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“Reconcile land system changes  
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## Socioeconomic impacts of road infrastructure development in Kenya

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### Abstract

Over the past two decades, governments and development institutions have significantly increased investments in road infrastructure across Sub-Saharan Africa, viewing transport connectivity as a critical driver of economic growth, poverty alleviation, and market integration. In many cases, the high financial costs of these projects are met through partnerships with international organisations such as the World Bank, International Monetary Fund, and, more recently, China, which has taken an active role in funding and constructing road networks as part of its broader Belt and Road Initiative.

Despite widespread advocacy for infrastructure-led development, a crucial empirical question remains: do road investments in these regions and especially in the remote rural areas translate into tangible socioeconomic improvements? Moreover, how can observed changes in economic outcomes be causally attributed to road infrastructure, rather than to other concurrent development programs?

To explore these questions, we use a case study of Kenya, a country that has embarked in extensive road infrastructure improvement and expansion over the past two decades (since 2002). We use a novel approach to measure accessibility due to these investments using a time-series road network maps and integrate it with satellite-derived nighttime lights data, gridded gross domestic product and electricity consumption measures to evaluate economic impacts of road development.

Employing recent advances in causal inference methods, we estimate the effects of road infrastructure on local economic activity in a spatio-temporally dynamic manner. Our findings reveal that road investments have indeed fostered economic gains; however, these benefits are disproportionately concentrated in arable areas and regions that were already socioeconomically advantaged. In contrast, remote and historically underserved regions, despite receiving new roads, have shown limited economic response.

This research contributes to the literature on infrastructure development impact evaluation by demonstrating how remote sensing and spatially disaggregated data can be leveraged to evaluate large-scale policy interventions, in data scarce areas developing regions. The findings have important implications for infrastructure development planning.

**Keywords:** Impact evaluation, road development, rural areas, socioeconomic development