"*MEASURING THE LEVEL OF ENERGY POVERTY USING MULTIDIMENSIONAL ENERGY POVERTY INDEX: EMPIRICAL EVIDENCE FROM HOUSEHOLDS IN PERU, 2006-2016*"

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Overview

The term 'energy poverty' is generally understood as a lack of access to modern energy services (Day et al., 2016). This is a complex isue that cannot be assessed as a fixed concept. There are a variety of economic, environmental and behavioural factors that can cause it. Thus, erradicating energy poverty requires the application of tools that can measure, monitor and track it from different dimensions. One of the more advanced approaches deriving from a multidimensional perspective was developed by Nussbaumer et al. in 2012, who developed the Multidimensional Energy Povery Index (MEPI), based on Amartya Sen's capability approach to development as an underlying theoretical framework.

The purpose of this paper is to outline a study measuring energy poverty in Peru at the household level, where the rural population is still registering 22% without access to electricity and 40% still using biomass for cooking (Vásquez et al., 2017). Initial studies have evidenced the positive impact of transitioning towards modern energy services in rural areas in Peru. However, the literature on energy poverty in Peru sufffers from two main shortcomings. First, there is a reliance on uni-dimensionality indicators. Second, researches lack information about energy poverty on different levels (i.e. sub-national levels). These are the gaps this paper aims to fill. Towards this, this paper applies the methodology of the MEPI and use 'Peruvian National Household Survey' (ENAHO, by its acronym in Spanish) database. In this manner, the aim of this paper is to measure from a multidimensional focus the extent and intensity of energy poverty in households in Peru on national and sub-national levels, during the period from 2006 to 2016.

Methods

The MEPI is a composite index proposed by Nussbaumer, Bazilian and Modi (2012). The authors derived this methodology from the literature on multidimensional poverty measures as developed by the Oxford Poverty and Human Development Initiative (OPHI), inspired by Sen's Capability Theory. Basically, the MEPI framework is composed of five dimensions of household energy services: cooking, lighting, services provided by means of household appliances, entertainment/education appliances, and means of communication. These group-weighted indicators are assigned their respectives variables. In this multidimensional context, the MEPI aims to capture diverse deprivations that may affect a person. Thus, a person is considered energy poor if the sum of the deprivations is above a pre-defined threshold. For the threshold, Nussbaumer et al. (2012) used the dual cut-off method applied by OPHI. In relation to the weights of the indicators, they established them according to their relative importance. Mathematically, the MEPI is calculated as the multiplication of two components: (a) a headcount ratio of people recognised as energy poor (poverty incidence), and (b) the average intensity of deprivation of those who are identified as energy poor (poverty intensity) (Nussbaumer et al., 2012).

Results

Considering that this paper analyses household-level data, the research will be based on the ENAHO database, the official household survey in Peru. The ENAHO covers all national territory: 24 departments and the constitutional province of Callao, covering rural and urban areas. The sampling frame for the selection of the sample is based on the National Population and Housing Censuses and updated cartographic material for this purpose. From this, ENAHO applies a probabilistic sample of areas, using a multistage and stratified procedure. In this way, the sampled unit involves diferent levels, the lowest level being the household. This paper will use the ENAHO annual survey for the period 2006-2016. During this period, the sample's confidence level was 95%.

Applying the ENAHO database, the results show that the MEPI at the national level in Peru has fallen progressively from 0.27 in 2006 to 0.11 in 2016. This means that the MEPI value has been reduced by more than half over the period from 2006 to 2016. This trend is similar among the 24 departments and the constitutional province of Callao. All of these, without exception, have reduced their level of energy poverty. As shown, the MEPI value of 15 departments in 2006 was over 0.3, while only two departments registered over 0.3 in 2016. Following Nussbaumer et al. (2013), the MEPI results can be classified according to the degree of energy poverty. They indicate that the MEPI results range from acute energy poverty (MEPI > 0.7) to a low degree of energy poverty (MEPI < 0.3). In that sense, the MEPI for 2016 in Peru reflects the low energy poverty level nationwide. However, there are departments where the MEPI value is moderate (MEPI > 0.3): Loreto (0.35) and Huancavelica (0.30). The MEPI values by departments demonstrate that the areas located on the western coast register lower energy poverty levels in comparison to the areas located on the Andes highlands in the center and the eastern Amazon jungle. These results confirm the significant inequalities between the different departments.

Conclusions

This paper offers a wider perspective of energy poverty in Peru, based on the idea that energy poverty is multidimensional in nature. Thus, it has sought to overcome the dependence on unidimensional indicators, as well as provide an extensive analysis from different levels over the period from 2006 to 2016. In this regard, this paper presents initial empirical evidence that aims to contribute to the research on energy poverty in Peru, and thus provides valuable information for policy analysis and design. Such a study could be replicated for other developing countries to contribute to the understanding of energy poverty and, consequently, its eradication.

References

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