

Citations, funding, and influence in energy-policy research on Low-and Middle-Income Countries

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Key Messages

- Energy research on developing countries shows a strong bias in reflecting the frameworks and perspectives from the developed world, resulting in a vicious cycle where the most influential knowledge about these countries is produced without considering regional particularities and needs.
- Papers focusing on energy policy in LMICs are more likely to be cited and funded the larger the GDP of the first author's country of affiliation.
- 71% of papers about energy policy for LMICs (excluding China) are funded by institutions and 61% authored by researchers based in HICs.
- Research should propose specific policy-design and technologies to LMICs reflecting local knowledge.

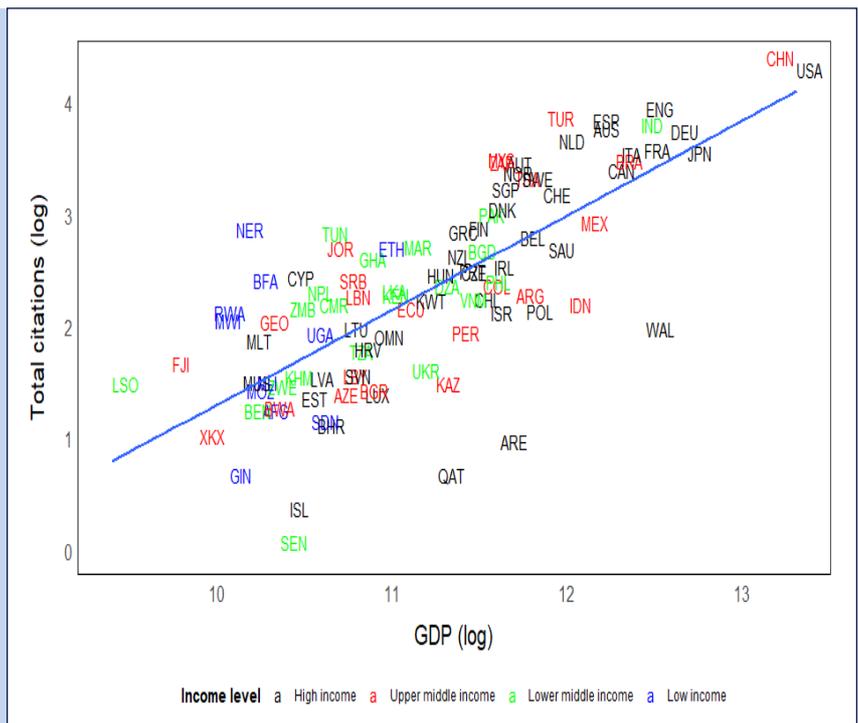


Figure 1 – Total citations vs GDP of country of primary author

Introduction

Energy research and policy recommendations for Low-and Middle-Income countries (LMICs) are usually conducted in, and funded by, institutions from High-Income Countries (HICs).

Local knowledge matters and local researchers normally have valuable experience in their own geographies [1]. They normally have a better understanding of local needs and are more familiar with local data [2], which are often produced in a local or regional language.

While researchers and funders from HICs dedicate efforts to

studying energy issues in LMICs [1,3], the opposite does not normally hold true. Hence, authors from HICs dominate knowledge creation both regarding their own contexts and the contexts of LMICs. Authors from LMICs are normally constrained to study their own countries, and still publish less about them than authors from HICs.

This creates a vicious cycle where flows of knowledge move in a single direction: evidence for policy-making about both HICs and LMICs is produced by the former and imported to the latter [4].

In this brief, we analyse the dynamics of energy research on LMICs through a bibliometric assessment of 6,636 papers found in the Web of Science database. Our results confirm that HICs perspectives are dominant and have the greatest impact within research providing evidence for energy policy for LMICs.

We propose fundamental changes to the mainstream energy research framework, by prioritizing local perspectives and knowledge creation, even when projects are funded by institutions from HICs.

Methodology and data

We conducted a bibliometric analysis using the Web of Science database of journal articles focusing on energy policy in LMICs [5]. The papers are chosen based on their stated aim of influencing energy policy.

We initially searched for “energy AND developing AND countries”. We then limited the search to applied social sciences, engineering, and other related fields and included all papers from 1966 to 2019, excluding 2020 and 2021 in order to allow time for papers to be cited. We included papers published in all languages.

Data on number of citations, journal impact factor, author affiliation, country of study, funding acknowledgement, and income levels of countries are used.

We used the World Bank’s threshold of USD 12,535 Gross National Income per capita (GNIpc) in 2018 [6] to classify countries as LMICs or HICs. GDP data used were also retrieved from the World Bank for the year 2018 in current values [7].

Key results

A large sample of 6,636 papers on both HICs and LMICs reveals a trend in who does research on whom. This is important for several reasons:

Dominant research on LMICs being conducted by HICs cements the perspective of HICs. We selected papers exclusively studying LMICs for specific analyses, which reduced the main sample to 4,281 papers. Results from this specific sample show a strong positive correlation between number of citations and the GDP of the country where the first author is based (**Figure 1, above**).

There is clear dominance of authors from institutions in specific countries. LMICs are studied more by authors in HICs than by their own researchers, while we would

expect each country to be more studied by its own researchers:

- 51% of first authors are based in HICs, 18% of which are based in the UK or US, and 49% of first authors are based in LMICs.
- Only 32% of first authors are based in LMICs apart from China.
- The dominance of China is palpable: 16.8% of papers have a first author based in China.

China is clearly an outlier. Despite being considered a developing country by the GNIpc threshold, China has the world’s second largest total GDP and research funding [6], behind the US only [8]. China had the most academic publications in 2018 [9] and with a steady growth of R&D investment, China spent a record of 2.5% of GDP (USD 322 billion) in 2020 [10]. In the energy-policy field, China’s number of publications per year has grown exponentially from a 2% growth rate in 2009 to 22% in 2019, when it ranked first with 208 publications [5].

Notably, using the entire sample, we found that the lower the GDP of the country of study, the higher the difference between its GDP and the GDP of the country where the first author is based (**Figure 2, below**).

There is a clear trend in which only authors from higher-income countries study lower-income countries, while negative differences are observed solely when high-income countries study each other, as shown in Figure 2.

Also, a sample of 905 papers focusing exclusively on LMICs which have provided funding information reveals that funders from HICs are dominant. Excluding papers about China, 71% of papers focusing on LMICs are funded by developed country institutions, while only 29% by funders from developing country institutions. The same analysis for 143 papers in the Scopus database reveals similar proportions: 72% to 28%.

China also has a clear dominance in terms of funding: 46% of all papers which provided funding information study China and were funded by Chinese institutions.

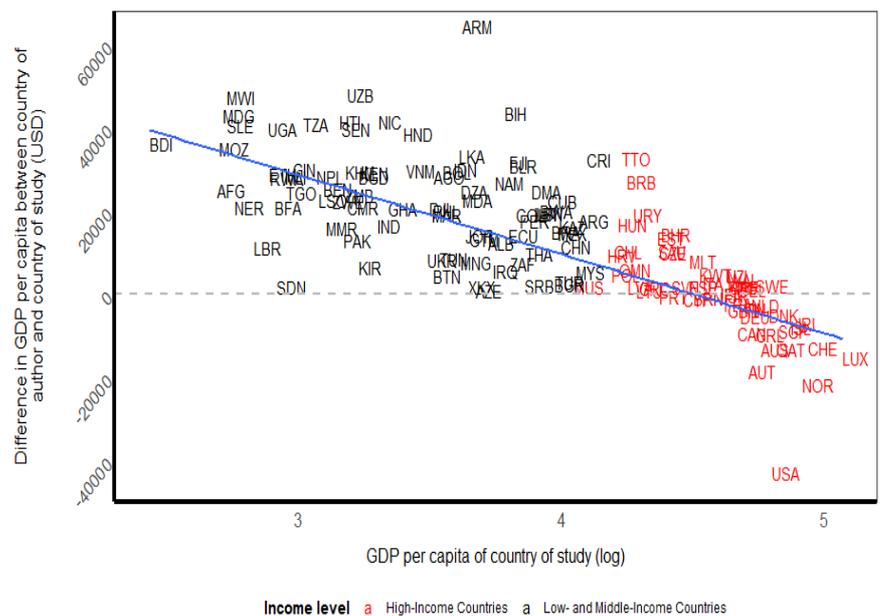


Figure 2 - Difference in GDP per capita between country of author and country of study vs log of GDP per capita of country of study

The data reveal that funding institutions tend to fund publications whose first author comes from the same country, or another HIC, meaning authors from countries with higher GDP attract most funding (**Figure 3, box 1**).

The data also show that funder countries with lower GDP tend to fund authors in their own country but also fund authors from HICs (**Figure 3, box 2**). Funding from HICs is directed to authors across GDP levels, but still mostly concentrated in authors from HICs (Figure 3).

Taken together, these findings mean authors from HICs are more likely to influence policy [11], which creates a vicious cycle of knowledge flows as follows:

HICs authors find funding in their own geographies (Figure 3) to conduct research about LMICs (Figure 2, Figure 3) and have a higher number of citations than local authors (Figure 1). Their perspective becomes dominant; they influence policy and attract more funding. More funding means more research output and more citations. They eventually create a monopoly on accepted knowledge. LMICs authors must adopt established knowledge or risk becoming obsolete.

This dynamic perpetuates geographical imbalances in influence on energy policy. If policy makers

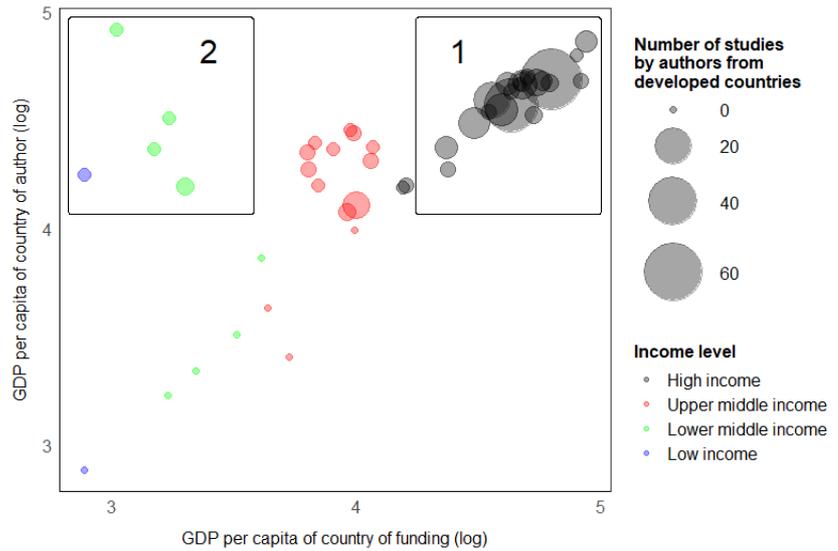


Figure 3 - GDP per capita of funder country vs Average GDP per capita of first author's country (papers focusing exclusively on developing countries)

prioritize policy recommendations formulated from a developed world perspective, it could ultimately lead to replicating policies which are inadequate for their specific contexts and adopting technologies that may not be efficient in their geographies.

Policy makers are, therefore, more likely to neglect their countries' potential advantages and disadvantages, and systematically fail to guarantee energy access and justice [12]. It could also lead to further technological dependency, by continuing to im-

port technologies recommended (and produced) by HICs.

Notably, this is an initial analysis of a large dataset. So, it has not been possible to discuss the types of frameworks and methods used in the literature in detail. Nor has it been possible to reflect in detail the extent to which the nationality of authors, as well as their institutional affiliation, affects the type of research that is carried out. These aspects are further discussed in the full-length research paper.

Recommendations

- Energy research and policy recommendations for LMICs should reflect their actual particularities, development needs, and infrastructure.
- Funding characterized as aid should be thought of in better ways to prioritize local knowledge and propel it through impactful publications led by local researchers.
- This would ensure research funding to LMICs where resources are severely limited, while allowing them to conduct the most relevant research, answering their specific research questions and proposing appropriate policy recommendations.
- Authors from HICs, when conducting studies about LMICs and making policy recommendations for them, should cite local authors and prioritize local authors to lead publications
- Policy makers from LMICs should be aware of the extent to which the policies they adopt reflect Northern frameworks and perspectives and how much of that is applicable to their specific contexts.
- These recommendations, taken together, could allow LMICs to close the energy justice gap by focusing on tailored policy-design and technologies.

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Notes

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