

Fuel poverty in low-income households in Chile

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Perspective on Fuel poverty in low-income households in the policy debate of Chile

Chile is one of those countries that are rapidly transforming from developing to advanced societies, being recently labelled as “emerging economies”. It was the first South American country to join the OECD due to its political stability and steady economic growth, from which all strata of society are benefitting. According to official sources poverty levels have been significantly reduced from 29.1% in 2006 to 8.6% in 2017 (Ministerio de Desarrollo Social de Chile, 2017). Access to energy services is guaranteed for the immense majority of the population, as practically 100% of Chilean homes have access to electricity (“Acceso a la electricidad (% de población) | Data,” 2018); other energy services, such as gas, are also widely available and the country is also making a remarkable effort in promoting renewable energies and energy efficiency in the building sector.

Poverty has been an issue of debate in Chile for a long time. The Ministry of Social Development has been conducting the [CASEN](#) survey (National Survey for Socioeconomic Characterization) since 1990 to keep track of the evolution of poverty levels across the country. In its latest editions, the survey has adopted a methodological approach to measure poverty in accordance with the “Theory of capabilities framework” (Day, Walker, & Simcock, 2016). In this framework, poverty is measured using six main factors: education, work, income, health, identity, and social engagement, and finally, dwelling and environment. In this last section, residents answer about the state of conservation of their houses and the energy services available at their place of residence, but no specific question targets the energy expenditure of the households. Despite the fact that the Chilean

government has a continuous record of poverty levels and characteristics based on a robust methodology, fuel poverty is still not addressed in the official agenda.

This multidimensional approach to poverty has only recently raised concern about the issue of fuel poverty. The first study specifically tackling fuel poverty in Chile was born in 2016 following a joint initiative by the UNDP (United Nations Development Program) and The Chilean Ministry of Energy (Ministerio de Energía, 2016). The project entitled "Development of a conceptual and methodological framework to tackle fuel poverty in Chile" aimed at three basic objectives: compile international experiences that may exert an influence on the public policies in Chile; define the basic necessities, consumption standards and energy quality in Chile; and draft an action plan to measure fuel poverty in Chile. The project concluded in 2017 and shed light on some important aspect of the Chilean context (Barrera, M. del Valle; Ansoleaga, 2017). There is not a single definition on fuel poverty, and any definition itself conditions the ways of measuring it, as well as the intervention mechanisms taken to address it. Besides, metrics are not directly transferable from one context to another, which is why Chile needs its own theoretical and analytical framework to conceptualize fuel poverty. The main dimensions of fuel poverty as a phenomena are related to access to an adequate range of energy services, affordability, sustainability, habitability, and energy education. With regards to energy sources, there is still a wide gap between poor and rich households: 30% of families nationwide still use wood as fuel for heating, and this percentage rises to 75% in rural areas; around 10% of the population do not have hot water, this percentage being 30% in rural areas. A recent study that focused on the poorest group among Chilean households clarified that 90% of the respondents allocated more than 10% of the minimum wage in Chile to pay for energy services (Porrás-Salazar, Contreras-Espinoza, Cartes, Piggot-Navarrete, & Pérez-Fargallo, 2020), surpassing the classic limit of 10% by Boardman (Boardman, 1991).

This data describes a particular context, where the wealthiest households enjoy standards of living comparable to developed countries and the lowest strata, notwithstanding coverage of their basic needs and reliable access to energy services, still find problems with regard to their variety and accessibility. In this context the Chilean network on fuel poverty was launched in 2017 to specifically tackle this phenomenon ("Red de Pobreza Energética - | Universidad de Chile," n.d.). This network gathers specialists, scholars, researchers, and stakeholders from a multidisciplinary background, both from Chile and abroad, to exchange experiences, conduct joint research, advance the understanding of fuel poverty in Chile and propose directions for future public policies. The network hosts periodic events, shares information about initiatives by the members and has an online repository of research articles, presentations, reports and working papers, all of which are publicly available; during the last 3 years it has been actively

contributing to the public debate about the conceptualization and characterization of fuel poverty in Chile (Universidad de Chile, 2017).

Research perspective on Fuel poverty in low-income households in Chile

Chile is a country with a great variety of climates: the desert plains in the North have a dry and warm desertic climate, the central strip features a Mediterranean climate with oceanic influences and the South is cold, with snowy winters and fresh summers.

Research on fuel poverty is still recent in this country and has been mainly focused on the wellbeing and health of low-income residents associated with cold conditions for two main reasons. First, the vast majority of the population is concentrated in a central strip that ranges from Santiago to Puerto Montt and mainly features Mediterranean climates with oceanic influences (Köppen Climate Classification Csb) and Marine West Coast Climates (Csf), where discomfort is mainly associated with winter, when the weather is cold and very humid. Second, the gap between rich and poor households is more evident when talking about heating systems: the former group mainly rely on centralized heating systems running on gas or other fuel, whereas the latter resort to wood, which is freely available in the vast forests that cover the south of the country. For that reason, the research perspective of Chile offered here covers the main problems associated with fuel poverty, which are thermal discomfort and energy services in cold climates.

A survey conducted amongst 2 025 households in the southern city of Valdivia revealed high consumption of wood as fuel for heating the houses, which was associated with high levels of pollutants inside their homes. Other factors such as the low energy efficiency of houses and a large share of the family income dedicated to paying for energy services revealed that a considerable number of families live in fuel poverty (Schueftan, Sommerhoff, & González, 2016). The poorest households would use as much as around 30% of their income to pay for fuel. This situation could be somehow alleviated by retrofitting the houses; if completed, that percentage could be reduced to 17% of household income dedicated to fuel, which is still far above the 10% threshold mentioned above, but represents a remarkable improvement.

Recent research by Perez Fargallo and colleagues (Pérez-Fargallo, Pulido-Arcas, et al., 2018) was carried out in the Bio-Bio region in Central-South Chile. This research aimed at characterizing fuel poverty among the poorest strata of the society in relation with their comfort conditions. This study surveyed 121 low-income residents living in social dwellings and monitored their homes for indoor

and outdoor environmental conditions for one year. The results showed that low-income residents keep their homes at very low temperatures (13-15°C) during winter season although they assess those conditions as “comfortable”, despite the fact that they are far lower than the recommended values from current standards in the building industry (18-21°C). The study pointed out that this mismatch may be explained by their low levels of expectations regarding the thermal environment in their homes, and also by adaptive measures, such as changing clothes. A follow-up study continued analysing data from this survey and clarified the relation between these low indoor temperatures and other factors such as energy expenditure, recurrence of respiratory illnesses and the type of fuel used to heat up their homes. The most remarkable findings clarified that people living under 14°C are more prone to suffering from respiratory illnesses. Besides, 90% of the surveyed residents spend more than 10% of their income on energy services, and there is a statistically significant relationship between time spent in discomfort due to cold conditions and the number of respiratory illnesses, with the most vulnerable group being those who spend more than 35% of their time in discomfort. As per the recommendations by international standards: The American ASHRAE 55-2017 (American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE), 2017), and the European EN 16798 (European Committee for Standardization, 2019).

Inefficiency of these houses and heating equipment is therefore a major factor contributing to fuel poverty, and for that reason further research has been conducted to clarify two aspects: first, how an improvement of the energy efficiency of those houses could alleviate fuel poverty; second, how a new house, subsidized by the government and with higher technical standards, could rescue those families from the situation of fuel poverty.

Regarding the first approach, a study conducted by Rubio et. al (2017) showed that orienting future upgrades to standards of adaptive thermal comfort could contribute to a better indoor environment. On top of that, higher technical standards, such as super insulated buildings with state of the art heating systems do not always imply higher comfort levels. Besides, they may impose a burden to their owners since their maintenance requires a considerable investment. Conversely, reducing infiltration rates from windows and doors and using high thermal mass in the external walls would be the most effective measures (Rubio-Bellido, Pérez-Fargallo, Pulido-Arcas & Trebilcock, 2017).

With regard to public housing, Chile has been supporting a continuous and robust policy more than 50 years, and it is estimated, according to data from the Chilean government, that 3.5 million households have received some kind of housing subsidy from 1964 to 2015 (MINVU, 2016). The houses delivered by the government are organized in condominiums, have higher energy standards, and basically rely on electricity, which is one of the most expensive energy sources in

Chile, as well as relative to other OECD countries (OECD, 2011). Therefore, it is evident that low-income families residing in such condominiums will see that their available choices for energy services are reduced, and somehow will be compelled to rely on electricity, which, in turn, may lead them to fuel poverty. For that reason, further research has been conducted aiming at the development of a predictive index to detect fuel poverty before those families move into a new home: the Fuel Poverty Potential Risk Index (FPPRI). The theoretical formulation on this index was proposed in 2017 by Fargallo et. al (Pérez-Fargallo, Rubio-Bellido, Pulido-Arcas, & Trebilcock, 2017) and has been tested using building simulation for 7 776 social dwellings made from combination of the most common design parameters in Chile. Considerations about climate change have also been included in a follow-up study (Pérez-Fargallo, Rubio-Bellido, Pulido-Arcas, & Javier Guevara-García, 2018).

In conclusion, research and policy perspective in Chile regarding fuel poverty is still recent and social awareness of the problem is just starting. However, an active group of scholars and researchers from institutions across the country are building a stable network that supports continuous research on this topic and, at the same time, the government is including fuel poverty as one of the main factors contributing to the conceptualization of poverty, taking into account the rapid changes that this country is experiencing in its society and its economy.

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