

## Electric cookstove adoption in Tanzania: Longitudinal trajectories of product use and the causal effect of an electricity tariff reduction

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### Abstract

Are electric appliances viable clean cooking alternatives to traditional cookstoves? Around three billion people worldwide cook using traditional cookstoves (TCS) such as open fires or simple stoves fueled by kerosene, biomass (charcoal, wood, animal dung, etc.) and coal. Close to four million people die prematurely from illnesses that are attributable to household air pollution from stoves that use solid fuels or kerosene. One solution—electric cooking—has the potential to reduce household air pollution, cooking labour (predominantly done by women), and even cooking costs. In particular, electric pressure cookers (EPCs) can save 50-90% of energy when used to cook heavy dishes (beans, meat stew) and 20-50% when used to cook staples (maize and rice) compared to TCS. This study follows a pilot of EPCs with 100 households in six mini-grid locations around Lake Victoria, Tanzania from March 2020 to May 2021. Each EPC was connected to a smart metre to collect 5-minute interval data on how EPCs were used. Willingness-to-pay data was also collected. The study period included an unexpected, country-wide decrease in electricity cost in October 2020. An interrupted time series analysis was conducted to estimate the causal effect of the drop in electricity cost on EPC adoption. A reduction from a \$1.00kW-hr to \$0.04kW-hr in electricity tariff led to an increase from 3.3% to 16% of households using their EPC at least once per day, as shown in the figure below. A growth modelling analysis was used to analyse households' EPC adoption trajectories over time and identified characteristics of households that followed different adoption trajectories. These analyses may be adapted and applied to pilots of other electricity-powered products. This work has implications for electric cooking appliance manufacturers, electric mini-grid and utility operators, and global progress toward U.N. Sustainable Development Goals 3, 7, and 13.

