



## Effects of access to electricity interventions on socioeconomic outcomes in low- and middle-income countries

Access to electricity, considered a foundation of modern society, is crucial to poverty reduction. Such access can provide a range of benefits, from better public services to improved health and education to more productive economies.

As of 2018, over 800 million people worldwide did not have access to electricity. Sources such as the Asian Development Bank have invested significantly in an attempt to bridge this gap and achieve the seventh Sustainable Development Goal: access to affordable, reliable, sustainable and modern energy for all.

The Asian Development Bank's Independent Evaluation Department, together with the International Initiative for Impact Evaluation (3ie), have produced this systematic review in order to provide an up-to-date understanding of electricity access interventions, as well as to inform future investment and resource allocation by the Asian Development Bank.

### Highlights

- Electricity interventions have had positive, if modest, effects across the range of outcomes observed. The most significant impact was increased study time, especially at night.
- There is considerable variation in results across studies. This means that understanding the specific context is crucial if interventions are to achieve positive social outcomes.
- There are relatively few impact evaluation studies in energy, meaning there is a substantial gap in the evidence. Funding for rigorous studies, especially those incorporating theory-based, mixed-method approaches, is needed.
- The majority of studies focus on supply-side interventions, such as rural grid connections. However, fixing supply-side issues is insufficient to ensure electrification programmes are taken up by clients. Further research on demand-side interventions is needed to gain a deeper understanding of the factors affecting demand.



## Main findings

For this review we examined studies that evaluated interventions falling under three dimensions: physical access; system management and policy; and incentives and consumer access. Three main findings were established.

### **Electricity access interventions have had modestly positive effects on household socioeconomic outcomes.**

Interventions aimed at providing new or improved access to electricity have led to an increase in household connectivity and electricity use. They have also had moderate effects on the ownership and use of household electrical appliances. The effects on education, socioeconomic welfare, health and the environment are positive, but moderate. Average education effects were realised more by children (aged 18 or less) and socio-economic effects were realised more by women, though the additional effect for women was small.

### **Results vary considerably across studies.**

This stems partly from the particular characteristics of the various studies, such as study design, type of outcome evaluated, how variables were measured, location, method employed and length of follow-up. However, most heterogeneity stems from factors beyond those captured by the review's analysis.

### **Understanding the specific local context matters for yielding positive changes in social outcomes.**

Given the high degree of variation across study results, assessing how context determines or influences uptake and use of electricity infrastructure is key to yielding positive change in social outcomes. Without appropriate consideration of these factors, beneficiaries may not take up electricity; use electricity at a much later date than anticipated; or consume sub-optimal levels of electricity for basic energy services, for short periods of time.

The findings above have a number of implications for policy and programming and for future research.







## Implications

### Policy and programming

**Funding research is necessary to fill evidence gaps.** A substantial gap exists in the evidence base due to the small number of impact evaluations; wide variation in the types of electrification interventions; and limited detail on intervention specifics, causal mechanisms and costs.

Funding for additional research on this topic – including process evaluations, health and environmental impacts, and qualitative research accompanying impact evaluations of specific electrification interventions – can help fill this gap, especially if such funding stipulates that researchers provide complete and detailed information on intervention specifics, mechanisms and costs.

**It is important to adjust expectations on the magnitude of project outcomes.** Governments and development partners should adjust their expectations regarding the magnitude of electricity project outcomes. The positive but modest effects on education, socioeconomic and environmental outcomes should not deter future investments in electricity access. Instead, they offer a reality check on what is plausible in terms of potential impact, and so should guide expectations of intervention results.

These effects were realised across a range of contexts and settings,

and persisted even after several study factors were accounted for, such as study design, length of follow-up, type of outcome evaluated and local context.

**Targeting multiple constraints leads to improved results.** Evidence suggests that interventions targeting multiple constraints (e.g. electricity infrastructure and reliability, or reliability and affordability) yield better results than interventions targeting a single constraint. Similarly, interventions focused exclusively on a single constraint, such as expanding physical access to electricity (on-grid or off-grid), may produce smaller benefits than interventions targeting reliability, affordability or a combination of the two, as observed in education.

Though future research may identify other social outcome types bearing higher returns to electrification, in the short term it may be useful for policymakers and practitioners to consider not only the direct social effects of electricity access, but also the instrumental role electricity plays in multi-component interventions.

### Research

**Studies should seek to understand the effects of demand-side interventions and combinations of demand- and supply-side interventions.** Of the studies addressing demand, the majority focused on testing voucher or subsidy interventions as a means

of reducing cost barriers, but did not address reliability, consumer preferences, social acceptance, regulatory constraints or other factors affecting demand. This is especially important, as evidence suggests that beneficiary-related factors – such as consumer knowledge, attitudes and preferences – affect intervention effectiveness.

**Increased use of theory-based, mixed-method approaches are recommended.** Less than 15 per cent of studies in this review included a qualitative component. Theory-based, mixed-method approaches are likely to yield more nuanced results, as they provide insight not only into the magnitude of effects, but also on how and why they arise, for whom, and in what contexts. Such studies will provide practitioners with more nuanced understandings with which to formulate new policies and interventions.

**More studies should look at outcomes affecting quality of life and social experience.** Studies have focused on the educational and economic impacts of electrification, with evidence pointing to modest effects. However, these are not the only – indeed, may not even be the most important – effects of electrification. While a few studies have measured other plausible outcomes, such as quality of life, work in this area is limited.





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## What is a systematic review?

3ie systematic reviews use rigorous and transparent methods to identify all of the studies that qualify for analysis and synthesis to address a specific research question. Reviewers identify published and unpublished studies and use theory-based, mixed methods to analyse and synthesise the evidence from the included studies. The result is an unbiased assessment of what works, for whom, why and at what cost.

## About this review

The findings in this brief are drawn from the technical report *Effects of access to electricity interventions on socio-economic outcomes in low- and middle-income countries*, by Nick Moore and colleagues.

## About this brief

This brief was authored by Amber Franich. She is solely responsible for all content, errors and omissions. If you would like more information about this systematic review, please contact Douglas Glandon at [dglandon@3ieimpact.org](mailto:dglandon@3ieimpact.org).



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