

# Do men and women benefit differently from the productive use of energy? Evidence from the Brong Ahafo region in Ghana

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## Abstract

Productive uses and gender mainstreaming are two priorities of Ghana's energy policy, but they have not been addressed jointly. This paper provides new evidence about how men and women use energy productively in urban areas within the Brong Ahafo region, which display high electrification access rates and significant levels of women empowerment. Three research questions are posed: 1. What is the differential benefit of the productive use of energy (PUE) for men and women? 2. What explains the differences? And 3. Which interventions can successfully address the constraints that men and women face to benefit from the PUE? A multi-methods approach combining quantitative and qualitative analysis is applied to provide answers. In the three towns surveyed, men and women-led enterprises display similar levels of energy consumption and intensity, but men dominate the use of electricity, whereas women dominate cooking fuels. Women's businesses are smaller and operate in a narrow subset of sectors, while men's businesses are more capitalised and operate along a wider set of activities. The promotion of Light Industrial Zones with improved electricity supply in the region has clearly benefitted men over women, but women have benefitted from other policies and overall do not display worse performance than male businesses located in LIZ. Education and exposure to role models have eroded to some extent gender norms determining the kinds of activities that men and women can aspire to at home and at work. Still, many deep-rooted preconceptions prevail. Two types of recommendations are made to further improve gender equality in the productive use of energy: first target the specific needs of men and women in their current roles through for example, finance, energy management education, higher power reliability, equipment and affordable tariffs. Second, support further transformation of gender roles with education, exposure to role models and associations to scale up.

**Keywords:** productive uses of energy, gender, Ghana

## 1 INTRODUCTION

Ghana has walked giant steps to provide universal access to energy, and particularly electricity. The latest statistics show that 84% of the Ghanaian population have a power connection (IEA, 2018), making Ghana one among 8 Sub-Saharan African (SSA) countries with access rates above 80% (IEA-OECD, 2018). These figures are tainted, nevertheless, by low consumption levels and poor reliability. Electricity consumption per capita is well below the SSA average and the average for Lower Middle-Income countries, Ghana's income group according to World Bank's classification (Pueyo, 2018). Furthermore, chronic unreliability causes significant losses for local firms. As a result, more than 50% of them need to resort to a generator to guarantee their supply (World Bank, 2013).

On one hand, low power consumption figures are a symptom of low productive uses in Ghana. On the other hand, poor quality of electricity supply is considered the second most important constraint to business activities in the country, after access to finance (World Bank, 2013a). Whether good electricity supply causes economic growth, or instead economic growth causes good electricity supply is an issue that remains unresolved in the literature ((Best & Burke, 2018; Paul & Bhattacharya, 2004). What is clear is that low productive uses damage the financial sustainability of electrification

programmes. The poor state of the Ghanaian electricity utility is in part a consequence of the low commercial and industrial demand in rural areas (Pueyo, 2018). This is in spite of the widespread use of generators in the country, which points at a large latent demand for grid electricity. Productive uses of energy and improved reliability have therefore become two distinctive priorities of Ghana's energy strategy (MoE, 2010; Energy Commission, 2010).

The Program for Sustainable Economic Development (PSED), presented by the Ghanaian Ministry of Trade and Industry and implemented by GIZ, is one of the interventions aiming at increasing productive uses of energy in the country. The program combined the provision of electricity, improvement of other infrastructures, business and environmental management training and clustering of enterprises in light industrial zones (LIZ). The improved access to electricity jointly with other interventions was expected to increase productivity by facilitating the use of appliances. With this aim, the programme supported a total of 15 LIZ in five regions of Ghana between 2006 and 2014. In order to check if expected impacts were fulfilled, the program went through two separate impact evaluations. The first, found that electricity supply had not had the expected positive impact on profits. Instead, industrial zones had created a destructive competition, damaging the performance of existing firms (GIZ-RWI, 2011). The second found no significant difference in profits between firms connected and not connected to electricity, with the result being robust across different methods (Peters, Sievert and Vance, 2013). While these evaluations faced some shortcomings, such as small samples and the impossibility to find a credible counterfactual, the results backed previous research showing that electricity is a necessary, but not sufficient input for economic growth (Pueyo & DeMartino, 2018). But, following a tradition of "gender blindness" in energy planning (Clancy, Ummer, Shakya and Kelkar, 2007), both evaluations missed the gender dimension of the intervention.

Taking gender into account for the design and implementation of productive uses of energy (PUE) interventions is important because there is gender division of labour, and different activities have different energy consumption patterns (Clancy et al, 2007). Consequently, PUE interventions that do not take into account gender differences could be biased towards male dominated activities, as these are typically more visible (formalised), more productive, and larger than female activities (Addati, Bonnet, Ernst, Merola, & Wan, 2016b; Campos, Goldstein, McGorman, Boudet, & Obert, 2015; Morton, 2013; De Haan, 2016; Cirera & Qasim, 2014). Furthermore, due to their low participation in the energy sector, and to their heavy reliance on biomass and human physical energy for daily tasks, women's needs often go unnoticed for electricity planners and suppliers (Clancy, Ummer, Shakya, & Kelkar, 2007; Winther, 2012).

Lack of gender-disaggregated data is partly behind the lack of interest on gender equity among energy policymakers (Skutsch, 2005). To address this gap, this paper revisits the LIZ experience in Ghana, this time around with an emphasis on gender disaggregated data. Three research questions are addressed: 1. What is the differential benefit of the PUE for men and women? 2. What explains the differences? And 3. Which interventions can successfully address the constraints that men and women face to benefit as much as men?

The empirical strategy consists of a multi-methods approach, combining quantitative and qualitative methods. Quantitative tools include enterprise questionnaires administered to 400 enterprises (63% male owned and 37% female owned). Randomisation of electricity provision or LIZ location was not possible, as it took place more than a decade ago. Thus, the quantitative analysis consists of differences in means in energy consumption and business performance between men and women enterprises, and OLS regressions to identify the most significant variables that explain performance differences. Qualitative data are used to complement and enrich the quantitative findings, providing the all-important context in which gender norms manifest themselves. Qualitative methods include

Semi-structured interviews (SSI) with 40 men and women workers and entrepreneurs, Key Informant Interviews (KKI) to 10 informants, and Focus Group Discussions (FGD) gathering 80 participants.

The paper is structured as follows: The second section provides the background about gender, energy and employment in Ghana, and describes PUE interventions in our target communities. The third section explains the methodology. The fourth section shows results for each research question. The discussion provides policy recommendations drawing from the results and the final section concludes.

## 2 GENDER AND PRODUCTIVE USES OF ENERGY IN GHANA

### 2.1 Ghana's policy framework for energy, productive uses and gender

The energy policy landscape of Ghana is laden with various policies stretching over the past three decades. The first major energy policy framework of Ghana was undertaken in 1990 by the then National Energy Board (NEB) geared towards energy development in Ghana (ISSER, 2012). The NEB established five key departments (petroleum planning, electricity planning, renewable energy programmes, energy conservation programmes and energy information) (ISSER, 2012, citing Edjekumhene et al., 2001). In succession, the following policies and programmes have been fundamental in the development of Ghana's energy sector within the past three decades: The National Electrification Scheme (NES) (1990); Energy Sector Development Programme (1996-2000); Energy for Poverty Alleviation and Economic Growth: Policy Framework, Programmes and Projects (2001-2009); Strategic National Energy Plan (SNEP) (2006-2020); National Energy Policy (NEP) (2010); Ghana Renewable Energy Policy (2009-2020); Sustainable Energy For All (SE4ALL) Action Agenda of Ghana (2015).

The main goal of the National Electrification Scheme (NES), which came into effect in 1990, was to extend electricity to all parts of the country by 2020. The Energy for poverty Alleviation and Economic Growth programme aimed at developing an energy economy that would ensure a reliable supply of high-quality energy services for all Ghanaian homes, businesses, industries, transport as well as exports. The Strategic National Energy Plan (SNEP) (2006) was developed with the goal of creating a sound energy market that would provide sufficient, viable and efficient energy services for Ghana's economic development. Similarly, the National Energy Policy's (2010) main goal was to develop an energy economy that would guarantee secure and reliable supply of high quality energy services for all sectors of the economy and also contribute to export earnings. The Renewable Energy Act 2011, Act 832 provided the necessary legislative support and framework to boost renewable energy's share in the energy mix. The SE4ALL Action Agenda of Ghana (2015) provided the roadmap for the attainment of the three global 2030 energy objectives.

Strongly embedded within the identified past and present energy policies and programmes have been the overarching goals of enhancing energy accessibility as well as the productive uses of energy. Thus, these policies share lots of similar goals and objectives. Additionally, the National Energy Policy (2010) and the SE4ALL Action Agenda of Ghana (2015) do not only cover the accessibility and productive uses of energy, but also gender issues. These mainly relate to the promotion of modern forms of energy in households to minimize the adverse health effects of the use of wood fuels on women; provisions for ensuring the participation of women in the formulation and implementation of energy interventions; and provisions for building the capacity of women in the energy sector.

The policy, regulatory and institutional framework related to gender mainstreaming in the energy sector is growing in the ECOWAS region. Increasingly, a number of Member States have referred to gender equality in their energy policy documents; have established gender focal units within public sector energy agencies; and have conducted gender audits of energy agencies (ECREEE and NREL, 2015). Key energy policies within the ECOWAS region recognise the gender gap in energy access and

the need to empower women to make productive use of modern energy sources. The 2006 ECOWAS White Paper on a Regional Policy for Increasing Access to Energy Services in Peri-urban and Rural Areas specifically mandates member states to prioritise women's energy needs at the household level. Also, the ECOWAS Renewable Energy Policy (EREP), highlights the need for the creation of opportunities for women to have access to modern sources of energy in a bid to maximise their economic potentials as well as the need to enhance clean energy sources for cooking. Similar to the (EREP), the ECOWAS Energy Efficiency Policy (EEEP) recognises that efficient and clean energy sources are *sine qua non* to bridge the gender gap. It enjoins member states to implement policies that will build the capacity of women as well as get them to actively participate in the energy sector. Building on these, the ECOWAS White Paper for a Regional Policy and the Bioenergy Policy both mandate member states to ensure substantive women participation in the energy decision-making process at all levels.

These policy guidelines have shaped various programmes and projects that seek to empower women to access modern energy sources. The ECOWAS Women's Business Fund, for instance, has supported women groups to access clean energy source (mainly LPG) in Ghana and Senegal. Similarly, the ECOWAS Programme on Gender Mainstreaming in Energy Access (ECOW-GEN) and The West African Clean Cooking Alliance (WACCA) have supported gender-sensitive policy development, and have enhanced capacity of women to engage in awareness creation on clean cooking initiatives.

The ECOWAS regional level policy frameworks have also shaped various national levels' policy options. In Ghana for instance, the 2015 National Gender Policy identifies gendered energy inequality as a critical issue in society that needs to be addressed. The policy therefore envisions to promote sustainable energy sources particularly, for women at the household level. It, however, does not outline how the identified gaps will be closed and also failed to show the nature and extent of gendered energy inequality. More importantly for the topic of this paper, it does not address specifically gender issues in the PUE, failing to bridge the gap between these two important dimensions of Ghana's energy policy.

## 2.2 The case of energy supply for LIZ in Brong Ahafo Region

Within Ghana, this research looks at PUE and gender in three towns in the Brong Ahafo Region. The region was selected because it had been targeted by PUE interventions implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). A partnership between GIZ and the researchers, facilitated fieldwork logistics and access to key informants. Techiman, Tuobodom (which until recently was part of Techiman, but was recently established as a new municipality) and Berekum were the towns selected for fieldwork, due to their large size in comparison to other towns where LIZ had been implemented, and their proximity to each other, allowing for faster transfer of enumerators.

Brong Ahafo is a transition zone between the relatively poorer Northern regions and the more densely populated and wealthier central and coastal regions, where economic hubs of Kumasi and Accra are situated (Peters, Sievert and Vance, 2013). Agriculture is the most important source of income, with commercial crops like maize, yams, cassava, plantain or cocoa. The non-agriculture sector is dominated by trading and the surveyed towns have large markets operating at least once a week. Techiman in particular has one of the biggest markets in West Africa. Manufacturing activities include palm oil production; grain milling, woodworks, nuts roasting, tailoring, shoemaking, welding, and car repair and maintenance services which prevail in the region. Figure 1 shows the location of the fieldwork sites, in Mid-Western Ghana.

Figure 1- Location of Techiman and Berekum



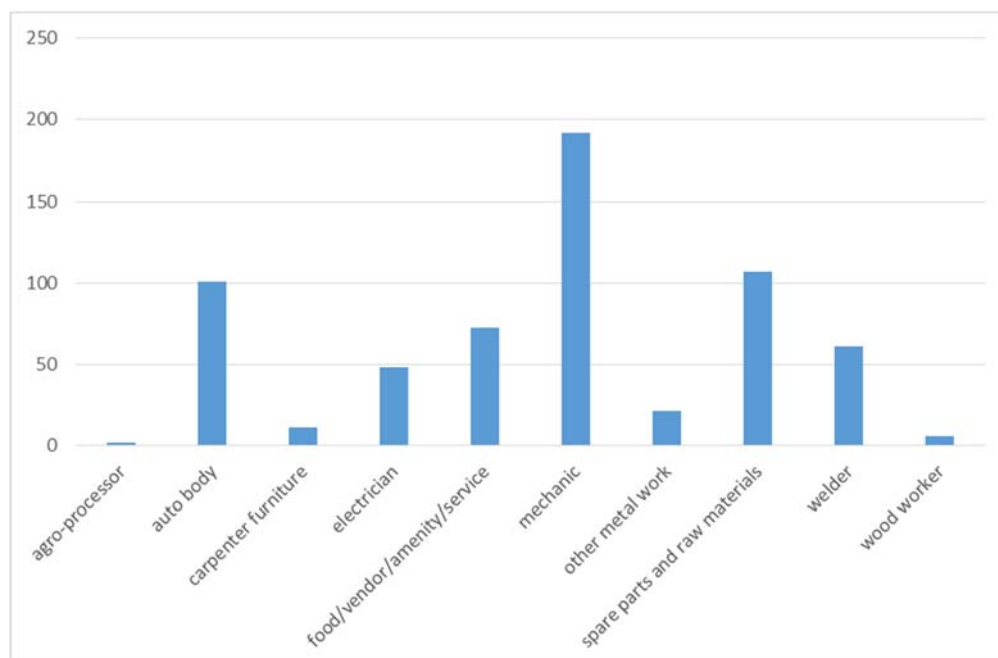
Source: Google maps

Techiman-Tuobodom and Berekum were targeted by the Industrial Zone Development component of the Programme for Sustainable Economic Development, implemented by GIZ from 2007. The promotion of LIZ aimed at expanding Ghana's economic growth beyond the capital and the major cities of the South. Some of the challenges faced by SMEs in the targeted areas were: unsecure land tenure, which decreased willingness to invest; missing access to infrastructure like electricity and roads; unregulated business causing environmental degradation; and road congestion in the town centre. The project provided entrepreneurs with land and business capabilities and served industrial zones with improved infrastructure, such as grid extension, road access, water supply and sanitary facilities, as well as business development services to the enterprises and technical assistance to the district government. The three main actors that participated in project implementation, and their key roles are:

- Local Governments and Business Associations: identified and acquired land; prepared the land for infrastructure; provided access to roads, drains, water supply and latrines, and paid labor costs for electricity hardware installations.
- GIZ: Advised on planning, design, implementation and management of the sites; supported local economic development processes and sets up dialogue platforms; procured and delivered the electricity hardware; supported management and environmental training.
- Utilities: provided technical assistance for network design, cost estimates and installation.

LIZ in Techiman, Tuobodom and Berekum clustered automotive maintenance and related industries and are managed by garages associations. However, since their creation, many other supporting businesses have joined such as restaurants, shops and barbers. Figure 2 shows the number of businesses, per sector of operation, jointly for all LIZ analysed as of the December 2016. Car mechanics are the most frequent trade, followed by autobody and share of spare parts.

**Figure 2- Number of business per sector of operation in Techiman and Berekum LIZs as of December 2016**



Source: authors, from GIZ monitoring data

Table 1 shows the main characteristics of the two towns and their LIZ. In this research, within Techiman municipality we also include Tuobodom, because this new municipality was created by introducing a new border in what used to be Techiman after the time of the LIZ intervention. Even if Techiman municipality is larger, Berekum’s LIZ hosts more enterprises.

**Table 1- Key characteristics of Techiman, Berekum and their industrial zones.**

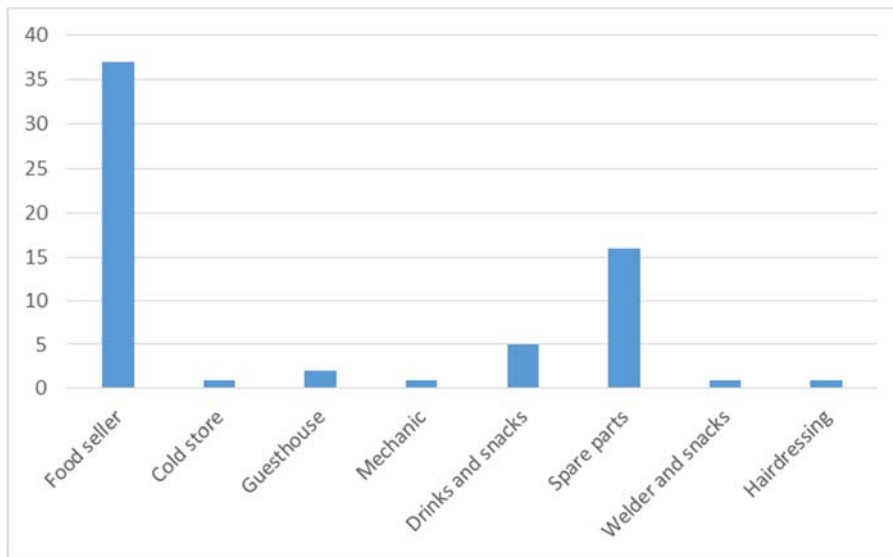
	<b>Techiman-Tuobodom</b>	<b>Berekum</b>
<b>Population of municipality</b>	206,856	129,628
<b>Area of municipality (km2)</b>	669.7	955
<b>Date of grid connection</b>	1990	1990
<b>Implementation of LIZ</b>	2007	2007
<b>Number of plots in LIZ</b>	525	400
<b>Date of electricity connection to LIZ</b>	2007	2008
<b>Number of enterprises at the site (December 2016)</b>	160	477
<b>Number of workers at the site</b>	974	2450
<b>Number of women-led enterprises</b>	11 (7% of total)	72 (15% of total)
<b>Number of enterprises connected to electricity</b>	73 (46%)	200 (42%)

Source: Field survey, 2018

Gender data included in the previous table was extracted from GIZ’s monitoring records. Women’s participation is very small, with just 7% of the total enterprises in Techiman and 15% in Berekum. As

illustrated in Figure 3, food vending is the most common female activity, followed by the sale of spare parts.

**Figure 3- Female owned businesses in Techiman and Berekum LIZ, per sector of occupation**



Source: authors, from GIZ monitoring data

GIZ's rationale for the support of LIZ was that a service package including infrastructure, training, access to microfinance and clustering of enterprises, to take advantage of agglomeration effects, would be more effective than providing these services individually. Electricity in particular would improve business productivity, allowing the use of new equipment (Peters et al, 2013). However, two impact evaluations carried in 2011 and 2013 did not show these positive results.

The first impact evaluation assessed the impact of LIZs on firms' performance and energy usage. It included enterprises within LIZ in Techiman, Berekum and Goaso-Min involved in manufacturing (welding and carpentry) and car repair (car body, upholstery, electricians, other metal work, and mechanics). A before-after comparison was used as counterfactual. Findings showed that access to land was the main reason why companies had relocated to LIZ, with access to electricity being just a secondary reason. There were encouraging signs of investment picking up, as 44% of firms with access to electricity purchased new equipment after relocation, and increased their credit uptake. However, monthly profits and customers per week decreased, due to increased competition among clustered enterprises. Therefore, the LIZ had not led to positive impacts for companies, even if they had benefitted from land and services (Peters, Sievert and Strupat, 2012).

The second impact evaluation extended the scope to include enterprises both in and out of LIZ in Techiman, Berekum, Goaso Min and Nkoranza; and across a wider set of sectors, including services (hairdressing, communications, electrical services, mechanics, and restaurants) and manufacturing (dressmaking, tailoring, metal works, and carpentry). It described energy use patterns in the firms and analysed the impact of electricity use on firm performance. The counterfactual were firms not connected to electricity. No significant effect of electricity on firm performance was found, showing that electricity does not increase income by all means.

This paper does not seek to replicate previous evaluations, but to extend the scope by providing gender disaggregated data, and using a diversity of methods, qualitative and quantitative, as described in the following section.

### 3 METHODS

Our analysis uses a mixed methods approach where quantitative data is drawn from an enterprise survey, and qualitative data from semi-structured interviews (SSI), key informant interviews (KII), and participatory focus group discussions (FGD). Mixed-methods approaches provide the rigour required in complex environments like this, where randomisation of the PUE interventions is not possible and where several gender and entrepreneurship programmes have already taken place, which makes it difficult to isolate their effects (Chambers, 2017).

The identification strategy consisted in comparing energy consumption patterns and business performance of men and women entrepreneurs located in and out of LIZ in Techiman and Berekum. Subsequently we looked for the main reasons that could explain these differences, by looking at correlations between outcomes and independent variables through OLS regressions and using insights from qualitative research.

All data were collected by a gender-balanced team of 10 enumerators and 4 senior researchers from the Institute of Social, Statistical and Economic Research (ISSER) of the University of Ghana, with support from a researcher from the Institute of Development Studies (IDS). Previous to departure for fieldwork, enumerators had 3 days of training about the context and underlying theory of the research, the research tools, and the functioning of Computer Assisted Personal Interview (CAPI) enabled tablets. Fieldwork activities started on the 21<sup>st</sup> of May 2018 and ended on the 1<sup>st</sup> of June 2018. To meet district entry protocols, the project leaders met the Municipal Assembly Chief Executives of Techiman and Berekum, who guaranteed support for the study.

An enterprise questionnaire was used to collect data about enterprise and business owner characteristics, business performance, and energy use patterns, for quantitative analysis. Government bodies could not provide the researchers with an updated census of enterprises. Therefore, we had to design a sampling frame drawing from three sources: a baseline survey undertaken by GIZ in 2007; the enterprise census prepared by LIZ as part of their M&E activities, and observations during a reconnaissance visit ahead of the fieldwork. With a target of 400 respondents, we designed a stratified sample taking into account sector of activity, gender, population, and location in and out of LIZ. Eleven target sectors were selected, with the aim of focusing on enterprises with some employees apart from the owner, and requiring a substantial amount of energy for their operations. This meant excluding petty trading, a sector where many women operate individually in Ghana, that due to its small size and energy consumption was not interesting for our study.

Each enumerator received a sampling frame showing the kinds of enterprises to be targeted and requested to screen the zones in search of respondents. Data were uploaded every day to the central server and monitored by a senior researcher to guarantee high quality. There were no major incidences during fieldwork.

Table 2 shows the characteristics of the sample per location and gender. A 37% share of enterprises are women owned, and 20% of all enterprises are located in LIZ. Female representation within LIZ is significantly smaller than in the total sample, at 20% of enterprises, because the car repair industry is dominated by men. We oversampled female enterprises in LIZ, which is why the share appears higher than shown in the LIZ census prepared by GIZ.

**Table 2- Sample characteristics- Number of enterprises per town, owner's gender, and location within LIZ**

	<b>Berekum</b>	<b>Techiman</b>	<b>Tuobodom</b>	<b>Total</b>
<b>Total</b>	162	169	69	400
<b>Women owner</b>	59 (36%)	61 (36%)	27 (39%)	147 (37%)
<b>Within LIZ</b>	49	48	21	118 (20%)



<b>Women owner within LIZ</b>	6 (12% of LIZ)	3 (6% of LIZ)	3 (14% of LIZ)	12 (10% of LIZ)
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Source: Field survey, 2018

Table 3 shows the characteristics of the sample per sector of activity, and then disaggregated by location in industrial zones. The most frequent sector is vehicle repair, where 22% of enterprises in the sample operate. Other sectors with numerous enterprises are hairdressing, with 16% of the sample, tailoring with 14%, metal works and restaurants, each with 12%.

**Table 3- number and percentage of enterprises per sector of activity, in and out of LIZ**

	<b>Total</b>	<b>% of total</b>	<b>% out of LIZ</b>	<b>% in LIZ</b>
Food preservation (cold store)	19	5%	19	0
Manufacture of grain mill products	15	4%	14	1
Manufacturing of textiles	1	.3%	1	0
Manufacture of wearing apparel	58	14%	58	0
Manufacture of wood and products	12	3%	11	1
Manufacture of fabricated metal products	48	12%	23	25
Manufacture of furniture	15	4%	8	7
Repair and installation of machinery and equipment	11	3%	7	4
Maintenance and repair of motor vehicles	88	22%	19	69
Restaurants	48	12%	37	11
Hairdressing	64	16%	64	0
Bakery	21	5%	21	0
<b>Total</b>	<b>400</b>	<b>100</b>	<b>282</b>	<b>118</b>

Source: Field survey, 2018

KII aimed at improving understanding about cultural and gendered norms in the region and country; Government activities to promote gender equity in PUE; and approaches of electricity suppliers for meeting this goal. A total of 10 key informants were interviewed from the Government and the private sector. Details of respondents are presented in Table 4.

**Table 4- Key informant interview details**

<b>Position of interviewee</b>	<b>Type of organisation</b>	<b>Gender</b>	<b>Location</b>
District Chief Executive Officer	Government	Male	Berekum
Chairman of LIZ	Private sector	Male	Berekum
Gender, Child and Social Protection Officer	Government	Female	Sunyani
NEDCO assistant chief technical engineer	Public electricity utility	Male	Berekum
President of hairdressers association	Private sector	Female	Berekum
Head of hairdressers association	Private sector	Female	Techiman
Head of business advisory centre	Government	Male	Techiman
Chairman of Light Industrial Zone	Private Sector	Male	Techiman
Municipal Assembly Planning Officer	Government	Male	Techiman
District Planning Officer	Government	Male	Techiman

Source: Field survey, 2018

In-depth interviews with men and women explored time availability constraints, gender roles, access to skills and resources, motivations, aspirations, etc. A total of 40 (20 men and 20 women) respondents were targeted, half in each of the towns, and equally split in four groups: women workers or entrepreneurs in female dominated or neutral activities; women workers or entrepreneurs in male dominated activities; men workers or entrepreneurs in male dominated activities; and male workers or entrepreneurs in female dominated or gender neutral activities.

Finally, five mixed sex<sup>1</sup> FGD were conducted in Techiman and Berekum, therefore 10 FGD, with a total of 80 participants. Four different research tools were used to elicit different types of information:

- Tool 1- Community and energy mapping. The objectives of this exercise are: identifying key services and infrastructure that men and women use in the community; where men and women work; the types of work they do; the types of energy they use and how they use them.
- Tool 2- Activity and energy use mapping. This tool supports men and women to talk about the activities they do through the day, classifying them in three groups: unpaid care work; paid work; and leisure or community work. The tool also supports a discussion about the different energy sources men and women use for each of these activities.
- Tool 3- Access to and control over resources. This tool reveals the differences between men and women in terms of their access to and control over household and business resources, including productive assets, natural resources, family labour, income, etc. Access represents the opportunity to use a resource without having the authority to make decisions to sell, exchange or modify it. Control, on the other hand, represents the full authority to make decisions about the use of a resource.
- Tool 4- Gendered value chains. A value chain is defined as the sequence of activities required to make a product or a service from conception, through the different phases of production, delivery to final consumers, and final disposal after use. This activity aims to map the way men and women are involved in the different steps of the value chain. We wood works, metal fabrication, cassava and wearing apparel, due to their male or female dominance and their economic and energy consumption importance for the region.

**Table 5- FGD participants per township, tool and gender**

	<b>Berekum</b>	<b>Techiman/Tuobodom</b>
Community and energy mapping	8 (5 women, 3 men)	9 (4 woman, 5 men)
Activity and energy mapping	8 (4 women, 4 men)	9 (5 woman, 4 men)
Access to and control over resources	7 (3 women, 4 men)	9 (unknown)
Gender value chain	Textiles: 8 (5 women, 2 men) Wood: 6 (all male)	Metal: 7 (all men) Cassava: 9 (4 female, 5 men)
Total	37	43

Source: Field survey, 2018

The analysis of enterprise data starts with descriptive statistics, showing differences in means of a number of indicators for men and women enterprises, and for different regions. Descriptive data is organised around research questions. Firstly, we show differences in energy consumption patterns for productive uses by men and women owned enterprises. Then we look at data to support or refute the following hypothesis about gender differences: in business size and performance; in access to financial and physical capital and skills; in domestic care responsibilities; in motivations to run businesses; and in occupational segregation.

Following the descriptive statistics, the report presents results of several Ordinary Least Square (OLS) regressions looking at outcomes of interest related to enterprise performance and energy consumption. An experimental design was not possible, due to the impossibility to randomise electricity provision in our context, as this arrived to the sites over a decade ago. Quasi-experimental approaches were challenging as well, due to the difficulty of finding enterprises not connected to electricity that share all other characteristics with those connected, or credible instrumental variables. Our OLS results, therefore can only be able to establish whether the correlations among our variables

<sup>1</sup> After piloting the FGD we realised that mixed groups were able to provide the information we required, as men and women felt comfortable to express themselves freely, with good facilitation.

of interest are statistically significant, without the possibility of claiming for causality. The model used for this analysis is presented in Equation 1:

$$y_i = \alpha_i + \beta_i X_i + \gamma Female_i + \delta Electricity_i + \theta Industrial\ Zone_i + \varepsilon_i \quad ^2$$

The dependent variables  $y_i$  are a set of business-related indicators about economic performance (including profits, customers, sales, opening hours and business expenditure) and energy consumption (measured as monetary expenditure for energy and electricity). The paper details the results for monthly profits, energy expenditure, and number of hours of electricity used<sup>3</sup>.

The list of covariates in  $X$  includes a set of control variables accounting for business, individual and household characteristics. The following Table 6 summarizes the list of control variables, common for all estimated regressions.

**Table 6- List of control variables**

<u>Business</u>	<u>Individual</u>	<u>Household</u>
Number of workers	Age	Number of children
Starting capital	No Education/Primary Education	Number of elderlies
Member of an association	Migrant <sup>4</sup>	
Officially registered	Married	
Keep books	Bank Account	
Permanent Building		
Requested Loan		

Source: Field survey, 2018

The dummy variables *Electricity* and *Female* and *Industrial Zone* account for, respectively, whether the business uses electricity, whether the business is female-owned and whether the business is within an industrial zone. Finally, all sample regressions include sector and region fixed effects. For sector fixed effects we take “*Processing and preserving of food and vegetables*” as the sector of reference, against which performance of the other sectors is compared. This sector is selected because both men and women are represented and there are many observations. For the regional fixed effects, Berekum is taken as the reference region.

The qualitative analysis is used to validate and complement the results of the quantitative analysis. The information gathered through FGD, SII and KII was transcribed and then coded using the same themes as the quantitative analysis, to provide answers to our research questions.

## 4 RESULTS

This section on results provides answers to the first two research questions about differences in PUE by men and women enterprises, and the reasons behind them. The first two sub-sections use descriptive statistics and qualitative analysis to provide answers, whereas the third uses OLS regressions to isolate the importance of each explaining variable *ceteris paribus*. The last research question about interventions for gender equity in the PUE, is addressed in the discussion section.

### 4.1 Do men and women benefit differently from the PUE in Brong Ahafo?

The creation of LIZ with improved infrastructure and business services has clearly targeted male enterprises. LIZ cluster enterprises within the vehicle repair and maintenance sector, which is a

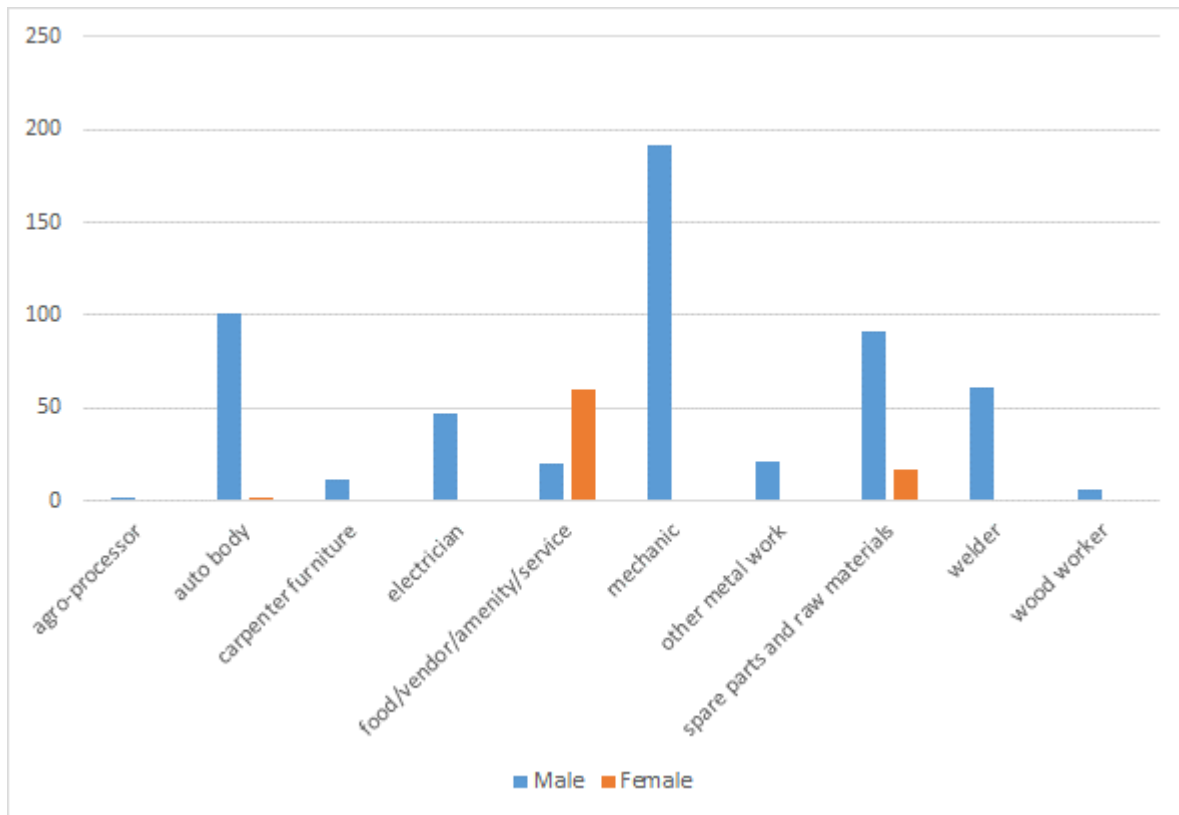
<sup>2</sup> For all outcome variable relative to electricity, the variable *Electricity* is omitted.

<sup>3</sup> Results with other economic and energy indicators are reported in the Appendix

<sup>4</sup> Every individual not born in the same village where the business is located is defined as migrant

typically male sector. Figure 4 shows all enterprises located in Techiman and Berekum LIZ, per gender of the owner and sector of activity. Only 13% of enterprises in the LIZ of these towns are owned by women, and they operate in a narrow number of activities, mainly food preparation<sup>5</sup>.

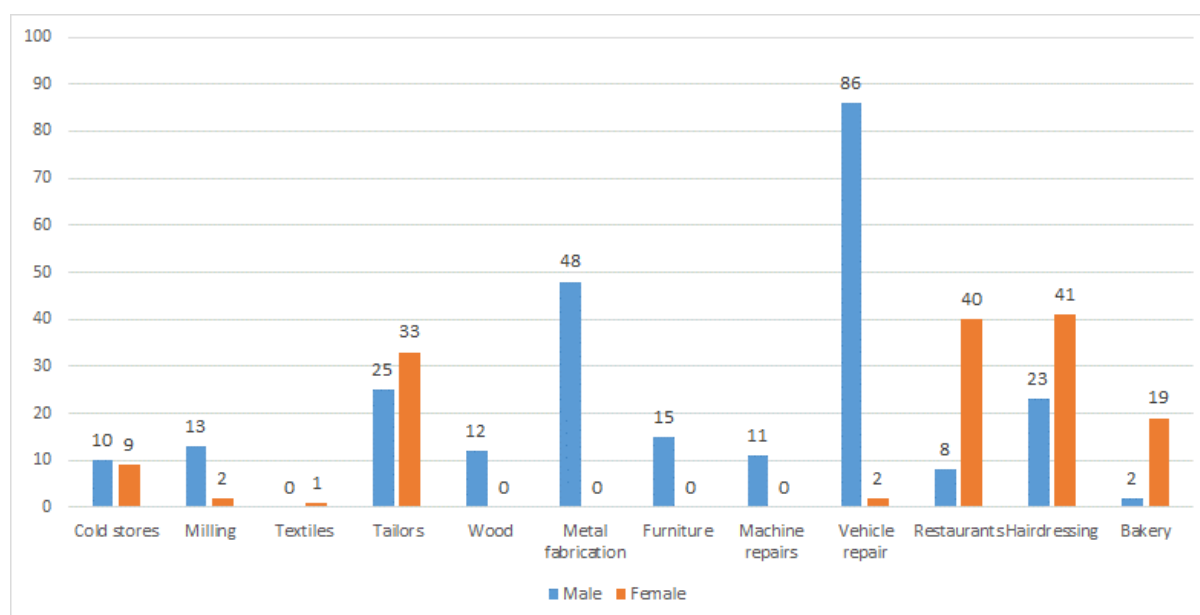
**Figure 4- Number of enterprises in Techiman and Berekum LIZ per gender of the owner and sector, December 2016**



Enterprises within LIZ represent only 20% of the sample used for quantitative analysis in this paper. This research includes enterprises in and out of LIZ precisely to take into account energy consumption patterns of female owned enterprises. Even so, most of the enterprises in our sample are male owned, and 37% are female owned. As indicated in the methodology, our sample excludes petty trading, which is a sector that women dominate. The market, described in our FGD as “the most important location” in town, is dominated by women traders, but they often operate individually and with very small energy consumption. Figure 5 shows the gendered distribution of business activities in our sample, with a clear division of activities between male and female (occupational segregation will be further discussed in section 4.2.5).

<sup>5</sup> A more detailed account of female activities is presented in Figure 2 in section 2.2

Figure 5- Number of enterprises in our sample, in Techiman and Berekum per sector and gender of the owner



Enterprises outside of LIZ have also benefitted from business promotion interventions, and hence we cannot assume that women enterprises are not targeted just because they have not benefitted from LIZ. Table 7 shows that effectively female enterprises have received as much support as male enterprises, and to some extent more, but none of these activities dealt with improving electricity supply, as the LIZ did.

Table 7- Share of enterprises that have received support activities, per location and gender of the owner

	Location			Gender		
	No Ind Zone	Ind Zone	P-value	Male	Female	P-value
Awareness campaigns to involve women in business	1.8%	0.0%	0.146	<b>0.4%</b>	<b>2.7%</b>	<b>0.044</b>
Management training	17.4%	27.1%	0.027	17.8%	24.5%	0.108
<b>Technical training***</b>	<b>19.9%</b>	<b>35.6%</b>	<b>0.001</b>	24.5%	24.5%	0.997
Loans to purchase equipment	0.4%	0.0%	0.517	0.0%	0.7%	0.189
<b>Support to find and engage with customers ***</b>	5.7%	0.8%	0.029	<b>1.2%</b>	<b>9.5%</b>	<b>0.000</b>
Provision of raw materials at a better price	0.4%	0.0%	0.517	0.4%	0.0%	0.445
Other	1.1%	0.8%	0.843	1.2%	0.7%	0.624
<b>None***</b>	<b>78.4%</b>	<b>61.9%</b>	<b>0.001</b>	72.7%	74.8%	0.646

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

As regards energy use, electricity is used by 68% of enterprises and hence is the most commonly used type of energy. Within LIZ, 74% of enterprises use electricity, as compared to 66% of enterprises in town. Besides, table 8 shows that it is used in a significantly higher share of male owned enterprises. Most enterprises also use electricity not only for lighting, but also for operating equipment and in some cases, for cooking.

Cooking related fuels: gas, charcoal and firewood are used by a significantly higher share of female owned enterprises. Charcoal in particular is used by 59% of female enterprises, a similar share as those using electricity, pointing at the prominent role of this fuel for women in the region. We find a significantly larger share of male owned enterprises using only metabolic energy for their activity, which is interesting because it contradicts previous research showing a higher share of women using metabolic energy for productive uses (Clancy et al, 2007). Men's "physical strength" was mentioned

by a number of interviewees and participants in FGD as a determinant of men and women segregation across sectors. Some men in the carpentry and car repair industries indicated that they only use their man-power and manual tools for their job. For this reason, the introduction of electric machines replacing physical energy with electricity would allow women to enter male trades, like carpentry: “if the government gives us machines, a woman will not give birth once and stop the work and stay at home. Because the machines will help you do the work without using the physical energy that men use.” (Female carpenter in Techiman).

**Table 8- Share of male and female businesses using each type of energy**

	<b>All</b>	<b>Male</b>	<b>Female</b>	<b>P-value</b>
<b>None</b>	<b>13.8%</b>	<b>18%</b>	<b>6%</b>	<b>0.001</b>
<b>Dry cell batteries</b>	<b>3.0%</b>	<b>1%</b>	<b>6%</b>	<b>0.005</b>
Lighting	91.7%			
Cooking	0.0%			
Operating Equipment	33.3%			
<b>Car or other rechargeable battery</b>	<b>1.5%</b>	<b>2%</b>	<b>1%</b>	<b>0.861</b>
Lighting	1.0%			
Cooking	0.0%			
Operating Equipment	0.5%			
<b>Gas (LPG)</b>	<b>13.0%</b>	<b>7%</b>	<b>23%</b>	<b>0.000</b>
Lighting	0.0%			
Cooking	54.5%			
Operating Equipment	71.1%			
<b>Diesel or Petrol</b>	<b>6.8%</b>	<b>8%</b>	<b>4%</b>	<b>0.105</b>
Lighting	26.0%			
Cooking	0.0%			
Operating Equipment	100.0%			
<b>Charcoal</b>	<b>24.8%</b>	<b>5%</b>	<b>59%</b>	<b>0.000</b>
Lighting	0.0%			
Cooking	82.6%			
Operating Equipment	47.4%			
<b>Firewood</b>	<b>10.3%</b>	<b>3%</b>	<b>23%</b>	<b>0.000</b>
Lighting	0.0%			
Cooking	97.5%			
Operating Equipment	9.8%			
<b>Electricity</b>	<b>68.5%</b>	<b>74%</b>	<b>60%</b>	<b>0.005</b>
Lighting	97.6%			
Cooking	30.5%			
Operating Equipment	94.6%			

Total energy expenditure, and energy intensity are not significantly different in male and female enterprises. However, men spend significantly more on electricity than women. According to representative of NEDCO (Northern Electricity Distribution Company), men typically operate the larger businesses in the area and are heavier consumers of electricity. For example, two of NEDCO’s major consumers in Berekum are a large saw mill and a plastic factory, run by men. Within trades, for example cold stores, men typically own large cold rooms, whereas women operate smaller kiosks with one or two freezers. In an interview, a rare female miller clarified that she produces at a much smaller scale than male owners. Average expenditure in cooking fuels, LPG and firewood in particular, is very high. This is unexpected for firewood, as during FGD some respondents indicated that they collect it from the bush themselves, and therefore it is free. However, the Manager of the Business Advisory

Centre in Techiman indicated that the Forestry Commission is trying to curb the use of firewood, and accessing it is getting difficult and more expensive with time.

**Table 9- Average monthly expenditure in each type of energy source, by gender**

<b>Fuel types</b>	<b>All</b>	<b>Male</b>	<b>Female</b>	<b>Diff.</b>	<b>p-value</b>
Dry cell batteries (e.g. torch or radio batteries)	17.1	37.0	10.4	26.6	0.118
Car or other rechargeable battery	27	2.5	76.0	-73.5	0.008
Gas (LPG)	191.9	130.1	224.7	-94.6	0.281
Diesel or Petrol	123.6	152.5	22.5	130.0	0.041
Charcoal	99.5	152.0	91.5	60.5	0.569
Firewood	213.3	288.6	197.8	90.8	0.184
<b>Electricity (solar, generator, mini-grid or national grid)***</b>	<b>161.4</b>	<b>192.0</b>	<b>96.8</b>	<b>95.2</b>	<b>0.007</b>
Total energy expenditure	280.2	281.7	277.6	4.08	0.969
Energy Expenditure over Total Expenditure	20%	15.2%	15.2%	0.0%	0.995
Energy Expenditure over Profit	40%	43.3%	46.1%	-2.8%	0.775

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Electricity is used longer than all other types of energy per day and, even if they spend less on it, women use it longer than men. This implies that it is used with low power consuming appliances, such as lighting or mobile phone charging. Firewood and charcoal are the second most used energy sources, and for those business using it, there are no significant differences in the amount of time for male and female enterprises.

**Table 10- Average number of hours each fuel is used per day, by gender**

<b>Fuel types</b>	<b>All</b>	<b>Male</b>	<b>Female</b>	<b>Diff.</b>	<b>p-value</b>
Dry cell batteries (e.g. torch or radio batteries)	3.9	6.3	3.1	3.2	0.351
Car or other rechargeable battery	0	0.0	0.0	0.0	0.643
Gas (LPG)	5.8	5.8	5.8	0.0	0.990
Diesel or Petrol	4.8	5.5	2.3	3.1	0.011
Charcoal	6.3	6.8	6.2	0.6	0.545
Firewood	7.3	7.7	7.2	0.5	0.660
<b>Electricity (solar, generator, mini-grid or national grid)***</b>	<b>9.6</b>	<b>9.1</b>	<b>10.7</b>	<b>-1.6</b>	<b>0.002</b>

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Electricity provides benefits for businesses when it is used with electric appliances. Table 11 shows differences in electric appliance ownership in male and female enterprises. Women more frequently own general appliances such as TVs, fans and fridges, while men have high power consuming machines like electric saws or mills. In mixed sectors like hairdressing or tailoring, men have more electric appliances.

**Table 11- Average number of electrical appliances per male and female owned business<sup>6</sup>**

	<b>Male</b>	<b>Female</b>	<b>Diff.</b>	<b>p-value</b>
<b>General appliances</b>				
TV	0.15	0.20	-0.06	0.150
Fan	0.33	0.78	-0.45	0.000
Fridge/freezer	0.18	0.64	-0.46	0.000
Mobile phone	1.30	1.07	0.23	0.000
<b>Hairdressers</b>				
Hair drier	0.09	2.80	-2.72	0.000
Shaver	6.04	0.22	5.82	0.000

<sup>6</sup> We do not present differences in the automotive sector as only two women report ownership of specialised assets, making the sample too small for comparison with men.

Smoother	0.00	0.66	-0.66	0.025
<b>Tailors</b>				
Electric sewing machine	2.04	0.59	1.45	0.000
Electric iron	0.84	0.65	0.19	0.222
<b>Hotel</b>				
Blender	0.10	0.46	-0.36	0.030
<b>Woodworks/furniture</b>				
Electric saw	0.5	-		
Electric drill	0.8	-		
<b>Milling</b>				
Mill with motor	3.6	-		

Table 12 shows characteristics of electricity supply, and their differences per location of the enterprise and gender of the owner. There are significant differences in reliability of supply, which is higher in industrial zones due to improvement of the distribution network, resulting in less outages with lower duration. Location in or out of LIZ may hence be driving gender differences in reliability of supply, with female enterprises suffering significantly more outages than male owned enterprises. On the other hand, we observe differences in the reported connection fees paid by male and female owned enterprises, with women paying significantly lower fees.

**Table 12- Characteristics of power supply per location and gender (averages)**

	Zone differences				Gender differences			
	<u>Non-Ind Zone</u>	<u>Ind Zone</u>	<u>Diff</u>	<u>p-value</u>	<u>Male</u>	<u>Female</u>	<u>Diff</u>	<u>p-value</u>
Availability (hours per day)	9.71	8.44	1.26	0.086	9.24	9.64	-0.40	0.552
Availability in the evening (hours)	6.94	8.03	-1.09	0.044	7.32	7.16	0.17	0.738
Average number of outages per week	3.75	2.75	1.00	0.129	2.63	5.03	-2.39	0.000
Average duration of outages (hours)	4.07	2.41	1.66	0.001	3.50	3.87	-0.37	0.410
Upfront investment - connection fee	358	318	40.4	0.595	410	236	174.1	0.039
<u>N</u>	<u>239</u>	<u>85</u>			<u>208</u>	<u>116</u>		

The representative of NEDCO explained that Berekum is currently suffering from power reliability issues. The distribution network has not grown with population, and overloading is common, leading to power cuts and voltage drops, which are particularly acute during evening hours. There are plans to upgrade the network to deal with overloads. Unreliable supply causes losses for businesses in the area. For example, a car mechanic explained “When someone has given his car to be done and for the past three days the lights have been off, there is a problem because the person needs the car for work and you have seized it”. A female sprayer shared her frustration “If power is reliable, you are able to meet the deadline as promised to your customers thereby keeping the bond between you and the customer. He or she will pay for the services happily, but when light goes off, they are highly disappointed and may reduce the price agreed”. A hairdresser also explained that “when potential customers find there is no power, they just leave, and we can spend 3 days without business”. Not only power cuts reduce sales, but also they can damage equipment: “the straighteners over there they are about 8 and 3 are damaged because of on and off of power” (female hairdresser from Berekum). To deal with frequent outages, some businesses aspire to purchase diesel powered machines or solar PV systems that provide a backup for the grid. According to a female grain miller from Berekum “Due to frequent light out, I plan on getting the diesel version of the machine to provide a support. This has



been my dream for long (...) but my best wish is that the government minimizes power cuts and if possible eliminates them because it is really worrying”

Electricity tariffs are set by the Public Utilities Regulatory Commission of Ghana (PURC), in a way that households and enterprises with higher consumption levels pay higher tariffs per kWh than lower consumers. Table 13 shows the most recent electricity tariffs approved, at the date of this research. While our respondents could not specify the tariff they pay per unit consumed, it is expected that male owned enterprises, typically consuming more, would be paying higher tariffs than female enterprises consuming less. This could effectively create a cross-subsidy from high power consuming, typically male, enterprises, to low power consuming, typically female ones.

**Table 13- Approved electricity Tariff – Effective 15 March, 2018**

<b>Tariff Category</b>	<b>Unit</b>	<b>Effective 15 March, 2018</b>
<b>Residential</b>		
0 - 50	GHp/kWh	27.6858
51 – 300	GHp/kWh	55.5450
301 – 600	GHp/kWh	72.0866
601+	GHp/kWh	80.0963
Service Charge		
Lifeline Consumers	GHp/month	213.000
Other Residential Consumers	GHp/month	633.1717
<b>Non-Residential</b>		
0 - 300	GHp/kWh	67.7536
301 - 600	GHp/kWh	72.0971
600+	GHp/kWh	113.7598
Service Charge	GHp/month	1055.2862

Many respondents manifested lack of knowledge about how their electric bills are set and required further information on this topic. According to a car mechanic, “I had one master welder, just recently they came to cut his power. His bill was about GHc 1,500 and they had given him a meter but he doesn’t have a fixed price so when the person comes he can give him any amount”. This lack of trust in meter readings was also stated by the female president of the hairdressers’ association: “We are pleading that the people who come to read the meters are truthful to those of us who are not that educated”. Although the NEDCO representative insisted on the benefits of pre-paid meters for businesses to control their expenditure in electricity, this was not welcome by some users, particularly the hairdressers, which indicated they don’t have enough cash flow to pay for the bills in advance, and a power cut during a service to a client can damage their reputation. Other trades, however, were happy with the prepaid meters as they allowed them to control their expenditure.

In summary, the quantitative data shows that the provision of improved electricity supply in LIZ has targeted male enterprises. However, female owned enterprises have benefitted from other business promotion interventions. Even though electricity is the most prevalent type of energy in enterprises across genders, a larger share of male enterprises uses it and they spend more on it. Women enterprises use cooking related fuels and while LPG is widely available, charcoal is still used more frequently. Men owned enterprises more frequently use no energy other than their physical energy. In the end average energy expenditure and energy intensity, including all fuels, is similar across genders. The quality of electricity supply is poor, with frequent and long outages that bring significant costs and lost sales for businesses. However, quality is better in LIZ, served with a new transformer and more stable electricity supply. Furthermore, women enterprises report more frequent outages than men’s, as well as lower connection fees. Finally, electricity tariffs are set progressively in Ghana,

with consumers that use more, paying higher tariffs per kWh. This could have created a cross-subsidy from larger, male owned enterprises, to smaller, typically female enterprises.

## 4.2 Which gendered constraints affect women’s chances to benefit from PUE?

### 4.2.1 Differences in size and profitability of men and women enterprises

Indicators of business performance presented in Table 14 show that women on average sell less than their male counterparts during the high season, but the difference is not statistically significant. Seasonality is determined by public festivities and the harvesting period. On the other hand, women have a higher number of customers than men, indicating the lower value of their unit sales. Even if male owned businesses have higher average monthly and annual profits, the difference with women is not statistically significant, due to the high standard deviation of profit figures. Business performance, therefore, is not clearly biased in favour of men. Interviewees highlighted that women’s businesses are typically smaller than men’s, because women are typically involved in petty trading, but this sector was not part of our sample. Also, that women tend to combine many different activities, while men focus on larger scale businesses: “It looks like women are rich because they can do so many things at the same time, but the men too are rich because they are involved in relatively large scale activities” (District planning officer from Techiman North).

**Table 14- Differences in means of business performance indicators by gender of entrepreneur**

	<u>Gender</u>			
	<u>Male</u>	<u>Female</u>	<u>Diff</u>	<u>p-value</u>
Average Sales in high season (GHC/week)	2481	1852	628	0.475
Average Sales in low season (GHC/week)	869	866	3	0.994
<b>Customers in high season***</b>	<b>66</b>	<b>161</b>	<b>-95</b>	<b>0.001</b>
<b>Customers in low season***</b>	<b>33</b>	<b>93</b>	<b>-59</b>	<b>0.001</b>
Last Month Profit (GHC/month)	1267	966	301	0.481
Annual Profit (GHC/year)	14207	11692	2515	0.608
Total expenses (GHC/month)	2762.6	2841.3	-78.7	<b>0.912</b>

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

LIZ interventions, which targeted predominantly male dominated sectors, have not led to better performing businesses. As evidenced by Table 15 below, sales, customers and profits are significantly higher in enterprises out of Industrial Zones, while expenses are higher in industrial zones.

**Table 15- Differences in means of business performance indicators by location in and out of Light Industrial Zones**

	<u>Location</u>			
	<u>No Ind Zone</u>	<u>Ind Zone</u>	<u>Diff</u>	<u>p-value</u>
<b>Average Sales in high season (GHC/week)*</b>	<b>2665</b>	<b>1257</b>	<b>1408</b>	<b>0.076</b>
<b>Average Sales in low season (GHC/week)*</b>	<b>1058</b>	<b>414</b>	<b>644</b>	<b>0.099</b>
<b>Customers in high season**</b>	<b>123</b>	<b>44</b>	<b>79</b>	<b>0.017</b>
<b>Customers in low season**</b>	<b>69</b>	<b>20</b>	<b>49</b>	<b>0.014</b>
Last Month Profit (GHC/month)	1360	670	690	0.218
Annual Profit (GHC/year)	15592	7762	7830	0.232

Total expenses (GHC/month)	2638.3	3157.6	-519	0.639
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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Women's enterprises, in terms of number of employees, are significantly larger than men's with an average of 3.6 employees apart from the owner, compared to 2.8 for men. Table 16 shows that men entrepreneurs typically hire men, while women hire women. However, women workers perceive significantly lower salaries than men, indicating the lower value added of their activities. No significant gender differences are observed in formality or business practices like keeping accounting books.

Male businesses, more frequently organise themselves in business associations, typically sectoral groups. A previous study by World Bank about energy enterprises for women, had noted Ghanaian women's preference for individual work, often petty trading, as opposed to men, who are more likely to team up to pull resources (ESMAP, 2006). In any case, nearly 50% of women entrepreneurs in our sample are involved in associations. Because the retail sector was not included in our sample, the smaller type, more individualistic kind of women's enterprises do not reflect in the statistics, which could be biasing upwards women's participation in business associations. The female president of the Association of Small Scale Industry (ASI) and Chairwoman of the Hairdresser's association of Berekum, indicated some of the benefits of being part of trade associations, including: pulling resources for specialised training; engaging with the authorities to get fair tax bills; organising apprenticeship schemes; and targeting markets together, for example, persuading municipal authorities and public services in the town to buy furniture from local artisans instead of going elsewhere.

**Table 16- Gender differences in business characteristics**

	Male	Female	Diff.	p-value
<b>Number of workers***</b>	<b>2.8</b>	<b>3.6</b>	<b>-0.8</b>	<b>0.001</b>
<b>Female workers***</b>	<b>0.2</b>	<b>3.3</b>	<b>-3.0</b>	<b>0.000</b>
<b>Male workers***</b>	<b>2.6</b>	<b>0.3</b>	<b>2.2</b>	<b>0.000</b>
<b>Weekly salary of workers (GHC)***</b>	<b>201.7</b>	<b>92.5</b>	<b>109.3</b>	<b>0.000</b>
Business registered	20.2%	17.7%		0.546
Business keeps books	15.4%	16.3%		0.809
<b>Business part of an association***</b>	<b>65.6%</b>	<b>47.6%</b>		<b>0.000</b>
N	225	135		

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 17 shows that enterprises are open to external markets, regardless of gender. Half of them sell to customers outside of their district within Ghana, and 10% export outside the country.

**Table 17- Share of businesses that sell in and out of their town, by gender**

	Male	Female	p-value
Customers from this town	99.6%	99.3%	0.697
Customers from outside the town, same district	84.2%	83.7%	0.892
Customers from outside district in same country	52.6%	48.3%	0.410
Customers from outside country	9.5%	11.6%	0.509

Summarising, we do not observe stark gender differences in business performance between men and female owned enterprises. The key differences are the higher amount of customers, but lower value of unit sales for women enterprises, as well as the larger number of female employees, but lower salaries. This points at women's occupation in lower value activities. We find a similar predisposition to export across genders, as well as similar levels of formality and record keeping. On the other hand, men more frequently organise themselves in sectoral associations to jointly pull resources and reach economies of scale, whereas women show higher individualism in business. Lower business

performance, therefore, does not explain the lower level of electricity consumption of female businesses.

#### 4.2.2 Differences in access to and control over capital, skills and other resources

Businesses across the sample show significant access to financial services. More than 75% hold bank accounts, and nearly 40% have requested loans, the majority of which were granted. Gender differences in bank accounts are significantly biased in favour of women. Banks were in fact described by women participants in FGD as one of the most important services in the town, because “After selling, we cannot take our money home. We must keep it at a place where it cannot be stolen” (female tailor in Berekum). Male enterprises, on the other hand, have higher capitalisation, but the difference with women is not statistically significant.

**Table 18- Access to capital and finance by gender of the owner**

	All	Male	Female	Diff.	p-value
Starting capital	3346	3693	2748	945	0.245
<b>Own Bank account**</b>	<b>76.5%</b>	<b>73.1%</b>	<b>82.3%</b>		<b>0.037</b>
Requested loan	38.5%	36.0%	42.9%		0.172
Loan Granted	93.5%	94.5%	92.1%		0.545

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Women also display a degree of economic empowerment not common in Sub-Saharan Africa with regards to asset availability. When requested to list assets available for the business, up to 63% of women entrepreneurs referred to land, and 47% to buildings, a similar share as men. Cars are the only valuable asset available for a significantly higher share of men than women entrepreneurs.

**Table 19- Assets available for the business, ANOVA by gender**

	All	Male	Female	P-value
Land plot/farm	65.3%	66.8%	62.6%	0.394
Buildings	51.0%	53.4%	46.9%	0.216
<b>Car***</b>	<b>19.0%</b>	<b>24.9%</b>	<b>8.8%</b>	<b>0.000</b>
Bicycle	65.3%	66.8%	62.6%	0.394

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Access to capital was pinpointed as the most important constraint to business growth by our respondents, regardless of gender, as presented in Table 20. This agrees with existing literature about constraints to growth in Ghana (World Bank, 2013; IFC, 2007). In-depth interviews also conveyed this message. Women working in traditionally male trades referred specifically to the difficulties faced in raising the finance required to buy appliances and land:

“If they want females to be engaged in male activities, the government must support the females with machines. The machines help and you don't need your physical energy to cut wood. When you don't have machines the work is so difficult. But before you need to look for land and set up a shop. So when women consider all these, they just settle for hairdressing...you can even operate from your veranda.” Woman carpenter, Techiman.

Men also face similar challenges to raise finance to buy equipment, but they can more easily use their physical strength in place of it, for example:

“If I had money, I would have purchased a lot more tools. Because the cash inflow is inconsistent, we are unable to save money to buy better machines. I really need an electric machine and a grinding machine. No matter how good you are at the job, without the tools,

there is nothing you can do. (...) but if you don't have machines, you can hire them" Male straighter from Techiman.

Contradicting previous research (de Mel, McKenzie, & Woodruff, 2009) some respondents said men's business profits are more likely captured by household needs than women's profits:

"Female businesses are the ones that usually grow faster than those of men. The reason is that, if she is a married woman, she doesn't spend her revenue on anything. She is always reinvesting it back into the business but for a married man, you are responsible for the household expenses. She can say she doesn't have money but you can't. You have to manage for the business to survive as well as bring something home. This is why businesses of men do not grow as fast as those of women." (Male welder from Berekum).

"When women come for a service they put it into the right place, but men sometimes divert the funds. When women get support for their businesses, they look and their families look happier." Head of the Business Advisory Centre of Techiman.

It seems, therefore, as if women had lower access to capital to start with, but then they were more able to save and reinvest in their businesses to make them grow: "when a man decides to take up this job, he easily expands because of the bigger start-up capital, but for the females they start from somewhere and grow into a bigger business." Female soap maker Techiman.

**Table 20- Most important constraints for doing business (two selected per respondent)**

	All	Male	Female	p-value
Accessing capital	59.8%	59.3%	60.5 %	0.805
Family or friends disapproval	0.3%	0.0%	0.7%	0.189
<b>Limited time due to family care responsibilities***</b>	<b>1.8%</b>	<b>0.4%</b>	<b>4.1%</b>	<b>0.007</b>
<b>Lack of skills***</b>	<b>4.3%</b>	<b>2.0%</b>	<b>8.2%</b>	<b>0.003</b>
Harassment by customers or public authorities	6.3%	7.5%	4.1%	0.172
Competition- many people do business in a similar	17.3%	18.2%	15.6%	0.518
Not enough customers	16.8%	16.2%	17.7%	0.702
<b>Other***</b>	<b>28.5%</b>	<b>34.4%</b>	<b>18.4%</b>	<b>0.001</b>
No barriers	7.8%	7.1%	8.8%	0.533

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Participatory focus group discussions revealed inequalities in women and men's access and control over resources. In these discussions, access was defined as the opportunity to use a resource, while control represented the full authority to make decisions about the use of a resource (e.g. to buy, sell or modify it). The tool used to ascertain gender differences requested men and women participants to draw a list of all the resources available in their households and workplaces. Then they would agree on a 0-10 score for access and control over those resources by men and women. The score was decided by consensus, and the group was moderated to avoid dominance of some participants over others. Table 21, presenting household resources in decreasing order of women's control, shows that women's access to resources is lower than for men, but control is nearly equal. Women control and have higher access to all resources related to food preparation and water. They also control a number of electric appliances, such as fridges and TVs. Men on the other hand, control more valuable assets such as land, buildings, vehicles, furniture and livestock. Surprisingly, and in line with later results about care responsibilities, men have higher access to and control over irons, indicating men's increasing contribution to some household chores facilitated by electricity. Regarding energy sources, women have higher access over cooking fuels such as gas and charcoal, whereas men have higher access to electricity and petrol. Respondents considered equal control over charcoal and electricity by

men and women, but higher women’s control over gas, and higher men’s control over petrol. Participants also indicated that men and women have control over their own income.

**Table 21- Access and control of resources by men and women- Averages for Techiman and Berekum**

	ACCESS		CONTROL	
	Men	Women	Men	Women
Water	8	2	0	10
Firewood	0	10	2	8
Microwave	6	4	2	8
Woman's income	3	7	2	8
Gas (LPG)	5	5	3	7
Fridge	6	4	4	7
Television	6	4	4	7
Other elec. appliances	4	6	4	6
Utensils for cooking	2	9	4	6
Charcoal	0	10	5	5
Electricity	7	3	5	5
Fan	9	1	5	5
Mobile phones	7	3	7	4
Motorbike	9	2	7	4
Radio	8	2	7	4
Cash	7	3	7	3
Computers	9	2	7	3
Iron	7	3	7	3
Livestock	7	3	7	3
Furniture	8	3	8	3
House	8	2	8	2
Lands	9	2	9	2
Car	9	1	9	1
Man's income	7	3	9	1
Petrol/Diesel	9	1	9	1
<b>Total Average</b>	<b>6.3</b>	<b>3.7</b>	<b>5.5</b>	<b>4.5</b>

Skills are another important resource for starting and operating businesses. Gendered data on education, presented in Table 22, shows again that in our target region men and women entrepreneurs enjoy similar levels of education. This aspect was validated in our interviews to workers and key informants:

“Things have changed drastically as far as the education of the Ghanaian children. Gone are the days when education was restricted to the boys alone here in Berekum” Berekum Municipal Chief Executive (male)

“when it comes to school enrolment you have gender disaggregated data showing that the ratio is almost 1 to 1” Techiman Municipal Planning office (male)

**Table 22- Education of business owner, ANOVA by gender**

	<b>All sample</b>	<b>Male</b>	<b>Female</b>	<b>P-value</b>
None	15.8%	16.6%	14.3%	0.540
Primary	10.5%	11.1%	9.5%	0.627
Secondary	52.5%	50.6%	55.8%	0.316
High School	13.5%	15.4%	10.2%	0.141
Vocational	4.0%	3.2%	5.4%	0.262
University Degree/Master/PhD	3.8%	3.2%	4.8 %	0.417

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Several trades in the region organise apprenticeship schemes to support young people to gain the necessary skills to open their own businesses or be employed in existing ones. Apprenticeship programmes in male businesses such as auto mechanics appear longer and more expensive than those in female trades like tailoring or hairdressing, implying lower barriers of entry for female trades. However, chairmen of these associations worry that even after their apprenticeships these youngsters will not be able to work due to lack of capital to open their businesses.

#### 4.2.3 Differences in care responsibilities

Unbalanced care responsibilities are one of the reasons why women operate in smaller survivalist enterprises, closer to home or home-based, according to previous literature (Kabeer, Mahmud, & Tasneem, 2011; Nordman & Vaillant, 2014; Razavi, 2007). In our sample, however, when requested to identify the two most important constraints for the growth of their business, only 4% of female respondents highlighted care responsibilities. On the other hand, women more frequently operate from their home, and more frequently indicate the need to be close to home as the rationale for their business location, as presented in Tables 23 and 24. In any case, 42% of women indicate that they chose their location to attract customers, a similar share to men.

**Table 23- Business Characteristics – Location and Physical Structure by Gender**

	<b>All</b>	<b>Male</b>	<b>Female</b>	<b>P-value</b>
<b>Home-based enterprise (in our outside the home)***</b>	<b>6.8%</b>	<b>3.2%</b>	<b>12.9%</b>	<b>0.000</b>
No structure (i.e. blanket or mobile display) in a public space	0.8%	0.4%	1.4%	0.281
Mobile stand or structure in a public space (i.e. cart, trolley, etc.)	20.0%	18.2%	23.1%	0.233
<b>Permanent building structure (shop)***</b>	<b>72.5%</b>	<b>78.3%</b>	<b>62.6 %</b>	<b>0.001</b>

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 24- Reasons for the selection of the business location**

	<b>All</b>	<b>male</b>	<b>female</b>	<b>total</b>
<b>It is close to home so I can combine work with caring for my family***</b>	<b>8.8%</b>	<b>4.3%</b>	<b>16.3%</b>	<b>0.000</b>
It is a good place to attract customers	44.5%	45.9%	42.2%	0.476
I was told to take this location (i.e. allocated by municipality)	2.3%	3.2%	0.7%	0.107
<b>Available for hire***</b>	<b>29.0%</b>	<b>34.8%</b>	<b>19.0%</b>	<b>0.001</b>
<b>Inherited this location*</b>	<b>6.5%</b>	<b>4.7%</b>	<b>9.5%</b>	<b>0.061</b>
<b>Had no alternative**</b>	<b>6.8%</b>	<b>4.7%</b>	<b>10.2%</b>	<b>0.036</b>
Other	2.3%	2.4%	2.0%	0.830
<b>Total</b>	<b>100%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Women also report shorter opening hours, which could be due to higher care responsibilities.

**Table 25- Differences in means of starting capital and opening hours by gender**

	<b>All</b>	<b>Male</b>	<b>Female</b>	<b>Diff</b>	<b>p-value</b>
Hours Open***	10.9	11.1	10.4	0.7	<b>0.002</b>

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Qualitative data offers further insights about the care burden of women in the region, as compared to men, and its impact on paid work opportunities. Some men in the study areas share household activities such as caring for the children by taking them to school, getting them ready in the morning,

helping with homework or putting them to sleep. On the other hand, there are some activities that are still specifically female, mainly cooking and serving food, washing clothes and dishes. But men have distinctively taken over activities such as ironing, probably facilitated by the use of electric irons. Table 26 shows caring activities done exclusively by women, by men, and both as detailed by FGD participants.

**Table 26- Care activities detailed in FGD discussions in Techiman and Berekum, per men or women responsibility**

<b>Women’s responsibility</b>	<b>Men’s responsibility</b>	<b>Both men and women</b>
<ul style="list-style-type: none"> <li>• Prepare and serve food for the family</li> <li>• Wash children’s clothes</li> <li>• Wash dishes</li> <li>• Pray with children</li> </ul>	<ul style="list-style-type: none"> <li>• Pound fufu (cassava meal)</li> <li>• Iron my family’s clothes</li> <li>• Take my wife to the shop</li> </ul>	<ul style="list-style-type: none"> <li>• Walk my child to school</li> <li>• Clean the house/sweeping</li> <li>• Bath children</li> <li>• Dress children/ get them ready in the morning</li> <li>• Help children with homework</li> <li>• Put children to sleep</li> </ul>

The discussions highlighted that strong traditional gender roles, giving women full responsibility for the care of the household, coexist with attitudes that challenge them. The following quotes provide some examples of traditional gender roles:

“The difference here is that, we men are very occupied so when the women wake up in the morning, bath the children and send them to the bus station to go to school, the men face the rest of the responsibilities. That is the arrangement between husband and wife. Activities undertaken by men and women towards children or other members of the household can never be equal.” (39 years old man, father of three, working in radio electronics, in Techiman)

“Due to financial pressures, men get up early and go to work so all the household chores automatically are left for the women”. (35 years old, father of 3 auto-electrician in Techiman)

“it is the responsibility of men to take care of their wives. So, if a man should take a wife, he will have to assume all the responsibilities of her parents by making sure he provides for her. That is what God said. It is not in the place of a woman to take full responsibility for her husband. Any man who allows that is not man enough. This explains the disengagement of men in domestic chores. Even if for a day, a man is not able to provide housekeeping money it becomes a debt that he ought to pay.” (Man working in Techiman)<sup>7</sup>.

“It is women who take care of household chores and if not done, the whole house will be very dirty.” (30 year old female hairdresser, mother of one)

“If someone builds a house and it is covered in weeds, the remarks from society are, is there no woman in this house? It is the responsibility of women to ensure cleanliness and keep the house in order.” (Man working in Techiman)

“It is the responsibility of the man to give the woman money for housekeeping, school fees and give gifts at funerals. So if you don’t try to work hard, your family won’t do well. Most of the houses in Berekum are built by men. So if you are a man, you always have to work hard to get money to look after your family.” (56 year old welder working in Berekum.)

This traditional role of men as providers was not entirely satisfactory for men themselves, who found it very stressful:

<sup>7</sup> Personal details of this participant could not be retrieved due to his late arrival



“Financial responsibilities of households are left to men and at times it becomes psychologically daunting. There are times you won’t be able to sleep as a man due to thoughts on how to provide pocket money “chop money”. Other times you have to even use money meant for buying raw materials or inputs to undertake a work for a client to provide for your children or household.”(Male worker in Techiman)

“What my brothers have said is true. The pressure on us men is not very easy. Consider a woman, her hairdo, shoes, slippers, are all a man’s responsibility to provide. All household expenses are on the men so we do not have peace of mind. If you don’t work hard to provide financially for your wife, she might not look good or decent. Members of the community will start reproaching you concerning her looks and blame you for not taking good care of her. If the children are not schooling in this age where education is the key, it is the woman that will be bombarded with questions like “Where is your husband? Is he not taking care of the children?” All these are not very easy burdens for men to bear.” (Male electric welder, father of 4 and with two other dependents, from Techiman.)

Some men considered that if women worked, this would reduce their financial burden:

“There are some men who are under so much pressure but if the woman is also working, she can support the man financially and his burden will reduce.” (Electric welder, father of 4, Techiman)

Often women’s work was just seen as just a back-up when men could not provide, which would not relieve them from household responsibilities. For women to reduce their care burden, they must earn enough to pay for house help:

“For a woman to go out and work to take care of the household, it implies that the man has lost his job or he is sick. If it happens this way a good woman will look for something to do to raise some money in the interim. If the man is at home he will take care of the household chores and a vice versa”. (35 years old auto-electrician, married and father of three, Techiman)

“I leave the house at 6 am and return at 6 pm unlike my wife who will have to attend to the kids and household chores therefore, by the time she leaves the house to attend to her business that would be around 10am.” (Electric welder, father of four from Techiman)

“As I take care of my mum I do not get enough time for the business as I used to when she was quite younger and strong enough to take care of herself. But men have no such responsibility” (Female corn miller, Berekum)

“The women mostly work in the market because it is not very difficult. A woman can buy some food stuffs for 5 cedis and with a little effort can make a profit of 1 cedi. So they can combine market activities with home making” (Electric welder, married with kids, from Techiman)

Traditional views were contested energetically by some women participants in FGD:

“In this era, both men and women contribute financially to housekeeping” (Female petty trader from Techiman, mother of three)

“Things have greatly changed in our time. It is no longer the way it used to be where women depend on men. Now women are equally sharing in the household financial responsibilities.” (Female hairdresser, mother of one, from Techiman)

“A woman will do as much as the man. If a man does not have money, as a mother you need to use whatever means to ensure that the children eat. Both men and women work very hard to be financially responsible for their households so the men cannot say they are under pressure. Women in Ghana are more concerned about their children than men.” (56 years old woman, operating a chop bar in Techiman, mother of six and looking after grandchildren.)

“You men after marrying will go for “side chicks” or other women apart from their wives, so if they say they are under pressure, who put them under pressure? It is their own doing. They should stop lamenting.” Same as previous female respondent

“I don’t agree with him because household chores are not for just the wife or children. If the woman has difficulties, the man can help the woman” (Female seamstress from Berekum)

A growing concern is that the move away from traditional gender roles can leave women unprotected. The Gender, Child and Social Protection Officer for the Region explained that fathers eluding children maintenance responsibilities were worryingly on the rise: “Often men and women cohabit and don’t go into a formal system of marriage. They have children, but then fatigue sets in and the man starts another relationship. The woman has to move out because she is not recognised as a legitimate wife, nobody has performed her bride price. Men don’t need to provide for their children anymore and the burden falls fully on the woman, which perpetuates women’s cycle of poverty”.

Even when attitudes to household responsibilities change, some specific household activities remain distinctively female, like washing clothes and cooking:

“For women most of our time is used on food preparation. If a woman is in church and the pastor is preaching, a woman will be counting down to get home to prepare food for the family.” (56 year old woman, operating chop bar in Techiman, mother of 6).

“What I can’t do is washing my wife and children’s’ clothes (...) For someone who is married, washing is not my work. Besides, when the neighbours see you washing, they will talk. They will say my wife has fooled me and I am now washing for her” (41 year old man, father of 3, working on electronics in Berekum)

“Washing, especially washing for men is not very easy”. (Female petty trader from Techiman)

“Because I am a married woman, I have to wash my husband’s things so by the time I am done the time to go to work will be all gone”. (Female sprayer)

Interestingly, the use of electric appliances could switch gender roles for household tasks, with some men indicating that they are now in charge of ironing. Also, experiencing the hardship of household chores could persuade men to purchase time-saving appliances:

“My wife got boils on her hand and washing was very difficult. I live with just my wife so I had to do the washing. I didn’t like it, so I had to buy a washing machine.” (41 year old man, father of 3, working on electronics in Berekum)

A clear message from the discussions was the importance of exposure for gender norms to change:

“I know a bank manager at Sunyani, who will wake up in the morning, wash his baby and wife’s clothing while his wife stays in the kitchen preparing breakfast. When he is done, he dresses up and goes to work. This makes it easier for both of them to go to work early. The men are supposed to help in household chores.” (Female petty trader from Techiman)

“Today’s discussion has opened my understanding on how I can be of help to my wife at home so we can all live peacefully and grow together. I will also like to urge my fellow men to assist

their wives in domestic chores in order enhance the welfare of both men and women.” (Male worker from Techiman)

“From what we have done today, I have realized men can help women in their work. So we are going to tell the men who are home to help the women to develop.” (34 years old female automechanic, Berekum.)

Discussions on time use also covered leisure time. Both sexes spend a lot of time watching TV, watching football or soap operas, which can be detrimental for their work

“If I like the football, I will stop my work to go and watch. The whole day I won’t work. So it can affect the paid work.” (34 years old female automechanic, Berekum.)

“Watching television delays the paid work we do because at the moment you decide to watch a movie on TV, you will want to watch till the end. So before you realize the time you are supposed to go to work may have passed. Secondly, those who watch late movies sit behind the TV the whole night. They are not able to wake up at the time they should, to go to work and get money.” (43 years old male tailor from Berekum)

#### 4.2.4 Differences in motivations

Previous literature has pointed at the different motivations that men and women have for running business as a cause for differences in their performance (Banerjee, Duflo, Glennerster, & Kinnan, 2015; Minniti, 2010; Nagler & Naudé, 2014). Hence, women would typically run survivalist enterprises aiming at meeting daily household needs, whereas men would be more ambitious driven and growth-oriented. Our data does not show this pattern. Instead, men and women entrepreneurs exhibit similar motivations, as reflected in Table 27, with similar shares of men and women driven by ambition and independence, or need.

**Table 27- Motivations for running a business- Share of enterprises, total and by gender**

	Total	Male	Female	p-value
Affording daily food needs	20.5%	21.7%	18.4%	0.421
Contribute to home expenses	16.0%	15.8%	16.3%	0.892
Needs for children	11.0%	9.1%	14.3%	0.109
Independence	13.0%	13.8%	11.6%	0.515
To have something to do	14.0%	14.2%	13.6%	0.862
It was my ambition to have an enterprise	24.5%	24.1%	25.2%	0.812
I could not find another job	1.0%	1.2%	0.7%	0.624

Both men and women manifested their worry to provide for their family as a main motivation, and preconceptions of women as risk averse were challenged:

“Market women take a lot of risks, they travel long distances taking their products and when they get to their destination towns they might end up even sleeping in the stations. Some of these women are raped in those lorry stations and some of the goods they sell are perishable but still they take the risk to go and bring it”. Ministry of Gender, Child and Social Protection Officer for Brong Ahafo region (female)

Growth ambitions are similar in men and women owned enterprises. Nearly all enterprises, regardless of gender, would like to expand their businesses. The most frequent growth ideas involved: increasing

production, investing in new equipment or improving to a better or bigger space. Similar shares of men and women aim at these.

**Table 28- Growth strategies- share of enterprises total and per gender**

	Total	Male	Female	p-value
Expand business	97.5%	96.8%	98.6%	0.266
Expand the range of products on offer	43.3%	50.2%	31.3%	0.000
Increase production	55.8%	54.2%	58.5%	0.398
Invest in new equipment	56.5%	57.7%	54.4%	0.523
Improve to a better or bigger space	57.8%	54.9%	62.6%	0.136
Hire more staff	26.8%	25.3%	29.3%	0.389
Open another enterprise in the area	18.5%	22.5%	11.6%	0.006
Don't know	2.3%	2.8%	1.4%	0.361

Even if both men and women had business ideas for growth, women were often more articulate in expressing them, with some examples presented below. Capital constraints were mentioned in all cases as the main factor preventing these ideas from materialising.

“I haven’t been able to open more branches or to paint the place and make it more attractive, due to financial constraints” (Female caterer Techiman).

“I want to see it expanded by adding more materials to stock, renovating the salon, and providing entertainment for visitors” (woman hairdresser Techiman)

“What I will do is to get additional activities. I would buy machines for neatening and over lock and employ someone who knows how to do it” (woman dressmaker Techiman)

“When I get additional funds I will get an additional machine because I have only one machine. If I get one additional electric machine my business will grow.” (Female dressmaker Berekum)

“I very much want to grow. I want to open a second annex with a barbering shop, but I would need money because without money you can’t do anything, and strength from God”. (Female hairdresser from Berekum.)

“I want to grow, so when I work I save part because I want to build a container. When I am done I would like to add the chemicals” (Female hairdresser Berekum)

“I would like to add stores to my auto-mechanic job, where I will be selling parts. Because there is no money that is why I can’t do it. If there was money, I will need a container to put on the plot, then I will buy the things in Kumasi.” (Female automechanic in Berekum)

“I would love to open a shop that sells the materials needed in the spraying process such as filler, paint... etc. so we don’t buy from anywhere but within to keep the profit (...) what is stopping me is money, these materials are very expensive”. Several female sprayers shared an interest in diversifying towards selling parts.

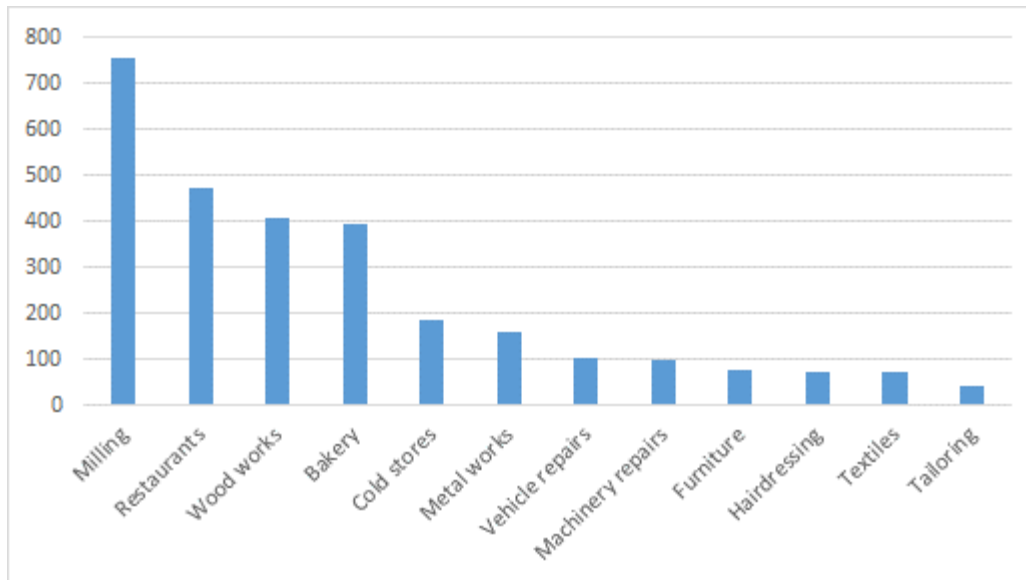
#### 4.2.5 Gendered occupational segregation

There is a clear gendered division of tasks within the 11 sectors targeted by this research. This was illustrated in Figure 5 within section 4.1. Women operate in a more narrow number of activities than men, including restaurants, hairdressers and bakers. Men, on the other hand, dominate vehicle repair and maintenance, milling, furniture, woodworks, metal works, and machinery repair. Tailoring and cold stores appear as gender balanced sectors. It is worth noting that petty trading, which employs

many women in the region, was left out of this research which targeted enterprises with higher energy consumption and more employees.

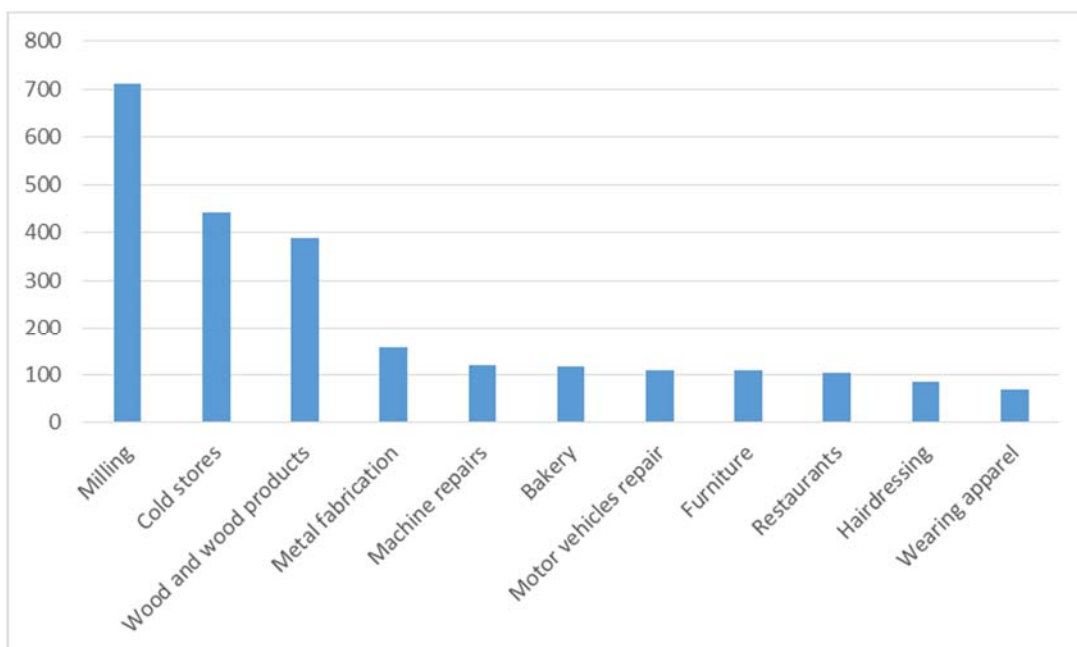
Figure 6 shows, however, that there is not an evident gender bias in energy expenditure (including all energy sources). The highest energy consuming sectors alternate male dominated sectors such as milling and woodworks, and female dominated ones, such as restaurants and bakeries.

**Figure 6- Average expenditure in energy per sector (GHC/month)**



Expenditure in electricity is more clearly biased towards male dominated activities, as presented in figure 7.

**Figure 7- Average expenditure in electricity per sector (GHC/month)**



The reality of gendered occupational segregation came up clearly in our interviews. Socially constructed as well as biological differences (mainly men’s physical strength and women’s pregnancy) were common justifications. There were also a number of aspirational formal occupations such as working as banking clerks, teachers or in civil service that were considered appropriate for women.

“Because God created them out of a man’s rib, females are weaker than men. So, to say you are equal to the person you were created from is a lie. We have been saying women can do anything a man can do, but I don’t believe that. Women can never do a better job than men” Male sprayer in Berekum

“The carpentry work involves strength because all the things are weightlifted (...) Women will be a subset of the men. Men can do all the general work but women cannot do everything. When it comes to finishing work, women can do it.” Male carpenter in Berekum

“there are some jobs that the average Ghanaian woman or Berekum woman will never dare to do, for example fitting, welding, blacksmith, timber lumbering or sawmills. These are more or less areas reserved for men, not specifically reserved but women don't have the courage to enter into such businesses, but I wouldn't blame them” Berekum District Chief Executive.

“In formal settings most women are in junior staff positions such as secretaries, cleaners, labourers ..., at that level they don't take decisions, they just obey instructions. So, if you go to heads of department meetings you end up being the only female. In informal settings women are mostly engaged in hairdressing, dressmaking sweepers, cleaners, petty trading and the likes. They are also into farming but not into cash crops, only into peppers, onions, tomatoes... those small crops that can be grown around the house and don’t fetch much. The cashew and the cocoa are male dominated and even if you see women, they are supporting their husbands“. Ministry of Gender, Child and Social Protection Officer (female)

“If a lady who is young and in search of a husband looks dirty she doesn’t attract men. It therefore makes the women not to show interest in the job. Women are interested in cooking and store keeping” Chairman of Berekum LIZ.

“I've seen a lot of women entering the spraying shops. Spraying is easier to learn than working on the engine. A lot of women are also doing supporting services like selling spare parts, because it’s easy to do. Some fitters open for their wives to sell as they attend to their main occupation. Other women also go there to provide food services to those who are working at the site. So we have quite a number of women there, but when we talk of people working as the core target of the site it is always male-dominated. (Chief development planning office, male Techiman)

“The women are shy but the men are not.” Female caterer from Techiman

“Catering job is a female’s job and it is a job that brings peace to the house” female caterer

“There are certain jobs that are for men only because females are usually soft. That is why females who are hard are sometimes referred to as man-like. There are some jobs that are for men and seeing a female do it is surprising.” Male autoelectrician in Berekum

“You can’t work in a place like this. Sometimes, the way customers talk to you, you could easily get angry. You know women have a bad temper compared to men.” Male welder in Berekum

(What perception men have about women sprayers?) “They will think she wasn’t good at school or she just likes men.” Male welder in Berekum

“If you see a woman working in the magazine, you will either think she is promiscuous or she is strong. I know a woman who drives the Metro Mass Transit (MMT) bus and the way she even talks shows that she is strong. (...)Yes, I respect her. The ways she orders you when you go there is just like a man.” Male working in a drugstore, Berekum

These traditional perceptions coexisted with broader perceptions of women roles and examples of gender equality that are not common in many other countries in the developing world. Women have a reputation of strong traders and control the town's markets. Furthermore, with education and globalisation, interviewees had been exposed to several instances of women surpassing their traditional roles. This was seen with admiration and respect, rather than as a threat.

"Recently when I went to Accra, the VIP bus I boarded was driven by a woman. I was surprised initially when the woman came into the steering wheel. I nearly went down. Psychologically I was not comfortable, how can a woman drive me to Kumasi? But she was doing very well, she was very careful too and the zeal she was putting, I mean I was clapping! So when I dropped down I said: Mama God bless you (chief development planning office, male Techiman)

"When I went to the school for monitoring the headmaster of our programme on building and construction, he was full of praise for one of the trainee ladies. He couldn't imagine that she could lift blocks and start building by herself. He was so amazed. When the girl started performing, the boys saw that girls too can do it. They had to see to believe." Ministry of Gender, Child and Social Protection Officer (female)

"There are female technicians that are able to climb up to transformer level, they come and check the faultiness of meters, perform meter calibrations and they're working very well. It was in the olden days that people didn't like or women didn't like pursuing technical programs and science courses but now you can see they dominate in many of these courses" NEDCO representative in Berekum.

"If the women do the carpentry work, they can do it and do it better. Because at certain times, it does not need much strength, it needs skills." Male carpenter in Berekum

"I think both men and women have the same brain, so if you put your mind to it you can do it, except when it comes to strength." Male straighter, Techiman

"When I was in Kumasi, three of the masters were females and were giving instructions to male and female apprentices, but men did the lifting work" Male straighter in Techiman.

"When you come to the political arena gone are the days when politics was purely reserved for men. At the moment we have women becoming MPs, women becoming even Chief Justice" Chief Executive Officer of Berekum

There was a feeling of pride among women doing male jobs, because they had been able to show that they could do it:

"Some people come to see you doing that job and they become happy and give you more work because you are a female [...] everyone is happy that this sister is doing this work. I am happy if someone says something good about it." (Female auto-mechanic)

"I enjoy the work much because you wouldn't see many women into it. People sometimes asked me why I am into this job as a woman but I usually say to myself that these people do not know what they are saying." (Female sprayer)

"You are happy because you can also say you are the one who did it." (Female sprayer)

"I really feel proud of my job. People even call me by the name of my business (...) at the beginning men were surprised and some came to check me out. I believe women can also do men related work and even do it better than them" (female miller, Berekum)

“When some people see you in the working gear, they like you and even give you money. It motivates me to work. Sometimes when I am by a car working you won’t see that I am tired. When you see me working on the car, you wouldn’t even think it is me. When someone comes to see you doing the job, they are marvelled because I am a female doing this kind of work. The work is nice and it is beautiful when a female is doing it.” Female sprayer

“[When you walk around Techiman Township and people who know you as a female carpenter look at you, do you feel shy?] No, I don't feel shy. I feel proud. I'm excited about the work. Even my family members are excited about my work. They even say that "my sister is the one doing carpentry here". Female carpenter in Techiman.

Many men agreed that they would prefer to pay a woman over a man doing car services or carpentry: “One advantage the women have is, over here the females don’t like learning a vocation so, if one of them is able to go through and she opens her shop, men prefer patronizing their services.” Male sprayer in Berekum. “Women will get more customers. When a woman does something, men like to go there. If a woman owns a bar, men usually go there.” (Male carpenter in Berekum). But the same happened with men venturing into female jobs: “When the males learn (hairdressing) they get a lot of customers because it is not common so it helps them.” (Woman hairdresser).

A common element in most women who had crossed over to male dominated sectors, was the influence of male role models, or exposure to the sector from family and friends:

“I used to sell yams alongside this milling business inherited from my father but fully resorted to the milling after the death of my father (...) I had a customer at Kumasi Magazine who died a month ago; he taught me how to assemble the station because I was been cheated by repairers (...) I took inspiration from a man who came for a funeral in this town. After I had discussed with him my interest in milling, he promised to give me the machine to start the business. He lavishes praises on me anytime he comes around. I can say it is that motor which coined the whole business.” (Female corn miller)

“I was one day chatting with a friend and she told me that her father said someone has sprayed her motorcycle. A female had sprayed his motor cycle! And when she completed it was very nice. So her father said he will let her train as a sprayer. At that time I didn't know about the spraying vocation. I didn't know what it entails but I took a decision that I will also do that thing. So when I completed school and my parents told me that there was no money, I told myself I will learn this job” Female sprayer

“A woman trader came to our village. We were chatting and she said that her daughter was going to train as a sprayer. So when she said that, I said wow, this woman has spoken about this job and made me happy. I said that if her daughter is going to learn spraying, then I will also learn spraying.” Female sprayer

“What motivated me is that, my male sibling came to do it and I came after him.” Female sprayer

“I had a teacher of Social Studies called Mr. Sulley. Now he teaches at Techiman Secondary. He taught me freely. He had wished to support me financially to further my education, but that did not happen. So when he realised that I was learning a male job, he was the only one who came to the workplace and visited me and encouraged me. He said that if I worked hard I would be equal to my colleagues furthering their education.” Female carpenter



### 4.3 Modelling results

This section presents the results for the model specified in equation 1, Section 3, with monthly profit, energy expenditure, and number of hours of electricity consumption as dependent variables. Results for other variables (electricity expenditure, opening hours, sales, number of customers, business expenditure) are included in the appendix.

Dependent variables are expressed in natural logarithm, hence coefficients of the independent variables in the subsequent tables have to be multiplied times 100, and be interpreted as percentage change in the outcome variable when continuous variables increase by one, or when the value of dummy variables is 1, *ceteris paribus*. Results are presented for all the sample, and then separately for just male owned enterprises and just female owned enterprises, to identify gender differences in the impact of variables. To rule out the presence of collinearity in explanatory variables, their correlation coefficients were looked at, without finding any high value.

We begin by presenting the results for last month profit in Table 29. Among our main variables of interest, female owners and businesses in the industrial zone report significantly lower monthly profits, while businesses using electricity report a positive and statistically significant coefficient. It is quite interesting to notice the difference among gender in the magnitude of the coefficient related to the industrial zone variable, indicating that being in an industrial zone has, generally, a negative impact for profits that becomes even more negative for female owned businesses.

Among the statistically significant individual characteristics, older individuals report higher profit, similarly to married and migrant owners, with the first driven by the female gender and the second driven by the male gender. The number of children is negatively correlated with profits, potentially due to higher care responsibilities or lower ability to save and reinvest. The negative impact of having children is higher for male than for female businesses. This may seem counterintuitive but matches insights from interviewed men saying that they had little left to reinvest after providing for their families, but this was not such a problem for women. Financial variables like having a bank account and high starting capital have a significant positive impact on business outcomes, while the coefficients related to loan requests are positive but not statistically significant. Finally, among business characteristics, businesses that are formally registered and in a permanent structure are associated with significantly higher monthly profit.

Results for other business performance variables (sales, customers, opening hours), presented in the appendix reiterate the positive impact of financial variables- having a bank account, high starting capital, and requesting loans. Likewise, enterprises in industrial zones always perform worse than their counterparts, and enterprises using electricity always perform better. However, the impact of gender is mixed, with female owners having significantly less customers than male, but no significant differences in opening hours and sales.

**Table 29- OLS Results- LN last month profit**

	(1) <b>All Sample</b>	(1.1) <b>Male</b>	(1.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.055*** (0.008)	0.058*** (0.013)	0.055*** (0.008)
No Education/Primary Education	-0.017 (0.146)	0.151 (0.193)	-0.285 (0.222)
Migrant	0.304** (0.135)	0.415** (0.181)	0.053 (0.198)
Married	0.304**	0.242	0.404**

	(0.153)	(0.267)	(0.195)
Bank Account	0.955***	0.933***	0.686***
	(0.149)	(0.201)	(0.244)
Requested loan	0.215	0.329	-0.040
	(0.150)	(0.201)	(0.204)
<b>Household Characteristics</b>			
Number Children	-0.150***	-0.227***	-0.051
	(0.049)	(0.076)	(0.044)
Number of Elder	0.008	-0.007	0.021
	(0.023)	(0.054)	(0.024)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>-0.333*</b>		
	<b>(0.199)</b>		
<b>Electricity</b>	<b>0.623***</b>	<b>0.498**</b>	<b>0.701***</b>
	<b>(0.146)</b>	<b>(0.230)</b>	<b>(0.208)</b>
<b>Industrial Zone</b>	<b>-0.588***</b>	<b>-0.444*</b>	<b>-1.014**</b>
	<b>(0.194)</b>	<b>(0.236)</b>	<b>(0.417)</b>
Member of Association	0.167	0.252	0.011
	(0.154)	(0.228)	(0.190)
Registered Business	0.356**	0.339	0.304
	(0.180)	(0.236)	(0.236)
Starting Capital ('000 <sup>th</sup> )	0.003**	0.002	0.005**
	(0.001)	(0.001)	(0.002)
Permanent Structure	0.422**	0.375	0.575***
	(0.163)	(0.229)	(0.219)
Keep Book	0.238	0.395	0.093
	(0.204)	(0.292)	(0.276)
Number of Workers	-0.010	0.068	-0.043
	(0.030)	(0.049)	(0.038)
Observations	393	248	145
R-squared	0.963	0.960	0.976
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The coefficients for both Region and Sector fixed effects are not presented here, but they show Techiman's businesses performing significantly better than the other towns, and restaurants outperforming all other sectors. Furthermore, male dominated sectors do not present significantly higher profits than female dominated ones.

Looking at energy outcomes, the following Table 20 presents the results relative to businesses' expenditure in all energy sources. Among the main variables of interest, only using electricity has a statistically significant and positive impact, raising the energy bills for business, and more so for male owned ones. Being a female owned business increases energy bills, but it is not statistically significant. On the other hand, being located in Industrial Zones has a positive impact on energy expenditure, not significant for the sample as a whole but significant for female owned businesses. Among other statistically significant variables, age reports statistically significant coefficients with opposite sign by gender and low level of education reports a positive and statistically significant coefficient only for males. Larger firms, in terms of number of employees, also have significantly larger energy bills.

**Table 30- OLS Results – Total Energy Expenditure (In '000 TZS)**

	(2)	(2.1)	(2.2)
	<b>All Sample</b>	<b>Male</b>	<b>Female</b>
<b>Individual Characteristics</b>			
Age	0.017** (0.007)	-0.003 (0.009)	0.041*** (0.011)
No Education/Primary Education	0.023 (0.162)	0.405** (0.201)	-0.015 (0.235)
Migrant	-0.073 (0.148)	-0.161 (0.173)	-0.042 (0.254)
Married	0.088 (0.157)	0.307 (0.210)	-0.107 (0.216)
Bank Account	-0.101 (0.186)	-0.020 (0.211)	0.082 (0.332)
<b>Household Characteristics</b>			
Number Children	0.016 (0.044)	0.032 (0.057)	-0.009 (0.071)
Number of Elder	-0.019 (0.030)	0.038 (0.056)	-0.004 (0.026)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>-0.202</b> <b>(0.198)</b>		
<b>Electricity</b>	<b>2.365***</b> <b>(0.198)</b>	<b>3.289***</b> <b>(0.264)</b>	<b>1.386***</b> <b>(0.302)</b>
<b>Industrial Zone</b>	<b>0.143</b> <b>(0.234)</b>	<b>-0.049</b> <b>(0.258)</b>	<b>0.725*</b> <b>(0.406)</b>
Member of Association	-0.149 (0.161)	-0.233 (0.217)	0.259 (0.214)
Registered Business	0.156 (0.197)	0.341 (0.226)	-0.352 (0.289)
Starting Capital ('000 <sup>th</sup> )	-0.000 (0.001)	-0.001 (0.002)	0.001 (0.002)
Requested loan	0.083 (0.151)	0.148 (0.175)	-0.038 (0.250)
Permanent Structure	-0.080 (0.186)	0.034 (0.228)	0.126 (0.299)
Keep Book	0.110 (0.218)	0.131 (0.228)	0.259 (0.367)
Number of Workers	0.075** (0.032)	0.088 (0.056)	0.020 (0.039)
Observations	396	250	146
R-squared	0.908	0.922	0.933
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Results with regards to expenditure in electricity, which are detailed in the appendix show a negative but not statistically significant sign for variables of interest being female and location in an industrial zone. Among other explanatory variables, only age had a positive and significant sign for the sample

as a whole. However, for the subsample of women entrepreneurs, having a bank account, being member of an association and starting capital are positively and significantly correlated with electricity expenditure.

Finally, results for the variable hours of electricity consumption are presented in Table 31. Focusing on the main variables of interest, female owners report a significantly more hours of use of electricity that however drops for female owned businesses in industrial areas. Among statistically significant individual characteristics, age reports a positive coefficient while being married and having a bank account has a positive impact only for females. Finally, having a business registered and higher starting capital have a positive and statistically significant coefficient for all sample and males, while female owned businesses in permanent structure report higher consumption of electricity and businesses with higher number of employees report a lower number of hours of electricity used for both female and all sample. Observing fixed effects, which are not detailed in the table, we see that restaurants outperform all other sectors in term of number of hours of electricity consumption.

**Table 31 - OLS Results – LN Total Hours Electricity Used**

	(3) <b>All Sample</b>	(3.1) <b>Male</b>	(3.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.020*** (0.004)	0.018** (0.007)	0.022*** (0.007)
No Education/Primary Education	0.063 (0.085)	0.071 (0.106)	0.051 (0.129)
Migrant	0.053 (0.077)	0.006 (0.089)	0.107 (0.145)
Married	0.115 (0.087)	0.003 (0.131)	0.231* (0.134)
Bank Account	0.121 (0.096)	0.071 (0.116)	0.580*** (0.194)
<b>Household Characteristics</b>			
Number Children	-0.020 (0.017)	-0.015 (0.028)	-0.034 (0.027)
Number of Elder	0.012 (0.010)	0.033 (0.024)	-0.003 (0.013)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>0.325***</b> <b>(0.111)</b>		
<b>Industrial Zone</b>	<b>-0.146</b> <b>(0.130)</b>	<b>0.104</b> <b>(0.135)</b>	<b>-1.145**</b> <b>(0.518)</b>
Member of Association	0.011 (0.087)	-0.112 (0.127)	0.130 (0.126)
Registered Business	0.184** (0.086)	0.218** (0.106)	0.089 (0.126)
Starting Capital ('000 <sup>th</sup> )	0.001*** (0.000)	0.001** (0.001)	0.001 (0.001)
Requested loan	0.067 (0.077)	0.100 (0.091)	0.130 (0.135)
Permanent Structure	0.077 (0.094)	-0.051 (0.131)	0.356*** (0.121)
Keep Book	0.096 (0.112)	0.079 (0.144)	0.152 (0.172)

Number of Workers	-0.025* (0.013)	-0.004 (0.024)	-0.041* (0.023)
Observations	270	183	87
R-squared	0.937	0.936	0.961
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The previous modelling exercise has shown correlations between different explanatory variables and outcome variables related to profits and energy consumption, *ceteris paribus*. Results have shown that being a female owner is correlated with lower profits, and lower energy and electricity consumption, but in the last cases the relationship is not statistically significant. However, female owners show a significantly higher number of hours of consumption of electricity. This means that women use electricity with lower power appliances than men, which keeps their consumption low. Enterprises located in industrial zones present lower profits and lower electricity consumption measured as expenditure and number of hours, but the last two correlations are not statistically significant. The lower performance of firms within Industrial Zones had already been highlighted by two previous impact evaluations and attributed to higher competition among all businesses moving to these areas. During an interview to the (female) President of the Small Industry Association of Berekum, she provided as an additional explanation the inconvenient long distance to get to these industrial zones. To avoid being stranded, customers requiring to get their car fixed would typically go to a mechanic close to the town centre. Consequently, the car mechanics that stay in town get more customers than those moving to industrial zones. We also hypothesise that traders that moved to industrial zones in the search of free land for their businesses had worse starting conditions than those already settled in town with their own structure. Accordingly, they would be expected to perform worse, even if the Industrial Zone provides beneficial services such as better electricity supply. The final variable of interest, which is using electricity, has a positive and significant impact for all business performance indicators, but also significantly raises energy bills. Among all other explanatory variables, financial ones in particular are correlated with higher business performance.

## 5 DISCUSSION: WHICH INTERVENTIONS CAN WORK TOWARDS GENDER EQUITY IN THE PUE?

This study has looked at the case of support to light industrial zones with improved electricity supply in urban areas of Mid-Western Ghana. It has also gone beyond that case to analyse energy consumption patterns of male and female owned enterprises in and out of these industrial zones. The results of the analysis show that, in the absence of gender considerations, interventions for the promotion of productive uses of electricity are likely to target electricity intensive, typically male owned, enterprises. Such was the case of the LIZ with improved electricity supply in the Brong Ahafo region. The intervention mainly targeted enterprises with male owners and employees in the auto mechanics sector. Only 13% of enterprises in these zones are owned by women, and women employees are a minority.

The focus on male sectors of PUE interventions does not necessarily mean that women using energy productively are disadvantaged. In fact, there is no evidence that enterprises in the LIZ are performing better than female enterprises in the region. On the contrary, increased competition in industrial clusters, and distance from the town centre appear to have had a destructive effect. In fact, the

predominantly male enterprises located in LIZ display lower profits than their counterparts outside these zones. This brings to the fore the importance of careful planning of PUE. As previously demonstrated in the literature, energy alone cannot create economic growth and other enabling factors need to be in place when planning these interventions. In this particular case, the lack of enforcement of LIZ policies has prevented a level playing field for automotive industries. Car mechanic shops are still springing up in the town's centre, creating disincentives for car owners to go to the LIZs.

Even if women's enterprises typically consume less electricity than men's, total energy expenditure and energy intensity are similar across genders in our sample. Compared to men, women are more heavy consumers of cooking fuels such as charcoal, LPG and firewood. Interventions related to cooking fuels, such as Ghana's LPG promotion programme would therefore have benefitted women rather than men entrepreneurs. Productive uses interventions, therefore need to go beyond electricity. Still, electricity is the most frequently used type of fuel for both genders, closely followed by charcoal for women. In terms of average expenditure, women consume significantly less electricity than men, but use it for longer hours, with lower wattage appliances. Because Ghana applies a progressive electricity tariff schedule, where households and commercial customers consuming less pay less per kWh, lower consuming female enterprises could be effectively cross-subsidised by higher consuming male enterprises.

Women have benefitted as much or more than men from other interventions, such as the training, awareness campaigns, access to finance or customers. The Head of the Business Advisory Centre in Techiman maintained that women seek support from the Centre more proactively than men and put to better use the finance, training and advice received. The Centre now runs more training programmes for female dominated trades than for male trades and is trying to target them with financial support. The Centre is also supporting female based enterprises to scale up by encouraging them to join up in sectoral associations.

On the whole, it cannot be concluded that the support to LIZ with improved electricity discriminates against women's businesses because they are targeted by other energy and business promotion policies. Still, it is necessary to explain why there are profit, salaries and an electricity consumption gaps for women enterprises as compared to men.

Several reasons can account for these gaps. Firstly, women are typically specialised in sectors with lower average electricity consumption (but no lower total energy consumption). These include hairdressing, tailoring, restaurants and bakeries. Their businesses display a large number of customers, but low revenues as compared to men, indicating small profit margins per unit sales. They are more likely to combine several small activities. Occupational segregation persists, by which women are more likely to engage in traditionally female trades such as petty trading and the previously mentioned sectors. But these gender norms are slowly being challenged. Second, women's enterprises have lower starting capital, and display lower ownership of high wattage electric appliances. Lack of equipment was mentioned by many women as an important barrier for them to access typically male trades, where men would use their physical energy in the absence of equipment. Third, women work shorter hours, mainly due to care responsibilities within the household. Some activities in the household remain distinctively female, such as washing clothes and cooking meals, in spite of progress in others, such as ironing and child rearing.

There are also many encouraging signs towards gender equality in the PUE in the region. First, women's educational attainment is similar to men's. Education is helping both men and women to challenge gender stereotypes about household responsibilities and the types of businesses that men and women can/should do. More women are getting into desirable formal employment in banks, civil

service or as school teachers, for example. And more of them are getting into STEM<sup>8</sup> professions. Second, even if women display a lower starting capital, they show significant economic empowerment, holding bank accounts more frequently than men, and being able to save and reinvest their business profits without diversion to the household. In this respect, the cultural norms of the region make men responsible to provide for the household, and men more often complained of being unable to save for their business after meeting family needs. Third, facilitated by globalisation and exposure to new role models, more men and women are challenging traditional gender roles. Women in traditionally male businesses show pride in what they do, and in having been able to demonstrate that women can do as good a job as men. Many men appreciate women venturing into traditional male jobs and show delight when their preconceptions are proved wrong.

Taking into account the prevailing gaps towards gender equality in the PUE, as well as the many achievements of the region towards this goal, we provide policy recommendations. These are classified in two groups: first PUE interventions that support the activities that men and women currently do and leave no one behind. Second PUE interventions that transcend traditional occupational segregation as well as segregation within sectors, moving towards equity in the use of energy at work.

The following actions would support men and women's PUE in their current roles:

1. **Access to finance and equipment.** Finance was identified by both men and women as the most pressing constraint to growth. Women, have more need of starting capital to buy equipment, but once they start their operations are more prone to saving and reinvesting. Men, on the other hand, typically start with higher capital, but later on struggle to save and reinvest when the business is operating. Different strategies for finance provision are hence required for men and women to match their particular needs. Besides, access to finance not only supports men and women in their current roles, but also can support women to access male trades by allowing them to purchase equipment that replaces physical energy, for example in the carpentry or milling sectors.
2. **Energy management training.** Many businesses in the area displayed a total lack of understanding about how electricity bills are calculated and a distrust about whether the meter readings were legitimate. There was in many cases resistance to prepaid meters, which should allow businesses to better control their bills. Further understanding of energy bills, and how to achieve savings could support both male and female businesses to improve energy efficiency and derive higher benefits from their productive use of energy.
3. **Reliability improvements.** The poor reliability of electricity supply was highlighted by both men and women entrepreneur as a key constraint to their businesses. Poor reliability causes delays in production, lost customers, lower sales, and damaged equipment. As a result, those who can afford it are turning to individual generators or solar home systems to bypass the grid. This has significant consequences for the power utility, starting a vicious cycle in which higher consumers abandon the grid, hence reducing the revenues of the power utility and its ability to invest to improve reliability.
4. **Support to traditionally female trades with high quality, affordable energy, and not only electricity.** Interventions to improve the cost and quality of cooking fuels, and to support small commercial consumers of electricity are more likely to target women. Cooking fuels interventions include the promotion of LPG, with lower impacts for women health or improved cookstoves using charcoal more efficiently. Interventions to support small electricity consumers include progressive electricity tariffs, where large consumers subsidise

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<sup>8</sup> Science, Technology, Engineering, Mathematics

smaller ones, like is the case in Ghana. This system could have unintended consequences, though. Unreliable grid electricity in Ghana makes wealthier electricity consumers turn to back-up solutions reducing the required revenues required for the cross-subsidy scheme. Good quality of service therefore becomes essential to maintain a cross subsidy.

5. **Support traditionally male trades with improved high quality, affordable energy as well as new technologies, but taking into account other business constraints.** Predominantly male heavy consumers of electricity have benefitted from improved supply when they have moved to LIZ in our target region. However, LIZ based businesses face other challenges that keep their profits low, such as inability to invest in equipment, destructive competition in industrial clusters, and distance to the town centre, which discourages potential customers. Men in our sample use their own physical strength as their only energy source more often than women. Inability to purchase equipment is one of the key reasons for this, and should be one of the key areas targeted for further support to PUE by men. Furthermore, many women are not attracted to typically male sectors due to their reliance on physical strength. Support for businesses in these sectors to upgrade with new technologies could make it easier for women to crossover, as apprentices, workers and entrepreneurs. Another area would involve supporting men to get more advanced skills to move up the more crowded occupations where competition is the highest.

The following actions would support men and women to transcend their traditional roles and move towards gender equity in the PUE:

6. **Education.** Gender equality in education is behind changing attitudes with regards to what men and women can do at work and at the household. Higher education is allowing women to enter into formal occupations that can bring stability and higher income for women. A new role for women at the workplace can also reduce the pressure that men feel due to cultural norms that make them fully responsible to provide for the household. The sharing of household and financial responsibilities can support both men and women to feel professionally accomplished, save and reinvest in their business, and enjoy time for leisure.
7. **Soft skills and exposure to new role models.** Even if women are increasingly entering the formal market thanks to education, they are still relegated to secondary positions with no decision making power. Those in the informal sector operate at smaller scale than men, and using less machinery. Our interviews clearly conveyed that stereotypes can be broken when men and women are exposed to others transcending gender roles and showing that it is possible. Confidence building for women venturing to male trades had often come with the encouragement of male role models. Policies to increase these level of exposure to women in decision making positions, or women in highly capitalised sectors could be very effective to erode the persisting occupational segregation. Some examples of these interventions are affirmative action to include women quotas in training programmes and apprenticeships; mentoring programmes where women in powerful positions or running businesses in male trades counsel younger women; or associations where women in male dominated sectors or occupying positions of responsibility share their challenges support each other.
8. **Support women to scale up.** The small scale character of women's businesses acts as a drag for growth and keeps them as small electricity consumers. Women can be supported to join forces in associations to target customers together, access supplies at a lower cost, or increasing their bargaining power with the Government. In our region, associations are more common among male trades than female trades, but they are picking up in some sectors, like hairdressing, or tailoring with many beneficial impacts.



The first set of recommendations, targeting men and women's current roles, is expected to achieve faster success. The second set requires transformations at the community level. In the urban context we analysed, however, these set of transformational interventions are already showing positive outcomes. They should serve as an example that gender roles can change with time, education and exposure. In any case, a lot remains to be done, as deep-rooted preconceptions are still widespread. Furthermore, as traditional norms erode, women could face new vulnerabilities perpetuating their poverty, as proved by the rise of fathers escaping financial responsibilities towards their children in the absence of official marriage deeds.

## 6 CONCLUSIONS

As Ghana progresses towards universal access to modern energy and particularly electricity, productive uses are becoming a key factor for the financial sustainability of power utilities. At the same time, Ghana has adopted gender mainstreaming as a policy goal and is looking to promote women's economic empowerment and equality in access to resources.

This paper gathers evidence on how men and women use energy for productive uses in enterprises located in urban areas within the region of Brong-Ahafo. The towns that we surveyed benefited from a programme to promote industrial clusters with better electricity supply.

A multi-method approach was used, combining quantitative research- involving descriptive statistics and OLS regressions- and qualitative research, involving key informant interviews, semi-structured interviews and focus group discussions. Results from different tools were triangulated to validate the statements made, and we complement quantitative insights with qualitative detail about people's perceptions, motivations and aspirations.

Results show that men and women use energy differently at work. Men in our sample operate in enterprises that use more electricity and metabolic energy than women. Women's use of electricity is also widespread, but in smaller quantities, and they dominate the use of cooking fuels at work. Data on energy consumption as a whole, and energy intensity measured as the share of energy expenditure in total expenditures and total profits, is similar across genders. Poor electricity reliability is a drag for both men and women businesses. However, women are more affected as the distribution network is weaker outside industrial zones.

Gender differences in energy consumption patterns for productive uses can be explained by the lower capitalisation of women's enterprises, lower profits, higher care responsibilities, and the gendered segregation of men and women in different trades. Men occupy sectors like milling, carpentry, auto-mechanics and metal works. Women often work in food preparation, hairdressing or tailoring. Cold stores are an electricity intensive businesses that both men and women do, but men typically have larger stores with more freezers. On the other hand, there are many signs of gender equality in education, ability to export, and motivations to run businesses. There were also many instances in which both men and women were challenging traditional norms about the distribution of tasks at work and the household, even if many norms still prevailed.

Results from the regression model show that electricity is consistently associated with better outcomes for businesses, and location in LIZ is associated with worse outcomes. All else being equal, being female is associated with lower profits, and higher hours of electricity supply, but has no impact in other variables.

Drawing from the lessons learnt in the towns of Techiman and Berekum, the paper concludes offering policy recommendations. Two approaches are proposed. First, targeting men and women in their current productive roles with improved finance, energy management education, improvements in

reliability of electricity supply, targeted supply of improved cooking fuels and affordable electricity for female businesses, and targeted supply of equipment and higher specialisation for male businesses. Second, transforming current gender roles with further education, exposure to role models, and associations to scale up small female businesses.

The above policy recommendations apply to an urban context, within a middle income country, with high levels of electricity supply, relatively high women empowerment and relatively high energy consuming small businesses. However, many other countries can learn about the sticky gender norms that prevail, and the way to target PUE interventions at intermediate stages towards gender equality.

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## 7 APPENDICES

### 7.1 Regression results for additional dependent variables

**Table 32 - OLS Results – Opening Hours**

	(7) <b>All Sample</b>	(7.1) <b>Male</b>	(7.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.085*** (0.015)	0.100*** (0.020)	0.081*** (0.026)
No Education/Primary Education	-0.131 (0.297)	-0.129 (0.299)	-0.336 (0.606)
Migrant	0.640** (0.251)	0.440* (0.256)	0.773 (0.517)
Married	0.369 (0.335)	0.011 (0.371)	0.796 (0.601)
Bank Account	1.427*** (0.294)	1.062*** (0.329)	1.583** (0.715)
<b>Household Characteristics</b>			
Number Children	-0.245** (0.095)	-0.224** (0.090)	-0.376 (0.234)
Number of Elder	-0.009 (0.045)	0.019 (0.077)	-0.052 (0.064)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>-0.254</b> <b>(0.450)</b>		
<b>Electricity</b>	<b>1.025***</b> <b>(0.292)</b>	<b>0.272</b> <b>(0.348)</b>	<b>1.692***</b> <b>(0.528)</b>
<b>Industrial Zone</b>	<b>-1.034***</b> <b>(0.336)</b>	<b>-0.704**</b> <b>(0.326)</b>	<b>-0.668</b> <b>(1.239)</b>
Member of Association	-0.273 (0.295)	-0.314 (0.295)	-0.333 (0.570)
Registered Business	0.784** (0.339)	0.713* (0.404)	0.692 (0.624)
Starting Capital ('000 <sup>th</sup> )	0.003** (0.001)	0.002* (0.001)	0.007** (0.003)
Requested loan	0.624** (0.285)	0.367 (0.321)	1.121** (0.535)
Permanent Structure	1.039*** (0.334)	0.360 (0.389)	1.868*** (0.641)
Keep Book	0.139 (0.356)	-0.168 (0.404)	0.650 (0.710)
Number of Workers	-0.127** (0.050)	-0.013 (0.081)	-0.168** (0.080)
Observations	395	250	145
R-squared	0.954	0.969	0.944
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 33 - OLS Results – LN Sales High Season**

	(8)	(8.1)	(8.2)
	<b>All Sample</b>	<b>Male</b>	<b>Female</b>
<b>Individual Characteristics</b>			
Age	0.062*** (0.009)	0.062*** (0.013)	0.062*** (0.012)
No Education/Primary Education	0.126 (0.141)	0.070 (0.169)	0.168 (0.244)
Migrant	0.386*** (0.125)	0.451*** (0.158)	0.221 (0.242)
Married	0.223 (0.165)	-0.051 (0.250)	0.623*** (0.221)
Bank Account	1.083*** (0.152)	1.002*** (0.178)	1.358*** (0.323)
<b>Household Characteristics</b>			
Number Children	-0.097** (0.043)	-0.167*** (0.054)	0.022 (0.052)
Number of Elder	-0.004 (0.024)	-0.004 (0.043)	0.011 (0.032)
<b>Female Owner</b>	<b>0.246</b> <b>(0.214)</b>		
<b>Electricity</b>	<b>0.692***</b> <b>(0.145)</b>	<b>0.523***</b> <b>(0.196)</b>	<b>0.589**</b> <b>(0.281)</b>
<b>Industrial Zone</b>	<b>-0.504***</b> <b>(0.189)</b>	<b>-0.479**</b> <b>(0.221)</b>	<b>-0.390</b> <b>(0.423)</b>
Member of Association	0.048 (0.140)	0.121 (0.176)	-0.028 (0.225)
Registered Business	0.319* (0.174)	0.369* (0.200)	0.059 (0.317)
Starting Capital ('000 <sup>th</sup> )	0.003** (0.001)	0.003* (0.002)	0.004** (0.002)
Requested loan	0.356** (0.146)	0.325* (0.191)	0.295 (0.248)
Permanent Structure	0.620*** (0.161)	0.772*** (0.211)	0.609** (0.307)
Keep Book	-0.020 (0.177)	0.145 (0.222)	-0.253 (0.299)
Number of Workers	0.001 (0.029)	0.077* (0.042)	0.000 (0.039)
Observations	396	250	146
R-squared	0.969	0.971	0.972
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 34 - OLS Results – LN Sales Low Season**

	(9) <b>All Sample</b>	(9.1) <b>Male</b>	(9.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.049*** (0.009)	0.042*** (0.013)	0.057*** (0.012)
No Education/Primary Education	-0.042 (0.196)	-0.019 (0.282)	0.159 (0.253)
Migrant	0.291 (0.183)	0.332 (0.259)	0.036 (0.247)
Married	0.511** (0.203)	0.677** (0.320)	0.605** (0.234)
Bank Account	1.267*** (0.229)	1.371*** (0.317)	1.001*** (0.322)
<b>Household Characteristics</b>			
Number Children	-0.159** (0.071)	-0.300*** (0.087)	0.052 (0.056)
Number of Elder	0.017 (0.032)	0.071 (0.071)	0.001 (0.032)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>0.140</b> <b>(0.226)</b>		
<b>Electricity</b>	<b>0.691***</b> <b>(0.200)</b>	<b>0.871**</b> <b>(0.339)</b>	<b>0.296</b> <b>(0.290)</b>
<b>Industrial Zone</b>	<b>-0.016</b> <b>(0.315)</b>	<b>0.106</b> <b>(0.400)</b>	<b>-0.645</b> <b>(0.474)</b>
Member of Association	0.061 (0.217)	0.215 (0.339)	-0.170 (0.240)
Registered Business	0.135 (0.252)	0.196 (0.335)	-0.171 (0.342)
Starting Capital ('000 <sup>th</sup> )	0.003** (0.001)	0.002 (0.001)	0.004* (0.002)
Requested loan	0.375** (0.177)	0.350 (0.270)	0.244 (0.241)
Permanent Structure	0.497** (0.215)	0.722** (0.341)	0.401 (0.322)
Keep Book	0.018 (0.216)	0.242 (0.261)	-0.205 (0.348)
Number of Workers	0.028 (0.034)	0.063 (0.065)	0.058 (0.045)
Observations	396	250	146
R-squared	0.908	0.885	0.958
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 35 - OLS Results – Customers High Season**

	(10)	(10.1)	(10.2)
	<u>All Sample</u>	<u>Male</u>	<u>Female</u>
<b>Individual Characteristics</b>			
Age	0.038*** (0.006)	0.035*** (0.009)	0.039*** (0.009)
No Education/Primary Education	0.260* (0.153)	0.208 (0.183)	0.246 (0.216)
Migrant	0.409*** (0.127)	0.408*** (0.151)	0.146 (0.211)
Married	0.256* (0.137)	0.066 (0.185)	0.569*** (0.188)
Bank Account	0.742*** (0.140)	0.594*** (0.170)	0.799*** (0.244)
<b>Household Characteristics</b>			
Number Children	-0.027 (0.035)	-0.015 (0.050)	-0.006 (0.051)
Number of Elder	-0.053** (0.021)	-0.005 (0.040)	-0.050* (0.030)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>-0.520**</b> <b>(0.204)</b>		
<b>Electricity</b>	<b>0.336**</b> <b>(0.144)</b>	<b>-0.126</b> <b>(0.203)</b>	<b>0.206</b> <b>(0.231)</b>
<b>Industrial Zone</b>	<b>-0.472***</b> <b>(0.176)</b>	<b>-0.364*</b> <b>(0.197)</b>	<b>-0.771*</b> <b>(0.410)</b>
Member of Association	-0.266* (0.142)	-0.218 (0.170)	-0.184 (0.205)
Registered Business	0.289* (0.173)	0.284 (0.185)	0.239 (0.286)
Starting Capital ('000 <sup>th</sup> )	0.000 (0.001)	-0.001 (0.001)	0.002 (0.002)
Requested loan	0.270* (0.140)	0.213 (0.173)	0.287 (0.212)
Permanent Structure	0.059 (0.163)	0.097 (0.206)	0.405 (0.264)
Keep Book	0.169 (0.179)	0.275 (0.193)	-0.058 (0.303)
Number of Workers	0.017 (0.028)	0.069 (0.044)	0.032 (0.036)
Observations	368	222	146
R-squared	0.904	0.915	0.932
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1



**Table 36 - OLS Results – Customers Low Season**

	(11) <b>All Sample</b>	(11.1) <b>Male</b>	(11.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.035*** (0.006)	0.029*** (0.009)	0.041*** (0.008)
No Education/Primary Education	0.173 (0.155)	0.120 (0.194)	0.232 (0.223)
Migrant	0.332** (0.131)	0.331** (0.159)	0.056 (0.220)
Married	0.318** (0.136)	0.243 (0.187)	0.580*** (0.197)
Bank Account	0.690*** (0.142)	0.541*** (0.178)	0.719*** (0.249)
<b>Household Characteristics</b>			
Number Children	-0.099** (0.039)	-0.093 (0.058)	-0.089* (0.050)
Number of Elder	-0.063*** (0.022)	-0.043 (0.042)	-0.042 (0.029)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>-0.515**</b> <b>(0.208)</b>		
<b>Electricity</b>	<b>0.395***</b> <b>(0.139)</b>	<b>0.201</b> <b>(0.206)</b>	<b>0.128</b> <b>(0.214)</b>
<b>Industrial Zone</b>	<b>-0.425**</b> <b>(0.182)</b>	<b>-0.369*</b> <b>(0.212)</b>	<b>-0.682*</b> <b>(0.366)</b>
Member of Association	-0.149 (0.147)	-0.019 (0.188)	-0.142 (0.210)
Registered Business	0.201 (0.181)	0.157 (0.190)	0.141 (0.311)
Starting Capital ('000 <sup>th</sup> )	0.000 (0.001)	-0.001** (0.001)	0.002 (0.002)
Requested loan	0.249* (0.141)	0.249 (0.179)	0.223 (0.216)
Permanent Structure	0.106 (0.161)	0.094 (0.217)	0.383 (0.257)
Keep Book	0.101 (0.184)	0.150 (0.201)	-0.033 (0.335)
Number of Workers	0.042 (0.028)	0.085* (0.045)	0.049 (0.038)
Observations	378	232	146
R-squared	0.843	0.828	0.901
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 37 - OLS Results – LN Annual Profit**

	(14) <b>All Sample</b>	(14.1) <b>Male</b>	(14.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.073*** (0.011)	0.072*** (0.017)	0.081*** (0.012)
No Education/Primary Education	0.226 (0.188)	0.424* (0.250)	-0.004 (0.296)
Migrant	0.618*** (0.189)	0.726*** (0.253)	0.301 (0.269)
Married	0.539** (0.210)	0.348 (0.335)	0.934*** (0.300)
Bank Account	1.161*** (0.196)	1.062*** (0.266)	1.229*** (0.354)
<b>Household Characteristics</b>			
Number Children	-0.184*** (0.064)	-0.269*** (0.097)	-0.070 (0.058)
Number of Elder	0.008 (0.029)	0.008 (0.066)	0.028 (0.030)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>0.298</b> <b>(0.296)</b>		
<b>Electricity</b>	<b>0.728***</b> <b>(0.202)</b>	<b>0.698**</b> <b>(0.328)</b>	<b>0.608*</b> <b>(0.329)</b>
<b>Industrial Zone</b>	<b>-0.724***</b> <b>(0.237)</b>	<b>-0.614**</b> <b>(0.283)</b>	<b>-1.056*</b> <b>(0.536)</b>
Member of Association	0.060 (0.209)	0.247 (0.303)	-0.242 (0.279)
Registered Business	0.270 (0.266)	0.233 (0.349)	0.055 (0.378)
Starting Capital ('000 <sup>th</sup> )	0.004*** (0.001)	0.003* (0.002)	0.007*** (0.002)
Requested loan	0.260 (0.201)	0.306 (0.265)	0.141 (0.306)
Permanent Structure	0.531** (0.205)	0.546* (0.296)	0.695** (0.327)
Keep Book	0.304 (0.250)	0.505 (0.352)	0.107 (0.388)
Number of Workers	-0.053 (0.039)	0.044 (0.057)	-0.090 (0.055)
Observations	396	250	146
R-squared	0.963	0.961	0.972
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 38 - OLS Results – LN Total Expenditure**

	(15) <b>All Sample</b>	(15.1) <b>Male</b>	(15.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.066*** (0.008)	0.049*** (0.014)	0.091*** (0.011)
No Education/Primary Education	-0.096 (0.182)	-0.033 (0.211)	-0.072 (0.247)
Migrant	0.401*** (0.135)	0.382** (0.163)	0.321 (0.262)
Married	0.448*** (0.170)	0.390 (0.259)	0.533** (0.235)
Bank Account	1.060*** (0.174)	0.945*** (0.213)	1.311*** (0.361)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>0.005</b> <b>(0.243)</b>		
<b>Electricity</b>	<b>0.394**</b> <b>(0.176)</b>	<b>0.457*</b> <b>(0.249)</b>	<b>0.156</b> <b>(0.329)</b>
<b>Industrial Zone</b>	<b>-0.507**</b> <b>(0.205)</b>	<b>-0.522**</b> <b>(0.229)</b>	<b>-0.290</b> <b>(0.522)</b>
Member of Association	-0.164 (0.154)	-0.002 (0.193)	-0.317 (0.233)
Registered Business	0.533*** (0.202)	0.662*** (0.236)	0.066 (0.343)
Starting Capital ('000 <sup>th</sup> )	0.003*** (0.001)	0.003** (0.001)	0.005* (0.003)
Requested loan	0.558*** (0.162)	0.492** (0.219)	0.516* (0.266)
Permanent Structure	0.618*** (0.179)	0.627*** (0.234)	0.759** (0.350)
Keep Book	0.105 (0.244)	0.026 (0.328)	0.211 (0.303)
Number of Workers	0.029 (0.035)	0.152*** (0.049)	-0.053 (0.043)
Observations	396	250	146
R-squared	0.965	0.968	0.972
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 39 - OLS Results – LN Total Expenditure Electricity**

	(3) <b>All Sample</b>	(3.1) <b>Male</b>	(3.2) <b>Female</b>
<b>Individual Characteristics</b>			
Age	0.037*** (0.011)	0.023 (0.015)	0.044** (0.017)
No Education/Primary Education	0.043 (0.183)	0.114 (0.195)	0.335 (0.370)
Migrant	0.071 (0.167)	-0.062 (0.184)	0.079 (0.304)
Married	0.237 (0.197)	0.464* (0.260)	0.237 (0.285)
Bank Account	0.203 (0.192)	-0.061 (0.218)	1.316** (0.506)
<b>Household Characteristics</b>			
Number Children	0.003 (0.049)	-0.042 (0.076)	0.030 (0.064)
Number of Elder	0.019 (0.048)	0.137** (0.059)	-0.022 (0.039)
<b>Business Characteristics</b>			
<b>Female Owner</b>	<b>-0.194</b> <b>(0.279)</b>		
<b>Industrial Zone</b>	<b>-0.325</b> <b>(0.214)</b>	<b>-0.190</b> <b>(0.251)</b>	<b>-0.207</b> <b>(0.441)</b>
Member of Association	0.270 (0.175)	0.168 (0.220)	0.758** (0.330)
Registered Business	0.183 (0.223)	0.326 (0.272)	-0.056 (0.332)
Starting Capital ('000 <sup>th</sup> )	0.001 (0.002)	0.001 (0.001)	0.004** (0.002)
Requested loan	0.137 (0.170)	0.189 (0.185)	0.177 (0.316)
Permanent Structure	-0.016 (0.216)	-0.131 (0.270)	0.410 (0.344)
Keep Book	0.308 (0.225)	0.206 (0.266)	0.529 (0.319)
Number of Workers	0.012 (0.037)	0.040 (0.055)	-0.056 (0.051)
Observations	270	183	87
R-squared	0.932	0.950	0.933
Region Fixed Effect	Yes	Yes	Yes
Sector Fixed Effect	Yes	Yes	Yes

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1