

OCCUPATIONAL CHOICE AND ENERGY ACCESS – ELECTRICITY FOR MORE AND BETTER JOBS

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Overview

Access to affordable and clean energy is considered essential for development and is part of the 17 Sustainable Development Goal. As such, it is measured and monitored in the SDG7 Tracking report, jointly issued by the SDG7 custodians¹. The current status is mixed. Access to electricity, indicator 7.1.1 rose markedly between 2010 and 2020, from 83 percent to 91 percent (SDG Tracking 2022). Last year contributed less to this gain than earlier years. The SDG7 Tracking report projects, that at current rates of progress, the world will reach only 92 percent electrification by 2030.

The impact of energy access on development, though intuitively understood, is hard to measure, as is its impact on more and better jobs. The literature to this regards is scarce and inconclusive, and the few empirical results show, depending on the measurement method positive to neutral effects. Increasingly the literature agrees that mere connection of a village or a household to a grid or mini-grid will not automatically lead to large development effects.

The WBG has developed a Multi-Tier-Framework (MTF) based on household surveys, providing a detailed picture of the quality of energy, the affordability, health aspects and energy use for household appliances, public services and economic activities, including questions regarding productive use.

This paper uses the respective data set to analyze how the probability of taking up non-agrarian economic activity is influenced by access to electricity. It follows an idea by (Khurana and Sangita 2022), and extends it to estimating the probability not only to take on non-agrarian activities, but specific economic activities in different sectors. In the case of Nigeria, for instance, the probability to work in a self employed non-farm business, is less strongly influenced by energy access than the probability to work in salaried non-farm businesses as an employee. Hence electricity access seems to enhance the quality of jobs, too. Also, regressing revenues from said economic activities or incomes, energy access in the Nigerian case shows positive and significant parameters. The model is set for the Nigerian case study, but the analysis is currently extended to more African states, such as Niger, Zambia and Kenya, As comparison can Nepal and Honduras serve, for which the extended survey data already have been published.

Taking household characteristics, energy access, land ownership and access to loans into the estimation helps identify entry points for policy support of productive use of energy to make energy access a true contributor to development and growth.

Methods

Access to clean and affordable energy needs an indicator to monitor progress and include it in impact analysis of developing policies. The IEA defines energy access as "a household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average". A basic bundle of energy services means, at a minimum, several lightbulbs, task lighting (such as a flashlight), phone charging and a radio.

The WHO and the World Bank have developed a more finely grained approach, acknowledging that more granular household energy data can facilitate energy policy analysis and energy infrastructure (Bhatia and Angelou 2015). For energy access to contribute to development, energy supply must be reliable and suffice for productive engagements and community facilities. Hence, data collection for this multi-tier framework (MTF)² based on additional questions to be integrated in national household surveys (SDG7 Custodians 2022) supports analysis on access to energy, productive engagements, income, productivity, and employment.

In the following, this dataset is used to identify the probability of an individual participating in entrepreneurial activity as dependent on various factors following (Nagler and Naude 2016) or later (Khurana and Sangita 2022). (Nagler and

¹ IEA, IRENA, the United Nations Statistics Division, the World Bank and the WHO

² Access to energy for community infrastructure (such as schools, health facilities, and government offices) can lead to substantial improvements in service delivery, human capital, and governance. The MTF specifies this in a chapter on Access to Energy for Productive Engagements Productive uses. They are defined as uses that increase income or productivity and can be seen as value-adding activities. The country reports published thus far can be found under (<https://mtfenergyaccess.esmap.org/publications>) for Cambodia, Ethiopia, Myanmar, Nepal, Rwanda, São Tomé and Príncipe and Zambia.

Naude 2016) apply discrete choice, selection model and panel data estimators to data from the Living Standards Measurement Study—Integrated Surveys on Agriculture from Ethiopia, Niger, Nigeria, Malawi, Tanzania, and Uganda, this paper uses the MTF data collection in North-West Nigeria occurred from September 2017 to March 2018 (ESMAP 2018) A total of 3,668 households (1,833 in rural and 1,835 in urban areas) are equally split between urban and rural areas, from all the seven states of the North-West Nigeria. North-West Nigeria is one out of six geopolitical zones in the country with both economic development and access to energy lower than those in southern zones of Nigeria (World Bank 2019).

Occupational choice is reflected in three categorical variables, the binary variable *non-farm-act*, the variable *occ* with 7 occupational categories and an 8th category of students, pensionists and unemployed, and the variable *ind*, indicating in which industry the occupational choice is realized. Assets, household incomes, education, family size, access to credit markets, are factors earlier authors established as enablers of non-farm business enterprises in various studies across the developing world. We estimate the binary choice to take on a non-farm business as a logit model, then the specification of particular choice and the economic activity as multinomial logit models, estimating how the set of explanatory variables – with energy access as one of them – affect the probability of becoming active in a certain business field.

From the binary choice model (case 1), we find for rural non-farm activities that education level increases the probability of entering a non-farm business activity, decreases with age, decreases when the individual only has access to informal loans from family or friends and is higher with energy access. The latter however, is only barely significant at the 90% level. Turning to the multinomial logistic regression of *occ*, the occupation “Self-employed in agriculture and livestock” is used as the base outcome. Explaining variables are the same as in case 1, with energy access being significant at the 99% level and positive for selecting Self-Employed Non Farm Business enterprise, and Self-Employed Non-farm Independent contractor, technician, professional etc. as an occupation over Self-employed in agriculture and livestock.

Looking at the choice of economic activity, access positively and significantly affects the probability to go into handicrafts, shops, or mobile phone services. For instance, the probability for entering manufacturing, decreases with age, increases with energy access is not significantly influenced by the formal aspects of loans. The full paper will contain the estimation results and the respective goodness of fit measures.

Lastly, we estimate the effect of energy access, occupational choice and industry on the natural logarithm of incomes. Incomes increase with access, are higher in non-farm enterprises compared to subsistence farming (the variable *occ* is coded as 1 for Salaried Employee, Non-Farm, 5 for Self-Employed Agriculture and 10 for unemployed, retired, student and other occupations) and are not significantly increasing with industry.

Conclusions

Household survey data for Nigeria were analyzed to elicit the effect of energy access on the choice of economic activities in rural areas. The cross-sectional regressions show that the probability of taking on a non-farm activity is higher in areas with energy access. However, additional factors seem to play a role, such as education, age, asset ownership and access to formal loans. The analysis will be extended to three more African countries (Niger, Zambia and Kenya) to study similarities and differences and to infer enabling factors to fully exploit the possibilities of productive use of energy for more and better jobs.

References

- Bhatia, Mikul, and Niki Angelou. 2015. *Beyond Connections: Energy Access Redefined*. World Bank. <https://doi.org/10.1596/24368>.
- ESMAP. 2018. “Nigeria - Multi-Tier Framework for Measuring Energy Access Household Survey.” World Bank. [file:///C:/Users/WB589753/Downloads/mtf_nigeria_062820_web%20\(1\).pdf](file:///C:/Users/WB589753/Downloads/mtf_nigeria_062820_web%20(1).pdf).
- Khurana, Tanvi, and Seema Sangita. 2022. “Household Access to Electricity and Non-Farm Business in Rural India: A Panel Data Analysis | Elsevier Enhanced Reader.” 2022. <https://doi.org/10.1016/j.esd.2022.01.008>.
- Nagler, Paula, and Wim Naude. 2016. “Non-Farm Enterprises in Rural Africa: New Empirical Evidence,” 52.
- SDG7 Custodians. 2022. “Tracking SDG7: The Energy Progress Report 2022.” May 2022. https://cdn.who.int/media/docs/default-source/air-pollution-documents/air-quality-and-health/sdg7-report2022-052622-final_web.pdf?sfvrsn=e93a8386_4&download=true.