

GENDERED EFFECTS OF ELECTRIFICATION: ANALYZING TIME USE CHANGES IN ETHIOPIA

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Overview

Electrification is commonly said to benefit especially women by allowing time reallocations from unpaid chores towards income-generating activities. However, in settings with limited electricity access (i.e. capacity, reliability, quality etc.) and low appliance ownership, this might not be the case. For one, it remains unclear whether low-capacity electrification can lead to significant time use changes. For another, electricity might place additional burdens on women by extending the time spent on work without adequately reducing the chore burden. I contribute to understanding the full extent of electrification benefits and trade-offs by studying the heterogeneous effects of electrification on gendered time use in Ethiopia, focusing particularly on women's work burden. Additionally, I add to the literature, which has predominantly focused on grid-based electrification, by distinguishing between grid- and off-grid electrification, considering both their direct and spillover effects. I find that electrification generally leads to an increase in household working hours, especially on non-farm work. This increase is driven by women, rather than by men. Furthermore, households reduce their time spent on firewood and water fetching. Finally, I find evidence for spillover effects leading to increased working hours even in households without electricity connections. While the results encourage electricity expansion, be it on- or off-grid, they highlight the need for policies that promote electricity use for household chores, to ensure that electrification increases household time spent on work without exacerbating women's time poverty.

Methods

I analyse data from the Ethiopian Socioeconomic Survey (ESS; LSMS-ISA), collected by the World Bank and the Ethiopian Central Statistical Agency between 2011 and 2022. Particularly, the effect of household electrification (binary indicator for the household's main source of light) on households' and individuals' daily time use on i) self-employed farm work, ii) non-farm work, further divided into iii) work on household-owned non-farm enterprises and iv) remunerated work outside of the household, as well as v) firewood fetching and vi) water fetching is analysed. To analyse the spillover effect, local electrification is proxied by the electrification status of the primary or secondary school within the enumeration area. I employ a two-way fixed effects model to identify the causal effects of electrification on time-use outcomes. Results from a staggered Difference-in-Difference model are presented as a robustness check. The sample used contains two panels spanning waves 1-3 and waves 4-5 of the ESS. Households (individuals) that were not interviewed twice, or had missing or unreasonably high observations for the control and outcome variables are excluded, so that the final sample contains 9590 households. For the analysis of the spillover effect, the sample is further restricted to observations from enumeration areas with a primary or secondary school within 10 km, yielding a sample of 9,561 households.

Results

I find that even in contexts with limited electricity access and appliance ownership, where electric lighting might be the only channel of influence, electricity increases the time households spend on non-farm work, while reducing the time spent on farm work and firewood and water fetching. This effect is observed in both grid- and off-grid electrified households, with the former experiencing a more pronounced effect. Further, the analysis reveals that the increase in household working hours is driven by women, rather than by men. Indeed, while women consistently

increase their time spent on non-farm work more than they reduce their time spent on farm work, thus increasing their work burden, men's work burden does not change or even decreases. Additionally, I find evidence of spillover effects on non-electrified households, and within these especially among women.

Conclusions

The finding of significant effects of both on- and off-grid electrification on individuals' time use and specifically on household time allocation towards non-farm work highlights the benefits of electrification and emphasizes the relevance of promoting electrification efforts. This is further underscored by the observation that even households without direct electricity access but located in electrified areas experience spillover effects. On the individual level, finding that especially women increase their time spent on non-farm work could be another argument to support electricity expansion, since higher female (non-farm) employment is often seen as beneficial for women, as it may strengthen financial autonomy (Debela et al., 2021) and women's bargaining power within the household (Kamanyire et al., 2024), consequently leading to greater gender equality. However, the analysis also reveals that electricity increases women's work burden relative to that of men. To prevent this from leading to a gendered disadvantage in the form of heightened time poverty among women, increases in working hours must be offset by reductions in chore burdens. Consequently, I call for stronger efforts to promote the ownership of electric appliances and the use of electricity for cooking to enable electricity to unfold its full potential to lower women's chore burdens and to ensure that electrification leads to more time for income-generating work without worsening female time poverty.

References

- Debela, B.L., Gehrke, E., Qaim, M. (2021). Links between maternal employment and child nutrition in rural Tanzania. *American Journal of Agricultural Economics*. Vol. 103, No. 3, pp. 812- 830.
- Kamanyire, M., Matovu, F., Wabiga, P., Nanyiti, A. (2024). Rural electrification and women empowerment: Do bargaining game approaches with real household items reduce the bias? *The Electricity Journal*. Vol. 37.

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To who it may concern

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Bonn, 09.01.2025

RE: Qualification letter for Theresa Pieper

Ms Theresa Pieper has been a full-time PhD student in our Doctoral Program at ZEF (Center for Development Research), the Bonn International Graduate School - Development Research (BIGS-DR), since October 2023. I am her main supervisor. She is submitting an abstract to be considered in the student poster session titled "Gendered effects of electrification: Analyzing time use changes in Ethiopia" This is original work completed by the student. She has not previously won a prize at an IAEE affiliated conference.

Theresa Pieper's focus on the gendered time use impact of electrification is aligned with the themes of the conference, as both gender issues and universal access to clean and reliable energy are vital topics for a sustainable and inclusive future. I consider her work very relevant, creative, and valuable to the conference and therefore highly recommend it for consideration and presentation at the meeting.



Prof. Dr. Matin Qaim

VERIFICATION OF STUDENT STATUS

Dear Faculty advisor or responsible institutional representative,

The following person Theresa Pieper

has requested to register for our forthcoming conference or has applied for membership as a “student.” Students receive subsidized registration and membership rates supported by funds donated for that purpose. Since funds are limited, we need to ensure that they are used to support students genuinely in need. We define a “student” as “someone who is enrolled in a degree-granting program (either undergraduate or graduate) at an institution of higher learning and registered full-time according to the definition of their respective academic institution, and who is not employed full-time.”

Accordingly, we would be most grateful if you could answer the following questions about Theresa Pieper:

1. Is he/she “enrolled in a degree-granting program (either undergraduate or graduate) at an institution of higher learning”?

☒ Yes ☐ No

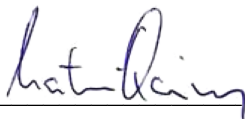
If yes, please name the program Doctoral Program at the Bonn International Graduate School for Development Research (BIGS-DR) and the institution Center for Development Research, University of Bonn.

2. Is he/she “registered full-time according to the definition of your academic institution?”

☒ Yes ☐ No

3. Is he/she “employed full-time” in a job paying competitive market salaries?

☐ Yes ☒ No

Signed 

Date 09.01.2025

Your position Executive Director, Center for Development Research, University of Bonn
(for example, faculty advisor, program director, department head, etc)

Return this form to: International Association for Energy Economics
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Certificate of enrollment for winter semester 2024/25

Date: 10/23/24

First name Last name: Theresa Pieper
Student ID Number: 50214512
Date of Birth: 11/27/1997

Degree	Degree program	Programrelated semesters
Promotion	Agrarwissenschaften	3

Theresa Pieper is enrolled as Student in the winter semester 2024/25.

Semester time periods: Summer semester: 01.04. – 30.09. Winter semester: 01.10. – 31.03.



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