carbonized briquettes. These applications reflect increasing utilization where relevant stove adaptations and equipment are available (Mugabi & Kisakye, 2020). However, several limitations hamper broader use. Briquette demand tends to be highly price-sensitive: household expenditure on fuel closely correlates with briquette consumption, which drops sharply as price increases. Further, small-scale producers largely depend on charcoal fines, a byproduct of charcoal production as the primary raw material. This linkage unintentionally maintains dependence on charcoal-based supply chains, undermining efforts to fully transition away from firewood and charcoal (Bamwesigye et al., 2020).

Moreover, institutional and market frameworks for briquette utilization suffer from inadequate infrastructure. Many potential adopters lack compatible stoves, and the absence of supportive supply chains means that even trained producers struggle with drying, carbonization, and packaging, which all limit product quality and consistent usage. Programs by organizations like EBAFOSA and UNEP have made strides—providing solar dryers, training, and solar-drying centres for women—but these remain limited in scope and unevenly distributed (East African Briquette and Fuelwood Suppliers Association (EBAFOSA Uganda), 2020).

In summary, utilization of briquettes in Uganda is highly context-dependent. Rural adoption where training, community engagement, and equipment are present is demonstrating uptake and economic impact. Urban and national household use, however, remains minimal, dominated by charcoal and firewood. Institutional use appears promising but still project-based. Expanding actual utilization will require strategies to lower costs, ensure compatible stoves, develop supply chains, reduce dependence on charcoal inputs, and deploy gender-sensitive and community-driven interventions. Evidently, the adoption of briquettes utilization can lead to environmental conservation, improved public health, and economic empowerment, however, continued support from policymakers, coupled with community engagement and education, is vital for the successful integration of briquettes into Uganda's energy landscape.

Gaps in Literature

Although briquette production and clean energy transitions have attracted research interest globally and in Uganda with some scholars emphasizing women's involvement, several key gaps remain unaddressed. Firstly, there is a lack of Uganda-specific empirical data exploring the experiences, barriers, and opportunities women face in the clean energy sector. Much of the existing literature is generic with no specific consideration to the cultural, economic, and institutional contexts that uniquely shape women's roles in Uganda's energy landscape.

Secondly, in terms of infrastructure, available data primarily highlight challenges such as low mechanization, poor access to capital, and lack of technical training. However, there is minimal evaluation of long-term sustainability, innovative potential, and the gender-sensitive infrastructure design and the implications for women's participation in the briquette production value chain. The role of women in accessing and managing briquette production infrastructure remains underexplored.

Thirdly, while briquettes are recognized as an alternative to firewood and charcoal, few studies critically examine household-level decision-making, consumer preferences, and adoption behaviour particularly from a gender perspective. There is limited data on the cultural and socio-economic factors that influence household's uptake of briquettes as an alternative source of energy.

Lastly, the policy and institutional frameworks supporting briquette production and women's inclusion are not well documented. The effectiveness of existing programs and policies in enabling meaningful women's participation in clean energy initiatives is not well understood. There is, therefore, a need for localized, gender-sensitive research that explores the full value chain of briquette production and use from infrastructure and production to marketing and household adoption.

4. WOMEN'S PARTICIPATION IN BRIQUETTE PRODUCTION: INSIGHTS FROM THE INTERVIEWS

4.1 SOCIO-DEMOGRAPHICS OF THE RESPONDENTS

The baseline survey covered respondents with varied social demographic characteristics including age, marital status, education level and major source of income.

Age: Majority 17(58.6%) of the employees in these enterprises belonged to the age group between 18-24 years of age, followed by 6(20.69%) who belonged to 25-34 years, and 2(6.9%) of 45-54 years (see Table 1). This implies that most of the respondents are young and therefore in a productive age to continue on the briquette's technology project even after the project lifetime if well trained. Our training on briquette production and marketing will target a critical mass in these age brackets as a strategic sustainability plan.

Table 1: Age of the respondents

Age	Frequencies (percentage)		
	Male	Female	Total
18-24	14(70%)	3(33.3)	17(58.6)
25-34	4(20%)	2(22.2)	6(20.69)
35-44	2(10%)	2(22.2)	4(13.79)
45-54	0	2(22.2)	2(6.9)
Total	20(100%)	9(100)	29(100)

Marital status: The results in Table 2 indicate that the majority 18(62.1%) of the employees are single, 8(27.6) were married or living together followed by 2(6.9) who were widowed, and 1(3.5) were divorced. Qualitative interviews suggest that gendered roles and domestic responsibilities limit married women's consistent participation in the sector. For instance, a married female participant mentioned, "I work every day, but since I have a baby, at times I pause and first take care of him." (Female IDI Wakiso), suggesting that the flexibility required to balance unpaid care work and labour-intensive briquette production is a barrier for married women. This explains why the majority are single because they have fewer domestic responsibilities and so more time to participate in briquette production.

Table 2: Marital status of the respondents

Marital Status	Frequencies (percentage)		
	Male	Female	Total
Single	15(75)	3(33.3)	18(62.1)
Marries or Living Together	5(25)	3(33.3)	8(27.6)
Widowed	0	2(22.2)	2(6.9)
Divorced	0	1(11.1)	1(3.4)
Total	20(100%)	9(100)	29(100)

Education status: In terms of education attainment, the majority 14 (48.3%) of respondents had attained secondary education, followed by 12 (41.38%) with primary education, and only 1 (3.45%) respondent had no formal education (Table 3). These findings suggest that the briquette production sector generally attracts individuals with some level of formal education, particularly at the secondary level. This level of academic qualification may contribute to better understanding of technical processes, improved adherence to safety measures, and more effective participation in marketing and business operations. However, it is important to note that more men than women had attained secondary education, pointing to a gender gap in educational qualifications. This gap may limit women's ability to participate in certain technical aspects of production or to take on leadership and managerial roles. For the project, this highlights the need to incorporate training and capacity-building programs specifically tailored to women, particularly those with lower levels of formal education, to ensure inclusive participation and enhance their technical competence. Strengthening women's skills through practical training could also improve the quality of briquettes produced and expand market opportunities.

Table 3: Education level of the respondents

Education of the Respondent	Frequencies (percentage)		
	Male	Female	Total
Primary School	8(40)	4(44.4)	12(41.4)
Secondary School	10(50)	4(44.4)	14(48.3)
Tertiary/College or University	1(5)	1(11.1)	2(6.9)
No formal Education	1(5)	0	1(3.5)
Total	20(100)	9(100)	29(100)

Major source of income: Findings from Table 4 below, show that briquette production business serves as a significant source of income and employment, particularly for women who might otherwise have limited access to formal employment. While respondents reported diverse income-generating activities such as crop farming, animal husbandry, and small retail businesses, several women explicitly stated that their involvement in the briquette enterprise is either their main or a highly dependable source of livelihood. Participants emphasized that when briquette production is running effectively, it provides them with regular income. The employment generated by the briquette enterprise includes a range of roles from raw material collection and biochar preparation to marketing and training. These insights suggest that briquette production can serve as both a primary and supplemental income source, especially for women in low-income communities. This underscores the importance of supporting the sustainability of such enterprises through better equipment, market access, and financial support. Enhancing these elements would not only stabilize income for current workers but also attract more women to view briquette production as a viable, long-term employment option.

Table 4: Major source of income of the respondents

Major source of Income	Frequencies (percentage)		
	Male	Female	Total
Agriculture-crop farming	8(40)	4(44.4)	12(41.4)
Animal Husbandry	1(5)	0	1(3.45)
Retail Business	-	1(11.1)	1(3.5)
Formal Employment	-	1(11.1)	1(3.5)
Briquette Business	14(70)	4(44.44)	18(62.1)
Others (specify)	1(5)	0	1(3.5)
None	1(5)	0	1(3.5)
TOTAL	20(100)	9(100)	29(100)

4.2 GENDER AND BRIQUETTE PRODUCTION

The briquettes value chain involves a series of steps and actors in the production, distribution, and use. In Uganda, the typical briquette production value chain, includes materials sourcing, materials preparation, briquette production (mixing of materials with binders, compacting, drying), packaging and storage, distribution and marketing and their end use. Our study focused on women and men's involvement to understand women's experiences across the different nodes of the value chain.

4.2.1 WOMEN AND MEN'S INVOLVEMENT IN BRIQUETTE PRODUCTION

The findings indicate that the majority of male and female respondents are engaged in core production tasks, with 80% (males) and 77.78 (females), identified as production workers. This shows that while production roles are

predominantly filled by men, a significant proportion of women are also directly involved in the production process. However, women remain under-represented in marketing and sales roles, where only men were reported to be active, and are more present in management roles than their male counterparts (22.22% of females compared to 5% of males). These findings suggest that while women participate in production, their involvement remains limited in specific areas such as marketing.

Table 5: Role of the respondents in the briquette production enterprise

Role of Briquette Production Enterprise	Frequencies (percentage)		
	Male	Female	Total
Production Worker	16(80)	7(77.8)	23(79.3)
Marketing/Sales	2(10)	-	2(6.9)
Management	1(5)	2(22.2)	3(10.4)
Other (Please specify)	1(5)	-	1(3.5)
TOTAL	20(100)	9(100)	29(100)

While women would be interested in briquette business, activities in the production process need men/boys. A female briquette enterprise owner explained how the briquette production process needs men and boys;

“ The women to be in this business, first of all if they have the space then they get boys to do the work because these activities in the production process, you cannot do them when you are a woman, you cannot. It is the males who can manage so the females just have to start up the project and then get these other workers, also making sure that you treat them well because many people treat their workers badly” (KII Female, Mpigi)

This quotation illustrates how deeply entrenched gender norms shape women’s roles in not only entrepreneurial spaces but also in energy production sectors like Briquette production that are male-dominated. The briquette entrepreneur, though female articulates a perceived inability of women to engage in the technical or physical aspects of production, which reinforces the gendered division of labour that often restricts women to managerial or supervisory roles. These experiences are echoed in the interviews with the employees presented under women and men’s tasks in the briquette production - below. The phrase “if they have the space” underscores the structural barriers women face in accessing the resources—both physical and social—needed to enter and succeed in briquette enterprises. The statement that women often start the business and then “get boys to do the work,” uncovers a workaround strategy where women assert economic agency within constrained gender norms. Further, the emphasis on treating workers well reflects a feminized ethic of care that contrasts with exploitative labour practices and highlights how gender shapes leadership values. While the voice illustrates women’s resilience and adaptive strategies in the male dominated energy production sector, it also underlines the limitations imposed by patriarchal assumptions about ability, labour, and leadership.

4.2.2 WOMEN AND MEN'S TASKS DURING BRIQUETTE PRODUCTION

The findings show that males were involved in collection of biomass material (gathering raw materials such as agricultural waste) as well as the females. As shown in Table 6 below, majority of the males 16(94.12%) as well as the females 7(87.5%) do sorting and cleaning. Additionally, both males and females participate in the drying of the raw material to reduce moisture content. In the same light, more males 15(88.2%) mix the binder with the biomass material to create a cohesive mixture compared to females 6(75%). Given that all the briquette enterprises visited had more male employees than female, the quantitative findings indicate that both engage in all tasks related to briquette production.

Table 6: Respondents tasks during briquette production

Tasks in briquette production	Frequencies (percentage)		
	Male	Female	
Collection of Biomass Materials			
Yes	10(62.5)	4(50)	14(58.3)
No	6(37.5)	4(50)	10(41.7)
Total	16(100)	8(100)	24(100)
Sorting and Cleaning			
Yes	16(94.1)	7(87.5)	23(92)
No	1(5.88)	1(12.5)	2(8)
Total	17(100)	8(100)	25(100)
Drying			
Yes	16(94.1)	7(87.5)	23(92)
No	1(5.9)	1(12.5)	2(8)
TOTAL	17(100)	8(100)	25(100)
Mixing the binder with the biomass material			
Yes	15(88.2)	6(75)	21(84)
No	2(11.8)	2(25)	4(16)
Total	17(100)	8(100)	25(100)

Findings from the qualitative interviews indicate that women and men engage in different but complementary roles during the briquette production process. These roles are influenced by physical demand, skill requirements, and available machinery. According to the study participants, females participate in tasks such as sorting and preparing raw materials, drying briquettes, and packaging, while the males tend to handle more physically intensive activities like operating heavy machinery, mixing raw materials, and transporting the briquettes. For example, some of the participants explained;

“The men help us with mixing of raw materials, they also carry the charcoal dust because we the women cannot manage to carry,” (KII, female, Mukono). “Men are the ones that make those briquettes because the machines are heavy, and women would need something lighter to be able to do the same. After the men make the briquettes, the women carry them out for drying,” (IDI Female, Wakiso).

The voices above reflect the perceptions about labour capacities of the different genders and how physical strength influences task allocation in the briquette production. Beyond physical distinctions, women also take on other roles in training and knowledge transfer within enterprises as one of the female participants asserted;

“I do a lot of things at this enterprise because most of the people that work here, I am the one who trains them. I prepare the bio char and the other people do the production of the briquettes,” (IDI, female, Wakiso).

This quotation highlights women's active involvement in capacity building and sustaining operations of the enterprise. Some of the respondents pointed to machinery limitations that restrict women's participation in production. Most of the enterprises have manual machines that need physical strength and operation which the women cannot manage to do as one of the enterprise owners mentioned.

“If we had automatic machines that use power, you would get women to work because they can operate them while others carry the briquettes for drying, but using manual machines, there is no way you are going to get women to work because they are very hard to operate,” (KII, female, Mpigi).

Health and safety considerations also frame women's participation in specific tasks. “When we are sieving the charcoal dust, we breathe it in, which affects our health, but we try to add water to reduce the dust,” (KII, Female Mukono). This shows the health risks women face in material preparation, and could be reason men avoid such tasks.

Overall, the production process in these enterprises reflects a gendered division of labour that is based on physicality, cultural perceptions, and the available machines. Nonetheless, women play roles not only in hands-on production activities but also in leadership roles such as training the new employers that come on board.

4.2.3 PERCEPTIONS ABOUT WOMEN'S INVOLVEMENT IN BRIQUETTE PRODUCTION

Majority of the women and men interviewed supported the idea about women involvement in briquette production and only a few disagreed. This shows a very positive trend towards women representation in briquette enterprises; however, it doesn't explain why there are fewer female employees in briquette enterprises. This calls for wider coverage on gender representation and awareness to enable women involvement in briquette production, and marketing on a larger scale.

Perceptions surrounding women's engagement in briquette production reflect social and cultural attitudes, norms and practical considerations that influence women's participation and acceptance within the different modes of the briquette production value chain. Several participants observed that women's involvement is increasingly recognized and appreciated, particularly as communities witness their contributions to clean energy alternatives. One participant remarked, "People actually admire the women so much... Many look at me and respect what I do," (Female KII, Mpigi). Similarly, another participant highlighted a shift from skepticism to support from the community.

"At first it was a laughing matter, they would see us carrying waste stock and it was funny to them, but now they wish they had joined us," (Female IDI, Wakiso).

The voice illustrates evolving community attitudes towards women's roles in traditionally male-dominated activities.

Nonetheless, persistent stereotypes continue to shape women's experiences. Several interviewees noted that women are often viewed as less physically capable, which affects their inclusion in certain production tasks. For example,

"Women think they cannot do the work men do, and balancing house chores and family responsibilities makes it harder," (Female KII, Mpigi).

Some respondents highlighted attitudes of self-doubt and "self-pity" among women themselves, which can dampen their willingness to participate fully in the enterprise. In addition to physical and social barriers, women face challenges related to resource access and decision-making authority. Limited capital, lack of access to mechanized equipment, and restricted mobility due to family obligations were frequently cited. One participant emphasized,

"The biggest barrier I see for the women is that they do not have working capital... without cash, there is no way they will be able to start the business," (Female IDI, Mukono).

The above participants stress economic constraints that affect women's entry and growth in briquette production. Cultural dynamics within households and communities also influence women's participation. Reports of domestic responsibilities, mistrust from spouses, and even cases of domestic violence were shared, which can restrict women's

freedom to engage in training or production activities. A participant shared,

“Some women are beaten or controlled by their husbands who do not want them to engage outside the home,” (Male KII, Kampala).

Despite these challenges, many respondents expressed optimism about increasing women’s involvement through targeted awareness, skill-building, and supportive leadership. For instance,

“If women are given skills and sensitized, they are willing and passionate; they just need encouragement,” (Female KII, Mpigi).

The above illustrates the importance of empowerment initiatives. The presence of female leaders in enterprises serves as role models, inspiring other women to participate, as one participant reflected, “When women see us leading and succeeding, they want to join in,” (KII Female, Wakiso). While women’s involvement in briquette production is gaining recognition, it remains constrained by social norms, physical and economic barriers, and cultural expectations. These could be addressed through community sensitization, gender-inclusive policies, and improved access to resources to enhance women’s meaningful participation and empowerment in the briquette sector.

4.2.4 CHALLENGES WOMEN FACE IN BRIQUETTE PRODUCTION

The findings indicate multiple challenges faced by women in the briquette industry. It was reported that women are disadvantaged by the fact that briquette production needs a lot of money 9(69.2). The other reported challenges included lack of training 5(38.5%), the high-risk nature of briquette production 4(30.8%) and time consuming (23.1%) as well as low wages (15.4%) with one respondent (7.7%) highlighting the challenge of lack of spousal support (see Table 7 below).

Table 7: Challenges women face in briquettes production

Role in Briquette Production Enterprise	Frequencies (percentage)		
	Male	Female	Total
Need a lot of money	2(33.3)	7(100)	9(69.2)
Time consuming	1(16.7)	2(28.6)	3(23.1)
High risk	2(33.3)	2(28.6)	4(30.8)
Lack of training	1(16.7)	4(57.1)	5(38.5)
Low wages	-	2(28.6)	2(15.4)
Lack of spouse support	1(16.7)	-	1(7.7)
Others (specify)	1(16.7)	-	1(7.7)
TOTAL	8(100)	17(100)	25(100)

The findings from the qualitative data reveal that women in the briquette production business encounter a number of challenges which often inhibit their ability to engage fully across the value chain and reduce their potential for economic gain and leadership within the sector. A recurring concern voiced by multiple participants was the physical strain associated with certain stages of production. Most manual machines used in the briquette enterprise require significant strength, which restricts women's participation in core production activities. One participant explained,

“These machines are very hard to operate; they need a lot of energy. There is no way you are going to get women to work with manual machines,” This points out how technology design inherently favours male workers (Female KII, Mpigi).

Beyond machinery, women are also affected by time constraints and domestic responsibilities. Several participants noted that balancing work and household duties, including childcare and food preparation, often forces women to miss training sessions or arrive late for production activities.

“The biggest challenge that women have is time since they need to balance work and family responsibilities,” one participant observed. There is clearly a gender imbalance in unpaid care work (Male KII, Mukono).

Women who are tasked with sieving charcoal dust or preparing biochar often work with limited or no protective gear. “When we are sieving the charcoal dust, we breathe it in which affects our health, but we try to add water to reduce the dust,” shared a female participant (Female IDI, Mukono), pointing out both exposure and the coping mechanisms they adopt. Sexual harassment and gender-based discrimination also surfaced as significant concerns, particularly for women involved in raw material collection or sales. In some cases, male customers and community members have made inappropriate advances.

“When women go out to supply briquettes, some of these men start touching them... that is sexual harassment,” noted a respondent, drawing attention to the unsafe conditions women navigate outside the production site,” (Male KII, Kampala).

Economic constraints further limit women's involvement. Many lack access to startup capital or collateral for loans, restricting their ability to purchase equipment or begin their own production.

“The biggest barrier I see for the women is that they do not have working capital. If one has no cash, there is no way they will be able to start the business,” (KII Female Mpigi).

Additionally, social norms and limited spousal support remain critical barriers to women's advancement in briquette production. Some women are discouraged or even forbidden by their husbands from participating in training or enterprise activities. One of the men noted;

“Some men don’t allow their wives to come here to learn. They think if she comes, she will start drinking or become adulterous,” (male participant, KII Kampala).

The above view illustrates the control some men exert over women’s mobility and opportunities. Despite these obstacles, many women have got resilience and innovation in navigating production roles, often volunteering to train others, take on marketing tasks. However, to ensure more participation there is need for gender awareness as well as training tailored to enhance women’s participation in briquette production.

4.2.5 RAW MATERIALS USED IN BRIQUETTE PRODUCTION

Raw materials form the foundation of the briquette production process. The type, availability, and quality of raw materials influence the choice of production method, briquette quality, and the overall cost of production. The baseline survey findings reveal that most briquette enterprises rely on locally available agricultural waste and biomass residues for their production.

Commonly used raw materials include charcoal dust, maize cobs and stalks, cassava peels, banana peels, sugarcane bagasse, groundnut husks, sawdust, and waste paper. Charcoal dust remains the most dominant input and is often collected from markets or charcoal-selling areas. Maize cobs and stalks, readily available after harvest seasons, are used in both carbonized and uncarbonized forms. Cassava and banana peels, along with sugarcane bagasse and groundnut husks, are sourced from households, farms, and processing centres—offering a renewable and affordable energy base. Sawdust, obtained from carpentry workshops and lumber yards, and waste paper, occasionally used as a binder or fuel extender, supplement these raw materials depending on availability.

These materials are valued for being low-cost, locally accessible, and environmentally sustainable alternatives to traditional wood fuels and charcoal. However, their seasonal availability and variability in quality can disrupt production continuity. For instance, during rainy seasons, drying maize cobs or banana peels becomes challenging, which slows production and compromises briquette quality.

The collection of raw materials is predominantly manual and labour-intensive. While both men and women participate in the process, interviews revealed that men mainly handle tasks involving transportation and carbonization, particularly when large quantities or heavy lifting are required. Women are more involved in sorting, sieving, and drying raw materials—activities that are less physically demanding but time-consuming and requiring detail-oriented labour.

One of the participants shared:

“We use charcoal dust, clay, molasse, termite soil and cassava flour. The raw materials are accessible because we normally use what is surrounding us like those banana peelings, the charcoal dust... maybe the clay, because we get it from far,” (Female KII, Wakiso).

Challenges associated with raw material handling include health risks from exposure to dust without protective gear, high transportation costs for collecting waste across scattered urban sites, and inconsistent quality due to lack of standardization or inadequate drying.

In addition to local experiences, global research affirms the use of agricultural waste as a sustainable input for briquette production. One of the key advantages of using materials such as corn stover, maize cobs, sugarcane leaves, and rice husks lies in their wide availability and accessibility, particularly in agrarian regions like Uganda. According to Sanchez et al. (2022), in the context of increasing global energy demand and growing climate change concerns, briquettes especially those derived from agricultural waste represent a viable and renewable energy alternative.

4.3 MACHINERY USED FOR BRIQUETTE PRODUCTION

Findings show that the majority of the respondents (82.76%) use manual machines for briquette production. This implies that briquette production is labour intensive considering you need a lot of manpower to be able to produce a briquette.

Table 8: Machinery used for briquette production

Machinery used for briquette production	Frequencies (percentage)		
	Male	Female	Total
Manual machine	16(80)	8(88.9)	24(82.8)
Mixer	3(15)	1(11.1)	4(13.8)
Carbonizer	1(5)	-	1(3.5)
Total	20(100)	9(100)	29(100)

Qualitative findings are in line with the above statistics. During a discussion with a female IDI participant, she mentioned that her role is looking for charcoal because the manual machine needs a lot of energy to operate “.... Looking for charcoal dust and at times mixing it because the briquette machine that we have is manual and it needs a lot of energy to operate it,” **(Female IDI, Wakiso).**

Voices from the KII were not different about the current briquette machinery being used in the briquette enterprises;

“Some of the barriers I see that prevent women from participating in briquettes, there is this machine which uses power, if someone had that one, you would get women to work because as someone is operating the machine, then they can carry the briquettes for drying but using the manual machines, there is no way you are going to get women to work because they are very hard to operate, they need a lot of energy.” (Female KII Wakiso)

The machinery employed in briquette production across the enterprises that were visited varies considerably on type, functionality, and operational challenges, significantly shaping production capacity and labour dynamics. The majority of respondents reported relying heavily on manual and semi-manual machines, with limited availability of fully automated equipment.

Most enterprises utilize manual briquette presses or extruders that require considerable human labour to operate. As described by one participant,

“We have 3 manual machines of which 2 of them are properly functioning. These machines require a lot of physical energy to operate, which is why men are usually the ones handling production,” (Female KII, Mpigi).

The same participant expressed a strong desire for mechanization to ease the workload: *“We are fighting hard to get an automatic power machine that can mix and produce briquettes to reduce the burden on workers.”* Another enterprise reported using a mixture of manual and electric machinery, though maintenance issues persist. One of the participants noted;

“We have an electric extruder, electric mixer, and an electric crusher, but sometimes they do not function properly. Spare parts are hard to find locally, so machines are never 100% efficient,” (Female KII, Wakiso).

This participant’s voice emphasizes the operational limitations imposed by equipment breakdowns and supply challenges. Several female participants expressed frustrations about machine reliability. One explained,

“We purchased an electric machine but it did not function and was a loss. No locally available machine is without issues, so we have to navigate with what we have,” (Female KII, Wakiso).

The participant’s voice above illustrates the challenges of accessing durable, high-quality machinery for the production of briquettes.

Health and safety considerations are also associated with machinery use. Protective gear such as gloves, masks, and a pair of gumboots are sometimes provided. ***“We encourage the use of masks and gumboots while in production. The production manager ensures safety protocols are followed,”*** shared a respondent, highlighting efforts to mitigate health risks during machine operation **(Female KII, Wakiso)**. Some enterprises reported inadequate safety equipment: ***“We lack gloves, safety boots, and overalls; workers mix with bare hands,” underscoring persistent occupational health challenges,” (Female IDI, Wakiso).*** The power supply system varies; some enterprises operate fully manually, while others have electric power or solar systems.

Those with solar-powered dryers, to support the production process indicated that they still have to use manual labour: ***“We have solar systems and dryers, along with manual machines,” highlighting a mix of traditional and renewable energy technologies (Female IDI, Mukono).*** Several respondents noted that machine size and capacity are misaligned with market demand, causing bottlenecks;

“Our drying rack can accommodate over five tons, but machine production capacity is low compared to the demand we receive, making it difficult to maintain consistent supply,” reported one participant,” (Female KII, Wakiso).

Efforts to train workers on machine operation are mostly hands-on, with few formal or gender-tailored programs. “We provide practical training on machinery, with experienced workers mentoring new ones,” **(Female KII, Mpigi)**. However, some noted that the physical intensity of manual machines deters female participation:

“Women cannot operate manual machines because they require a lot of energy; if we had power machines, more women would be involved,” reflecting the gendered implications of equipment design. (Female KII, Mukono)

In summary, briquette production machinery in the studied enterprises largely consists of manual and semi-automatic equipment, often constrained by maintenance challenges, limited spare parts, and power supply issues. These limitations influence gendered labour divisions and operational efficiency. Upgrading to more reliable, user-friendly, and mechanized equipment, accompanied by adequate safety provisions and training, is critical for enhancing production capacity and inclusivity.

4.4 GENDER AND PARTICIPATION IN BRIQUETTE MARKETING AND DISTRIBUTION

The findings indicate that the overall participation in the marketing and distribution of briquette products and services is relatively low, with only 44.4% of all respondents involved in these activities. Notably, male respondents reported significantly higher participation (60%) compared to females (25%). This suggests a gender disparity in access or engagement with the marketing and distribution components of the briquette value chain.

Table 9: Marketing and distribution

Marketing or distribution of briquette products or services	Frequencies (percentage)		
	Male	Female	Total
Yes	6(60)	2(25)	8(44.4)
No	4(40)	6(75)	10(55.6)
Total	10(100)	8(100)	18(100)
Total			

With regard to the tasks involved in marketing and distribution, the baseline survey findings show that only men, 9(64.29%) are involved in organizing the transportation of finished briquettes to local or international markets. The findings also revealed that 6(40%) men are engaged in promotional activities to raise awareness of the benefits of

6(40%) men are engaged in promotional activities to raise awareness of the benefits of using briquettes over traditional fuels like charcoal and firewood and customer education, compared to less females involved. This implies that there is gender inequality when it comes to distribution of tasks in briquette enterprises thus a need for gender awareness and training regarding transportation, marketing and customer education tasks.

Table 10: Tasks involved in briquette production

Variables	Frequencies (percentage)		
	Male	Female	Total
Transportation			
	9(64.3)	-	9(60)
	5(35.7)	1(100)	6(40)
	14(100)	1(100)	15(100)
Marketing			
	6(40)	1(100)	7(43.8)
	9(60)	-	9(56.3)
	15(100)	1(100)	16(100)
Customer Education			
	8(53.3)	2(100)	10(58.8)
	7(46.7)	-	7(41.2)
TOTAL	15(100)	2(100)	17(100)

While the quantitative interviews show that majority of the women were not involved in marketing and distribution, the qualitative interviews revealed the contrary. It was revealed that many women are involved in marketing and distribution, especially when they are not able to take part in the heavy production work. Their roles include finding customers, delivering briquettes, and explaining how the briquettes are used and why they are a better option compared to charcoal or firewood. Some women go door to door to talk to people in the community about briquettes. One participant shared;

“I used to just go to people, tell them about the briquettes we make, then they would come and buy,” showing how marketing often starts with basic word of mouth efforts,” (Female IDI, Wakiso).

Women are also involved in building customer relationships by explaining the benefits of briquettes, especially their long burn time and cost savings advantage. For example, one participant noted, ***“Our customers who buy them tell us that one piece can work for them the whole day,” (Female IDI, Mukono)*** and most of them indicated that they preferred the honeycomb type of briquettes. The participants however, noted that the process of marketing and delivering briquettes is not always easy. Transport is one of the biggest problems. Several respondents said they do not have delivery vehicles, so they walk long distances or using Boda Bodas, which is costly. One participant explained,

“We get challenges because as you are looking for the market, you have to look for means of transport, we end up putting in a lot of money,” (Female IDI, Wakiso).

In some areas, women face additional risks of sexual harassment when doing deliveries or interacting with customers. One male participant noted, ***“Some of these men start touching them when they go out to supply briquettes,” (Male KII, Kampala).*** Despite these challenges, women continue to take part in marketing because it is one of the areas where they can contribute actively. They often know how the product works because they use it at home, and this helps them convince others to buy. ***“It is easy for a woman to market these briquettes because they use them and see how good they are,”*** said one of the female KII participant from Wakiso.

All in all, marketing and distribution provide an important space for women’s participation in the briquette value chain. While there are difficulties such as lack of transport, exposure to harassment, and financial limitations, their knowledge of the product and commitment to promoting clean energy remain strong. With better support like safe transport options, marketing tools, and customer education, women could play an even bigger role in expanding the use of briquettes in their communities.

While participation in marketing and distribution of briquettes remains relatively low particularly among female employers, understanding the locations where briquettes are commonly sold is essential to identifying potential entry points and barriers within the value chain. This insight can help explain existing gender disparities in marketing roles and inform strategies to enhance women's involvement in briquette distribution activities. Over 54% of both male and female respondents agreed that briquettes are commonly sold at briquette production centres compared to the rest of the mentioned sites in the table below. This shows that the project should train concentrating on how to maximize marketing and distribution of briquette products and services at the briquette production enterprises.

Table 11: Sites where briquettes are commonly sold

Sales outlets for Briquettes	Frequencies (percentage)		
	Male	Female	Total
Market	6(30)	-	6(21.4)
Briquette production centres	13(65)	2(25)	15(53.6)
Shops	1(5)	1(12.5)	2(7.1)
Others (Specify)	7(35)	5(62.5)	12(42.9)
Total	27	8	35

According to the qualitative interviews, briquettes are mostly sold within the community and through personal connections, but some enterprises have managed to reach broader markets including institutions and small businesses. The most common sites for selling briquettes include schools, poultry farms, local markets, households, and roadside food vendors.

In many cases, schools are key customers. One participant explained,

“She (a staff member) constructs energy cooking stoves in two schools already and she also sensitized them. At the same time, we are getting the market from these schools, because they are taking our briquettes” (Female KII, Wakiso).

These institutions often purchase briquettes in bulk because they need reliable cooking fuel for large numbers of students.

Poultry farms are another important market. One participant said, farms use briquettes to keep chicks warm, especially during colder months.



“I used to stay near this poultry farm so I went to these gentlemen and told them that we sell briquettes, and they came here and bought. They still ask us till now”

Figure 3: Briquette use at a poultry farm

“The people that buy these briquettes, some of them are these guys on the streets that make chapatis,” said one participant, highlighting the demand among informal food sellers (Male KII, Kampala).

Local markets and trading centers are used by some enterprises, although this often comes with challenges. One participant shared that they had tried selling in places like Wandegeya and Owino markets, but later stopped due to limited production capacity.

“We tried having branches in Wandegeya market, in Owino market but we ended up being disappointed because of the limitation in production,” (Female KII, Kampala).

Home deliveries are also common, especially when customers are close to the production site.

“Yeah, they are easily accessible because my place is not far from the road and I am known in this area for producing these briquettes,” said one participant who mainly sells from home (Female KII, Mpigi).

The findings reveal that the most common sales sites for briquettes are schools, poultry farms, small businesses, markets, and surrounding homes. However, limited transport, low production volumes, and high costs of outreach prevent many producers from expanding their market reach. With better production tools and more organized distribution channels, these sales sites could grow and support wider adoption of briquettes.

4.5 MANAGEMENT AND ADMINISTRATIVE ROLES

4.5.1 WOMEN INVOLVEMENT IN THE MANAGEMENT OR ADMINISTRATION

From the findings, majority of the men (85%) and women (89%) agreed that women are involved in management and administration roles in briquette production enterprises while 4(13.8%) disagreed. According to majority of women (62.5%) and nearly half of the men (47.1%), women are largely in supervision, followed by finance and record keeping (17.7% of the men as shown in Table 12).

Table 12: Women roles held in management or administration

Roles held in management administration	Frequencies (percentage)		
	Male	Female	Total
Finance	3(17.7)	1(12.5)	4(16.0)
Planning	1(5.9)	2(25.0)	3(12.0)
Record-keeping	3(17.7)	-	3(12.0)
Supervision	8(47.1)	5(62.5)	13(52.0)
Others specify	2(11.8)	-	2(8.0)
Total	17(100)	8(100)	25(100)

Qualitative findings also indicate that across various briquette enterprises, women hold important responsibilities, commonly in financial management, marketing, staff coordination, customer care, training, and logistics. While the level of involvement differs between enterprises, many women are at the heart of daily operations, often juggling multiple roles to ensure the smooth running of the business.

In several cases, women are entrusted with managing finances. They handle payments, track income, and manage books of account. One participant noted,

“I handle the finances... we are not a big enterprise that may need bigger management or more administrators. So, it is just me,” (Female KII, Mukono).

Others spoke of women taking on formal administrative titles, as illustrated by one enterprise owners, “Our accountant is also a woman... the administrator is female, and we have two ladies on the board” (Female KII, Wakiso).

Women are also central to marketing and customer engagement. In many enterprises, they promote briquettes within their communities, relying on their own experience as users of the product to convince others. ***“It is easy for a woman to market these briquettes because they use them and see how good they are,”*** one participant explained, pointing to the natural connection between women and household energy needs **(Female IDI, Wakiso)**. In some enterprises, women lead the entire sales function. For instance, one female briquette enterprise owner explained;

“I do the marketing and handle client deliveries myself... I would like to acquire those electric machines to ease production,” (Female KII, Mpigi).

Another key area of women’s involvement is training. Some women, especially those who have been part of the enterprise for many years, are responsible for mentoring new workers and sharing technical skills. “Most of the people that work here, I am the one who trains them. I prepare the biochar, and I dry it,” (Female IDI, Wakiso). This shows the value of experience and how women can lead through skill-sharing even without holding formal leadership titles.

In several enterprises, especially those with fewer staff or simpler structures, women take on multiple responsibilities without formal role definitions. They coordinate raw material procurement, manage records, monitor staff activities, and ensure customer orders are fulfilled. This is particularly common in women-led businesses, where one or two individuals carry the administrative load.

However, while women are active in management, their involvement is not always evenly distributed across all enterprises. Some businesses still rely on men for high-level decision-making, while women are more engaged in supporting roles like marketing and finance. One participant observed;

“The men are the ones in charge, but the women are in marketing,” reflecting the limitations that still exist in some settings (Male KII, Kampala).

Despite these gaps, women’s leadership in management and administration remains strong and essential. Whether through formal roles or informal coordination, they provide critical oversight and guidance in day-to-day operations.

4.5.2 OPPORTUNITIES FOR WOMEN TO TAKE ON LEADERSHIP ROLES

As shown in Table 13 below, over 83% of the male and female employees agreed that women have equal opportunities to take on leadership roles in the briquette enterprises. This can be attributed to the workers awareness of their counterparts’ strengths and, therefore, believe female employees are also capable in the leadership roles.

Table 13: Opportunities for women to take on leadership roles

Agree whether women have equal leadership opportunities	Frequencies (percentage)		
	Male	Female	Total
Yes	17(85.0)	7(77.8)	24(82.8)
No	3(15.0)	2(22.2)	5(17.3)
Total	20(100)	9(100)	29(100)

4.5.3 CHALLENGES WOMEN FACE IN MANAGEMENT AND ADMINISTRATION OF BRIQUETTE ENTERPRISES

In Table 14 below, majority of both men and women 16(57.1) indicated that family responsibility was major constraint for women in management roles. According to the women, spousal discouragement was the second challenge as indicated by (44.4%) followed by time constraints and lack of childcare support. For the men the second challenge for women in management was time constraints (47.4%) followed by lack of child care support and spousal discouragement. Other constraints include low education.

Table 14: Challenges women face in the management or administration of briquette enterprises

Challenges	Frequencies (percentage)		
	Male	Female	Total
Lack of childcare support	4(21.1)	3(33.3)	7(25)
Family responsibilities	9(47.4)	7(77.8)	16(57.1)
Spouse discouraged me	4(21.1)	4(44.4)	8(28.6)
Low education	2(10.5)	2(22.2)	4(14.3)
Time constraints	9(47.4)	3(33.3)	12(42.9)
Others (Specify)	4(21.1)	-	4(14.3)

The interviews reveal that although women play key roles in managing briquette enterprises, they continue to face several challenges that limit their full participation and growth in leadership positions. As indicated in Table 14 above, one of the major difficulties is the burden of balancing work with domestic responsibilities. The findings show that as women take on managerial tasks, they also have to care of work in their homes and families as part of their main tasks, which limits the time and energy they can dedicate to the enterprise. As one participant put it,

“Women might face challenges like balancing work with family responsibilities, but our director tries to accommodate everyone” (Female IDI, Wakiso).

Lack of transport and capital also affects women in administrative roles. Women who are in charge of sales and marketing often have to move from one place to another to deliver briquettes or reach new customers, but they struggle without reliable transport.

“I do not have a car for marketing. The transport costs are high, and yet clients want us to deliver,” shared one enterprise owner who handles most of the administrative work alone (Female KII, Mpigi).

Another challenge is limited access to better tools and equipment, which makes it harder for women to grow the business or manage operations efficiently. One participant explained how expensive equipment prevents her from scaling up, saying, “I would want to get a mixer and a crusher, I am actually working hard to get them but they are very expensive” (Female KII, Mukono).

Some women also face low self-confidence and are overlooked for leadership roles because of gender norms. In some enterprises, women only participate in areas like marketing, while men control production and decision-making. One male KII in Kampala explained: “The men are the ones in charge, but the women are in marketing.” This shows that while women are capable, they are not always given equal opportunities or encouraged to take on broader responsibilities.

In some cases, women’s roles are informal and not recognized, even though they contribute significantly to training, organizing, and supervising. Their input may not be valued as leadership simply because it doesn’t come with an official title or position. Moreover, enterprises with no formal structure often depend on women to manage several tasks without giving them a clear leadership path.

In summary, women in briquette enterprises face a mix of practical and social challenges in management and administration from balancing home duties and lacking transport to facing low recognition and unequal access to resources.

4.6 BUSINESS ENVIRONMENT AND SUPPORT FOR WOMEN’S EMPOWERMENT

4.6.1 LENGTH OF STAY IN THE BUSINESS ENTERPRISE AND MOTIVATION

The findings indicate that the majority of the respondents had worked for an average of 3.5 years. Over 83% of the respondents explained that their stay in briquette enterprise was motivated by the good pay, followed by 77.8% who said work was manageable with a small proportion (5.6%) who indicated that machines were user friendly as indicated in Table 15 below.

Table 15: Stay in the enterprise by the respondents

Facilitating factors in the enterprise	Frequencies (percentage)		
	Male	Female	Total
Work is manageable	6(60)	8(100)	14(77.8)
The pay is good	8(80)	7(87.5)	15(83.3)
Machines are user friendly	1(10)	-	1(5.6)
I have no other choice	-	-	-
Others(specify)	1(10)	1(12.5)	2(11.1)

The lack of testimonies about the user-friendliness of the machines among women calls for deployment of user-friendly gender-inclusive briquette machinery. Participants were asked about their monthly earnings, to gauge if this could be a motivation to engage in the sector. The findings indicate a large proportion of the respondents 10(35.7) earned between 120,001-200,000 Uganda shilling equivalent of \$31.6 – \$52.6, followed by 8(28.57) who earned 20,001-40,000 (\$5.4–\$10.9 USD). Two (7.14) indicated were earning less than 20,000(\$5.4USD). Only 1(3.57) earned 400,000+ (\$108.8) with most of the women earning less than men in almost all categories (see Table 16 below).

Table 16: Monthly earnings of the respondents from briquette enterprises

Employees' remuneration at the briquette enterprises	Frequencies (percentage)		
	Male	Female	Total
Less than 20,000	1(5.3)	1(11.1)	2(7.1)
20,001-40,000	7(36.9)	1(11.1)	8(28.6)
40,001-80,000	-	3(33.3)	3(10.7)
80,001-120,000	3(15.8)	1(11.1)	4(14.3)
120,001-200,000	7(36.8)	3(33.3)	10(35.1)
400,000+	1(5.0)	-	1(3.6)
Total	19(100)	9(100)	28(100)

4.6.2 ENTERPRISE SUPPORT FOR WOMEN'S EMPOWERMENT IN BRIQUETTE PRODUCTION

Participants were asked to indicate how supportive their enterprises were towards the empowerment of women in briquette production. The majority (48.3%) considered their enterprises very supportive, while 34.5% indicated minimal support. However, 10.3% reported their enterprises as not supportive at all, and 6.9% were not sure (see Table 17 below).

Table 17: Level of support initiatives for women in the enterprise

Enterprise Support Level	Frequencies (percentage)		
	Male	Female	Total
Very Supportive	7(35.0)	7(77.8)	14(48.3)
Minimal Support	9(45.0)	1(11.1)	10(34.5)
Not Supportive	3(15.0)	0	3(10.3)
Not Sure	1(5.0)	1(11.1)	2(6.9)
Total	20(100)	9(100)	29(100)

These findings show that while nearly half of the respondents see strong institutional support, a substantial portion experience either limited or no support, pointing to inconsistencies in empowerment efforts across enterprises.

Qualitative data validates this mixed picture. For example, a participant, explained that although women are mostly engaged in marketing and finance roles, their involvement in briquette production is limited due to the physical demands and energy requirements of operating manual machinery.

“The two women in my enterprise work in marketing, finance, and also cooking for the team. The rest of the work is done by men since they are energetic and can run machines, mix materials, and do other tasks. Women prefer to stay clean and avoid dirty work, and being perceived as the weaker sex limits their involvement in production.” (Male KII, Kampala)

Such perceptions, combined with infrastructural challenges, contribute to the minimal or uneven support women receive at enterprise level . Similarly, insights from another participant, emphasized the need to mechanize production processes to better accommodate women’s participation. She stated,

“If we mechanize the system by bringing machines that do not require much physical energy, women can actively participate in briquette production.” (Female IDI, Mukono)

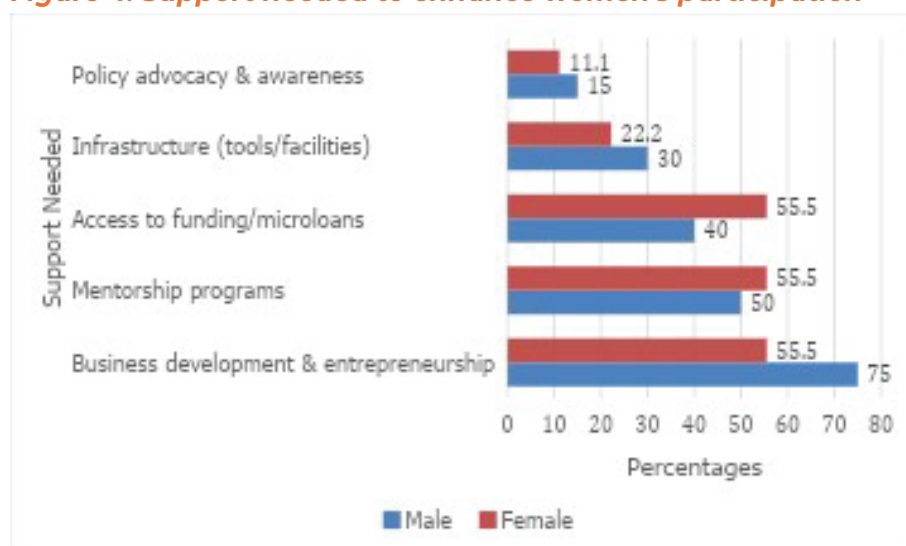
This reflects the view among many respondents that infrastructural limitations, such as reliance on manual and labour-intensive equipment, continue to hinder women’s full empowerment within the briquette sector.

4.6.3 SUPPORT NEEDED TO ENHANCE WOMEN’S PARTICIPATION

Participants identified several forms of support that would enhance women’s involvement in the briquette sector. The most cited were business development and entrepreneurship training (75% of the men and 55.5% of the women), mentorship programs (55.5% of the women and 50% of the men), and access to funding or microloans (55.5% of the

women and 40% of the men) as shown in Figure 3 below. Fewer respondents selected infrastructure support and policy advocacy and awareness.

Figure 4: Support needed to enhance women's participation



This multi-response data highlights a significant demand for skills training and mentorship, alongside capital support, to scale women's participation in the sector. The qualitative interviews provide additional depth on these support needs. For instance, a male participant emphasized the importance of capacity-building initiatives, observing that many women involved in briquette production face barriers due to lack of training in marketing and production techniques, which limits their ability to expand their enterprises effectively. Another participant pointed out the role of mechanization and access to appropriate technology to ease women's participation:

"Women don't have the energy to run the machines, so mechanizing the system with machines that do not need manual energy would encourage their involvement." (Female KII, Mpigi)

A participant also noted that limited access to funding constrains women's ability to acquire improved machinery or expand production, reinforcing the need for accessible microloans or financial support programs:

"Without enough capital, women cannot afford to buy better machines or scale up production. Most rely on traditional manual methods because they lack access to loans or funding, which limits their growth potential." (Female IDI, Wakiso)

The demand for mentorship programs was also echoed by female participants who underscored the value of mentorship in boosting women's confidence and technical knowledge, enabling them to overcome gender-based obstacles within the sector.

"Mentorship has been crucial for me and many women in this field. It helps build confidence and provides practical skills that empower us to face challenges and break through gender barriers in the briquette business." (Female KII, Wakiso).

4.6.4 EXISTENCE OF INITIATIVES TO INCREASE WOMEN'S PARTICIPATION IN BRIQUETTE PRODUCTION AND MARKETING

Respondents were also asked whether their enterprises had specific initiatives to enhance women's participation. Overall, 35.71% reported such initiatives exist, while another 35.71% said no, and 28.57% were unsure (see Table 19 below).

Table 18: Existence of initiatives

Existence of Initiatives	Frequencies (percentage)		
	Male	Female	Total
Yes	4(21.1)	6(66.7)	10(35.7)
No	9(47.4)	1(11.1)	10(35.7)
Not sure	6(31.6)	2(22.2)	8(28.6)
Total	19(100)	9(100)	28(100)

From the data captured while collecting the qualitative data, it revealed several initiatives, both formal and informal, aimed at enhancing women's participation in the briquette value chain. Although not widespread, a few enterprises have taken deliberate steps to include women in their operations and offer informal mentorship and training as one of the female enterprise owners indicated:

"We offer training and mentorship to women who show interest in briquette production. Most of the women we work with join through peer influence and gradually gain skills." (Female KII, Wakiso).

Another participant mentioned that she has adopted a community-based recruitment and exposure model:

"We invite women from the community to observe our production process and then enroll them into hands-on sessions. Though informal, it helps women gain confidence and practical experience." (Female IDI, Wakiso).

There were some of the enterprises who focused on training and financial literacy as an initiative they use:

"We integrate women in our business incubation programs and offer basic business skills, including financial management. It's not exclusive to women, but we deliberately ensure they are part of the intake." (Male KII, Mukono)

While these initiatives differ in approach and formality, they reflect emerging recognition of women's potential in this sector.

As the quantitative findings as shown in the table indicate that only 35.71% of respondents reported the existence of initiatives, qualitative data reveals that such initiatives, where present, are often informal, limited in scope, and heavily reliant on the leadership's personal commitment rather than structured institutional frameworks. For instance, a participant emphasized the lack of formalized structures within enterprises to support women's involvement:

“There is no structured program or policy at the enterprise level specifically to promote women’s involvement. Most efforts are informal and depend on whether the management is personally motivated to include women.”
(Female KII, Mpigi)

Similarly, another participant acknowledged that his enterprise has not implemented any deliberate programs to engage women in production:

“I don’t have women in production because the machines need energy, and we haven’t mechanized enough to make it easier for women. So, participation by women depends more on the willingness of the leader to make space rather than any formal plan.” (Male KII, Kampala)

On another note, some exceptions exist. One participant noted that while they have no official policy, they informally encourage and mentor women who express interest in the sector:

“We try to encourage women to participate, but there is no official program guiding this. It’s often on a case-by-case basis depending on the resources and support we can provide.” (Female KII, Wakiso).

These insights show that the absence of standardized gender-responsive strategies not only limits women's entry into production roles but also affects their ability to thrive and progress in the briquette value chain.

Participants also highlighted the need for intentional policy advocacy and institutional frameworks that embed gender inclusivity within briquette enterprises. For example, one observed that while women show great potential and dedication, ***“the lack of gender-sensitive infrastructure and enterprise policies creates a barrier that limits their access to production roles and leadership within the sector.”***

In conclusion, this section shows that while there is growing awareness and some effort toward supporting women's empowerment within briquette enterprises, such efforts are uneven and largely informal. Quantitative data shows that only a part of enterprises have specific initiatives in place to enhance women's participation, and qualitative evidence reveals that these often lack a formal policy. Support for women tends to focus on marketing and administrative roles, with limited inclusion in core production activities due to physical, technical, and infrastructural constraints. Mechanization,

mentorship, and capacity-building emerged as critical enablers, yet access to these remains limited. The findings underscore the need for enterprise-level strategies that institutionalize gender-responsive approaches, shifting from informal, leader-dependent actions to structured programs that prioritize inclusion, equity, and sustainability in women's participation across all segments of the briquette value chain.

5. SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE FINDINGS

The baseline study provides insights into women's participation in briquette production and marketing as an alternative clean energy source in Uganda. The findings reveal both opportunities and barriers across the briquette value chain, with important implications for gender equity, enterprise development, and sustainable energy access.

In terms of socio-demographic characteristics, most employees in briquette enterprises are youth aged 18–24 years. The majority have attained primary or secondary education, with men generally having higher levels of education than women. While most respondents are single, qualitative data suggest that married women face significant time and household constraints that limit their ability to engage in production activities.

Briquette production serves as an important source of employment and income for both men and women. Many women rely on this sector as their primary livelihood, often taking on roles such as biochar preparation, drying, packaging, and educating customers. However, due to the labour-intensive nature of production, women tend to earn lower wages and are more frequently assigned to less physically demanding tasks.

Gender roles within the production and marketing process remain clearly defined. Men tend to dominate the physically intensive tasks such as mixing and machine operation, while women are more involved in sorting, drying, and training activities. Although only a small proportion of women (25%) formally engage in marketing and distribution compared to men (60%), interviews revealed that women are active in informal marketing through customer outreach and product demonstrations.

Community perceptions of women's involvement in briquette production are generally positive, with many admired for their participation in traditionally male-dominated roles. Nonetheless, women face numerous challenges, including lack of access to capital, limited training opportunities, domestic workload pressures, health risks from charcoal dust, and exposure to sexual harassment during field activities.

Most respondents reported using manual machines, which are highly labour-intensive and hinder women's full participation in core production tasks. A lack of mechanized equipment, adequate drying space, and consistent energy supply were cited as major infrastructural barriers. These constraints limit the scale of production and reduce opportunities for greater female engagement.

Enterprise support for gender inclusion remains limited, with few organizations having formal policies in place. Some enterprises, however, reported initiatives aimed at increasing women's participation. Despite this, women are still underrepresented in leadership and decision-making roles, although some have taken on responsibilities in training, supervision, and even launching small-scale initiatives of their own.

Although briquettes offer environmental and health advantages over charcoal and firewood, their use remains relatively low, particularly in urban households. Sales typically occur at production sites or through direct delivery, and broader adoption is hampered by price sensitivity and low public awareness.

The study identified several gaps in areas such as access to gender-responsive technologies, financing mechanisms, marketing skills, and policy support. At the same time, it highlights opportunities for women's empowerment through targeted training programs, improved infrastructure, leadership development, and the implementation of gender-inclusive policies and programming.

5.2 CONCLUSION

The baseline survey provides insights into the current status of the target briquette enterprises in the Greater Kampala Metropolitan Area. The study revealed that briquette production presents a source of employment and income for both men and women. However, women's participation in the sector remains constrained, particularly in technical, less physically demanding roles and decision-making roles. Most women are involved in lower tier tasks such as sorting, drying, packaging, and informal marketing, while few are engaged in machinery operation or enterprise leadership. These limitations are compounded by several structural and socio-economic barriers, including limited access to modern briquetting equipment, inadequate capital and financial services, minimal technical training, and heavy domestic responsibilities. Health and safety concerns, particularly related to exposure to charcoal dust and the use of manual tools without protective gear, further affect women's ability to work consistently and productively in the sector.

Despite these challenges, the survey revealed a strong foundation of community support for women's participation in clean energy. Women themselves have shown resilience, innovation, and commitment, taking on informal leadership roles, training others, engaging in customer outreach, and advocating for briquettes as a cleaner, more affordable alternative to charcoal and firewood. While few enterprises have formal gender-inclusive policies, there is clear recognition of the need to create more equitable opportunities within the sector.

For women's engagement in briquette production to be meaningful and sustainable, several strategic priorities must guide future implementation. These include investing in gender-friendly briquetting machinery to ease the physical burden of production, enhancing women's access to capital, financial services, and market networks and expanding technical and business training tailored to women's unique needs. The creation of safe, flexible work environments that accommodate women's caregiving roles while ensuring occupational health standards is also equally important. Sustained community sensitization and the promotion of positive gender norms will also be critical to shifting perceptions and enabling women to take on more visible and influential roles in clean energy entrepreneurship.

Ultimately, the insights from this baseline survey provide a foundation for designing and implementing inclusive interventions that not only increase access to clean energy, but also empower women economically, socially, and professionally.

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