Access Is Not Enough
Impacts of Electrification on Women’s Time Use in Guatemala and El Salvador

Kathryn Duvall
Abstract

The benefits of electrification are widely discussed in energy and development literature, but little research to date has studied the impacts of household electricity access on women in particular. Women make up the majority of the world’s poor and are also disproportionately affected by energy poverty because of their social status and domestic roles but understanding women’s poverty is difficult. While few measurements of individual poverty are available, country-level time use surveys provide an insight into productive use of time by measuring hours spent on remunerated and non-remunerated work. This paper uses time use surveys from Guatemala and El Salvador to examine how rural women’s time spent in paid work, unpaid household work, and leisure time is impacted by electricity access. The paper examines the current policies and status of women in these two countries and employs quantitative linear regression models using government surveys on time use and the household. Results show that electricity access significantly increases daily leisure time in both countries, but only in Guatemala is electricity access a significant indicator of increased paid work and decreased non-remunerated household work. Applying the capability approach to the topic offers an understanding of electricity as part of a multidimensional solution to gender inequality. Thus, findings suggest that electricity can potentially alleviate women’s poverty, but that societal support, like job training, may also be important in increasing productive use of time.
Access is Not Enough: Impacts of Electrification on Women’s Time Use in Guatemala and El Salvador


Approved by Committee Members

______________________________
Dr. David Bernell, School of Public Policy

______________________________
Dr. Alison Johnston, School of Public Policy

______________________________
Dr. Rebecca Warner, School of Public Policy

I understand that this essay will become part of the permanent collection of Oregon State University Libraries. My signature hereunder authorizes the release of my final essay, upon request.

______________________________
Kathryn Duvall
Acknowledgements

Many people have helped me along the way over the past two plus years.

In no particular order, I want to thank my friends and family, who have bounced ideas and theories around with me since before I knew what public policy was. Fahad, who was always my first audience for talks and presentations and encouraged me to keep going when I just wanted to go have fun! My best editor, my mom, who always lets me know when any of these topics are in the news. My dad, who seems to have a sixth sense for when I really need a break. Finally, the crew at The Fox who know how to lighten the mood.

To my MPP cohort, who has been right there with me for one of the best experiences of my life. Every one of you have helped me in some way at some point, even if you didn’t know you were doing it. I know I’ve made friends for life in meeting you all and I won’t hesitate to ask for a position in your Cabinet when the time comes.

Brent Steel, for putting together such a unique, interesting, and smart group of people and for somehow doing that while also doing about three other jobs at once.

And of course, to my committee, who has helped me so much along the way with questions ranging from simple to obscure. Dr. Bernell, for endless encouragement and stoking my excitement for energy policy. Dr. Johnston, for having patience with my non-quant brain and having excellent cat memes. And Dr. Warner, for pointing me in the right direction when I got off track, but also for giving me the space to do that.

Also, to the people in my neighborhood, who provide laughs and food when it’s most needed.

Finally, to my cats, Milu, Felix, and Mona, which, if you can learn through osmosis, know much more about energy policy than I do, for the weeks of time they have spent inconveniently perching on top of my computer, books, and research articles.
Table of Contents

Abstract .................................................................................................................................................. 1
List of Acronyms ..................................................................................................................................... 5
1. Introduction ......................................................................................................................................... 6
2. Literature Review ................................................................................................................................. 8
3. Theory .................................................................................................................................................. 14
4. General Data and Methods ................................................................................................................. 18
  4.1 Variables .......................................................................................................................................... 21
    4.1.1 Dependent Variables ...................................................................................................................... 22
    4.1.2 Independent Variables .................................................................................................................. 23
5. Guatemala Case Study .......................................................................................................................... 25
  5.1 Country Profile .................................................................................................................................. 25
  5.2 Guatemalan Energy Sector ............................................................................................................... 28
  5.3 Survey Data and Methods ................................................................................................................. 30
6. El Salvador Case Study ........................................................................................................................ 31
  6.1 Country Profile .................................................................................................................................. 31
  6.2 Salvadoran Energy Sector .................................................................................................................. 34
  6.3 Survey Data and Methods ................................................................................................................. 35
7. Descriptive Statistics for Case Study Variables .................................................................................. 37
8. Results and Discussion of Case Studies .............................................................................................. 38
9. Limitations ............................................................................................................................................ 49
10. Policy Implications ............................................................................................................................... 51
10. Conclusion ........................................................................................................................................... 54
Appendix ................................................................................................................................................... 56
References .................................................................................................................................................. 63
List of Acronyms

CA  Capability Approach
CEPAL  Economic Commission for Latin America and the Caribbean
        Comisión Económica para América Latina y el Caribe
DIGESTYC  General Directorate of Statistics and Census (El Salvador)
        La Dirección General de Estadística y Censos
ENCovi  National Survey on Living Conditions (Guatemala)
        Encuesta Nacional de Condiciones de Vida
EHPM  Multi-Purpose Household Survey (El Salvador)
        Encuesta de Hogares de Propósitos Múltiples
INE  National Institute of Statistics (Guatemala)
        Instituto Nacional de Estadística
LMI  Lower-Middle Income Country
SDG  United Nations’ Sustainable Development Goal
SDG 5  Achieve gender equality and empower all women and girls
SDG 7  Ensure access to affordable, reliable, sustainable and modern energy
UN  United Nations
1. Introduction

Access to electricity is widely regarded as one of the most important development goals of our time. It is often cited that access to electricity foments economic growth and decreases poverty in developing countries (Pueyo and Maestre, 2019). Within communities, electricity can improve health care, increase educational attainment, and may even prevent violence and sexual assault (Rewald, 2017). On a household level, electricity has the potential to increase productivity by reducing the burden of domestic or agricultural tasks and increasing free time, which may translate into more time for leisure, education, or entrepreneurship, thus increasing both monetary and human capital (Pueyo and Maestre, 2019). However, on an individual level, the impacts of access to electricity on the world’s women are less empirically evident. Women are both disproportionately affected and studied within the scholarship of electricity access and this lack of understanding is a significant barrier in reaching gender equality in developing countries (Sovacool, 2014).

In 2015, the United Nations outlined seventeen global sustainable development goals (SDGs) to be achieved by 2030 (UN, 2018). These goals are wide-ranging but share a common theme which is generally to decrease inequality, increase quality of life, and sustainably provide for future generations. Goals five (SDG 5) and seven (SDG 7) focus on gender equality and modern energy access for all, respectively. While they are separate goals, when explored through the lens of energy justice, they are closely linked, as modern energy access is deemed necessary for other types of development and lack thereof perpetuates inequalities. Mulugetta et al. (2018) note that the United Nations has recognized SDG 7 as a catalyst for the success of other SDGs, like gender equality, clean drinking water, quality education, and sustainable communities, to name a few. Unfortunately, a progress report for SDG 7 in 2018 stated that the goal is unlikely to be met by
the 2030 deadline, based on the current rates of electrification growth and renewable energy installations (UN, 2018). In 2017, the global urban rate of electricity was nearly 97%, while in rural areas, more than one in five (21.3%) people lacked electricity worldwide and in low income countries, that disparity is larger, with 70.3% of urban areas having electricity and only 27.6% of rural areas (The World Bank, 2019a), which equates to nearly one billion people worldwide living without electricity. If SDG 7 falls short of its goal, millions of people will remain energy poor, inhibiting their chances to alleviate monetary poverty and inequality.

While the economic and social implications of one in seven people living without electricity are widely documented, these numbers do not clearly articulate the gendered consequences of continued energy poverty. Globally, in less developed, rural areas, the majority of household chores are the responsibility of the women in the household, meaning that women are disproportionately affected by energy poverty because of negative impacts on health, education access, civic engagement, and economic opportunities (Cecelski, 2005). They also tend to be more time poor and therefore have less freedom to seek opportunities to work for pay. Research on time poverty shows that the causes and consequences are varied, but the concept is essentially defined as a lack of freedom to choose how time is spent because of the amount of time required by other necessary activities. For example, a person may suffer from time poverty because of a need to work excessively in order to survive or, as is often the case with women, that so much of their time is spent on household activities and caregiving that they don’t have time for other activities (Woden and Blackden, 2006; Walker, 2013).

The new and growing field of energy justice research combines social science with energy systems, governance, inequality and marginalization to take a closer look at populations who are often left out of the energy policy process or who are unfairly adversely affected by energy
policies (Jenkins et al., 2016). While women as a population suffer from energy injustices on a global scale, as of yet, very little has been agreed upon about the best practices of measuring the gendered impacts of energy poverty and even less is known about the outcomes when this poverty is alleviated (Sovacool, 2014). Some research suggests that electricity access doesn’t alleviate time poverty and disenfranchisement but may exacerbate it by expecting more of women because of modernization (Rewald, 2017). Clearly, this is an area that requires more research. Thanks to the increasing number of countries which employ time use surveys, there is data available that may broaden understanding within this field.

In order to better examine this issue, this paper uses national surveys on living conditions and time use to explore whether access to electricity influences women’s paid, unpaid, and leisure time in rural El Salvador and Guatemala. The next section discusses the current literature on the topic. Section 3 looks at this question through Amartya Sen’s capability approach. Section 4 describes the surveys used and the quantitative methods involved. The following two sections delve into the country-specific case studies. And sections 7 and 8 discuss limitations of the study and policy considerations, respectively, followed by the conclusion.

2. Literature Review

This paper looks at how electrification impacts rural women and their economic activity, specifically their time use. The overall benefits of electrification have been discussed in hundreds of other papers (see Sovacool, 2014 for a thorough review of energy scholarship), therefore this literature review focuses on the existing research that has studied the effects of electrification on women’s daily lives, followed by a discussion of research around poverty alleviation and time use.
In the realm of development work, the consequences of energy poverty and the benefits of electricity access are commonly cited as reasons why electrification should be a top international priority, but much of the development scholarship has failed to consider and investigate the gendered impacts of household electrification (Sovacool, 2014). Recently, however, authors have begun to call attention to the paucity of academic literature on this topic (Ryan, 2014; Rewald, 2017). Those who have studied the impacts have found that women’s lives are often impacted more by electricity access than men’s through changes in workforce participation, health, educational attainment, and gender equality (Grogan and Sadanand, 2013; Pachuari and Rao, 2013). The health and safety benefits of transitioning from traditional three-stone cooking methods to electric or cleaner burning cookstoves are, by now, very well known (Jimenez, 2017). There is also evidence that improved energy resources make it easier to obtain reliable access to clean drinking water, an issue which disproportionately affects women and children (Cecelski, 2005). Energy access has also shown to increase life expectancy in women and decrease fertility rates, putting women in less danger, especially given these improvements largely affect rural areas where adequate health services may be limited (Jimenez, 2017; Cecelski, 2005). Socially, electrification has shown to encourage women’s empowerment, lower acceptance of partner abuse, and increase awareness of politics, rights, and gender inequality through consumption of television and radio programs (Panjwani, 2005; Jensen and Oster, 2009, as cited in Rewald, 2017, p.20; Cecelski, 2005). Additionally, Batliwala and Reddy (2013) found that when women have more access to resources and income through electricity, they are able to make better decisions for the well-being of their families.

These social impacts are important indicators of the plethora of positive indirect effects electrification can have. Nevertheless, the studies that look at time use and economic
consequences of electrification have more mixed results, calling into question whether women have experienced entirely positive changes. Some studies have shown that electricity access adds to women’s burden because of increased expectations of time use and responsibilities. In fact, in a recent review of the extant literature on women and productive uses of energy, Pueyo and Maestre (2019) cite a number of studies which have shown that women’s time poverty may increase because of electrification, as the amount of unpaid work stays the same alongside the addition of new paid work. Women may still be expected to do the same tasks as before and taking on any additional paid work is considered voluntary (Rewald, 2017). Changing traditional gender expectations is not as easy as flipping a switch. In Nicaragua, a study of rural electrification found that women who had electricity in their homes were more likely to work than those without. However, the authors found that there was no difference in the amount of women’s leisure time in homes with or without electricity, while men enjoyed an average of 25 more minutes of leisure time in electrified households (Grogan and Sadanand, 2013). Similarly, in a longitudinal time use study in Guatemala, the author found that electricity had a positive effect on women’s time spent in remunerated activities but had no impact on their leisure time (Grogan, 2018). In a study of time use and electrification in Northern El Salvador, women who were connected to the grid were 25% more likely to have a home business than those who were not, while men were largely unaffected by electricity access (Barron and Torero, 2014). In rural South Africa, women’s employment grew 9-9.5% over five years after an electric grid expansion, while men’s employment grew a third of that amount, although their wages fell overall, suggesting that electrification is not a straightforward path to increased income for all (Dinkelman, 2011). Additionally, the division of labor between men and women is not always equal, meaning that women’s labor hours may be much more physically strenuous than men’s.
Batliwala and Reddy (2013) found that in India, machinery and technology is perceived to be under male jurisdiction, so with the adoption of more efficient technology, women lose jobs or are relegated to more physically demanding manual labor. To add to the physical toll, women receive less food than men, increasing the risk for exhaustion and other health problems. Therefore, in some cases, electrification may perpetuate gender roles and unequal treatment.

Gender inequality with regards to income was found to be reduced, however, in a Kenyan town that received electricity access through solar microgrids, compared to a town that did not (Vernet et al., 2019). The ability for women to earn their own wages is paramount to alleviating gender inequality. Poverty itself is also an inherently gendered issue, as it’s estimated that nearly 70% of the world’s 1.2 billion people living in poverty are women (Clancy et al., 2003). Decreasing women’s poverty not only closes gender inequality gaps, but also leaves women less vulnerable to violence, exploitation, and abuse (Duflo, 2012; Sen, 1990).

Drawing a straight line between electricity access and women’s poverty alleviation, however, is difficult. There are two reasons why this is a tenuous assertion, the first being that disaggregating women’s poverty from household level poverty is challenging, not least because when women gain more access to capital, it is often dispersed within the household, making its true impact on individual women hard to measure (Batliwala and Reddy, 2013). Therefore, empirical evidence of changes to women’s poverty as a result of electrification is sparse and potentially inaccurate. Secondly, the notion in development that an electrical connection is the catalyst for more economic opportunities and thus directly leads to poverty alleviation for all involved, has been challenged lately by a call for increased consideration of other factors involved in household energy use, like reliability, affordability, and quality (Jimenez, 2017). Pachauri and Rao (2013) note that improvements in economic or human capital after electrification may be correlational.
with development, rather than caused by it. Separating the aftereffects of electrification from contemporaneous development is a challenge many organizations, governments, and researchers have not yet entirely overcome. Electrification may come hand in hand with other newly introduced services which also have an impact on poverty reduction.

Nevertheless, women’s economic advances in the developing world are a key contributor to empowering women and decreasing gender inequality (Sen, 1990), and one way to measure income in the absence of available data is to look at productive use of time. For this reason, in recent years, economic organizations have encouraged countries to collect data on household members’ time use. In 2002, the Comisión Económica para América Latina y el Caribe (CEPAL), or the Economic Commission for Latin America and the Caribbean, held the first international meeting of experts on time use and non-remunerated work, which set in motion an effort to employ time use surveys in all Latin American countries (Aguirre and Ferrari, 2013). Since 2002, almost every country in Latin America has instituted at least one time use survey on a nationally representative level. However, these surveys have been underutilized in energy policy scholarship, leaving much unknown about the impacts of electrification on women’s productive use of time in these countries (Grogan, 2018). As noted above, certain quality of life improvements are difficult to attribute directly to electrification, as some of those indicators may be correlational with overall development. The way that time is spent, however, is one of the first things to change in a household once access to electricity is achieved, as electric lighting, television and radio are the principal gains in these houses (Dutta, 2003), meaning that potential productive hours change and create an opportunity to spend more time doing any one of a chosen number of activities. High levels of energy poverty in the developing world mean that women’s daily tasks, like cooking or washing clothes, are arduous and time consuming and prevent them
from doing other activities outside of the house, like working, advancing education, or being engaged in the community (Clancy et al., 2003). In theory, with access to electricity, there should be a decrease in the amount of time that is devoted to those household chores. The amelioration of time poverty may also increase the freedom women have to become more politically active, pursue training or education, or spend more time on their health.

**Figure 1**

Electrification Rates for the World Compared to Latin America and Caribbean Countries (excluding high income), 1995-2017

Source: The World Bank DataBank, 2019
Latin America provides a good place to study the impacts of increased electrification on women’s time use. Starting in the late 1970s and continuing into the present, many Latin American governments made expanding the electricity grid a top priority and their success means that the region has some of the highest rates of electrification in the developing world (Banal-Estañol et al., 2017) (see Figure 1). Additionally, their detailed household and time use surveys provide an in-depth look at women’s economic, social, and human capital in houses with electricity compared to those without. However, despite increased development and research, there are still pervasive inequalities throughout the region. Specifically, in Guatemala and El Salvador, where women suffer from the highest rates of femicide in Latin America along with high rates of impunity for crimes against women (ONU Mujeres, n.d.; CEDAW, 2008). The marginalization of women in these two countries demonstrates the need to better understand the impacts development can have on improving their quality of life. This paper presents two case studies which look at electrification and women’s policies in El Salvador in 2010 and Guatemala in 2011 and the impacts those have on working age women in rural households, both with and without electricity. The next section discusses the applied theory which looks at the quality of life measured by freedom of capabilities.

3. Theory

The capability approach (CA) was born in the 1970s of economist and philosopher Amartya Sen’s skepticism towards traditional economic indicators that used values like GDP or poverty lines to measure a country’s level of development (Robeyns, 2003). Sen, along with Martha Nussbaum, argued that these strict measurements within welfare economics were overly focused on aggregate measures of material gains and ignored other measures of individual quality of life (Sen, 1995). According to the approach, an individual’s well-being is not determined primarily
by income, but on having the capability to pursue opportunities of their choosing. Furthermore, people face different barriers to fulfill the same capability depending on personal or societal circumstances; in other words, more opportunity is not a foregone conclusion of increased income (Day et al., 2016). These freedoms to live as one wants are characterized by a person’s capability set (Sen, 1993). While this holistic consideration of a person’s well-being may be more commonplace within the development field now, in the 1970s and 80s Sen’s ideas about capabilities made a significant impact on how we examine development. This theory actually helped inform the conceptualization of the Human Development Index (HDI) in 1980, which was created in order to have an alternative to GDP as a measure of a country’s prosperity. The HDI measures income, education, and life expectancy based on the assumption that the levels of those three things directly impact an individual's opportunities for achievement throughout their lifetime (HDRO Outreach, n.d.). Indeed, these few indicators provide us with a concrete measurement of a person’s well-being and potential opportunities and can be extrapolated to make estimates of a country’s level of development. A person’s ability to achieve, however, is multidimensional, Sen argues, and dependent on many abilities and freedoms allowed in their daily lives. For example, a woman may have enough income to start her own business, but if she lives in a society that eschews women as business owners, her level of income has no bearing on her ability to achieve her goal, therefore her capabilities are limited because of societal constraints.

While the CA gives us a tool to analyze individual potential through a set of predetermined freedoms, one of the challenges of applying the capability approach is its nebulous nature in several key areas. First of all, there is no specific set of terms or definitions used by all scholars when looking at the approach. Sen, Nussbaum, and others have teased out various common
phrases over the years but none that are universally applied. The words *freedom, option, ability* and *choice* are used interchangeably, with differences in what constitutes a *capability* or an *achievement*. Additionally, there is no universal list of capability sets that a person must have in order to be at a certain level of well-being (Robeyns, 2003). This has left ample room for debate among scholars using this approach as to how concrete or abstract a list of capabilities should be. The more concrete a capability set, the more measurable it will be, but such measurements run the risk of facing Sen’s initial criticism of development indicators in that having a certain level of a capability doesn’t necessarily translate to a high quality of life. On the other hand, if a capability set is highly abstract, it may get closer to what fulfillment looks like, but nearly impossible to measure. For example, Robeyns (2003) categorizes several lists created by CA scholars based on their level of abstraction. The Swedish approach, a low abstraction approach to quality of life in Sweden, (1987 as cited in Robeyns, 2003) looks at mortality, working hours, and housing conditions, to name a few, while Nussbaum attempts a universal approach with capabilities like bodily integrity, emotions, and control over one’s environment (Nussbaum, 1995, 2000, 2003 as cited in Robeyns, 2003).

These disparate lists may seem problematic at first glance, but their differences are what Sen had in mind when he initially developed the approach. It was meant to be intentionally vague in order to allow scholars to create capability metrics based on the people they were studying (Robeyns, 2003). Societies value certain freedoms and capabilities differently and therefore, a list that is context specific gets at the heart of the approach. In fact, its fluidity is one of its greatest advantages. For this reason, the approach has been adapted and applied across many fields with varying lists of capabilities depending on the scope of study. Robeyns (2003) states that the CA lends itself well to gender inequality studies because of its focus on individual level well-being.
rather than household or higher levels of examination. Where men and women don’t have the same freedom of choice in their opportunities, the CA offers a lens through which to examine the more specific inequalities that are present in a society. For this reason, Robeyns’ created a capabilities list for assessing gender inequality which focuses in on a set that is specific to the challenges women face\(^1\). Her list identifies fourteen capabilities that should be fulfilled in order for gender equality to exist in a society. They are life and physical health, mental well-being, bodily integrity and safety, social relations, political empowerment, education and knowledge, domestic work and nonmarket care, paid work and other projects, shelter and environment, mobility, leisure activities, time autonomy, respect, and religion (2003, p. 71-72).

As discussed earlier, energy development has implications for improvement in many areas of an individual’s life, not only those tasks directly affected by electrification. Therefore, many of the capabilities in Robeyns’ list can be connected to household electrification, but especially relevant to electrification and this paper are the capabilities which focus on time use and remuneration. In fact, several authors have begun to use the CA to look at the impacts improved energy access can have on quality of life. Malakar (2016) found that in rural India, electrification provided the people there with a wider range of capabilities like more time for recreational activities, climate change resilience, and improved health and safety, specifically for women. In figure 2 below, Day et al. (2016) show how having access to electricity can facilitate daily tasks, referred to here as *secondary capabilities*, like washing clothes or preparing food, which leads to long term improvements, like attaining education or focusing on good health measures, which they call *basic capabilities*.

\(^1\) Robeyns introduces the list by stating it is “[f]or the conceptualization of gender inequality in post-industrialized Western societies” (2003, p. 71).
Moreover, in their report on time use surveys in Latin America and the Caribbean, CEPAL touted the usefulness of the CA as a framework to understand the societal and economic needs of women in the region (Aguirre and Ferrari, 2013). The CA can be an important tool when trying to understand the subtle inequalities in an individual’s daily life. Through the lens of the CA, energy poverty can be addressed as the multidimensional issue that it is, by understanding all the ways it can affect a woman’s life. With better understanding of the capabilities that result from energy access, more comprehensive policies can be developed alongside those of electricity development, which focus on the hoped-for outcomes of improved energy access, not just the achievement of electrification itself.

The next section will discuss the surveys used in this paper, the quantitative methods used for the analysis and the variables involved.

4. General Data and Methods

Central America provides a good opportunity to examine electrification’s impacts for several reasons. First, Latin America as a whole is considered a success story when it comes to increasing electrification access (Banal-Estañol et al., 2017). However, Central America specifically continues to struggle with gender inequality and poverty and therefore looking at
countries within that region may shed some light on how electrification impacts women specifically.

In 2002, a number of organizations, including CEPAL, UN Women, and Mexico’s National Institute of Women, held a meeting which brought together experts on time use and non-remunerated work to discuss the implementation of time use surveys in Latin America and create a common data repository for the region. At that time, a very small number of Latin American countries had collected data on time use and not all of those were carried out on a nationally representative level (Aguirre and Ferrari, 2013). By 2018, nearly all CEPAL member countries had conducted several iterations of their time use studies, although the timing, level of representation, and availability of the surveys varies. Those limitations partly determined which countries would be a focus of this paper as there were certain necessary or desired characteristics of the data for the purposes of this research.

First of all, not all countries make the survey microdata publicly available, which was imperative in order to look at individuals rather than aggregate groups like sex, region, or education. Secondly, time use surveys had to be done in the same households and for the same time period as the population surveys. In most cases, time use surveys and national household surveys were not bundled together in data libraries, so in order to meet the goals of this paper, there must have been an identifying code to link an individual’s household survey to their time use survey. For example, the data for the Guatemala case study came from two separate surveys within the National Survey on Living Conditions (ENCOVI) and a common individual ID was what enabled me to link the two surveys together. Not all countries had that common identifier that was necessary in order to run the regression models.
Secondly, the two countries ideally would have done their surveys in the same year or close to the same time, as this was the best way to control for any mitigating events that may have had an effect on employment levels or monetary values, like a regional recession. Because of these specific requirements for data, the choice of countries was restricted. Ultimately, Guatemala’s 2011 data and El Salvador’s 2010 data were chosen for the two case studies presented in this paper.

There were many similarities in how the data was collected and recorded in the two countries, as well as how it was cleaned and analyzed for the case studies. Both case studies used cross sectional analysis to compare time use between women in rural areas who have electricity in their household and those who don’t. For the purposes of this study, the data was filtered to include only women living in rural households between the ages of 15-64, because the International Labour Organization considers those years to be productive working age and productive uses of time are the main dependent variables (The World Bank, 2019a). It’s not uncommon in developing countries that people work well beyond retirement age due to unreliable or nonexistent pension programs, but if all women aged fifteen and above had been included, there was a risk of skewing the data by measuring a number of women who might not work because of retirement, disability, or other age-related factors. Live-in domestic employees and temporary renters were omitted from the data analysis. Only rural households were used because of the severity of poverty in rural areas, the energy injustices faced in these areas, and the precedent set by other researchers who typically look at electrification impacts in rural areas due to a lag in electricity development in these areas (Clancy et al., 2003; Dinkelman, 2011).

Each case study presents three models with a different dependent variable for each model. For comparison, each case study has similar models, but with some variation based on what
information was available and how it was categorized. Because these surveys are not standardized throughout Central American countries, the focus around certain topics may be similar, but the data are collected with different units or wording. An Ordinary Least Squares linear regression was used for all models as statistical tests show it was a viable alternative to any counts models and allowed for more straightforward interpretation of time use variations. Robust standard errors were used in all models to correct for the presence of heteroscedasticity. The variables used are outlined in the next section.

4.1 Variables
Each case study presents three models, with each model having a different dependent variable, although the regression methods and the independent variables remain the same in all models. As mentioned above, the two countries address similar topics in different ways. For example, in time use surveys there are two common ways to ask a respondent to measure their time spent on activities; one is by asking them about their previous day or week and one is by asking them about a typical day or week. Both these methods are employed in each survey. Additionally, some of these variables are very straightforward and were taken directly from survey respondents answers, like their marital status, and some of the variables were calculated by adding a number of other questions together, like the number of hours per day spent on leisure activities. Below is a brief description of the variables used in the models. For brevity, neither specific questions as they are worded in the surveys nor all the variables that went into the dependent variable calculations are included in this section. For full survey questions and a more in-depth discussion of how the variables were calculated, please see Appendix 1.
4.1.1 Dependent Variables
The first model in each case study looks at the number of hours worked per week as the dependent variable. In the Guatemala case study, this was calculated by adding up the hours the respondent says they normally work each day of the week and the number of hours they typically work in their second job, if they have one. The method is similar in the Salvadoran case study except that instead of asking respondents about a typical work day or week, the survey asks about the previous week’s schedule.

The second model in each case study uses hours of leisure time as the dependent variable. The Guatemala survey asks respondents to think only about the previous day’s activity when answering questions about leisure activities. This variable includes things like personal care, sports activities, eating, and sleeping. The Salvadoran case study asks respondents to consider how much time they normally dedicate to these activities during the day, rather than just the previous day’s tasks. Volunteerism or community meetings were not included in leisure hours as the survey questions in both surveys made it difficult to discern whether those tasks were considered more “leisure” or “duty”.

The third model in each case study uses hours of non-remunerated work as its dependent variable. This variable includes many different activities, like caring for dependents, preparing food, collecting firewood or making household repairs. While many time use studies include agricultural work in variables of non-remunerated work, because of the vague nature of the agricultural work-related questions in the Guatemalan survey, that case study includes only caring for animals as agriculturally related work. The Salvadoran survey includes agricultural work as it specifies the difference between time spent on paid work and unpaid agricultural activities.
4.1.2 Independent Variables

*Electricity Access* is the primary independent variable for all models and is a dummy variable that represents whether or not a house has an electrical connection. This includes both direct household electrical connections and secondary connections to a neighbor or power line. Those secondary connections are included because the important factor being measured is the availability of electricity in the home, not how it reaches the home.

Relationship status in each survey was represented by five categorical variables. The categories *married* and *partnership* were combined as a nested F-test showed no significant difference between those two variables in either study. So, the *married/partnership* variable was the baseline with *divorced, separated, single,* and *widowed* all being included in the model.

*Per capita annual household expenditure* is used as a measurement of household economic status. This was used because the survey responses about household expenditure were more dependable than responses to questions about income. Additionally, receiving remittances from abroad is common in both these countries so measurements of income are not necessarily reflective of all available resources in a household.

*Head of household* was a dummy variable of whether the survey respondent was the head of the household or not. This was important to include because while male partners are typically the default heads of household in both these country surveys, head of household status cannot be assumed based on relationships status, considering families tend to live in larger family units in these countries, compared to the United States, for example.

*Organizational participation* and *training* variables were, unfortunately, only available through the Guatemala survey data as those questions are not addressed thoroughly in the Salvadoran
survey. These were considered because of evidence that women who receive support in the form of training, networking, or microfinancing are more likely to see increases in economic opportunities and poverty reduction (Pueyo and Maestre, 2019), as discussed in more detail in the literature review. Organizational participation is a dummy variable that represents whether or not the respondent was involved in any kind of organization or group that could be considered one that offers life skills or livelihood training, women’s empowerment, networking, mentoring, career training or entrepreneurships. A list of those organizations is provided in the detailed methods section in Appendix 1. Additionally, the training variable was a dummy for whether or not a woman had received any extracurricular training that was either job related or job seeking related.

Age, years of education, and number of members in the household are also included as controls.

Based on the current literature and available research, the hypotheses are as follows and apply to both case studies:

\[ H(1): \text{Women in households with electricity access will spend more hours on paid work in a week compared to women in households without electricity.} \]

\[ H(2): \text{Women in households with electricity will spend more hours per day in leisure activities than women in households without electricity.} \]

\[ H(3): \text{Women in households with electricity will spend less time per day on non-remunerated household tasks than women in households without electricity.} \]

More country specific data and methods are in the case studies that follow.
5. Guatemala Case Study

5.1 Country Profile
Guatemala is a small, mountainous country in Central America that borders Mexico to the north and west, Belize in the northeast and El Salvador and Honduras in the east, with the Pacific Ocean creating the southern border of the country. In 2011 Guatemala was classified as a lower-middle income (LMI) country by The World Bank (2019b), meaning that in that year, the GNI per capita was $1,026-4,035. In 2017 Guatemala was recategorized as upper-middle income after years of being LMI. In 2011, the population of nearly 15 million had one of the highest percentages of people living in poverty in Latin America with 53% of the population living below the national poverty line and nearly 75% of the rural population living in poverty. Guatemala also has one of the highest proportions of ethnically indigenous people in Central America, with estimates at around 45% of the country’s population (ONU Mujeres, n.d.). In 2011, the population was split almost evenly between rural and urban dwellers, although there is a trend towards urbanization.

Between 1960 and 1996, Guatemala suffered under a civil war that disproportionately affected rural Guatemalans and in particular, those of indigenous ancestry. Estimates put the number of killed or disappeared at 200,000 during the civil war, with an additional 500,000 to one million displaced (Chamarbagwala and Morán, 2011). In 1995, a ceasefire was declared and in 1996, a peace accord between the Guatemalan government and their opponent was signed (BBC, 2018). By then, the effects of the 36-year civil war were pervasive throughout all aspects of Guatemalan society. The war destroyed hundreds of villages and thousands of acres of arable land, kept entire

---

2 Because the data in this study comes from the 2011 ENCOVI survey many of the statistics and policies discussed refer to that time, rather than the time of writing. For clarity, the years are also specified throughout the paper as well as they can be.
generations of Guatemalans from getting an education, and may have exacerbated entrenched inequalities (Chamarbagwala and Morán, 2011). To make matters worse, the war prevented international aid from entering the country, despite several disasters, including a 1976 earthquake which killed more than 20,000 people and left 1.2 million homeless and the Latin American debt crisis of the 1980s, which had severe consequences for the Guatemalan economy (Jonas, 2013). In the aftermath of the war, UN investigators found evidence of war crimes and human rights abuses committed overwhelmingly by the Guatemalan government against its own people (BBC, 2018). As a result, the Guatemalan government created programs, passed laws, and formulated policies to try to rectify its history of human rights abuses and disenfranchisement of certain populations. Among these were La Defensoría de la Mujer Indígena (DEMI), or the Office of Defense of Indigenous Women, La Secretaría Presidencial de la Mujer (SEPREM), or the Presidential Secretariat for Women, and La Política Nacional de Desarrollo Rural Integral (PNPDIM), or the National Policy for the Promotion and Integral Development of Women, along with laws which sought to promote the protection of women from abuse, femicide, and exploitation (ONU Mujeres, n.d.).

However, in 2011, there was strong evidence of continued, widespread exclusion, disenfranchisement, and violence against women throughout Guatemala, particularly women of indigenous ancestry. Women in Guatemala suffer inequalities in nearly every social sphere—education, employment, domestic well-being, and health care. In 2011 the rates of illiteracy were 19% for non-indigenous women and 48% for indigenous women, compared to 11% and 25% for men, respectively (ONU Mujeres, n.d.). Access to formal banking services, health, education, and other public services is limited in rural areas and has intensified the social and economic exclusion of women within the country. In 2011, women made up an estimated 29% of the labor
force in rural areas and 34% nationally and women’s unemployment in Guatemala was at an estimated 6.6% while male unemployment was estimated at 2.9% nationally (INE, 2011; The World Bank, 2019a). Additionally, of working men and women in rural areas, women earned, on average, about two thirds of what men did on a monthly basis and that salary for women was 26% lower than the national average for rural areas, while men earned 8% more than the national average for rural areas (INE, 2011). The United Nations Development Programme’s Gender Inequality Index (GII), which is a measure of gender equality based on health, empowerment, and the labor market, indicates a score of .525 for Guatemala in 2011, which puts it near the bottom two-thirds of global rankings of gender equality (UNDP, 2018). Despite the aforementioned legislation, Guatemala has one of the highest rates of femicide in the world, at a rate of 9.1 per 100,000 between 2007-2012 (BBC, 2016), a trend which some sources attribute to low representation of women in the government and overall gender inequality on a national scale (WHO, 2012). A rate of 98% impunity for crimes of violence against women suggests an endemic complacency towards women’s lives throughout the country, at least on a judicial level (ONU Mujeres, n.d.).

There is evidence, however, that the women of Guatemala are not willing to be apathetic about their futures. While the average number of completed school years was higher for men in 2011, at that time more women than men were graduating from universities, despite only 12% of the population attending college. Additionally, in the 2011 presidential election, women made up 69.3% of the voters, largely attributed to the increase in women candidates for the offices of president and vice president and as a result, a woman held the position of vice president for the

---

3 The Gender Inequality Index is scored on a scale of 0 to 1, with 0 being perfect gender equality. For more information on how the index is calculated, see http://hdr.undp.org/sites/default/files/hdr2018_technical_notes.pdf.
first time in Guatemalan history (ONU Mujeres, n.d.). As mentioned previously, research shows that women’s empowerment is facilitated by civic engagement, financial independence, and decision making, areas which are lacking for women in Guatemala

5.2 Guatemalan Energy Sector

Starting in the 1980s, there was a global trend towards the privatization and unbundling of energy markets in order to improve efficiency and decrease costs (Urpelainen and Yang, 2019). Like many other countries in Latin America, the electricity sector in Guatemala went through a series of reforms in the 1990s when the legislature passed a law to begin unbundling the electricity market in the country (Barnes and Waddle, 2004). The 1996 law sought to break up the state-owned El Instituto Nacional de Electrificación (INDE), in English the National Institute of Electrification, and the Empresa Eléctrica de Guatemala S.A (EEGSA), or the Electricity Company of Guatemala, which had previously controlled all generation, transmission, and distribution of electricity in the country through its subsidiaries. The INDE had successfully expanded rural electrification throughout the previous two decades but was plagued by bad operational practices and high costs in subsidies, which limited the amount of funding it could continue to direct towards rural electrification (Barnes and Waddle, 2004). When the sector reforms began, less than half of the rural population of the country had access to electricity, as opposed to a 90% electrification rate in urban areas (see Figure 3) (The World Bank, 2019a). After the reform, much of the rural market came to be controlled by Union Fenosa, a Spanish company who had bought large shares in the Guatemalan electricity sector. In developing countries, rural grid expansion is a low priority because of high costs and low returns on investment, which is especially true if the organization in charge is private. To resolve this, a trust fund was established that was funded through international aid organizations, government
appropriations, and revenue from INDE’s sales of distribution assets. In order to encourage new electrical hook-ups, Union Fenosa received a fee for every new customer it connected to the grid, meaning that in rural areas of higher population density, new connections were often profitable for them (Barnes and Waddle, 2004). This worked for a time to expand the electricity access into rural population centers, but there was no motivation for Union Fenosa to build connections.
anywhere that were very rural, remote, or sparsely populated. Furthermore, there was no way for those populations to petition for electricity- their only choice was to wait until the company decided to expand.

Even so, Guatemala’s electricity reforms are largely considered a success in the context of Latin America (de Córdoba and Belt, 2019; Barnes and Waddle, 2004). The transmission market and hydropower generation remain almost entirely state-run, but in the past several years, there has been more research and investment into microgrids for very rural communities (de Córdoba and Belt, 2019). At the time of the 2011 Encuesta Nacional de Condiciones de Vida (ENCOVI), or the National Survey on Living Standards, that provides the data source for this paper, rural electrification rates were up to nearly three quarters of the population, which is higher than the global rate of rural electrification, but still much lower than Guatemala’s urban rate of electrification.

5.3 Survey Data and Methods

The survey data for Guatemala was taken from the 2011 ENCOVI survey, which is administered by the Instituto Nacional de Estadística (INE), or the National Institute of Statistics. The survey does not appear to be carried out with regularity as the most recently available surveys on INE’s website are from 2000, 2006, 2011, and 2014. The data was taken from the household-level and individual-level modules of the survey and the time use questions are included in the individual portion of the survey. The survey data was gathered throughout the country between March and August of 2011 and did not include every household and individual, but rather was taken on a nationally representative scale (INE, 2011). Survey data are available for 13,483 households and 66,524 individuals. A clear survey methodology is not available for the 2011 survey nor does the
INE provide general methodology for their surveys, unfortunately, so further understanding of how households were chosen is limited.

The time use questions are included in every survey, so there is a large sample size of time use respondents. Many of the questions around time use ask about the previous day’s activities, while the questions about paid work use the time frame of a typical day, for example, “How many hours do you normally work on Monday? On Tuesday?” etc.

After cleaning and filtering the data for the purposes of this research, there was a sample size of 11,033 rural women between the ages of 15-64. Short-term renters, house keepers, and visitors were excluded from the survey, additionally, any surveys which were incomplete or deemed unreliable by the surveyors were thrown out. The surveyors score the surveys for reliability and only surveys considered highly reliable were used in this research. Of the available respondents, 3,000 lived in houses without electricity and 8,033 lived in households with electricity.

The models for the Guatemala case study are as follows:

\[ DV = \beta_0 + \beta_1 Access + \beta_2 Wid + \beta_3 Div + \beta_4 Sep + \beta_5 Sin + \beta_6 Org + \beta_7 Training + \beta_8 Age + \beta_9 Ed \\
+ \beta_{10} HHSize + \beta_{11} HH + \beta_{12} ExpendGTQ + \epsilon \]

6. El Salvador Case Study

6.1 Country Profile

El Salvador is the smallest country in Central America but boasts the highest population density in the region with a population of 6.13 million in 2010. It is primarily a mountainous country that shares a border with Guatemala to the northwest, the Pacific Ocean to the south with Honduras sharing the remaining border. It is estimated that as much as 20% of the population lives abroad
due largely to emigration caused by the nearly twenty years of civil war which ended in 1992 and also because of persistent economic hardship in the 1990s and 2000s (The World Factbook, n.d.). Fleeing violence and poverty in rural areas, there was a significant trend towards urbanization throughout the 60s, 70s, and 80s and in 2010, 65% of the country’s population was living in urban areas (The World Bank, 2019a). El Salvador is ranked as a lower-middle income country by The World Bank (2019b) and about one third of the population lived below the national poverty line in 2010 with poverty being slightly more prevalent in rural areas, where 44% were considered poor. Remittances account for nearly 20% of the country’s GDP and are considered a large factor in poverty alleviation (The World Factbook, n.d.).

In the wake of the 1992 peace accords which effectively ended the civil war, stringent measures were taken to democratize the country and limit the ability for power to be concentrated within one party, branch, or administration (Encyclopædia Britannica, 2019). Despite attempts to increase equality and economic opportunity, women remained a largely disenfranchised group within the country. In 1996, the Salvadoran legislature created the Instituto Salvadoreño para el Desarrollo de la Mujer (ISDEMU), or the Salvadoran Institute for the Development of Women, which was charged with creating, managing, and upholding La Política Nacional de la Mujer (PNM), the National Women’s Policy. The policy outlines ten objectives which are meant to improve gender equality in nearly all areas of society (Moreno, n.d.). However, in 2008, over a decade after the initiation of the PNM, the United Nations’ Committee on the Elimination of Discrimination Against Women (CEDAW) issued a report on El Salvador’s progress of improving women’s equality throughout the country and found that little progress had been made in many of the focus areas. In the report, the Committee commends the creation of numerous departments, policies, or organizations to address these issues on a national scale, but in
actuality, women in El Salvador remained socially excluded, marginalized, and unempowered, especially in rural areas (CEDAW, 2008).

Unfortunately, violence against women is common in El Salvador with the country being one of the most dangerous for women in Latin America for many years in a row. In 2016 and 2017, El Salvador had a femicide rate of 10.2 per 100,000 women, with the next highest country, Honduras, coming in at 5.8 per 100,000 (OIG, n.d.). In 2010, the year of survey research for this paper, that rate was well over 10 per 100,000, with 580 women falling victim to femicide, and the following year seeing an increase in that rate, with 647 women dying by femicide, making 2011 one of the most dangerous years for women in the history of the country (ORMUSA, 2019). The Organización de Mujeres Salvadoreñas por la Paz (ORMUSA), or the Organization of Salvadoran Women for Peace, reports that many of these murders are violent, sexual, and rarely resolved through official channels, meaning impunity is common for the aggressors (ORMUSA, 2019).

Some of the statistics as provided by the data collected from the Guatemalan government show how inequalities measure up on an economic scale. In 2010, 47% of Salvadoran women were active in the labor force compared to 80% of men. Rural unemployment for women was 5.2% compared to 8.7% for men and urban unemployment had a similar disparity, with rates of 5.1% and 8.3% respectively. Rates of underemployment are similar for men and women, however, on average Salvadoran women earn 15% less per month than men with the same level of education. The burden of caregiving falls almost solely on women, with 37% of the population stating that they cannot work because of caregiving responsibilities, while only 1% of men face the same problem. When that number is considered alongside unemployment, it suggests a different narrative- not that women are being hired at higher rates than men, but that lower unemployment
rates among women likely mean that fewer women are actually free to look for paying work. Not only are women doing a much higher proportion of caregiving, but in a typical day, women in rural areas spent nearly two and a half hours more on unpaid domestic work than men (MINEC, 2012). While women are still significantly underrepresented in political positions, electoral participation was greater among women than men in the 2003 and 2006 municipal and legislative elections and in the 2004 presidential election, where women constituted 53% of the voters.

The next section looks at the recent history of the electricity market in El Salvador.

6.2 Salvadoran Energy Sector

In the mid-1990s the government of El Salvador began the process of unbundling and privatizing the country’s electricity sector, which had previously been controlled by the state under the name Comisión Hidroeléctrica del Río Lempa (CEL), or the Hydroelectric Commission of the Lempa River. The reform was meant to address issues with electricity reliability, quality, and sector-wide efficiency, while also being able to provide the rural poor with affordable access to electricity. In the late 1990s, the government created two new agencies, the Superintendencia General de Telecomunicaciones y Electricidad (SIGNET), or the General Superintendence of Telecommunications and Electricity, tasked with enforcing regulations and protecting consumers and the Unidad de Transacciones (UT), the Transactions Unit, which managed generation and transmission (Lecaros et al., 2010; Urpelainen and Yang, 2019). Today transmission and hydropower generation are still state run, while independent power producers and distribution are managed in the private sector. The government had hoped that these reforms would somehow lead to increased electricity access in rural areas but didn’t initially create any specific policies incentivizing grid expansion via the private sector. In 1996 rural electrification hovered at around 56% despite 95% of the urban population having access to electricity (The World Bank, 2019a).
Several years after the reforms began, the Salvadoran government created the Fondo de Inversión Nacional en Electricidad y Telefonía (FINET), or the National Electricity and Telephone Investment Fund, which was meant to fund rural electrification projects, but due to institutional barriers and a lack of funding, FINET was largely ineffective in improving electricity access in rural areas (Barnes and Waddle, 2004). There was a jump in access in the late 90s as a result of privatization, but once the most profitable areas had been connected, the rate of new electrification remained stagnant until the mid-2000s when a combination of external funding and the government’s update to its National Energy Policy in 2007 made rural electrification a national priority (de Córdoba and Belt, 2018). By 2010 when the surveys used in this paper were being conducted, El Salvador’s rural electrification rate was over 80% and it has continued to increase since then until reaching 100% electrification in 2017 (see Figure 4).

6.3 Survey Data and Methods
The survey data for the Salvadoran case study was taken from the country’s 2010 Encuesta de Hogares de Propósitos Múltiples (EHPM), or the Multi-Purpose Household Survey. The survey is administered annually and asks questions on the themes of sociodemographic data, education, technology and communication, living structure characteristics, employment and income, agricultural activity, health, remittances, and expenses. The survey uses multistage stratified sampling in order to collect nationally representative data. In total, 12,065 households were surveyed throughout the country. The time use survey addendum is not included in every survey, but the methodology for deciding which households receive the survey is the same as for the larger EHPM survey. In 2010, 3,305 households received the time use survey also (MINEC, 2012). After filtering out studies that were incomplete, unreliable, or out of the target audience for this research, there were 1,421 responses from rural women between the ages of 15-64. Of
those, 205 lived in households without access to electricity. Based on 80% rural electrification rate for that year, a nationally representative sample would have been 284 women living in households without electricity, so the actual number of respondents is slightly lower.

Model 1 used a dependent variable of the number of hours of paid work a woman self-reported as having worked the previous week. That includes all jobs done for remuneration. Model 2 used a dependent variable of number of hours spent in leisure time in a typical day. This includes

Figure 4

![Electricity Access: El Salvador Compared to Other Lower Middle Income Countries, 1995-2017](source: The World Bank DataBank, 2019)
leisure time and personal care. The dependent variable for model 3 is the number of hours spent on unpaid household tasks, including things like grocery shopping, caregiving, or cooking. The same independent and control variables were used in each regression and the equation is as follows:

$$DV = \beta_0 + \beta_1 Acess_{2011} + \beta_2 Wid + \beta_3 Div + \beta_4 Sep + \beta_5 Sin + \beta_6 Age + \beta_7 Ed + \beta_8 HHSize + \beta_9 HH + \beta_{10} ExpendGTQ + \epsilon$$

For further explanation of the variables, see section 4.1 Variables. For a complete list of questions used and how the responses were categorized to obtain time use groupings, see the Appendix.

The following section gives a brief description of the means and standard deviations of the variables used in the models, as well as other descriptive statistics about the data.

7. Descriptive Statistics for Case Study Variables

The table on the following page (Table 1) shows the means and standard deviations of the dependent and independent variables of the sample of survey respondents used in this research, as well as the percentages for the binary variables. Because these figures are from the sample used in this research, only women between the ages of 15-64 in rural households are included for each country.
Table 1: Descriptive Statistics of Variable Case Studies

<table>
<thead>
<tr>
<th></th>
<th>Guatemala</th>
<th></th>
<th>Guatemala</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Paid Hours Per Week</td>
<td>12.51</td>
<td>3.42</td>
<td>11.76</td>
<td>2.33</td>
</tr>
<tr>
<td>Leisure Hours Per Day</td>
<td>12.63</td>
<td>3.42</td>
<td>14.10</td>
<td>3.07</td>
</tr>
<tr>
<td>Unpaid Hours Per Day</td>
<td>7.45</td>
<td>4.66</td>
<td>6.62</td>
<td>3.13</td>
</tr>
<tr>
<td>Age</td>
<td>32.01</td>
<td>13.37</td>
<td>33.85</td>
<td>13.57</td>
</tr>
<tr>
<td>Years Education</td>
<td>3.65</td>
<td>3.68</td>
<td>4.81</td>
<td>4.01</td>
</tr>
<tr>
<td>Household Size</td>
<td>6.14</td>
<td>2.72</td>
<td>3.97</td>
<td>1.52</td>
</tr>
<tr>
<td>Annual Per Capita Expenditure</td>
<td>8407.54 (GTQ)</td>
<td>7131.45</td>
<td>749.59 (USD)</td>
<td>534.06</td>
</tr>
<tr>
<td>Percentage of Sample Size</td>
<td>72.80%</td>
<td>85.57%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Households with Electricity Access</td>
<td>72.80%</td>
<td>85.57%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Partnership</td>
<td>60.52%</td>
<td>56.58%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>4.63%</td>
<td>4.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>0.20%</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>28.07%</td>
<td>21.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>6.50%</td>
<td>16.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head of Household</td>
<td>10.15%</td>
<td>21.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Participation</td>
<td>1.57%</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Training</td>
<td>2.08%</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Results and Discussion of Case Studies

The bar graph below (Figure 5) shows the breakdown of women’s time use in rural households with and without electricity in Guatemala and El Salvador before any regression modelling was done. In both cases household electricity access shows that women spend more time on paid work and leisure and less time on unpaid household work, on average. The differences are more pronounced in the Guatemalan surveys, with women typically spending about four more hours on paid work per week, an hour more in leisure time per day, and two hours less on unpaid work per day when they live in an electrified home. Women in El Salvador spent less than two hours more on paid work in the previous week, only slightly more time in leisure and about an hour
less on unpaid work daily. However, because the number of Salvadorans who received the time use survey is smaller than the larger EHPM survey, when broken down into households with and without electricity, the sample size of rural women without electricity is very small.

**Figure 5**

![Bar chart showing women's mean time use in households with and without electricity in Guatemala and El Salvador.](chart.png)

Data Sources: Guatemala 2011 ENCOVI Survey; El Salvador 2010 EHPM Survey

After running the linear regression models, electricity access appears to have a more significant impact on women’s time use in Guatemala than in El Salvador. In the former, electricity access is positively correlated with more paid work and leisure time and negatively correlated with
unpaid work. However, in the El Salvador study, the results show that the impact electricity access has is only significant when looking at daily unpaid work while its impact on weekly paid work and daily leisure time is not significant. (See tables 1 and 2 below for results from those regression models.) Therefore, these results partially confirm the previously stated hypotheses on how women’s time use is affected by electricity access. Specifically, in Guatemala, in households with electricity, women typically work a little over two hours more per week, spend about 40 minutes more per day in leisure time, and work nearly one hour less on non-remunerated household tasks daily. The Guatemala results confirm other research that finds that electricity access can alleviate time poverty, but if we look at the numbers more closely, this may reveal something about time preference and the freedom to decide how a woman spends her time. If she works a five-day work week, based on the results in model 1, she is working about 25 minutes more per day, along with the forty minutes of leisure time, this almost directly replaces the hour of unpaid work that she’s not doing. Not only does this show potential for more economic gain and down time, but in a larger sense, this points to an important tenet of the capability approach- the importance of freedom of choice for human fulfillment. Leisure time is especially important in this regard as it’s assumed that she can use that time for whatever activity she would like, be it personal care, education, or entertainment. Of course, these activities are limited by what is available to her, which also underscores the basis of the CA. No matter what resources an individual has at their control, if there are few opportunities to utilize them, a person will not have the chance to achieve everything they are capable of. This is why electricity access alone cannot be the only metric by which to measure development and opportunity because the ability and freedom to develop must be present also.
Additionally, the results from the Salvadoran case study suggest another challenge—just measuring access is not enough. In El Salvador, the impact electricity has on unpaid work shows that a woman in an electrified household spends about 23 fewer minutes per day on unpaid work at a 90% confidence level. There are a few reasons electricity may appear to have no significant impact on paid time or leisure time. Perhaps the most straightforward is an issue with sample size or modelling. As mentioned previously, the lack of significant impact may also be due to a small sample size of non-electrified households. Ideally there would be more than just 200 rural women surveyed who don’t have access to electricity. Additionally, the $R^2$ values of the Salvadoran models are low, despite tests showing that the model is well specified. Regardless, more survey data around electricity access would undoubtedly be beneficial.

More to the point, electricity represented as a binary variable is problematic in that it doesn’t consider other aspects of the electricity sector which are important for use. Within energy policy literature, there is an increased call to consider affordability, reliability, and access to household appliances as important mitigating factors in electricity use. A household may have an electrical connection, but if it only receives two hours of electricity per day, the potential benefit of that service is much less compared with 24-hour access. Furthermore, unreliable access is more common in rural areas where service is more likely to be inefficient and unpredictable (Banal-Estañol et al., 2017). Likewise, the benefits of having an electrical connection are greatly diminished if electricity is too expensive to use. High costs of connection or use may be too much for low income families in rural areas to use it for anything more than lighting and communications. Similarly, the cost of household appliances which may alleviate time poverty have a bearing on electrification’s impact also. If the burden of household tasks is not eased with the introduction of more time-efficient appliances, like a clothes washer, time use may remain
relatively unchanged for many adult women, this may be especially true in places that have larger average household sizes, like Guatemala. For this reason, high rates of electrification in El Salvador compared to other LMI countries may be misleading when only looking at access.

If price and reliability data are not available, consumption is another way to gauge affordability and use, as higher consumption in developing countries often indicates growth and development. On average, El Salvador’s per capita electricity consumption is about a third of higher income countries like Argentina and Uruguay and a quarter of Chile’s, while Guatemala’s is even lower than that (Banal-Estañol et al., 2017). Unfortunately, there is not enough reliable data around these topics at a household level in either survey to adequately gauge their impact. The EHPM includes a question about time spent without electricity on a daily basis, but fewer than 20 rural households reported outages. There’s no reason to believe there is fraud in the surveys, but this number seems very low considering many urban areas with more modernized grids experience outages at a higher rate than that. To its credit, the EHPM does also ask about monthly electricity costs, but there are several issues with using that data to extrapolate for purposes of this research. First, the question asks about the previous month’s bill, without taking into consideration weather, holidays, or extenuating circumstances which may influence consumption. Secondly, the Salvadoran government offers tiered subsidies to poor households, with the amount based on kilowatt hour consumption, which is not accounted for anywhere in the survey.

Guatemala’s ENCOVI survey suffers from similar data gaps. The only further questions about electricity have to do with interruption of service, but based on responses to this question, the accuracy and consistency of the data are questionable. For example, households without any electricity answered that they had experienced interruptions in service, which is obviously a nonsensical answer.
Table 2 Linear regression results for Guatemala models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Access</td>
<td>2.153***</td>
<td>0.646***</td>
<td>-0.985***</td>
</tr>
<tr>
<td></td>
<td>(0.430)</td>
<td>(0.074)</td>
<td>(0.962)</td>
</tr>
<tr>
<td>Widowed</td>
<td>6.325***</td>
<td>0.296</td>
<td>-1.755***</td>
</tr>
<tr>
<td></td>
<td>(1.275)</td>
<td>(0.207)</td>
<td>(0.229)</td>
</tr>
<tr>
<td>Divorced</td>
<td>13.226***</td>
<td>-2.236</td>
<td>-1.451**</td>
</tr>
<tr>
<td></td>
<td>(5.084)</td>
<td>(0.833)</td>
<td>(0.734)</td>
</tr>
<tr>
<td>Separated</td>
<td>9.582***</td>
<td>-0.102</td>
<td>-1.687***</td>
</tr>
<tr>
<td></td>
<td>(1.016)</td>
<td>(0.142)</td>
<td>(0.197)</td>
</tr>
<tr>
<td>Single</td>
<td>5.441***</td>
<td>1.602***</td>
<td>-4.827***</td>
</tr>
<tr>
<td></td>
<td>(0.541)</td>
<td>(0.091)</td>
<td>(0.111)</td>
</tr>
<tr>
<td>Org. Participation</td>
<td>1.479</td>
<td>-0.033</td>
<td>0.467*</td>
</tr>
<tr>
<td></td>
<td>(1.615)</td>
<td>(0.227)</td>
<td>(0.281)</td>
</tr>
<tr>
<td>Training</td>
<td>6.618***</td>
<td>-0.259</td>
<td>-0.502*</td>
</tr>
<tr>
<td></td>
<td>(1.429)</td>
<td>(0.235)</td>
<td>(0.298)</td>
</tr>
<tr>
<td>Age</td>
<td>0.141***</td>
<td>0.208***</td>
<td>-0.075***</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Years of Education</td>
<td>0.405***</td>
<td>0.0004</td>
<td>-0.141***</td>
</tr>
<tr>
<td></td>
<td>(0.071)</td>
<td>(0.011)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>Household Size</td>
<td>0.112</td>
<td>-0.0415***</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>(0.083)</td>
<td>(0.136)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Head of Household</td>
<td>4.460***</td>
<td>-0.274**</td>
<td>0.110</td>
</tr>
<tr>
<td></td>
<td>(0.901)</td>
<td>(0.136)</td>
<td>(0.169)</td>
</tr>
<tr>
<td>Per Cap. Annual Expenditure (GTQ)</td>
<td>.0001***</td>
<td>-3.41e-08</td>
<td>-0.00002***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(5.97e-06)</td>
<td>(6.52e-06)</td>
</tr>
</tbody>
</table>

R²: 0.057  0.046  0.217
N: 11,031 11031 11031

Notes: Robust standard errors are shown in parentheses. Coefficients are significant for p < 0.01***, p < 0.05**, or p < 0.1*. Model 1 uses a DV of the typical number of hours worked per week. Model 2 uses a DV of the total leisure time in hours from the previous day. Model 3 uses a DV of the total non-remunerated domestic hours from the previous day. Baseline variable for relationship status variables is married/partnership.
Looking towards the next set of variables, the marital status of women in households with electricity shows some interesting, but not wholly unexpected, trends. Marital status has a significant impact on unpaid work in both countries, as well as a significant impact on paid work.
in Guatemala. (Recall that women who are married or in a domestic partnership are the baseline for marital status in all three models.) Survey respondents were asked about their marital status at the time of the survey, in other words, if a woman was previously widowed, but currently remarried, the latter would be her status. This is important to identify because it can therefore be assumed that women who identified as widowed, divorced, separated, or single were not currently living with a partner. In El Salvador, women who aren’t living with a partner do between 1.2 and 3.2 fewer hours of unpaid work per day compared to women in marriages or partnerships. In Guatemala, those figures are even higher, with women committing between 1.5 and 4.9 fewer hours to unpaid work.

When looking at paid work, however, the two countries diverge in their results. In Guatemala, relationship status is also a significant predictor of time spent on paid work. Divorced women, for example, work an average of 13.2 hours more per week than women in partnerships or marriages, while spending an average of one and a half hours fewer on non-remunerated household tasks. Separated women also work nearly 10 more hours per week and spend 1.7 hours fewer on unpaid tasks. In El Salvador, model 1 shows that there is no significant difference in the amount of weekly paid work a woman does depending on her marital status, meaning that married and partnered women do more unpaid work, but don’t see that balanced out through other uses of time. However, separated and single women do enjoy about 40 minutes and an hour and a half more leisure time, respectively, compared to married or partnered women.

Likewise, in Guatemala, a woman who is the head of her household works an average of 4.5 hours more per week than one who is not and in El Salvador, this number is higher at 6.2 more hours a week. This suggests that women without a partner may be required to work more in order to support their households, which is intuitive- if there is one less person making money in the
household, others must take on more economic responsibility. However, this might also point to a child support or alimony system that doesn’t actually support women very well. Additionally, this is an important indicator of why it’s important for policymakers to ensure that women are earning as much as men. Recall that women in rural Guatemala make less than the national average in rural areas, while men make more and in El Salvador, women make less than men with the same level of education. This places an undue burden on women who don’t have a male partner, or who have a male partner that can’t or doesn’t work.

Furthermore, household size was not a significant predictor of unpaid time in either case study, although increased household size did show a decrease in leisure time and a one hour increase in paid work in El Salvador at a 95% confidence level. In other words, the number of children, elderly, or other dependents in a household can be excluded as affecting a woman’s unpaid time. This seems surprising when data shows that women spend a disproportionate amount of time on caregiving. Therefore, the conclusion could be drawn that being married or in a domestic partnership puts an undue burden on women to do more unpaid work at home. If this model points to that conclusion, these findings support the United Nations’ CEDAW (2008) report on El Salvador that despite the nominal creation of policies and organizations supporting women, there appear to be intrinsic imbalances within domestic partnerships or marriages.

All this to point out that stronger societal support may benefit rural women in these countries and may be necessary in order to change traditional gender roles that make women time poor and limit their freedom of time use. In many parts of the developing world, it’s common for extended families to live together under one roof, contributing to women’s caregiving responsibilities. Not only are the women likely responsible for children in the household but may also be caring for elderly family members or those with disabilities while the men work. Policies which ameliorate
the burden of caregiving on women might include the availability of paid, professional
caregivers, although the cost and stigma associated with paying someone else to care for family
members may be prohibitive. Another option may be reimbursing trained family members for
full time caregiving. This is already in effect in some countries and in fact, over the past decade,
the Salvadoran government has been discussing policies which would change options for
caregiving within the country (Salvador, 2015). This might incentivize more men to take on
caregiving or at least increase women’s earnings, thus potentially decreasing the gender
inequalities associated with this type of work.

As previously mentioned, variables on organizational participation and training were only
available in the Guatemalan survey data, which is unfortunate because they could lend some
interesting insight. Participation in an organization was positively correlated with the amount of
time a woman spent on unpaid work and had no significant impact on leisure hours or paid work.
It should be noted that responses to a survey question about time spent on sports, cultural or
leisure activities were included as time spent in leisure, while responses to a survey question
about time spent on community meetings, community work, or volunteer work was not included
in any time category as it was unknown whether respondents interpreted those activities to be
leisure time, unpaid work time, or neither. Therefore, the correlation of organizational
participation and unpaid work and its lack of significant impact in the other areas is a little
surprising, based on literature that suggests that those organizations can be influential in
improving women’s economic opportunities (Pueyo and Maestre, 2019). However, there are a
few possible reasons for this. It could be that women spend more time in these organizations
instead of paid work or that they do things at home to contribute to their organizations, like
making snacks, sewing, or caregiving and this contributes to their amount of unpaid time. Of
course, a caveat for this variable is that the categorization of organizations may not be as accurate as desired without knowing more about them. In researching the organizations and deciding which to include in the variable, a more liberal interpretation of an organization which somehow supports women was used. Additionally, without knowing what the practices of these organizations look like on the ground in rural Guatemala, it’s difficult to understand their influence. Also, women may have stated that they were part of an organization on the survey, but how much participation they have in said organization is also unknown. There are many limitations to this variable, but it would be an interesting area to explore in future research, if more accurate or telling data are available.

On the other hand, women who had received training for work or for job seeking saw significant increases to the number of hours they worked and decreases in the number of unpaid hours they worked. On average, women with some kind of training worked 6.6 more hours per week and spent half an hour less on unpaid tasks. This finding suggests that training beyond traditional education may be instrumental in the inclusion of women in the workforce in rural Guatemala. When considered alongside the organizational participation variable, this suggests that formalized training creates a higher impact on women’s ability to work, more so than networking or organizational connections that may offer information training or relationship building. Perhaps lower education levels in rural areas may mean that formal training is required for some types of work or acts as a replacement for education, rather than the informal support received through organizations like cooperatives, non-governmental organizations, or microcredit groups. Additionally, the impact of networking through these organizations may be lessened in areas where communities are small and making new acquaintances is unlikely. On the other hand, there is also a possibility of sampling bias in that those who participate in training are already
working or seeking work. Nonetheless, it appears that more training for women in rural areas could be beneficial. Training is one area which could contribute to increased social support for women, which is one aspect of approaching energy policies holistically.

Other variables were significantly correlated with time use in ways that have been demonstrated in other areas of development literature. Increased education shows a significant increase in time on paid work in both countries and a decrease on unpaid tasks in Guatemala and a slight decrease in leisure time in El Salvador. Additionally, household expenditure increases with more paid work and decreases with more unpaid work, most likely because households that make more money can afford to spend more. However, something interesting about the correlations between work hours and spending is the incredibly small amount that spending changes. Essentially, for every additional Guatemalan Quetzal or U.S. Dollar spent per person, a woman works a fraction of a second more. Even over the course of a year, this equates to very little extra spending. This seems surprising and calls attention back to the issue of needing more reliable data on individual income within a household.

9. Limitations

Like most research that doesn’t involve primary data collection, one limitation of this research is how much control there was over what information was gathered and especially how it was interpreted by the survey respondents. Namely, some questions in the time use portions of the survey were ambiguous for the purposes of this research and were not explained anywhere in the supplementary information about the survey methodology. Questions regarding agricultural work, for example, were not entirely clear about whether the respondent was doing unpaid or

---

4 El Salvador uses the U.S. Dollar as its currency.
paid work in instances of family farms or cooperatives. Additionally, in many rural areas in Guatemala that receive tourists, women make fajas or cinturones at home, intricately hand-woven indigenous clothing, that may or may not end up being sold to visitors. Similar at-home tasks for money making purposes, like making and selling food from home might not be recorded with regularity or precision, especially if there are other things going on at the time. If a woman is cooking or weaving while also watching television, is that leisure, work, or both? Some of these questions might have been resolved more clearly if the surveys contained more reliable responses to income information. When looking through the answers given for income in the surveys, there seemed to be many inaccuracies, like respondents who say they work 30 hours a week, but don’t receive any pay for it. For that reason, per capita household expenditure was used as a control for income level, which is not nearly as accurate, but an adequate proxy for income. Additionally, in the Guatemala case study, the organizational and training variables were categorized at the author’s discretion so there may be some error in interpretation of those groups.

A second area of limitation is related to survey methodology. In time use surveys, there are two predominant methods used for getting the most accurate answers- asking either about the previous day’s or week’s activities or asking about a typical day or week. There are merits and drawbacks to both, which won’t be discussed here, but the limitation of that for this research was respondents answering these questions on a Sunday or Monday. On those days, asking about the previous day’s activities may not be wholly representative of a typical working day.

With regards to the data around electricity, just using a binary variable that measures access or no access has its limits. This is discussed more in other areas of the paper.
9. Policy Implications

Energy policy scholarship is increasingly calling for a more holistic evaluation of energy access in developing countries. While the benefits that come with energy access are well documented, there is more to understanding how electricity impacts lives than just whether or not it is available. The engineering challenges of expanding the grid are certainly important considerations and, with the exception of microgrid projects, the necessary first step in reducing energy poverty. However, in the energy development field, finding a solution for access in the “last mile” is the most difficult part of the whole process. This is especially true among populations which have been historically disenfranchised, isolated, or discriminated against. But this last mile is not just a physical barrier, but a social and economic one as well. Therefore, in order for electrification to bring the most benefit to the women of Guatemala and El Salvador, there are two important themes, previously discussed in the case studies, which must begin to emerge in conversations around energy poverty alleviation.

The first is reliability and affordability, of the electricity itself and of household appliances. While it may seem counterintuitive in a time when the developed world is focused on energy efficiency, increased energy consumption is actually a good sign in much of the developing world. Nearly all homes that have access to electricity use it for lighting, television or radio, which are very cheap uses of electricity, relative to large household appliances. Lighting and communication are important as there is evidence they may increase safety, educational access, and women’s empowerment (Banal-Estañol, et al., 2017), but they may not go far enough in significantly improving quality of life. The goal now would be to see increased consumption in areas where it was previously low, like in both El Salvador and Guatemala.
As discussed in the limitations section of this paper, reliability is also something that should be considered when measuring electricity access. Certain geographic areas suffer from this more than others, depending on things like unpredictable weather or natural disasters, availability of technicians to fix outages, or grid management to name a few. For reasons mentioned previously, reliability couldn’t be included in the models of this research, but if access is not dependable, this could limit the economic benefits and time poverty alleviation aspect of electrification. Essentially, having an electrical connection does not guarantee its use in an impactful way.

The second, and more complex, set of problems that should be considered surrounding electricity access is the societal landscape of the beneficiaries, which is the primary focus of this paper. This research shows that electricity access does have a significant impact on women’s time use in Guatemala but training also has an important effect on women’s paid and unpaid time, which supports what other research has found with regards to training and economic benefits (Pueyo and Maestre, 2019). In other words, electricity alone will not create gender equality, but it must be done in an environment where there are policies, resources, and support for women to thrive. Electricity access may be an important gateway for securing more economic opportunities, but in order to work towards gender equality, we need to look at women’s freedom of ability within their societies. Using a metric like the capability approach can act as a guide for areas where women may have more ability to choose and where they may still lack opportunities.

Specific to these case studies, women in both Guatemala and El Salvador still carry the disproportionate burden of caregiving and household tasks, which access to electricity doesn’t completely alleviate. They also likely face barriers through entrenched gender roles, which are difficult to change and typically happen over long time periods. These two governments, whether on a national or municipal level, could take several steps in order to allow women more time
freedom. Recognizing that societal change takes willingness as well as policy, these suggestions are intentionally painted with a broad brush and should merely be taken as considerations for women’s policies. First, more networking support or training for occupations or starting businesses which don’t have a high barrier to entry. Secondly, paid incentives for at home caregiving, like elderly care or other family members could provide income for women in a role that they are relegated to for free or create incentives for men to take on more caregiving roles. Additionally, while both these countries currently have subsidies for electricity, creating financial plans through which to help with the cost burden of larger appliance purchases, like cooperative microfinancing or NGO partnerships, would help with some of that burden, although there would still be an issue of paying for the electricity to operate the appliances.

Central American governments should also consider including a survey which relates to gender inequalities in their household surveys. A few additional questions could go a long way in understanding women’s empowerment, disenfranchisement, or perspectives in a rich context of other data. This could include questions about decision making, individual income, or civic engagement.

Finally, El Salvador should be lauded for having reached 100% electrification throughout the country, although at the time of this survey it wasn’t yet there. Guatemala has made large strides in the last several years to increase its rural electrification and as of 2017, it was at nearly 90% in rural areas (The World Bank, 2019a). Microgrid installation could potentially help this issue, if the necessary resources are present. However, one of the most pronounced criticism of microgrids, especially those installed by NGOs, is that once they begin to breakdown or deteriorate, there is no local person who knows how to fix them. Several projects have recently pointed to the merits of getting women themselves more involved in the energy sector, whether
as meter readers or engineers. This creates jobs for women in rural areas, increases their understanding of their electrical connections, empowers them, and creates a local point of contact for microgrid issues. This is already being tried in some areas and shows great promise in solving a gender inequality and energy justice issue (Rewald, 2017).

10. Conclusion

El Salvador and Guatemala are well ahead of many lower-middle income countries in their rates of electrification. These two countries provide insightful case studies of how electrification can be achieved and how it has impacted the populations there. However, they have a foot in both economic worlds in the sense that they have achieved high rates of electrification, but still have very high levels of poverty, inequality, and violence. In order for electricity to provide the benefits it is touted for, there must be an economic and societal space for its users to thrive.

Future research should focus on measurable outcomes of programs that seek to empower women in Guatemala and El Salvador, Central America, or other developing regions. The surveys lack questions which are aimed at understanding gender inequalities so developing a framework to quantify those perceptions on a national scale would be helpful in creating a multi-dimensional analysis of gender-energy injustice.

In research for this paper, the only articles or reports found that had utilized these studies were the governments themselves and development groups, like CEPAL. During the process of the literature review, no other papers were found that had used these or other time use surveys provided by the governments of Central America. There is a wealth of information in these surveys that could help in moving research forward not just with regards to gender and energy,
but health, education, or employment. The public availability of this data could contribute significantly to these and other areas.
Appendix

This appendix details how certain variables were measured. The original questions as they were worded on the surveys, in Spanish, are included here, along with an English translation. Most of the data work was done in Excel and the author used additive formulas to get totals for the variables. The codes provided are the question numbers from the official survey questionnaire.

Guatemala Case Study

Dependent Variables

The paid time variable was created by adding questions that asked respondents about the number of hours they usually worked in a day with the number of hours per week they reported working at a second job, if they had one. The questions were as such:

¿Cuántas horas trabaja normalmente? Lunes  P10B27A
How many hours do you usually work? Monday
¿Cuántas horas trabaja normalmente? Martes  P10B27B
How many hours do you usually work? Tuesday?
Etc…

And after a series of questions about a second job:
¿Cuántas horas a la semana trabaja normalmente?  P10C15
How many hours do you usually work in a week?

The leisure time variable was created by taking the sum of time from the following questions, which were asking about the previous day’s activity. After each question, the surveyor asked how much time, if the respondent answered yes. Those were left out for brevity.

¿Dedicó tiempo para el cuidado, atención y arreglo personal?  P09E19A
Did you dedicate time to personal care, attention, or grooming?
¿Realizó o participó en actividad deportivas, culturales o de esparcimiento? P09E20A
Did you participate in or do any sports, cultural, or leisure activities?
¿Cuánto tiempo le consumió: comer, dormir, leer y/o descansar?  P09E22A
How much time was taken for: eating, sleeping, reading and/or resting?

The unpaid household work variable was created by taking the sum of a series of questions that asked about the previous days’ activities. Like the leisure time variable, after each question, the respondent was asked how much time, but that is excluded here.

¿El día de ayer tejió, bordó, confeccionó o remendó prendas de vestir para los miembros del hogar?  P09A04A
Yesterday, did you sew, embroider, make, or mend clothing for members of your household?
¿Durante el día de ayer cuidó y/o crió animales?  P09A05A
Did you take care of or tend animals yesterday?

¿Efectuó reparaciones a su vivienda de cualquier tipo?  P09A06A
Did you make repairs of any type to your house yesterday?

¿Durante el día de ayer limpió la casa?  P09C09A
Did you clean the house yesterday?

¿Cocinó o preparó alimentos?  P09C10A
Did you cook or prepare food?

¿Durante el día de ayer lavo trastos?  P09C11A
Yesterday did you wash kitchenware?

¿Lavó y/o planchó ropa del hogar?  P09C12A
Washed or ironed clothing for the household?

¿El día de ayer tiró basura del hogar?  P09C13A
Yesterday did you throw out garbage from the house?

¿Acarreó agua, para el hogar?  P09C14A
Collected water for the house?

¿Recogió, cortó o rajó leña para el hogar?  P09C15A
Collected, cut, or broke up firewood for the house?

¿Atendió o cuidó niños del hogar?  P09C16A
Looked after or cared for children in the house?

¿Realizó compras del hogar, ir a la tienda de servicios de la vivienda?  P09C17A
Did you go shopping for the household, go to the store for household services?

¿Realizó pagos de servicios de la vivienda?  P09C18A
Made payments for household services?

Independent Variables

Electricity

¿Está la vivienda conectada a una red de Distribución de Energía Eléctrica?  P01A05C
Is this house connected to an electrical energy distribution network?

Organizational Participation

¿Es miembro o participa en algún grupo, organización o asociación, como por ejemplo: grupos culturales, sindicatos, gremio?  P03A01
Are you a member or do you participate in a group, organization, or association, like a cultural group, union, or guild?

If the respondent answered that they were involved in any of the following, they were coded as a “yes” for participating in an organization that could be deemed supportive towards the target research group:

Asociación de comerciantes/empresas
Association of salespeople/businesses
The per-person annual expenditure variable was calculated by dividing the annual expenditure variable (GastoAnualporHogar) provided in the survey data by the number of people in the household (PPB04A).

All other variables were taken directly from survey responses with no further calculation.

El Salvador Case Study

Dependent Variables
The paid time variable was created by adding questions that asked respondents about the number of hours they worked last week during the week and on the weekends and the number of hours they reported working last week at a second job, if they had one. The questions were as such:

¿Cuántas horas, días y en qué jornada trabajo efectivamente (...) la semana anterior? / How many hours, days and on what schedule did you/he/she actually work last week? R411

¿Cuántas horas trabajo (...) la semana anterior en su ocupación secundaria? / How many hours did (you/he/she) work last week at your second job? R433

The leisure time variable was created by taking the sum of time from the following questions, which were asking about time spent on certain activities in a typical day. These questions were themselves a sum of the reported time spent on the activities listed below them.
¿Cuánto tiempo dedica en un día a tareas de cuido personal? / How much time do you usually spend in a day on personal care? Horas 157 + Minutos 157
This includes the following activities:
- *Alimentarse* / Feed yourself
- *Bañarse/vestirse* / Take a bath or shower/get dressed
- *Dormir* / Sleep
- *Buscar atención en salud* / Seek medical attention

¿Cuánto tiempo dedica en un día a actividades de esparcimiento? / How much time do you spend on leisure activities daily? Horas 159 + Minutos 159
This includes the following activities:
- *Descansar* / Rest
- *Leer* / Read
- *Ver televisión, escuchar la radio o escuchar música exclusivamente* / Only watch TV, listen to the radio or listen to music
- *Asistir a reuniones sociales (bodas, cumpleaños, etc.)* / Attend social engagements (wedding, birthdays, etc.)
- *Visitador a familiares o amigos* / Visit with family or friends
- *Jugar* / Play

The *unpaid household work* variable was created by taking the sum of a series of questions that asked about a typical day’s activities. These questions themselves were a sum of other activities listed in each category. All those questions and their subcategory questions are listed below.

**Cómo tiempo dedica en un día a trabajo doméstico?** / How much time in a day do you spend on house work? Horas 148 + Minutos 148
This includes the following activities:
- *Prepara alimentos* / Prepare food
- *Servir la comida, tender la mesa, recoger y lavar los platos* / Serve food, tend to the table, collect and wash dishes
- *Hacer la limpieza o el arreglo general de la casa* / Clean or generally pick up the house
- *Lavar, doblar, planchar o acomodar la ropa de los miembros del hogar* / Wash, fold, iron, or put away household members’ clothing

¿Cuánto tiempo dedica en un día a compras cotidianas? / How much time do you spend on household shopping daily? Horas 149 + Minutos 149
This includes the following activities:
- *Comprar alimentos, bebidas, artículos de limpieza, etc.* / Buy food, drinks, cleaning supplies, etc.
- *Comprar ropa para si mismo o para algún miembro del hogar* / Buy clothing for yourself or another household member
¿Cuánto tiempo dedica en un día a gestiones externas? / How much time do you spend on outside administrative tasks? Horas 150 + Minutos 150

This includes the following activities:
Pagos relacionados con las cuentas de la vivienda / Payments related to household accounts
Reclamo de algún servicio del hogar / Complaints about a household service

¿Cuánto tiempo dedica en un día a reparaciones o mantenimiento de la vivienda? / How much time do you spend on household repairs or maintenance, daily? Horas 151 + Minutos 151

This includes the following activities:
Hacer alguna reparación eléctrica, sanitaria, trabajos de albañilería, etc. / Make an electrical or sanitary repair, construction work, etc.

¿Cuánto tiempo dedica en un día a cría de animales, recolección de flora y fauna (siempre y cuando no sea actividad económica)? / How much time do you spend raising animals, collecting flora or fauna in a day (only when it is not an economic activity) Horas 152 + Minutos 152

This includes the following activities:
Recoger agua, lena, frutas, etc. (exclusivamente del hogar) / Collect water, firewood, fruit, etc. (only for the household)
Cuidar o criar animales o realizar algún cultivo / Take care of raise animals or farm in some way

¿Cuánto tiempo dedica en un día a tareas de cuidó de niños/as del hogar (hasta 12 años de edad)? / How much time in a day do you spend on caring for children from this household (up to 12 years old)? Horas 153 + Minutos 153

This includes the following activities:
Dar de comer o mamar a algún niño/a pequeño/a del hogar / Feed or breastfeed a small child in the household
Bañar o vestir a algún niño/a pequeño/a del hogar / Bathe or dress a small child in the household
Llevar o recoger a algún niño/a a la guardería, jardín o escuela / Drop off or pick up a child from day care, kindergarten, or school
Llevar o recoger a algún niño/a a un centro de salud [sic] / Drop off or pick up a child from a health center
Ayudar en las tareas escolares / Help with school work
Jugar o llevar de paseo a algún niño/a del hogar / Play with or go on a walk with a child from your household

¿Cuánto tiempo dedica en un día a tareas de cuidó de personas dependientes o enfermas del hogar (hasta 59 años de edad)? / How much time in a day do you spend taking care of dependents or sick people from your household (up to 59 years old) Horas 154 + Minutos 154
This includes the following activities:
*Dar de comer o ayudar a hacerlo / Feed them or help do something*
*Bañar, asear, vestir, arreglar o ayudarle a hacerlo / Bathe, wash, clothe, tend to or help them do something*
*Administrar medicinas / Give medicine*
*Acompañarle a algún servicio de salud / Accompany them to any kind of health appointment*
*Hacer alguna terapia especial o ayudarle a realizar ejercicios en el domicilio / Do special therapy or help them do exercises in the house*

¿Cuánto tiempo dedica en un día a tareas de cuidado de personas dependientes o enfermas del hogar (de 60 años de edad o más)? / How much time do you spend in a day on non-taking care of dependents or sick people from your household (60 years old and older)

Horas 155 + Minutos 155

This includes the following activities:
*Dar de comer o ayudar a hacerlo / Feed them or help do something*
*Bañar, asear, vestir, arreglar o ayudarle a hacerlo / Bathe, wash, clothe, tend to or help them do something*
*Administrar medicinas / Give medicine*
*Acompañarle a algún servicio de salud / Accompany them to any kind of health appointment*
*Hacer alguna terapia especial o ayudarle a realizar ejercicios en el domicilio / Do special therapy or help them do exercises in the house*

¿Cuánto tiempo dedica en un día a tareas de cuidado de otros familiares o de otros hogares en forma gratuita [sic]? / How much time do you spend in a day on caregiving of other family members or people in other households for free?

Horas 156 + Minutos 156

This includes the following activities:
*Colaborar con las tareas domésticas de otro hogar / Help with the domestic work in another household*
*Cuidar niños o niñas / Take care of children*
*Cuidar personas dependientes / Take care of dependents*
*Pagar servicios de la vivienda como agua, luz, teléfono, etc. / Pay household services, like water, electricity, telephone, etc.*

Independent Variables

Electricity

¿Qué tipo de alumbrado posee esta vivienda? / What type of lighting does this house have?  R311

Responses that were used in this research were:
*Electricidad / Electricity*
*Conexión eléctrica del vecino / Electrical connection from a neighbor*
The *per capita annual expenditure (USD)* variable was calculated by dividing the reported monthly expenditure (GASTOHOG) by the number of people in the household (R033) and multiplying that by 12 (months of the year).
References


Sovacool, B. K. (2014). What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda. Energy Research & Social Science, 1, 1-29.


