Poverty and Energy Poverty in Ecuador: Subsidised Electricity Tariffs and Clean Cooking Programs

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Abstract

In this article, we identify potential energy poverty patterns using poverty indicators in Ecuador. We discuss the extent to which the current subsidised electricity tariffs are efficient and might require improvements. We also address the potential impact of energy poverty on participation in clean cooking programs.

Disclaimer: The opinions expressed within the contents are solely the authors' and do not reflect the opinions of the institutions or companies with which they are affiliated. Daniel Davi-Arderius works at e-Distribución Redes Digitales, SLU and is part of the EU DSO Entity. Xavier Rodríguez-Cruz is an associate consultant at Econintsa.

1. Introduction

Ecuador is one of the few officially dollarized economies in Latin America and a net oil exporter. Its economy is characterized by a huge informal sector in both the labour and the housing markets (Matano et al., 2020; Obaco et al., 2021). Economically speaking, Ecuador is a developing country with high levels of inequality and poverty, but a high Human Development Index (HDI), which is around 0.765.

Ecuador is a highly subsidised economy (Gould et al., 2018). These subsidies include electricity tariffs, gas for general transportation, and liquefied petroleum gas (LPG). However, to our knowledge, the Ecuadorian Statistical Agency (INEC) does not report specific energy poverty indicators (Siksnelyte-Butkiene et al., 2021). Instead, INEC publishes poverty statistics such as Income Poverty, Unmet Basic Needs or the Multidimensional Poverty Index. Income Poverty considers household incomes. Unmet Basic Needs covers five household components: economic conditions, rights to basic education, rights to housing, rights to essential services (sewage and water), and housing overcrowding. Finally, the Multidimensional Poverty Index considers four dimensions (education, work and social security, health, water & food, and housing structure) and is made of twelve indicators (Añazco et al., 2016).

In 2023, Income Poverty, Unmet Basic Needs and the Multidimensional Poverty Index criteria were 23.9%, 28.4% and 36.9%, respectively (INEC, 2024b). In the next section, we analyse these indicators by province and identify potential patterns of energy poverty (González-Eguino, 2015).

2. Poverty in Ecuador

INEC classifies "poor", and "extremely poor" populations based on the monthly household income per capita. As shown in Table 1, the rate of poor households in rural areas is several times higher than in urban areas, which implies relevant socioeconomic differences between both areas. Rural areas and provinces in the Amazon also have accessibility problems (Obaco et al., 2020). Similar regional patterns are identified in the Unmet Basic Needs and in the Multidimensional Poverty Index (Matano et al., 2022; Obaco and Díaz-Sanchez, 2018).

Table 1. Main poverty indicators in June 2024

Poverty criteria assessment	Definition	Ecuador	Rural areas	Urban areas
Households monthly Income per Capita	Share of poor population (less than 91.55 USD)	25.5%	43.2%	17.2%
	Share of extremely poor population (less than 51.60 USD)	10.6%	24.1%	4.4%
Unmet Basic Needs	5 components	30.8%	52%	21%
Multidimensional Poverty Index	4 dimensions and 12 indicators	37.3%	67.9%	23%

Elaboration: Authors. Source: INEC (2024a).

Ecuador is made of four regions: the Coast (Northern Coast, Southern Coast), the Andes (Northern Andes, the Andes, Southern Andes), the Amazon and the Galapagos Islands (Figure 1). Geographical characteristics set important socioeconomic differences in consumption patterns. For instance, weather is different between regions and households in the Coast mostly use air conditioning, while heating water in the Andes. Amazon has less accessibility in general. Thus, housing structure is also different between natural regions (Obaco et al., 2022). Higher wages are presented in three main provinces, in Pichincha where the capital Quito is, in Guayas where the economic port city of Guayaquil is, and in Azuay due to its industrial activity.

When analysing the poverty indicators from Table 1 in provinces, we find interesting results. Figures 2, 3 and 4 depict the regional Income Poverty statistics, the Multidimensional Poverty Index and the Unmet Basic Needs, respectively. In all cases, the provinces with the highest poverty statistics are in the Amazon, while the lowest are in the Andes.

Despite INEC not providing energy poverty indicators, this might be quite well estimated with the rate of

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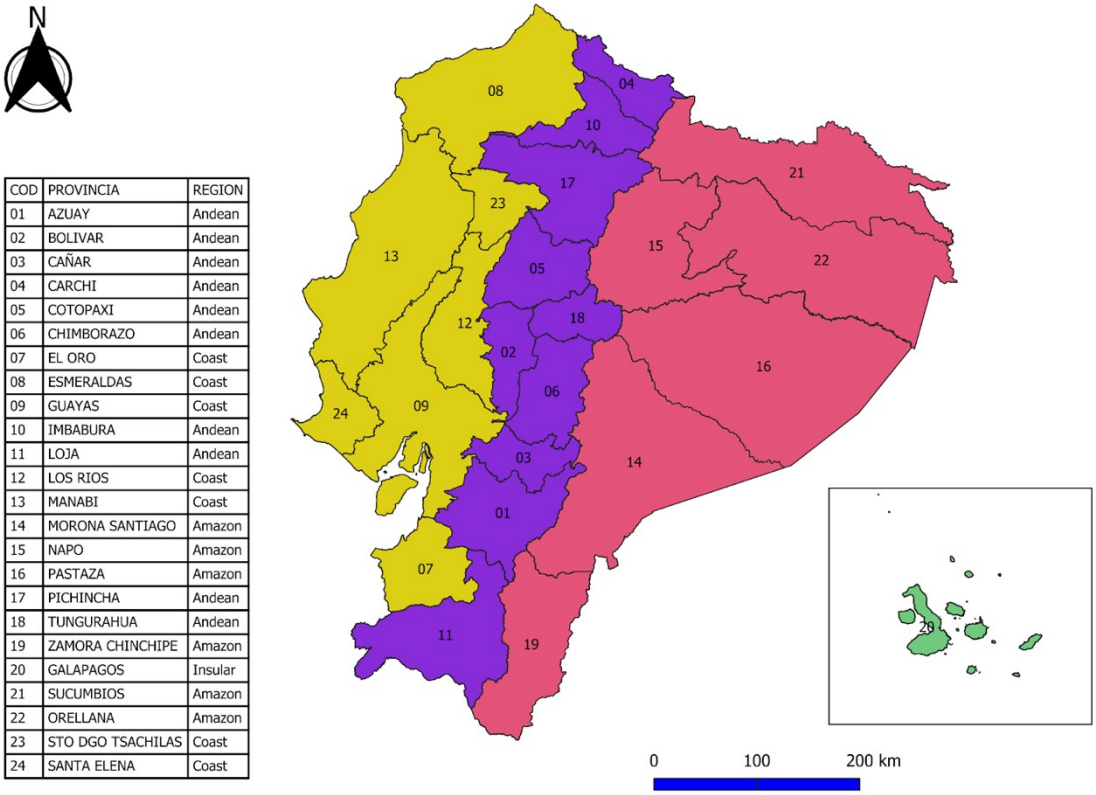

COD	PROVINCIA	REGION
01	AZUAY	Andean
02	BOLIVAR	Andean
03	CAÑAR	Andean
04	CARCHI	Andean
05	COTOPAXI	Andean
06	CHIMBORAZO	Andean
07	EL ORO	Coast
08	ESMERALDAS	Coast
09	GUAYAS	Coast
10	IMBABURA	Andean
11	LOJA	Andean
12	LOS RIOS	Coast
13	MANABI	Coast
14	MORONA SANTIAGO	Amazon
15	NAPO	Amazon
16	PASTAZA	Amazon
17	PICHINCHA	Andean
18	TUNGURAHUA	Andean
19	ZAMORA CHINCHIPE	Amazon
20	GALAPAGOS	Insular
21	SUCUMBIOS	Amazon
22	ORELLANA	Amazon
23	STO DGO TSACHILAS	Coast
24	SANTA ELENA	Coast

Figure 1. Provinces in Ecuador by regions. The Coast region is identified in yellow, the Andes in violet, the Amazon in purple, and the Galapagos Islands in green.
Elaboration: Authors. Source: Own elaboration based on INEC (2024a).

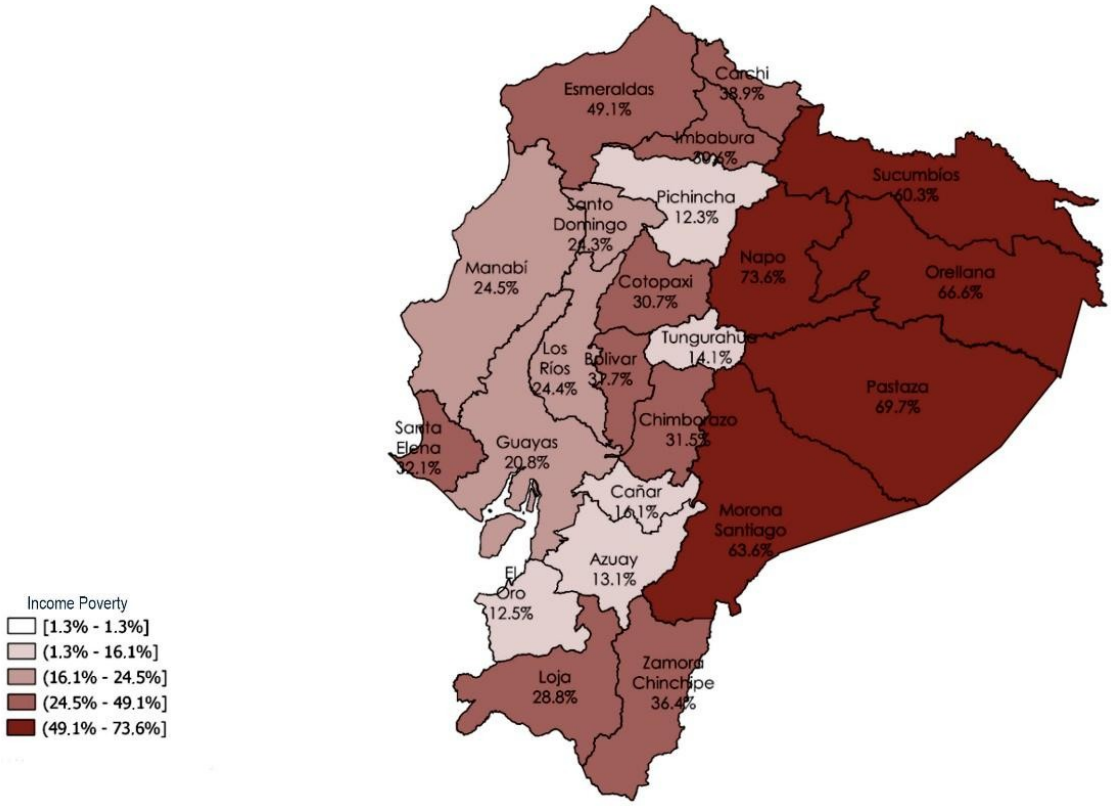

Figure 2. Income Poverty Index (in %) by provinces (2023).
Source: Principales resultados de la Encuesta Nacional de Empleo, Desempleo y Subempleo – Anual (INEC, 2024a; 2024b)

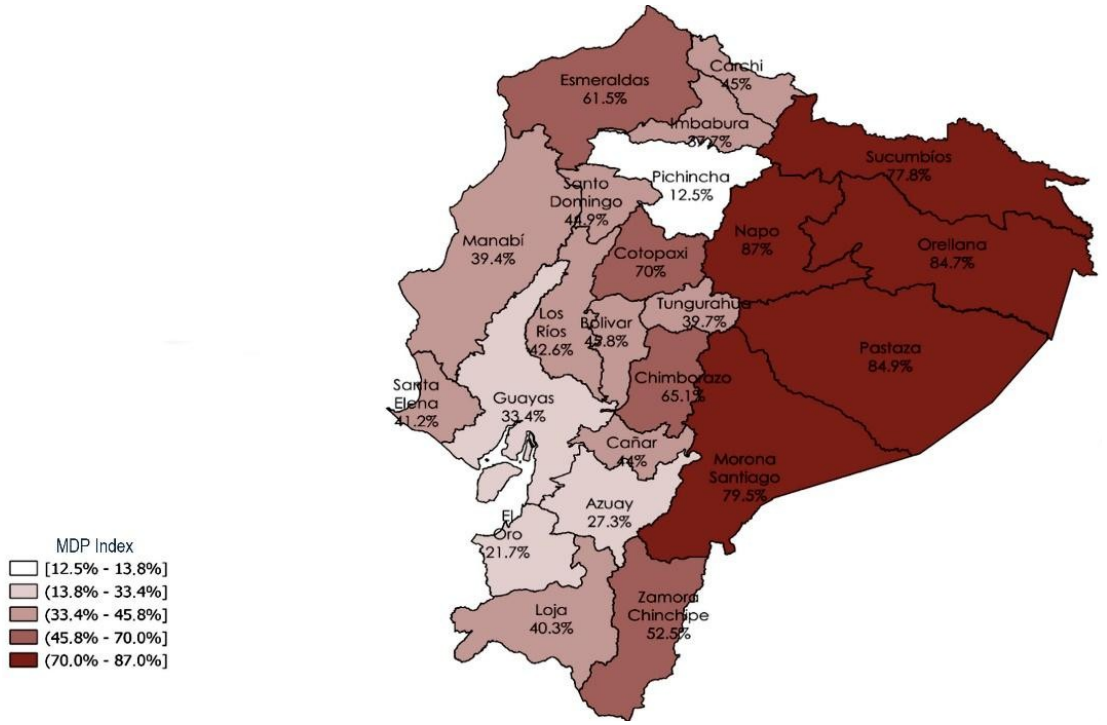

Figure 3. Rate of Multidimensional Poverty Index (in %) by provinces (2023).
Source: Principales resultados de la Encuesta Nacional de Empleo, Desempleo y Subempleo – Anual (INEC, 2024a; 2024b)

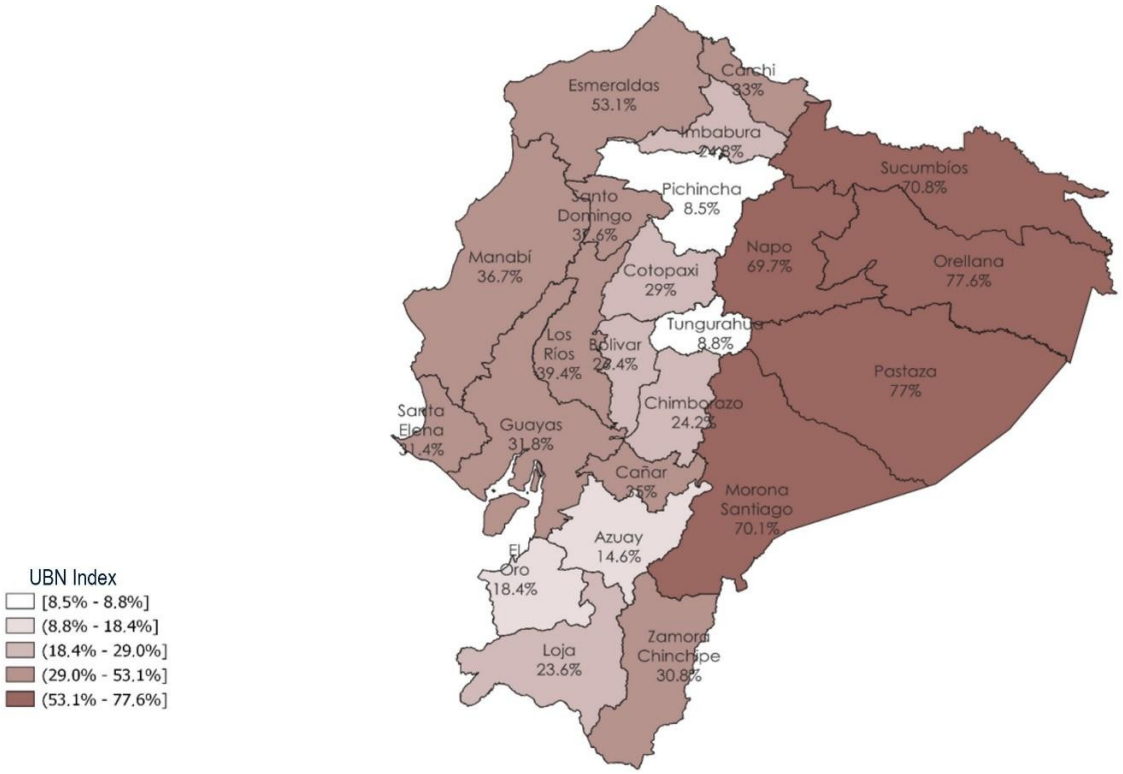

Figure 4. Rate of Unmet Basic Needs (in %) by provinces (2023).
Source: Principales resultados de la Encuesta Nacional de Empleo, Desempleo y Subempleo – Anual (INEC, 2024a; 2024b)

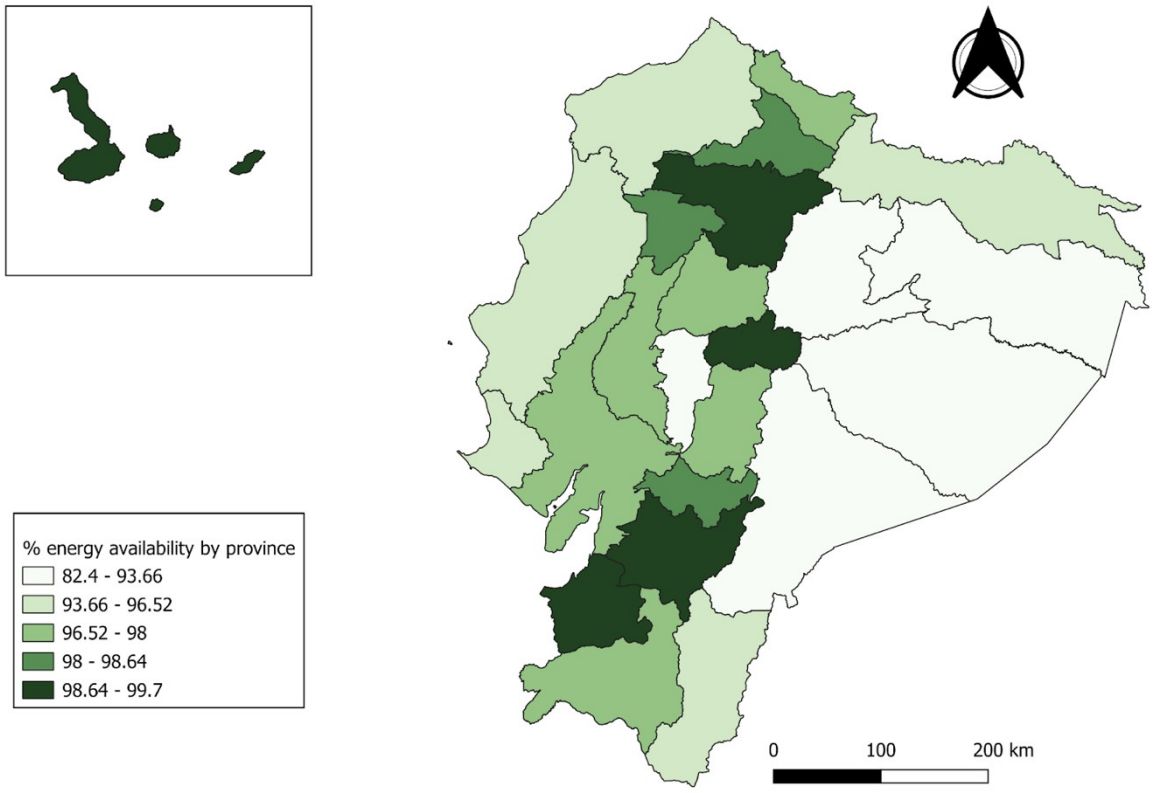

Figure 5. Rate of homes connected to the electricity public network by province (2023). Elaboration: Authors. Source: INEC (2024a).

homes connected to the electricity public network and the rate of homes owning a refrigerator. As shown in Figures 5 and 6, provinces in the Amazon have the lowest levels, while the opposite for provinces in the Andes. These results are relevant since the World Bank states that Ecuador has full access to electricity. These patterns represent potential regional poverty indicators (Figures 2, 3 and 4).

In the next section, we describe the electricity subsidies in Ecuador to show how the targeted population is benefiting from these subsidies. These subsidies in general coexist with other subsidies.

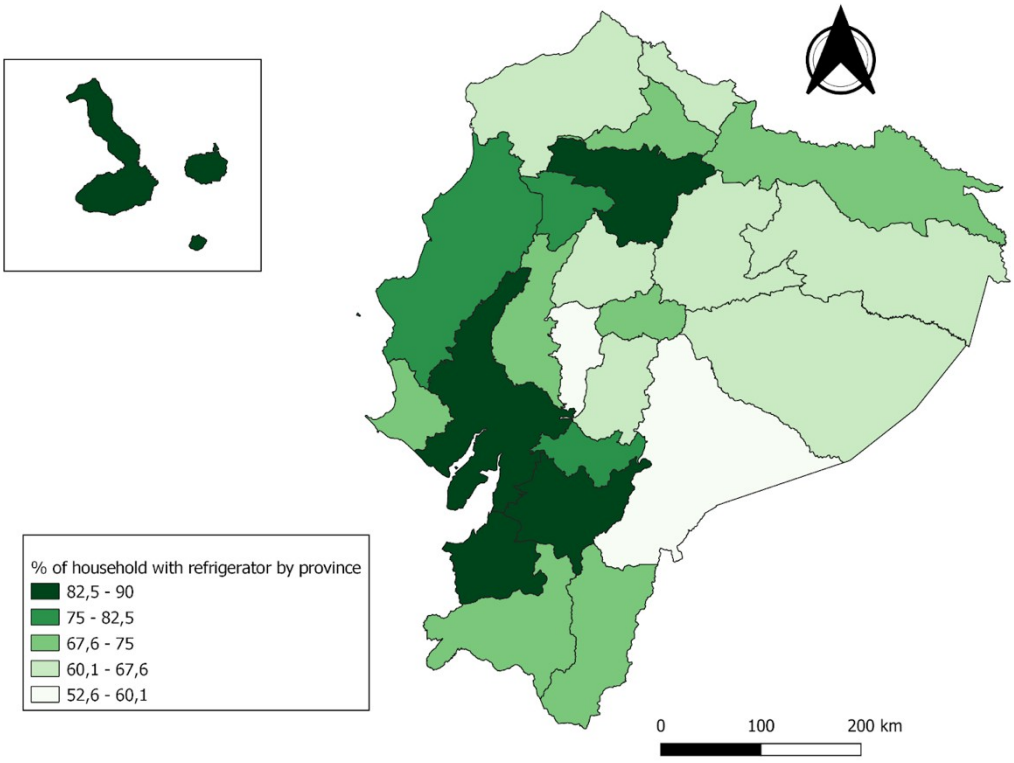

Figure 6. Rate of homes that have a refrigerator by province (2023) Elaboration: Authors. Source: INEC (2024a).

3. Subsidised electricity tariffs in Ecuador

Ecuador has several subsidised electricity tariffs: "*tarifa dignidad*" for low-income households, "*tarifa tercera edad*" for elderly people, and "*tarifa de la discapacidad*" for disabled people. In all cases, households also pay specific charges on their electricity bills, such as waste charges or fire services. See Table 2.

Table 2. Energy subsidies in Ecuador.

Energy source	Description	Target population	Subsidy	Participation requirements
LPG	Direct subsidy	General	Each LPG cylinder (15 kg) costs 1.65 USD	None
Electricity	Specific tariff identified as "tarifa dignidad"	Poor people	0.04 USD/KWh	Monthly electricity consumption lower or equal than 130 kWh during the last 12 months
Electricity	Specific tariff identified as "tarifa tercera edad"	Elderly people	50% discount on 138 kWh per month	Age > 65 years
Electricity	Specific tariff identified as "tarifa discapacidad"	Disabled people	50% discount and 225 USD maximum	Being a disabled person

Elaboration: Authors. Source: own elaboration based on ARCONEL (2024).

Access to the tariff for low-income households is conditional on the maximum monthly electricity consumption, which seems not to be the most efficient scheme since it does not consider the fact that poor households can't buy expensive energy efficient devices -led lights or low-consumption household appliances- or the higher number of people living in the house. Consequently, poor energy residential should opt for losing comforts if they want to receive the subsidy.

In 2014, Ecuador launched a clean-cooking program aimed at replacing LPG-fired cookstoves and LPG-fired boilers with electric devices. The main target of this program was to reduce the imports of highly subsidised LPG, reduce CO2 emissions and make a major use of new hydropower electricity generation (Davi-Arderius et al., 2024). The Ecuadorian government and the national regulator expected a participation of 3 million families in this program, and planned very ambitious investments in electricity networks and hydropower capacity. However, maximum number of houses participating was only 0.7 million. Economic benefits for the participants in the clean cooking program were the following (Obaco et al., 2025):

- Subsidy of electricity consumption: 20 KWh for water heating devices, 80 KWh for induction cooking, or 100 KWh for water heating and induction cooking.
- A tax exemption to purchase an induction stove.
- Government loans (between 150 USD and 600 USD) to purchase an induction stove.
- Agreements with national manufacturers of induction stoves and compatible pots and pans.
- Electricity grid connection to one's home.

Figures 7 and 8 depict the average consumption from tariffs for elderly and poor households between 2018 and 2021, respectively. Higher percentages represent a larger rate of the population covered by these tariffs. Moreover, Figure 9 shows the local participation in the clean cooking program.

When comparing regional patterns from subsidised electricity tariffs (Figures 7, 8 and 9) and the regional poverty patterns (Figures 2 to 6), we find some interesting conclusions:

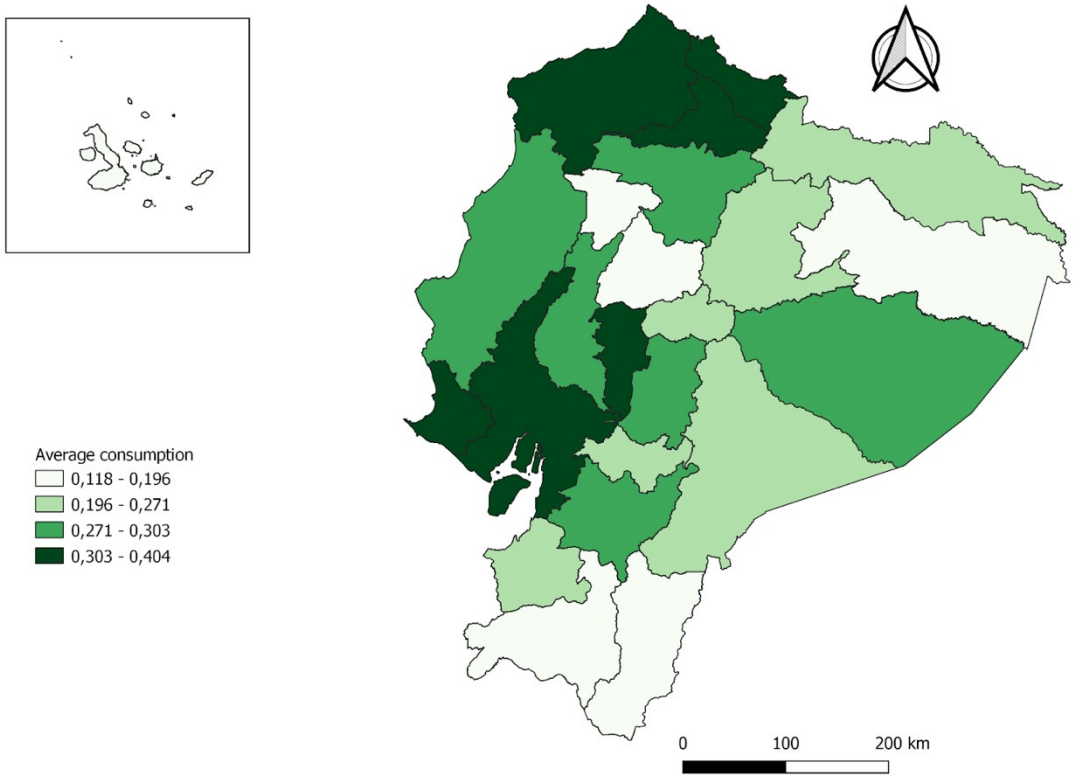

Figure 7. Average consumption for the elderly tariff (in USD/housing) by province (2018-2021)
Elaboration: Authors. Source: ARCONEL (2024).

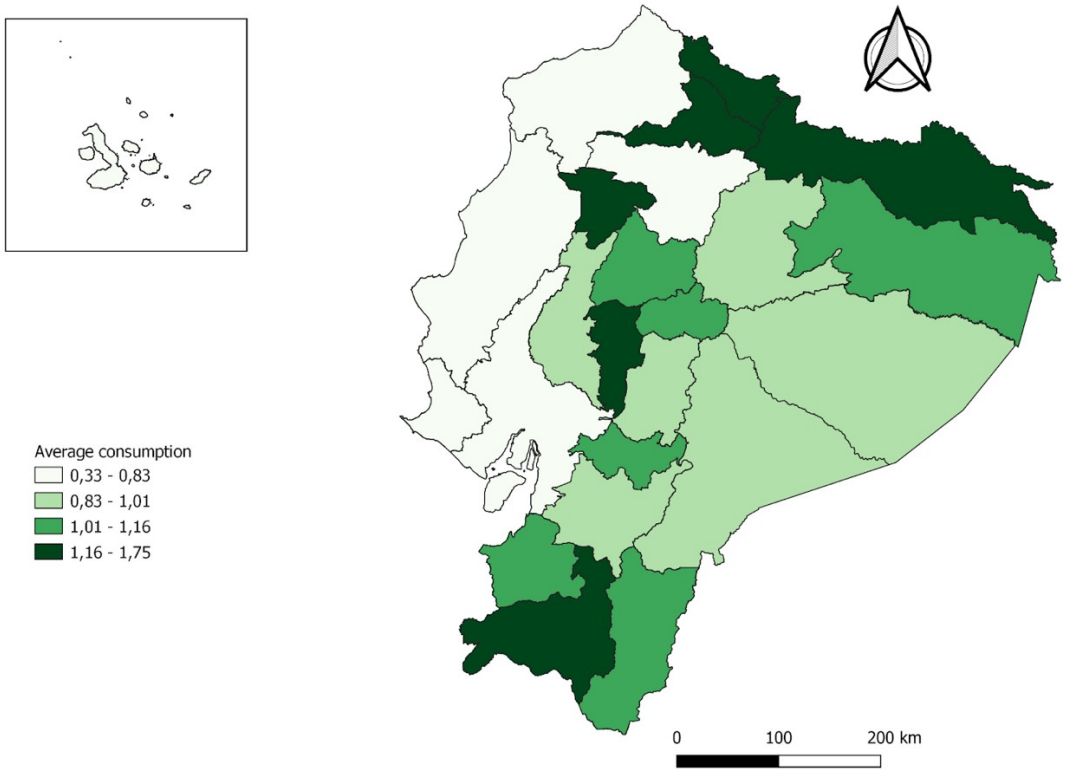

Figure 8. Average consumption for the poverty tariff (in USD/housing) by province (2018-2021)
Elaboration: Authors. Source: ARCONEL (2024).

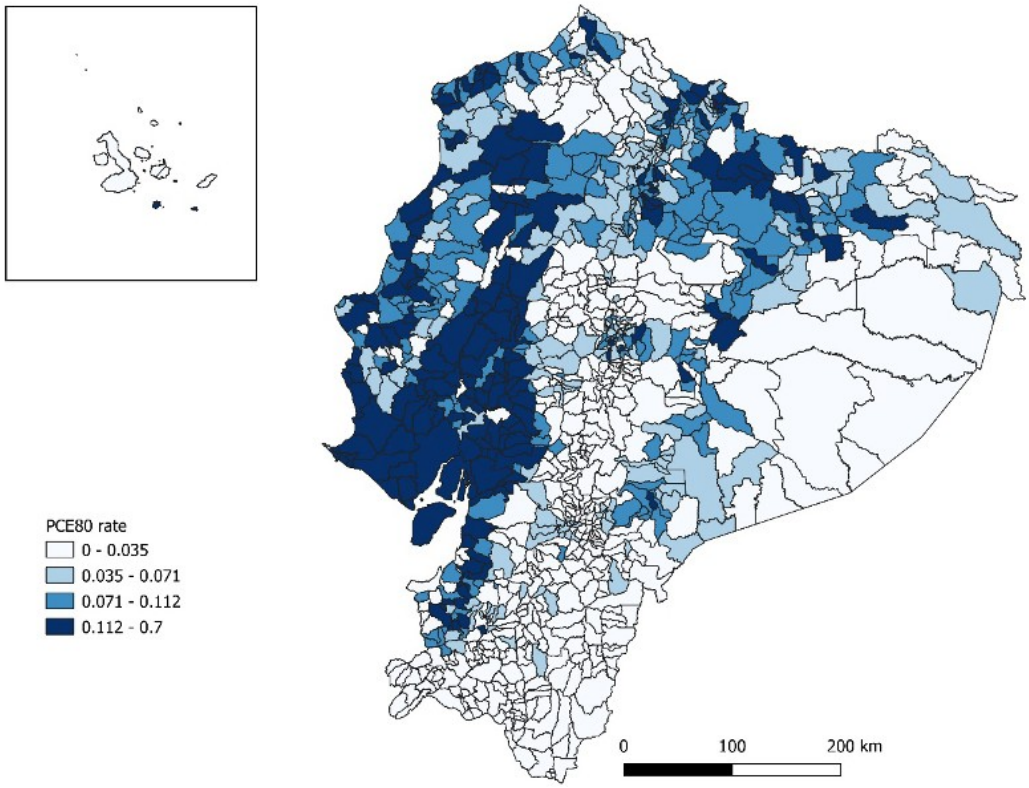

Figure 9. Average participation (p.u.) in the clean cooking program by parish (2015-2021).
Source: Obaco et al. (2024).

- **Elderly tariffs**: The highest use of this tariff is made in provinces in the Coast region. Guayas, the most populated province, has the highest consumption rate of this subsidised tariff (0.404 USD/housing). Pichincha, the second-most populated province, also has a high consumption rate (0.290 USD/housing). We also find provinces in the Amazon with significant consumption.
- **Poverty tariffs**: Regional consumption follows the opposite pattern than elderly tariffs. In this case, Guayas has the lowest consumption rate in this subsidised tariff (0.442 USD/housing) after Galapagos (0,333 USD/housing). Moreover, the province with the worst poverty indicators in Figures 2 to 4, Pinchicha, is the third on the list (0.520 USD/housing). On the other hand, Santo Domingo (1.75 USD/housing) and Bolivar (1.35 USD/housing) have the highest use of the poverty tariff. Bolivar is one of the provinces with the lowest rate of homes connected to the electricity public and homes that have a refrigerator (Figures 5 and 6).
- **Clean cooking program**: the highest participation in this program corresponds to the Coast and the most populated provinces, while it is very low in the Amazon.

4. Conclusions and Policy recommendations

From the above results, we identify some insights about poverty and the energy poverty:

- As expected, the poorest regions have higher consumption on the poverty-subsidised tariff. However, further analysis is needed at the parish level to confirm if the poorest population at the parish level is benefiting from them.
- There are concerning regional differences in the rate of homes connected to the public network. Additional programs could be implemented to improve this indicator, which could also cover improvements to housing conditions and subsidise household electricity installation or connecting it to the public grid.
- A subsidised electricity tariff for poor people whose participation is limited to a maximum consumption does not seem to be the best option, especially for people who might not have enough resources to buy efficient electricity devices. This characteristic should be assessed to consider potential improvements depending on the socioeconomic characteristics of the housing.
- INEC should perform specific studies in Ecuador to provide energy poverty indicators. They are essential to set efficient programs to deal with it.

Moreover, we identify interesting patterns of the electrification programs -clean cooking- and the energy poverty, which need to be considered in the future:

- Participation in this program follows the opposite pattern from the poverty tariff. Thus, income levels seem to increase the probability of adopting alternative energy sources to LPG. Education and location availability are also key factors (Karimu, 2015; Davi-Arderius et al., 2023; 2024).
- The effect of other energy subsidies, such as LPG, cannot be ignored. If participants do not have clear economic incentives to move from LPG to electricity, they don't participate in the clean cooking programs. Between 2010 and 2023, subsidies accounted for 53.9 billion USD of the public budget to subsidise fuel, which equals to almost 15 times the annual budget for health (3.7 billion USD). Nowadays, LPG remains the main cooking fuel in Ecuador: 93% of households used it in 2022 (ARCONEL, 2024).
- A uniform national approach for the clean cooking program might not be efficient when there are relevant socioeconomic differences between regions as we find (Obaco et al., 2025).

Nowadays, Ecuador is suffering from important electricity supply problems related to the lack of hydropower production. On one side, water reservoirs have drastically decreased due to climate change, and, on the other side, some generators and electricity lines are not fully operating due to technical problems. In some cases, these problems end with restrictions on electricity consumption or even blackouts. If this situation is not normalized soon, the consequences of poverty, and energy poverty in particular, may be significant in the future.

Recently, the Ecuadorian government announced that electricity bills for houses whose consumption is below 180 KWh will be zero for December 2024, January 2025 and February 2025. Its potential socioeconomic impacts need to be assessed in the future.

Finally, the development of renewables and the development of training and job retraining programs for workers in intensive sectors should be prioritized by the Ecuadorean government. This would reduce dependence on fossil fuels in line with the National Government's guidelines to advance the energy transition. This also includes facilitating the transition towards jobs in the renewable energy sector, promoting sustainable technologies, and setting stricter regulations on energy efficiency in industry, public buildings and the residential sector. All these recommendations might also have a positive effect on energy poverty through lower electricity consumption.

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