

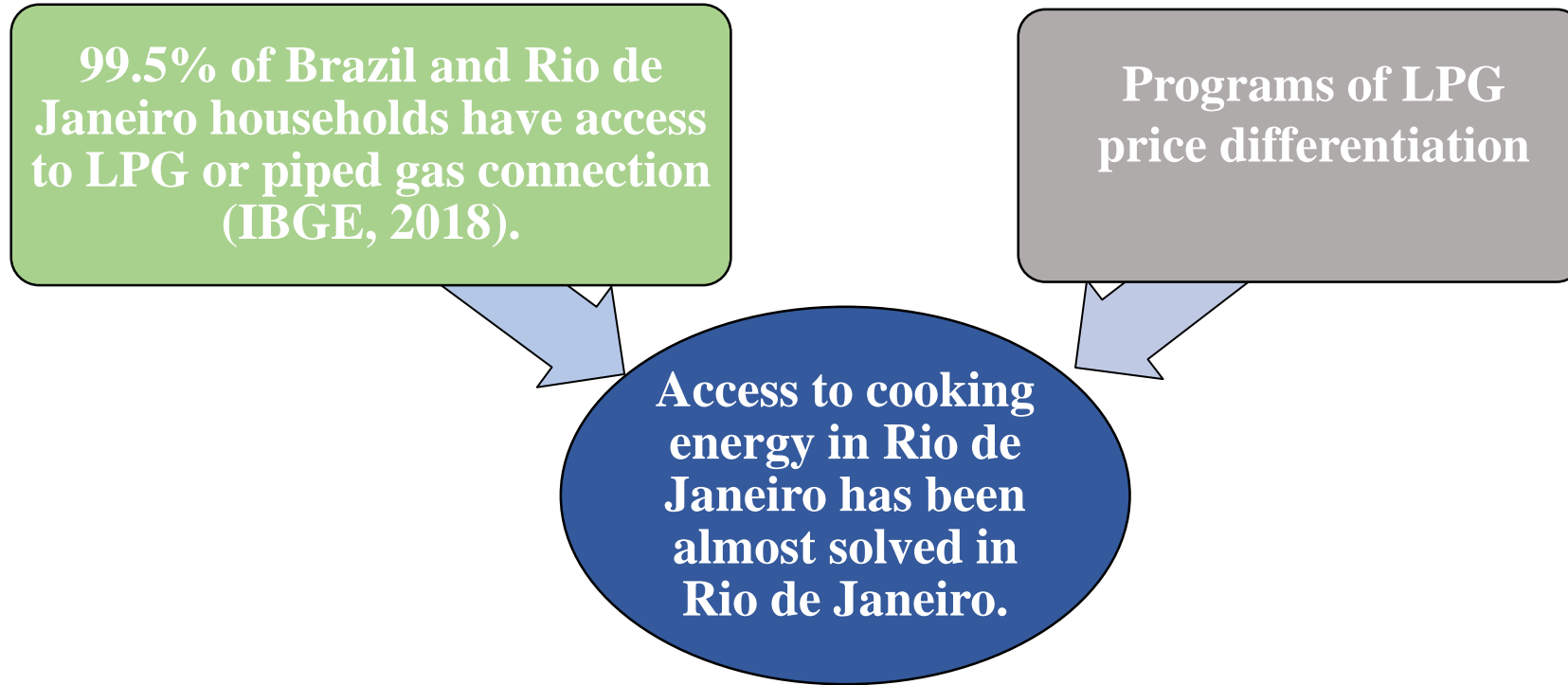
EVIDENCE OF HIDDEN DIMENSIONS THAT
DETERMINE THE USE OF ENERGY FOR COOKING
IN BRAZIL

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1. Introduction

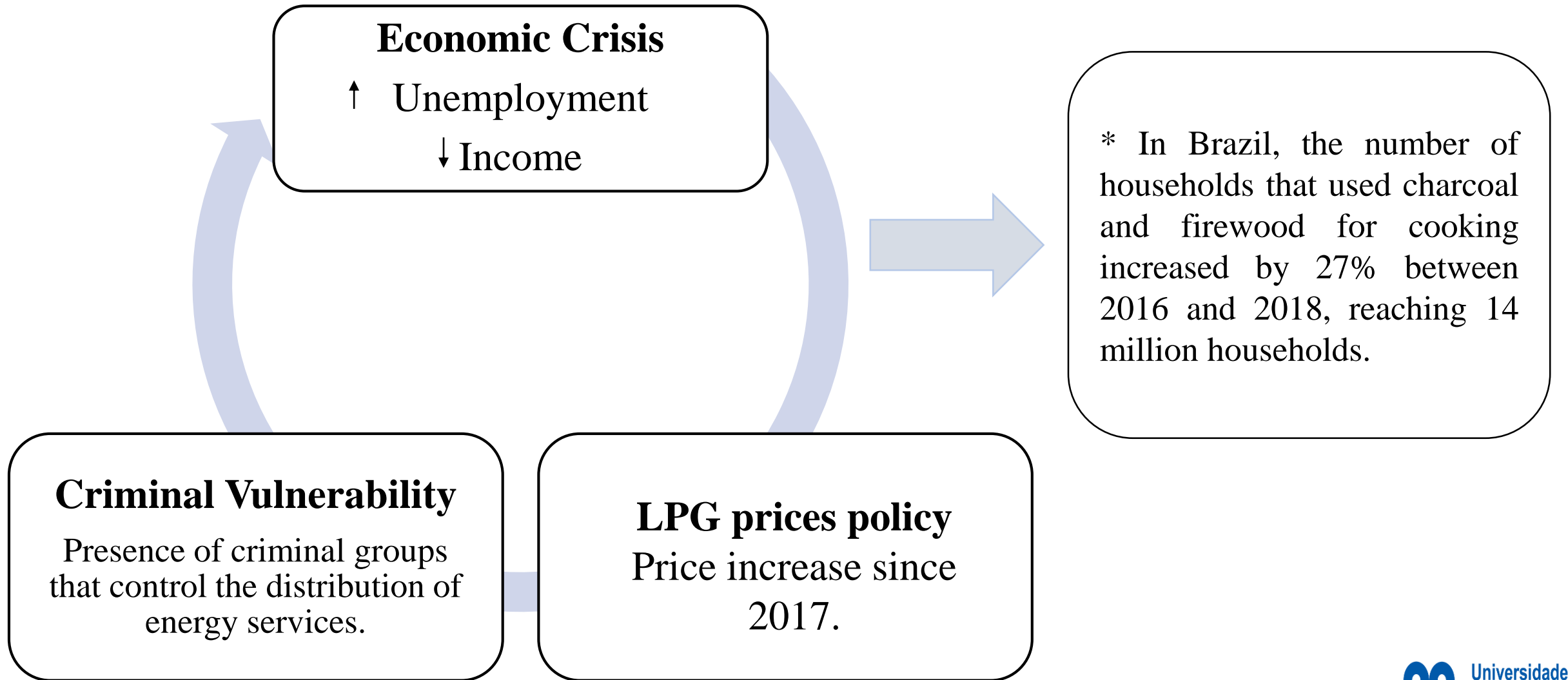
- The objective of this work is to examine household's accessibility to energy for cooking in Rio de Janeiro, Brazil.
- Data from the National Survey by Household Sample (PNAD from its portuguese initials) indicate that the Liquefied petroleum gas (LPG), a modern energy source, is being partially replaced by firewood and coal.

1. Introduction



There are other dimensions that interact and influence the use of energy for cooking. This is what we call the Hidden Dimensions of Energy for Cooking.

1. Introduction



2. Household Fuel Use: Theoretical Literature

Energy Ladder Theory

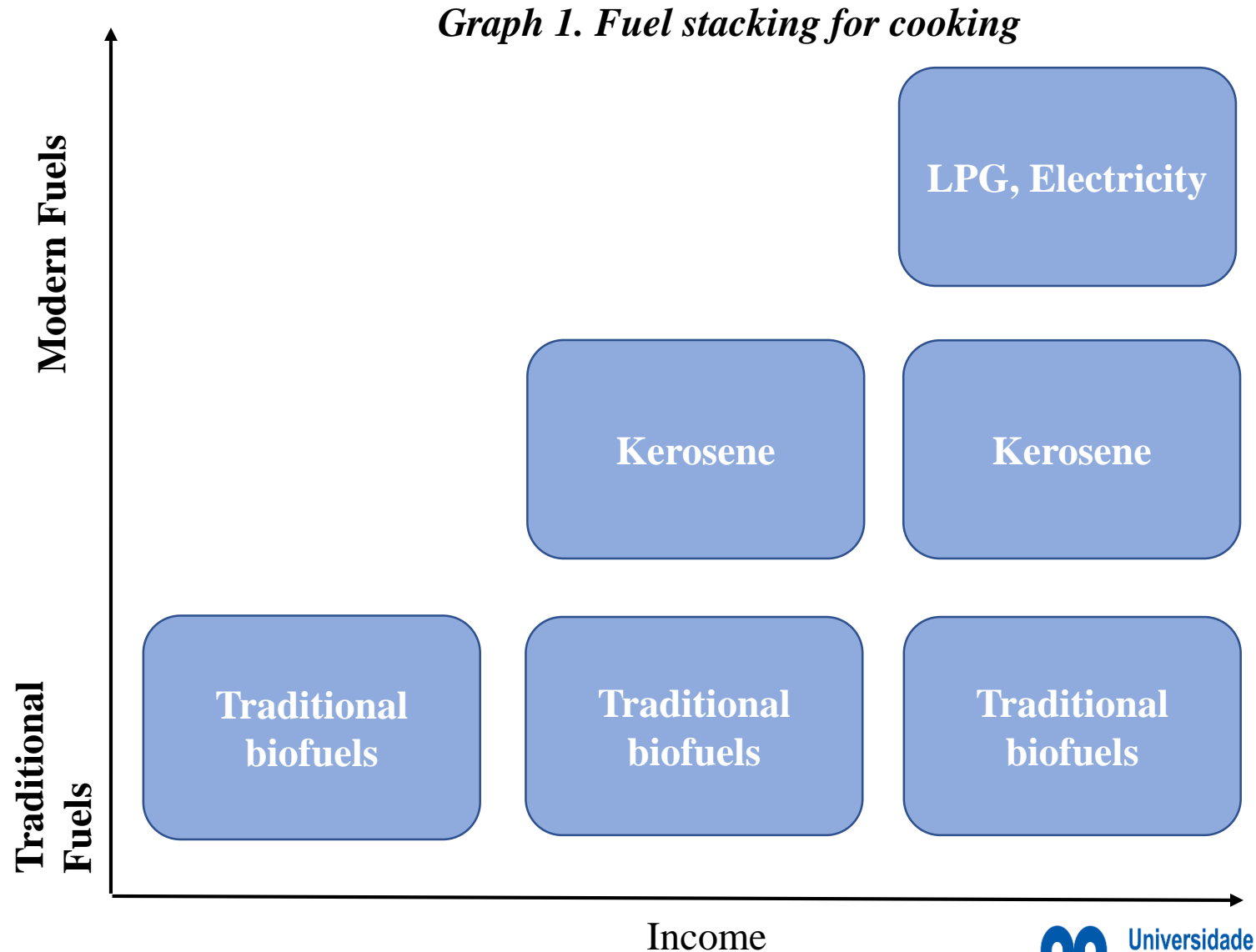
Assumes a linear progression of fuel adoption that implies moving up the Ladder, means a corresponding abandonment of the lower level fuels.

Fuel Stacking Theory

Households choose to use a combination of fuels and conversion technologies depending on budget, preferences, and needs.

2.1 Fuel stacking Theory

- **Fuel stacking** is associated with a variety of fuel usage patterns, in which households choose a **combination of fuels** from the **lower** and **upper levels** of the ladder.
- Indeed, **modern fuels** may serve only as **partial**, rather than perfect, **substitutes** for traditional fuels (Van der Kroon et al., 2013, 2014).
- Masera et al. (2000) noted that **fuel stacking** is common in both **urban** and **rural areas** of **developing countries**.



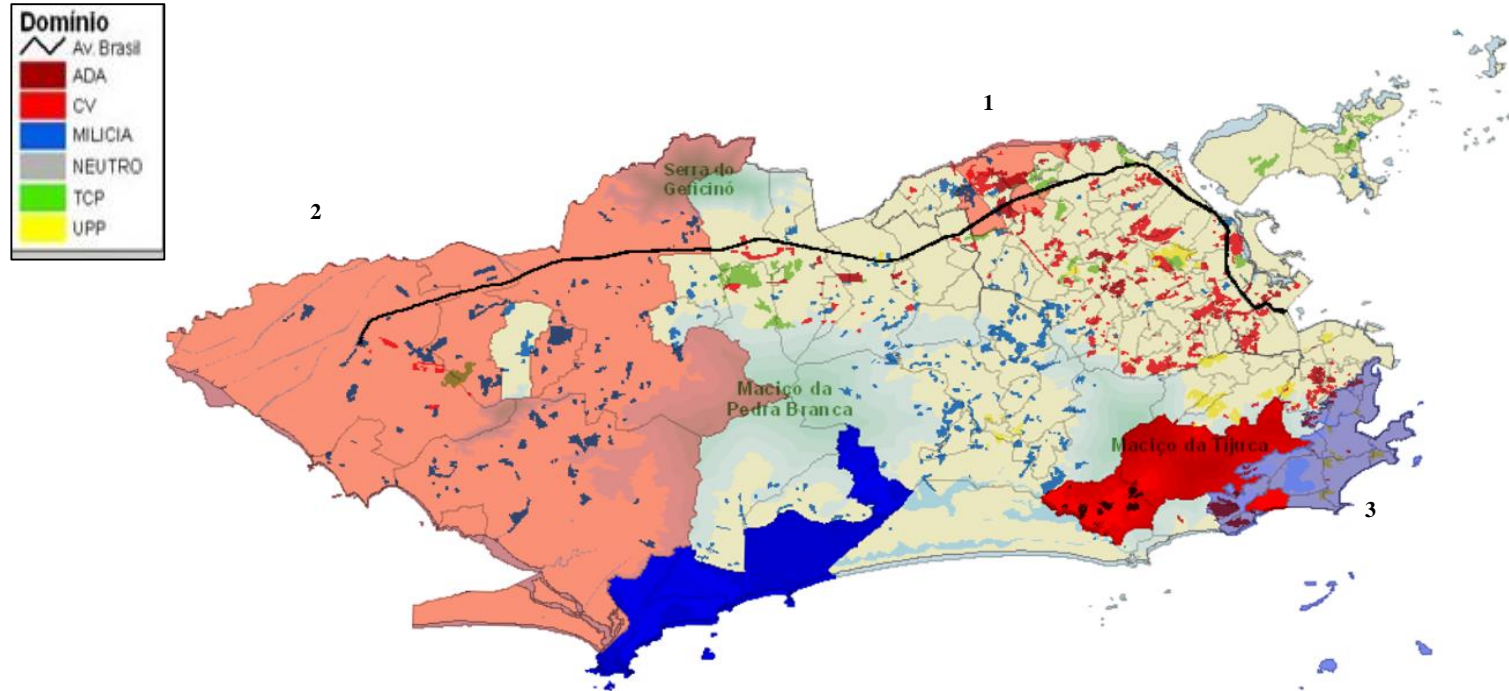
2.1.1 Factors Determining Household Energy Choice in the Literature

Dimension	Factors
Economic	<ul style="list-style-type: none">• Income, expenditure, relative prices.
Non-Economics	<ul style="list-style-type: none">• Household size, household composition, age, labor, information.
Social	<ul style="list-style-type: none">• Level educational, gender.
Cultural	<ul style="list-style-type: none">• Preferences, practices, habits, lifestyle, ethnicity.
Policy	<ul style="list-style-type: none">• Subsidies, Energy Policy, Market and trade policies.
Physics environmental	<ul style="list-style-type: none">• Geographic location.

3. Hidden dimensions determining the use of energy for cooking in Rio de Janeiro

- Low public security, high levels of violence and the fear of criminal groups → obstacles to government to offer social services as:
 - Health and education
 - Access to the justice
 - Quality of electricity.
- Criminal groups (especially militia groups formed by former policemen) use tactics of violent coercion, extortion and illegal exploration of monopoly services:
 - Transport, cable TV, electricity, LPG.
 - In Rio de Janeiro, criminal factions control large slums.
- Higher prices of LPG, due to the territory control of criminal factions → low-income consumers allocate a significant part of their budget for LPG acquisition and, eventually, replace them with firewood and charcoal.

3.1 Criminal Groups Distribution in Rio de Janeiro



- Regions with lower development indicators are controlled by Traffic (North Zone) and Militia (West Zone).

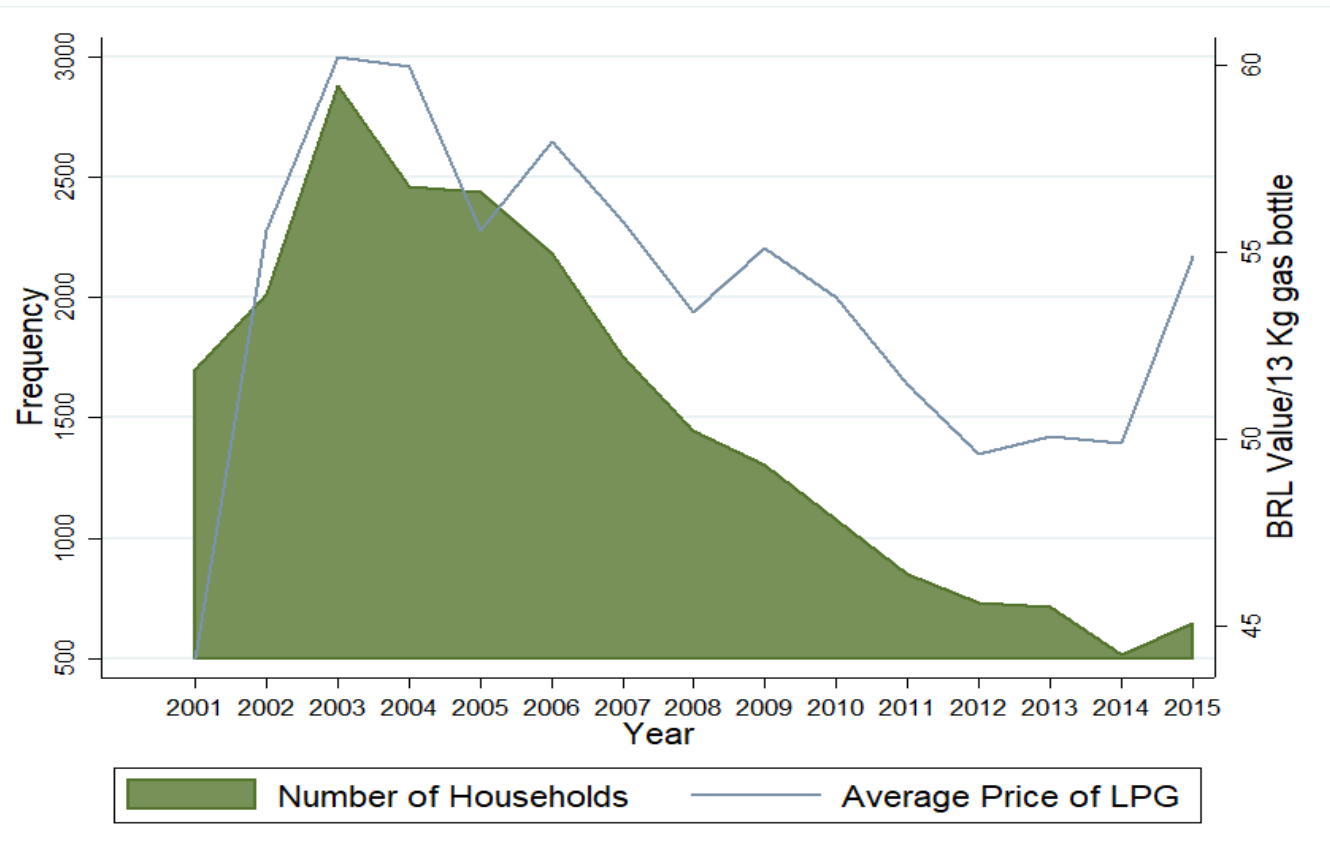
- (1) North Zone
- (2) West Zone
- (3) South Zone

Fonte: Own Elaboration based em Zaluar (2012).

3.2 Driving Dimensions of Energy for cooking in Rio de Janeiro

Dimension	Definition	Sphere of action
Socio-Economic	<ul style="list-style-type: none"> Associated with household income and its relation to fuel prices. 	External
	<ul style="list-style-type: none"> Factors such as the level of schooling, structure of the household. 	Internal
Location	<ul style="list-style-type: none"> The territory results from processes of control, domination and appropriation of physical space by state and non-state agents. Energy deprivation is sensitive to neighbourhoods with presence of criminal groups. 	External
Political and Institutional	<ul style="list-style-type: none"> It is associated to a culture of loose governance. Expressed by the quality of public service provision and the bureaucracy; corruption. Energy Policy 	External

3.3 LPG Price and Use of Firewood and Charcoal for Cooking in Urban Areas in Brazil, 2001-2015



- The Graph suggests that increases in the LPG price are related to a greater number of households (with lower incomes) that consume firewood and coal.
- This does not indicate causality or the integral substitution of modern sources for traditional fuels.
- The determinants of the choice of traditional sources is related to economic and social factors too.

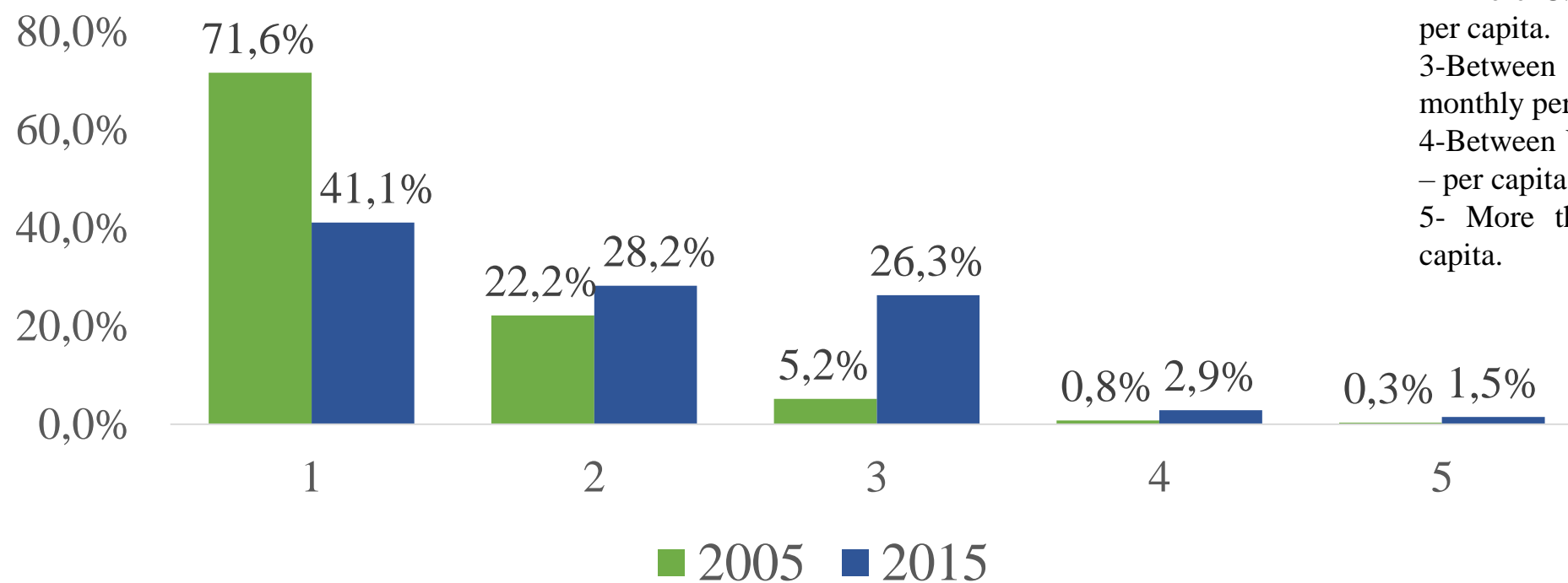
Source: Own elaboration based on PNAD and ANP.
Note: LPG Prices at constant prices of 2016.

3.4 Households using Firewood and Charcoal for Cooking in Brazil, 2016-2018

Variable	Area	2016	2017	2018	Variation 2018-2016
Household (Number)	Brasil	11.038.385	12.223.059	14.061.355	27%
Household (Number)	Metropolitan regions in Brazil	1.542.099	1.736.005	2.042.526	32%
Household (Number)	Rio de Janeiro City	4.791	3.660	5.665	18%

Source: *PNAD Continua*, IBGE (2019)

3.5 Households Using Firewood and coal for Cooking, by Level Income Urban Areas in Brazil - 2005 and 2015



Nota –Horizontal axis:

1- Up US\$118 monthly per capita (Poverty Line- IBGE, World Bank).

2- More US\$118 up US\$257 - monthly per capita.

3-Between US\$257 and US\$514 - monthly per capita.

4-Between US\$514 and US\$772 monthly – per capita.

5- More than US\$772 - monthly per capita.

Source: Own elaboration based on PNAD, 2005 and 2015 (IBGE).

Note: the income level were constructed from the real per capita monthly income, prices of 2016.

Conclusions: Implications for Research

- This work does not present conclusions about the relationships between the called *hidden dimensions*.
- The current economic situation, the adoption of LPG prices and the location determining the deprivation of use modern energy sources for cooking in Brazil.
- The increasing of the use of firewood and coal for cooking in Brazil is going against the 2030 Agenda for Sustainable Development adopted in 2015.
- The next step would be a quantitative analysis spatial of institutional and economic dimension and its influence on the use energy for cooking in Rio de Janeiro.

Thank You!

Questions?

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