

InFOCUS

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Impacts of New Electric Line Extensions in Tanzania

The line extensions led to:

- a large number of new connections, though less than one-third of the number assumed
- increased consumption of grid electricity, ownership of electric tools, time spent watching television, and perceived safety
- an increased percentage of communities with an electrified school
- increased percentages of communities with electrified businesses and of households with income generating activities using grid electricity
- no clear changes in pollution, health, income, or consumption

The Millennium Challenge Corporation (MCC) invested \$124 million to build new electricity distribution lines in 7 of Tanzania's 26 regions under the line extensions component of its Tanzania energy sector project. To assess the impacts of these lines, Mathematica researchers compared outcomes for households and businesses in the line extensions communities (the intervention group) with outcomes from those in a matched group of comparison communities. Accordingly, we examined the direct impacts of line extensions in the beneficiary communities. These impacts also incorporate impacts of the low-cost-connection offers that were made in 27 of the 178 communities that were targeted to receive the new lines. We used community and household survey data covering 358 communities and over 8,900 households.

CONNECTION RATES

The line extensions increased connection rates by 10 percentage points, from 11 percent to 21 percent (Figure 1). However, the estimated number of new connections (10,794) was only 31 percent of the original projection assumed by MCC.

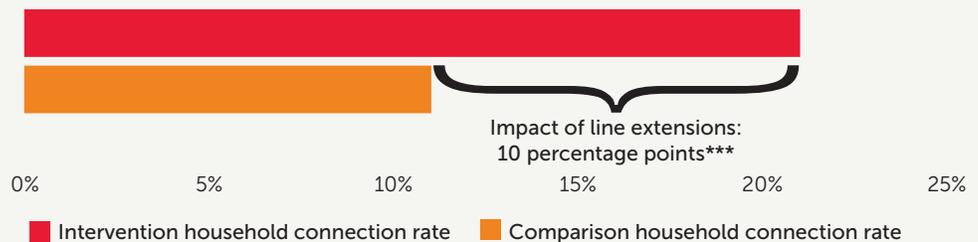
Households connected to the grid in the intervention group reported having grid electricity for about 15.7 hours per day and experiencing 1.7

power surges per week, on average. The estimates reflect some of the supply-side constraints in the Tanzanian electricity sector, including those related to power-generating capacity and reliability of the electricity supply infrastructure.

ENERGY USE

The line extensions had no clear impact on the overall amount of energy used by households, but they increased grid electricity use while reducing

Impact of line extensions on connection rates



Source: Tanzania energy sector baseline and follow-up household surveys.

Notes: The line extension analysis sample includes 8,897 households, with 4,467 in the intervention group and 4,430 in the comparison group. Impacts presented are regression-adjusted.

*** Impact estimate is significantly different from zero at the 0.01 level using a two-tailed test.

Figure 1

use of electricity from nongrid sources, such as generators. This substitution of grid electricity for nongrid electricity may have allowed households to use energy more efficiently because generators often produce far more electricity than needed to run the appliances, tools, and light bulbs households typically use. Indeed, the line extensions increased the use of electric tools and appliances and the amount of light consumed. They also increased the share of households that now charge mobile phones at home, thereby reducing mobile phone recharge expenses by about 22 percent. However, we did not find any clear impacts on kerosene or solid fuel use, which is not surprising given liquid fuel such as kerosene is already being replaced by dry cell batteries in nonelectrified households in most African countries.

EDUCATION AND CHILD TIME USE

The line extensions had a positive impact on the proportion of communities with electrified schools, with over half of communities that received the new lines having an electrified school compared to about one-third of the comparison communities. The line extensions did not clearly increase the amount of time children spent studying at night, but did boost the amount of time children spent watching television by about seven minutes per day.

HEALTH AND SAFETY

The line extensions had no clear impact on access to electrified health facilities or on health problems. Improvements in health might have been found if the line extensions reduced indoor air pollution from reduced use of kerosene and solid fuel, but we found no clear impacts on those outcomes.

The line extensions improved households' perceived safety at night by 20 percentage points, with just under half of respondents in the intervention communities reporting feeling safe on more than half the measures (Figure 2). The measures covered perceptions of safety with regard to light available at night, sense of security while walking at night, the threat of crime, and the threat of animals.

BUSINESS AND ADULT TIME USE

About 96 percent of communities that received the new lines had an electrified business—an impact of 44 percentage points. The line extensions increased the percentage of households operating an income generating activity (IGA) that used grid electricity from 7 to 9 percent. However, the line extensions had limited impacts on economic activities and adult time use: they increased the time both men and women spent collecting water and fuel and watching television.

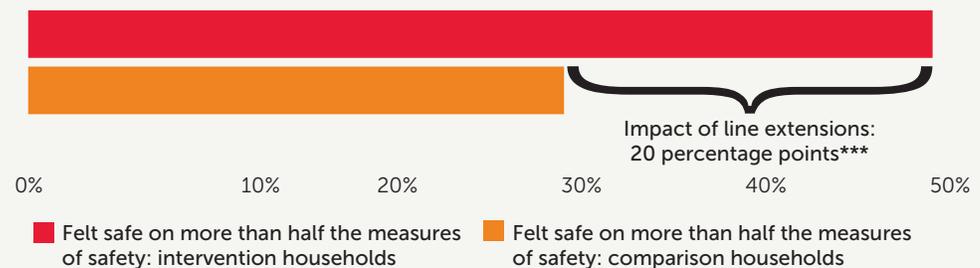
ECONOMIC WELL-BEING AND COMPOSITION AND MOBILITY

We hypothesized that the line extensions might increase land values and affect migration because the new lines would make a community more attractive, but we found mixed results. The line extensions increased the price of residential land by about 34 percent, but we did not find any impacts on migration. There were also no clear impacts on other measures of economic well-being, such as annual income or the proportion of households consuming less than \$1 or \$2 per day per person.

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This brief is based on the report, "Grid Electricity Expansion in Tanzania by MCC: Findings from a Rigorous Impact Evaluation" by Duncan Chaplin, Arif Mamun, Ali Protik, John Schurrer, Divya Vohra, Kristine Bos, Hannah Burak, Laura Meyer, Anca Dumitrescu, Christopher Ksoll, and Thomas Cook. Washington, DC: Mathematica Policy Research, February 2017.

Impact of line extensions on perceived safety at night



Source: Tanzania energy sector baseline and follow-up household surveys.
 Notes: The line extension sample includes 8,897 households, with 4,467 in the intervention group and 4,430 in the comparison group. Impacts presented are regression-adjusted.
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Figure 2

