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ACCESS TO ESSENTIAL UTILITIES BY THE BOTTOM OF THE PYRAMID (BoP) POPULATION IN COLOMBIA

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ABSTRACT

Objective: The article analyzes whether there is an association between the different levels of the BoP and the area of residence with the variables of access to essential utilities in a region of Colombia.

Theoretical Framework: The literature review addresses the concepts of access to essential utilities and the BoP Population.

Method: The data analyzed comes from 2,394 homes in the Norte de Santander region (Colombia), which were segmented by poverty conditions, resulting in 1,521 in the BoP. To establish the association between variables, the Mann Whitney U test was used; the magnitude of the association has been determined using Cramér's V coefficients.

Results and Discussion: Results show that cooking fuel, excreta disposal, and urban waste management services have a high association with the socioeconomic levels at the BoP; while the drinking water service has a moderate association, yielding a Cramer V value of 0.47. Regarding the area of residence, the independence between the variables Access to essential utilities and Area of residence is rejected; that is, they are associated. Little interest was evident on the part of public and private organizations in the essential services sector in serving this market segment, by not including it in their marketing targeting strategies. The finding was also that people from the BoP in Norte de Santander, Colombia, who reside in urban areas, have better access to these services than those in rural areas, confirming the hypotheses raised based on similar studies carried out in regions from Asia.

Research Implications: These results leads to recommending that companies in the essential services sector that have the BoP as their target market make a distinction in marketing strategies between the urban and rural markets of the BoP.

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Originality/Value: The study uses an innovative socioeconomic level classification method that facilitates comparison with other regions by not using income level as the only variable.

Keywords: Bottom of the Pyramid, Socioeconomic Level, Basic Services, Low Income, Norte de Santander.

ACESSO A SERVIÇOS PÚBLICOS ESSENCIAIS DA POPULAÇÃO DA BASE DA PIRÂMIDE (BdP) NA COLÔMBIA

RESUMO

Objetivo: O artigo analisa se existe associação entre os diferentes níveis de BoP e a área de residência com as variáveis de acesso a serviços públicos essenciais em uma região da Colômbia.

Referencial Teórico: A revisão da literatura aborda os conceitos de acesso a serviços públicos essenciais e população da BoP.

Método: Os dados analisados provêm de 2.394 domicílios da região Norte de Santander (Colômbia), que foram segmentados por condições de pobreza, resultando em 1.521 no BoP. Para estabelecer a associação entre as variáveis foi utilizado o teste U de Mann Whitney; A magnitude da associação foi determinada utilizando os coeficientes V de Cramér.

Resultados e Discussão: Os resultados mostram que o acesso ao combustível para cozinhar, à eliminação de excrementos e aos serviços de gestão de resíduos urbanos têm uma elevada associação com os níveis socioeconómicos na balança de pagamentos; enquanto o serviço de água potável apresenta associação moderada, gerando um valor de Cramer V de 0,47. Relativamente à área de residência, rejeita-se a independência entre as variáveis Acesso a serviços públicos essenciais e Área de residência; isto é, eles estão associados. Foi evidente pouco interesse por parte das organizações públicas e privadas do sector dos serviços essenciais em servir este segmento de mercado, uma vez que não o incluíram nas suas estratégias de marketing. Verificou-se também que as pessoas do BdP do Norte de Santander, Colômbia, que residem em áreas urbanas, têm melhor acesso a estes serviços do que as de áreas rurais, confirmando as hipóteses levantadas com base em estudos semelhantes realizados em regiões da Ásia.

Implicações da Pesquisa: Estes resultados levam a recomendar que as empresas do setor de serviços essenciais que têm a BoP como mercado-alvo façam uma distinção nas suas estratégias de marketing entre os mercados urbanos e rurais da BoP.

Originalidade/Valor: O estudo utiliza um método inovador de classificação dos níveis socioeconômicos que facilita a comparação com outras regiões ao não utilizar o nível de renda como única variável.

Palavras-chave: Base da Pirâmide, Nível Socioeconômico, Serviços Básicos, Baixa Renda, Norte de Santander.

ACCESO A SERVICIOS PÚBLICOS ESENCIALES DE LA POBLACIÓN BASE DE LA PIRÁMIDE (BdP) EN COLOMBIA

RESUMEN

Objetivo: El artículo analiza si existe asociación entre los diferentes niveles de BdP y la zona de residencia con las variables de acceso a servicios públicos esenciales en una región de Colombia.

Marco Teórico: La revisión de la literatura aborda los conceptos de acceso a servicios públicos esenciales y población de la BdP.

Método: Los datos analizados provienen de 2.394 hogares de la región Norte de Santander (Colombia), los cuales fueron segmentados por condiciones de pobreza, resultando en 1.521 en la BdP. Para establecer la asociación entre variables se utilizó el test U de Mann Whitney; la magnitud de la asociación se ha determinado mediante los coeficientes V de Cramér.

Resultados y Discusión: Los resultados muestran que el acceso a servicios de combustible para cocinar, eliminación de excrementos y manejo de residuos urbanos tienen una alta asociación con los niveles socioeconómicos en la BdP; mientras que el servicio de agua potable tiene una asociación moderada, arrojando un

valor de Cramer V de 0,47. Respecto a la zona de residencia, se rechaza la independencia entre las variables Acceso a servicios públicos esenciales y Zona de residencia; es decir, están asociados. Se evidenció poco interés por parte de las organizaciones públicas y privadas del sector de servicios esenciales en atender este segmento de mercado, al no incluirlo en sus estrategias de marketing. Se encontró también que las personas de la BdP de Norte de Santander, Colombia, que residen en áreas urbanas, tienen mejor acceso a estos servicios que las de áreas rurales, confirmando las hipótesis planteadas en base a estudios similares realizados en regiones de Asia.

Implicaciones de la investigación: Estos resultados llevan a recomendar que las empresas del sector de servicios esenciales que tienen la BdP como mercado objetivo hagan una distinción en sus estrategias de marketing entre los mercados urbanos y rurales de la BdP.

Originalidad/Valor: El estudio utiliza un método innovador de clasificación de niveles socioeconómicos que facilita la comparación con otras regiones al no utilizar el nivel de ingresos como única variable.

Palabras clave: Base de la Pirámide, Nivel Socioeconómico, Servicios Básicos, Bajos Ingresos, Norte de Santander.

1 INTRODUCTION

BoP researchers propose a vision of the poverty problem from a market perspective, where they can provide the productive sector with new market opportunities, with the potential to improve these social problems while being economically profitable for public organizations or private (Gómez et al., 2023; Pineda, 2015), taking the concept of business-society beyond philanthropy, where companies innovate in their business model with sustainability strategies that improve human and environmental conditions while generating profitability in their businesses (Gates, 2008; Hartman *et al*., 2008; Werhane *et al*., 2010), because as Ricart & Rodríguez (2006) affirm, “Earning money at the base of the pyramid is not only possible, but a reality; It is a market in which great possibilities for responsible and sustainable growth are concentrated” (p. 91).

The heterogeneity of developing economies poses challenges in terms of understanding the needs of people (Thakur, 2015), because they present socio-cultural realities, which impact their lifestyle, expectations and consumption habits (Banerjee & Duflo, 2007; Castro & Di Blasi, 2011; Craig & Douglas, 2011; García Cáceres & García Castiblanco, 2023). The above substantiates the importance of taking the behavior of BoP consumers as a basis when developing marketing strategies that adjust to their needs (Alur & Schoormans, 2013; Rovetta *et al*., 2023; Chikweche & Fletcher, 2010; Farooq & Maqbool, 2024; Ireland, 2008; Nakata & Antalis, 2015; Rajagopal, 2009; Seelos & Mair, 2007; Sridharan & Viswanathan, 2008).

Based on the need described in the previous paragraph, the article analyzes whether or not there is an association between the variables access to essential utilities such as cooking fuel, waste management services, excreta disposal (sewage), and drinking water service.

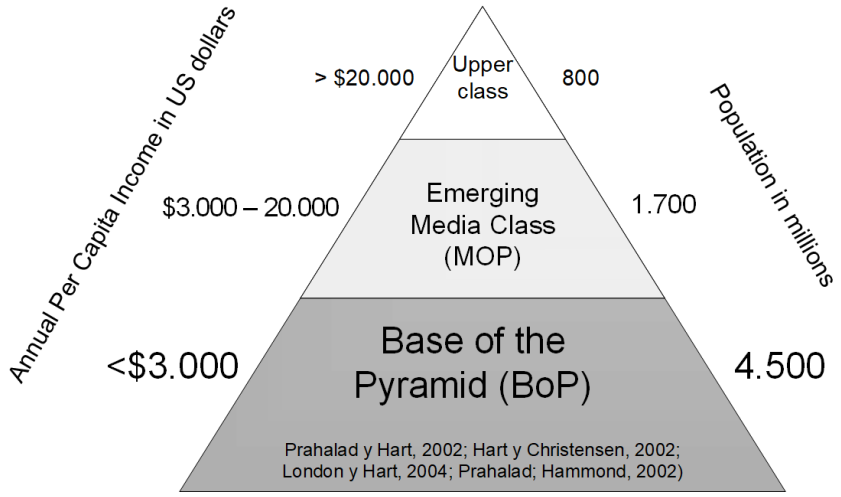
2 THEORETICAL FRAMEWORK

2.1 ACCESS TO ESSENTIAL UTILITIES IN BOP POPULATION

The BoP is the population that lives in developing countries, with a low-income level (Praceus, 2013). The number of people worldwide, classified by their income level, has a pyramid-shaped distribution, where there are few rich people at the top and a large area at its base, which is the representation of poor people (See Figure 1). This group is made up of 4.5 billion people in the world, who must cover their needs with less than 250 US dollars per month. (Prahalad, 2005; Prahalad & Hart, 2002; Prahalad, 2010). The conditions of the BoP worsen depending on its geographical location (Thakur, 2015; Varela et al., 2019), since in addition to its low purchasing capacity, there is physical isolation caused by inefficient investment in infrastructure, which makes access to essential products and services difficult. (Bird *et al*., 2002; Contreras *et al*., 2016; Linero Gómez et al., 2021).

Figure 1

Population pyramid by income level



Source: Authors

The population at the BoP varies between regions and countries (Thakur, 2015). It has characteristics such as cultural complexity and difficulty in accessing products and services,

especially in physically isolated rural areas due to inefficient investment in infrastructure (Engizek & Yaşin, 2018; Bird *et al.*, 2002; Contreras *et al.*, 2016; Sánchez-Montero et al., 2023).

In the case of Latin America, the BoP represents 9.1% of the world population, with an expenditure of more than 600 billion USD (Guesalaga & Marshall, 2008).

The provision of adequate essential utilities, such as electricity, drinking water and sanitation, is an increasingly important issue for livelihoods, sustainability and public policies. Community public service delivery can be described as the process of ensuring access to services, including decisions about the quantity and quality of services to be provided (Fernandez & Naveda, 2023; Gazzeh & Abubakar, 2018).

Access to adequate basic services determines people's quality of life and is a key indicator of sustainable development (UN-Habitat, 2003). However, in 2015, 9% of the world's population and 11% of the population in developing countries lack access to improved sources of drinking water. Regarding health services, 38% of the population living in developing regions lack access to these services. Lack of adequate sanitation and drinking water causes serious health risks, such as exposure to serious excreta-related and waterborne diseases and hinders efforts to reduce social inequality (Cetrulo *et al*., 2020; Bartram *et al*., 2005; Machado *et al*,. 2022; Reyes Vasquez et al., 2021). Likewise, there is evidence that in developing countries, access to services differs significantly between rural and urban areas (Pachauri & Spreng, 2004; Sepúlveda et al., 2022).

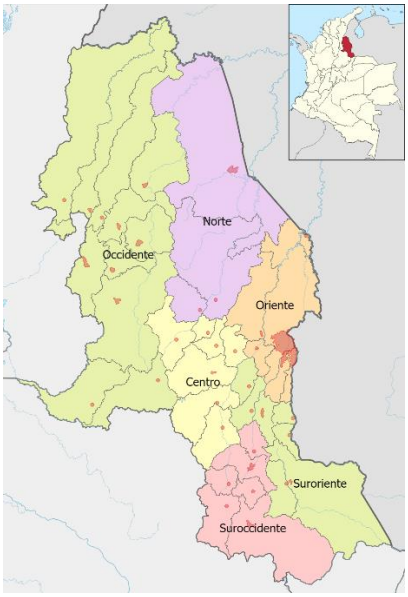
3 METHODOLOGY

3.1 STUDY REGION CONTEXT

Norte de Santander is located in the northeastern area of Colombia, bordering Venezuela to the east and north. It is made up of six subregions (See Figure 2) with a population of 1,355,787 people, of which a fifth resides in rural areas (DANE, 2015; García *et al*., 2016).

Figure 2

Geographic distribution North of Santander (Colombia)



Source: García et al., 2016

3.2 SAMPLE

The sample is calculated from the homes distributed in the six subregions of the department of Norte de Santander. The sample size was calculated by the stratified multistage probabilistic method with systematic random selection. Below is the formula used to calculate the sample:

$$n = \frac{Z_{\frac{\alpha}{2}}^2 PQN}{\varepsilon^2(N-1) + Z^2PQ}$$

The final sample size was 2,384 homes, after adjusting for design. Table 1 shows the sample for each study subregion.

Table 1

Sample distributed by subregion

Subregion	Households 2015	Sample	Sample adjusted by design
Center	10,041	69	69
North	16,525	117	118
Western	56,936	401	404
East	219,184	1,544	1,550
Southwest	21,138	149	149
Southeast	15,025	104	104
Total	**338,850**	**2,384**	**2,394**

Source: Authors.

The reliability of the instrument is shown below, where a Cronbach's alpha of 0.76 was obtained. (See Table 2).

Table 2

Instrument Questionnaire Statistics

Indicator	Mean	Standard Deviation	Cronbach's alpha
Area	1.85	0.36	0.75
Gender	1.57	0.50	0.77
Age Groups	2.24	1.02	0.78
Educational attainment	3.79	1.22	0.76
Able to read and write	1.01	0.12	0.77
Availability to work	1.76	0.43	0.77
Family	2.50	0.98	0.78
Opinion leader	1.80	1.07	0.78
Floor material	2.69	0.52	0.75
Wall material	3.78	0.50	0.75
Roof Material	3.84	1.07	0.74
Bedrooms	2.94	0.91	0.74
Number of beds	2.72	0.69	0.75
Overcrowding	1.99	0.07	0.76
Number of bathrooms	2.54	0.67	0.75
Number of bathrooms with shower	2.44	0.65	0.74
Drinking water service	3.48	0.60	0.76
Excreta disposal	4.79	0.60	0.75
Urban waste management	4.69	0.83	0.74
House ownership	5.49	0.85	0.76
Have a Kitchen	1.97	0.17	0.76
Cooking Fuel	2.93	0.35	0.76
Electricity service	2.00	0.04	0.76
Have a Refrigerator	1.98	0.15	0.76
Have a Landline at home	1.32	0.47	0.75
Number of mobile phones	2.46	0.66	0.77
Have TV	1.99	0.11	0.76
Number of TVs	2.53	0.53	0.75
Have Cable TV	1.72	0.45	0.75
Have a Vehicle	1.18	0.38	0.76
Number of Cars	1.19	0.42	0.76
Have a Motorcycle	2.00	0.00	0.76
Number of motorcycles	1.12	0.42	0.76
Number of motorcycles	2.10	0.31	0.76

Have Internet	1.49	0.50	0.75

Source: Authors

3.3 CLASSIFICATION BY BOP LEVEL

People who belong to the same social class have similar incomes, occupations, and tastes (Coleman, 1983). The unidimensional method by income to classify homes by socioeconomic level, despite being the traditional one, presents limitations that bias the analysis, due to measurement errors such as underreporting and non-declaration of income information by the respondent (Camelo, 1998; Donza, 2011; Feres, 1998; Llach & Montoya, 1999; Roca & Pena, 2001). Also, it is difficult to calculate income per period when there is informality in employment (Gómez, 2014; Minujin & Bang, 2002); Likewise, it is a method that does not allow comparison with regions of other countries, due to the volatility in macroeconomic indicators and exchange policies (Vélez & Moreno, 1994).

The method to classify homes is through a global synthetic index using scales to segment them by poverty conditions. To arrive at the index, an Optimal Quantitative Assessment is carried out on a set of variables associated with the living conditions in each home (Loaiza *et al*., 2007). The principal component analysis technique for categorical variables is used to obtain the scoring coefficients from the conditions of the homes. (Carmadiel *et al*., 2000).

To quantify the categorical variables, the category codes are replaced by optimal numerical values, in order to determine the existing relationships. The quantitative assessment process is carried out by optimal scaling of alternating least squares (Carmadiel *et al*., 2000; Vélez & Moreno, 1994). Then the k-means cluster classification technique is applied to group homes with similar characteristics.

4 RESULTS AND DISCUSSION

4.1 BoP HOUSING CLASSIFICATION

4.1.1 Variables associated with living conditions

To construct the synthetic poverty index, the variables associated with living conditions were taken into account: 1. Structural characteristics of the home; 2. Access to home services;

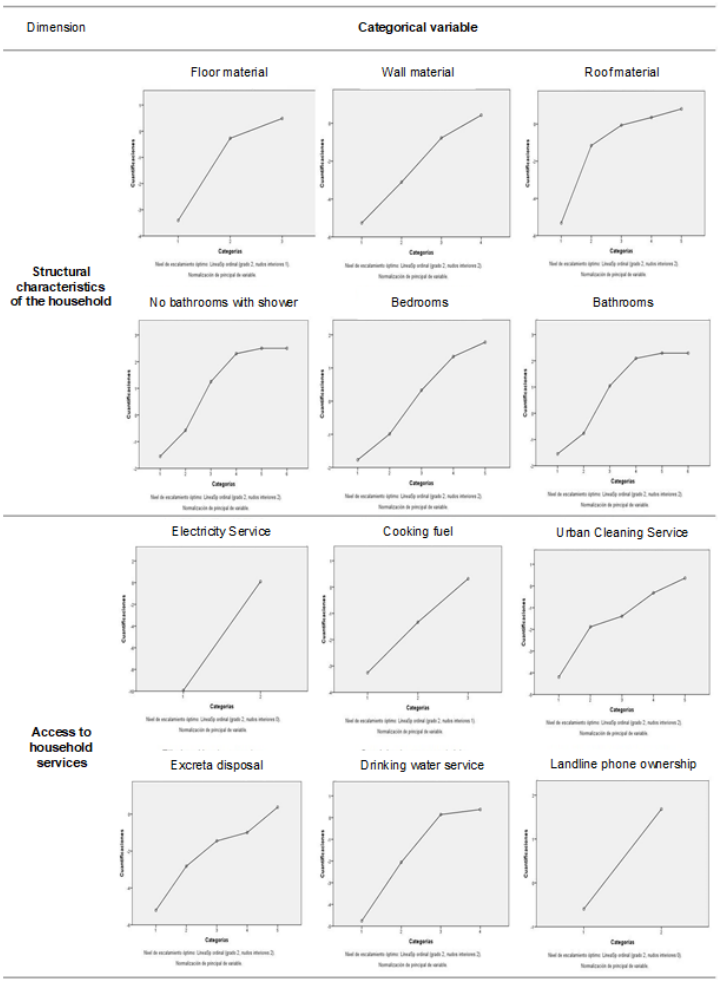
3. Possession of household equipment; 4. Asset Holding; and 5. Socioeconomic Characteristics (Camardiel *et al.*, 2000; Vyas & Kumaranayake, 2006).

4.1.2 Optimal variable scaling

Numerical values are assigned to the categories of each variable to analyze the scale with the optimal scaling technique, the transformations of each variable are represented with a vector that passes through the origin. Figure 3 shows the original category code on the horizontal axis, and the vertical axis represents the optimal quantifications, the greater the slope, the greater the importance.

Figure 3

Ordinal categorical variable transformation graphs



Source: Authors

4.1.3 Assignment of scoring coefficients to qualitative variables by home

CATegorical Principal Components Analysis (CATPCA) is applied to obtain in numerical value the possession or lack score coefficients assigned to each of the homes (Kolenikov & Angeles, 2009; Vyas & Kumaranayake, 2006; Khudri & Chowdhury, 2013; Van der Burg et al., 1988). The optimal scaling level of the variables is ordinal, so that the transformed values represent ordered categories (Carmadiel *et al*., 2000; Vélez & Moreno, 1994). It is defined that the number of components to be extracted is one, as in studies by Filmer & Pritchett (2001) and Van der Burg *et al*. (1988), where the first component explains between 12% and 26%. Table 3 presents the model estimation data, where an explained variance of 42.29% is obtained with 2 dimensions.

Table 3

Model Estimate of the Optimal Scaling Method

Dimension	Cronbach's alpha	Accounted Variance	
		Total (eigenvalue)	% Variance
1	0.906	7.483	32.537
2	0.580	2.245	9.761
Total	.938[a]	9.728	42.297

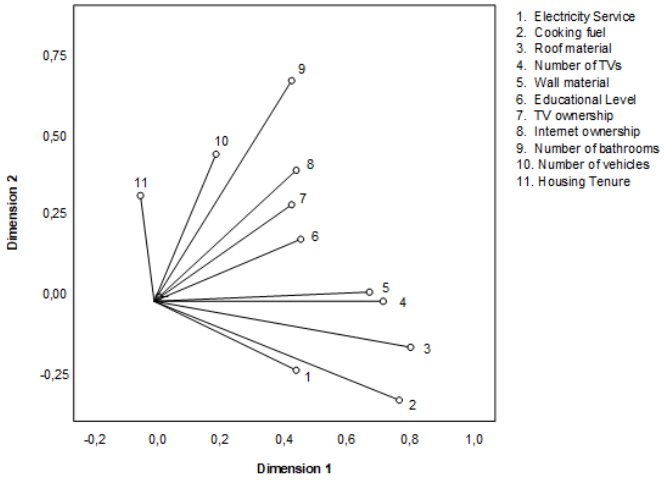
a. Cronbach's alpha total is used in the total eigenvalue

Source: Authors

When the model is consistent, the components that best represent all the variables are determined. In Figure 4 it can be inferred that dimension 2 represents property ownership variables, and the horizontal plane represents structural condition variables and access services.

Figure 4

Variable Saturation by Dimension

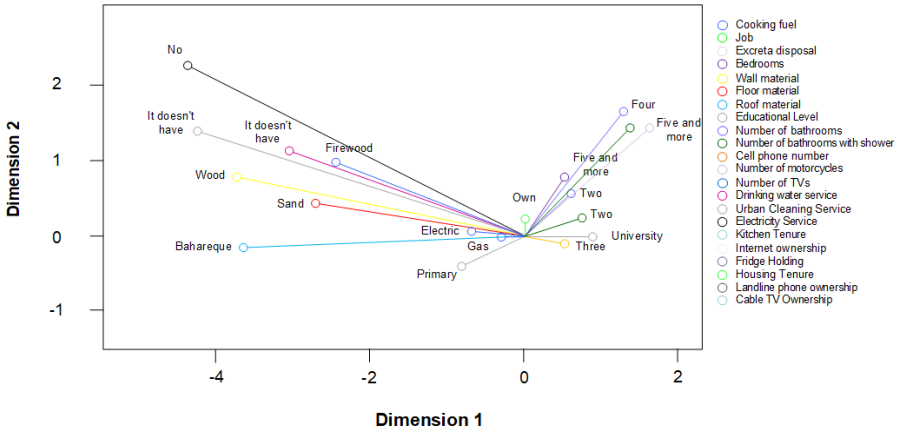


Source: Authors

Figure 5 shows possible associations or patterns of relationships in a plane quantifying the categories of the variables. Distant categories imply different patterns of responses, while close categories imply the same combination of responses., variables represented with a line imply association; Perpendicular lines represent independence. Patterns of lack of access to urban cleaning services, electricity and excrement disposal are observed in the upper left edge, in the other upper right side of dimension 1 patterns of association between the possession of goods are evident.

Figure 5

Category Point Charts



Source: Authors

4.1.4 Socio-Economic Level Index (INSE)

The INSE results from the linear combination of the vectors that define each of the categories within each variable. The index values have a range between 0 and 100, where the lower limit represents the most intense poverty condition and the upper limit, the best condition without poverty. (Carmadiel *et al*., 2000). Table 5 shows the scaling factor fe obtained from Equation 1.

$$fe = \frac{100}{\sum_j \max\left(\hat{Y}_{jk}\right)} \quad (1)$$

Table 4

Scaling factor by category

Variable	Min	Max Transf
Wall material	-5.26	5.69
Floor material	-3.41	3.90
Roof Material	-5.32	6.13
Bedrooms	-1.77	3.55
Number of bathrooms	-4.76	3.84
Number of bathrooms with shower	-1.55	4.05
Drinking water service	-1.55	5.13
Excreta disposal	-5.21	5.59
Urban waste management	-4.19	3.90
Electricity service	-9.94	10.04
Cooking Fuel	-3.26	3.57
House ownership	-1.42	2.12
Have a kitchen	-3.31	3.61
Have a refrigerator	-3.54	3.82
Have a landline phone	-0.60	2.28
Number of mobile phones	-2.63	3.31
Number of TVs	-3.81	4.96
Have Cable TV	-1.29	2.07
Have a vehicle	-0.43	2.12
Number of motorcycles	-0.67	10.15
Have internet	-0.72	2.11
Educational attainment	-1.85	3.78
Employment	-1.41	2.12
	$\sum_j \max\left(\hat{Y}_{jk}\right)$	97.84
	fe	1.02

Source: Authors

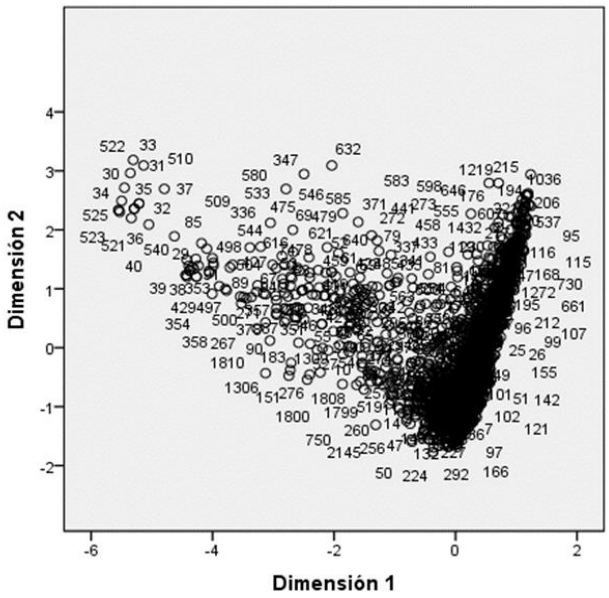
Finally, the INSE is calculated based on Equation 2.

$$INSE = fe \sum_{j} \max\left(\hat{Y}_{jk}\right) \quad (2)$$

Figure 6 shows the scores for each household on a two-dimensional plane.

Figure 6

Graphic of homes on the plan



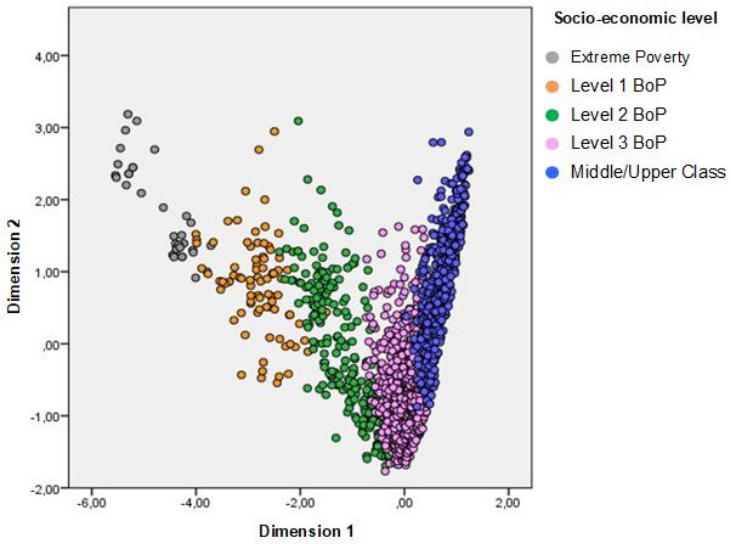
Source: Authors

4.1.5 Classification of homes by socioeconomic level

After applying the k-means Cluster technique with k=5, five levels are obtained: the first represents extreme poverty, the BoP is grouped into level two, three and four; as proposed by Guesalaga & Marshall (2008); Hammond *et al*. (2007) in their studies, and the fifth level that groups middle and upper class households (See Figure 7).

Figure 7

Households by socioeconomic status



Source: Authors

The ranges of the INSE obtained for each socioeconomic level of the households in the study region are presented in Table 5.

Table 5

Households by socioeconomic status in Norte de Santander

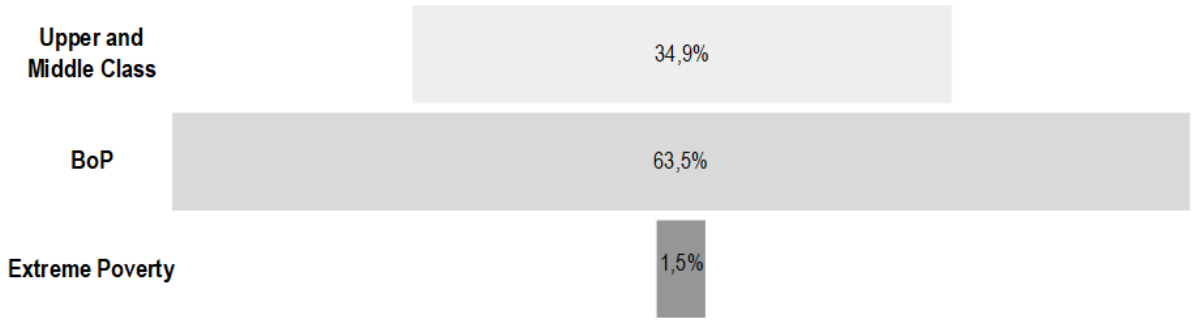
INSE range	Socioeconomic Level	Frequency	Percentage	Accumulated percentage
Between 0.00 and 25.02	Extreme poverty	37	1.55%	1.55%
Between 25.03 and 46.30	BoP 1	85	3.55%	5.10%
Between 46.31 and 62.47	BoP 2	263	10.99%	16.08%
Between 62.48 and 74.29	BoP 3	1.173	49.00%	65.08%
Between 74.30 and 100	Middle- and upper-class.	836	34.92%	100.00%
	Total	**2,394**	**100.00%**	

Source: Authors

Figure 8 graphically represents the socioeconomic pyramid of households in the Norte de Santander region, where the BoP has the largest portion of homes with 63.5% of the total sample.

Figure 8

Socioeconomic pyramid of Norte de Santander households

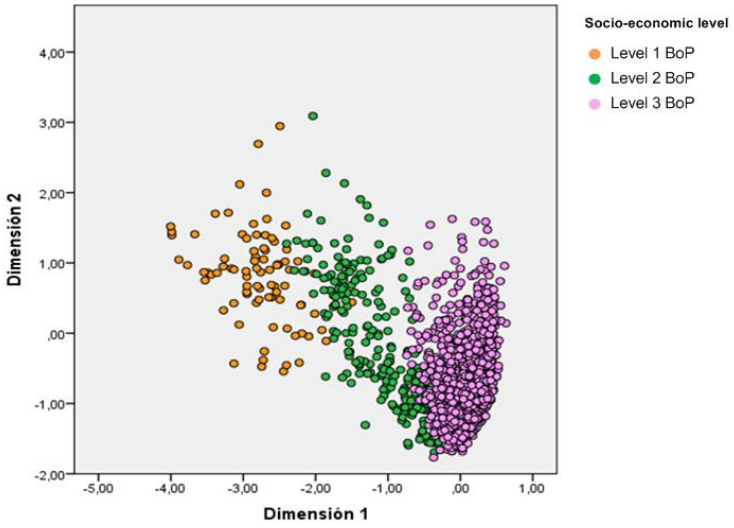


Source: Authors

Figure 9 shows the observations of the three internal levels of the BoP, as proposed by Guesalaga & Marshall (2008); Hammond *et al*. (2007) in their studies.

Figure 9

Housing by level within the BoP



Source: Authors

After applying the k-means cluster, Table 6 presents the INSE ranges obtained for each level of the BoP.

Table 6

Distribution by homes in the BoP in Norte de Santander

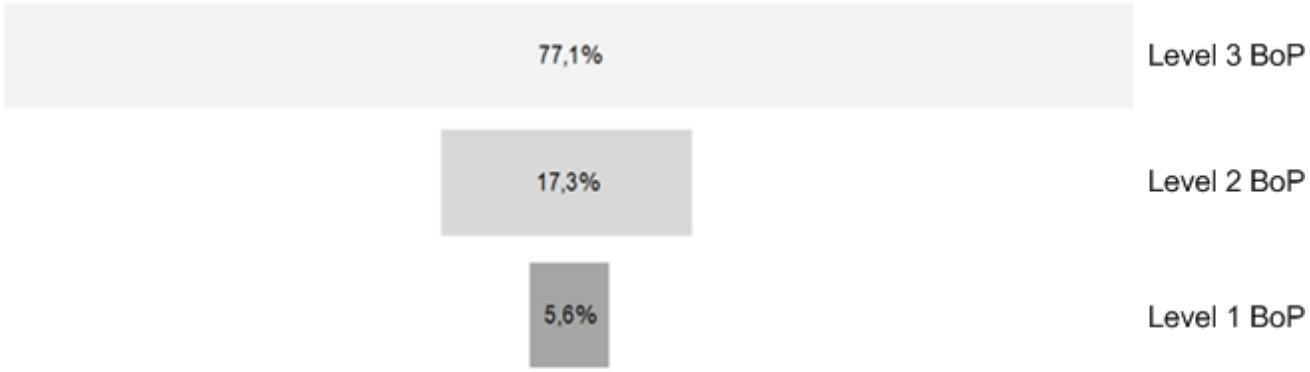
INSE range	Socioeconomic status	Frequency	Percentage	Accumulated percentage
Between 25.03 and 46.30	BoP 1	85	5.6%	5.6%
Between 46.31 and 62.47	BoP 2	263	17.3%	22.9%
Between 62.48 and 74.29	BoP 3	1.173	77.1%	100%
	Total	**1,521**	**100%**	

Source: Authors

Likewise, in Figure 10, the socioeconomic pyramid within the BoP is graphically presented, with Level 3 being the one that concentrates the largest number of homes.

Figure 10

Socioeconomic pyramid of the BoP in Norte de Santander



Source: Authors

4.2 ACCESS TO ESSENTIAL UTILITIES IN BOP HOUSEHOLDS IN NORTE DE SANTANDER, COLOMBIA

Table 7 shows that, of the total households belonging to the BoP, 58.19% are in the Eastern or Metropolitan region, made up of the capital Cúcuta and El Zulia, Los Patios, Puerto Santander, San Cayetano, and Villa del Rosario municipalities. It is also evident that at Level 1 BoP, the Western region, mostly located in Catatumbo, has almost half of the households with the worst living conditions of the BoP (48.24%), while the metropolitan area concentrates 67.83% of the households classified at Level 1 BoP, the one with the best living conditions.

Table 7

Households belonging to the BoP by level and region in Norte de Santander

Region	Socioeconomic level within the BoP						Total	
	BoP 1		BoP 2		BoP 3			
	Cant	% / Region	Cant	% / Region	Cant	% / Region	Cant	% / Region
Center	18	21.18%	8	3.04%	35	2.98%	61	4.01%
North	6	7.06%	35	13.31%	71	6.05%	112	7.36%
West	41	48.24%	95	36.12%	148	12.62%	284	18.67%
East	8	9.41%	81	30.80%	796	67.86%	885	58.19%
Southwest	6	7.06%	25	9.51%	76	6.48%	107	7.03%
Southeast	6	7.06%	19	7.22%	47	4.01%	72	4.73%
Total	**85**	**100.00%**	**263**	**100.00%**	**1,173**	**100.00%**	**1,521**	**100.00%**

Source: Authors

Table 8 shows that, of the total households belonging to the BoP, 72.32% are in urban areas and 27.68% in rural areas. It is also evident that in the rural area of Norte de Santander the largest number of households is concentrated at Level 1, that is, the one with the worst living conditions of the BoP (90.59%), while in urban areas, 85.25% of households are at Level 3, i.e., the most favorable living conditions of the BoP. Level 2 has mostly households located in rural areas (65.02%).

Table 8

Households belonging to the BoP by level and region in Norte de Santander

Area	Socioeconomic level within the BoP						Total	
	BoP 1		BoP 2		BoP 3			
	Cant	% / Region	Cant	% / Region	Cant	% / Region	Cant	% / Region
Urban Area	8	9.41%	92	34.98%	1,000	85.25%	1,100	72.32%
Rural Area	77	90.59%	171	65.02%	173	14.75%	421	27.68%
Total	**85**	**100.00%**	**263**	**100.00%**	**1,173**	**100.00%**	**1,521**	**100.00%**

Source: Authors

Regarding access to home utilities, Table 9 shows a difference between the levels of the BoP to access clean fuels such as gas and electric stoves. Level 1 BoP households have precarious conditions, most of them (83.33%) must cook with firewood, which could affect the health of the dwellers. Something similar happens at Level 2 BoP households, where 35.94% use firewood and 58.20% have access to gas as cooking fuel. Level 3 BoP households have access to gas as a cooking fuel mostly (87.57%). This is also the case for drinking water, excreta disposal, and waste management services; those at Level 1 BoP have precarious conditions, at Level 2 BoP have acceptable conditions, and at Level 3 BoP have better conditions.

The Mann Whitney U test was used to establish the association between variables, with significance levels less than 0.05, thus rejecting the hypothesis of independence of access to essential utilities between the levels of the BoP. It is inferred that the two variables are

associated. Likewise, Table 9 shows the Cramer V value, which measures the association effect between each essential utility and the BoP levels. The results show that regarding cooking fuel, excreta disposal, and urban waste management the association is high; while for the drinking water service the association is moderate, with a Cramer V value of 0.47.

Table 9

Access to essential utilities by the BoP per socioeconomic level in Norte de Santander

Essential utilities / Access		Socioeconomic level BoP							χ^2	*p*	Cramer 's V
		BoP 1		BoP 2		BoP 3		Total			
		% accord. level	% accord. total	% accord. level	% accord. total	% accord. level	% accord. total	% accord. level			
	Firewood	83.33_a	42.68	35.94_b	56.10	$.17_c$	1.22	10.96	820.12	0.000	**0.980 Strong**
	Electricity	4.76_a	18.18	5.86_a	68.18	$.26_b$	13.64	1.47			
	Gas	11.90_a	0.76	58.20_b	11.37	99.57_c	87.86	87.57			
	Do not have	28.24_a	43.64	7.98_b	38.18	$.85_c$	18.18	3.62	509.04	0.000	**0.47 Moderate**
	Outside household	43.53_a	39.36	15.97_b	44.68	1.28_c	15.96	6.18			
	Inside household	28.24_a	1.75	76.05_b	14.58	97.87_c	83.67	90.20			
	Do not have	14.12_a	85.71	$.38_b$	7.14	$.09_b$	7.14	.92	707.80	0.000	**0.910 Strong**
	Toilet / Pipe-Septic pipe system	78.82_a	19.2	63.88_b	48.14	9.72_c	32.66	22.95			
	Sewage	7.06_a	0.52	35.74_b	8.12	90.20_c	91.36	76.13			
	Do not have	42.86_a	62.07	8.08_b	36.21	$.09_c$	1.72	3.85	646.79	0.000	**0.933 Strong**
	Do not reach the home	28.57_a	25	21.54_a	58.33	1.38_b	16.67	6.37			
	Do reach the home	28.57_a	1.78	70.38_b	13.54	98.54_c	84.69	89.77			

Source: Authors

Regarding the area of residence, Table 10 shows the results of the hypothesis test that rejects the independence between the variables Access to essential utilities and Area of residence. That is, they are associated. Likewise, the Cramer's V value is observed, which measures the association effect between each essential utility and the area of residence. Results indicate that regarding the excreta disposal service the level of association is high, while for the cooking fuel, drinking water service, and urban waste management, the association is moderate, with Cramer's V values of 0.537, 0.475, and 0.514, respectively.

Table 10

Access to essential utilities by the BoP per Residence Zone in Norte de Santander

		Area				Total % accord. total	χ^2	*p*	Cramer's V
		Urban		Rural					
		% accord. to area	% accord. total	% accord. to area	% accord. total				
	Firewood	1.29_a	8.54	36.67_b	91.46	10.96	431.69	0.000	**0.537 Moderate**
	Electricity	$.28_a$	13.64	4.65_b	86.36	1.47			
	Gas	98.44_a	81.68	58.68_b	18.32	87.57			
	Do not have	$.09_a$	1.82	12.83_b	98.18	3.62	342.51	0.000	**0.475 Moderate**
	Outside household	1.00_a	11.70	19.71_b	88.30	6.18			
	Inside household	98.91_a	79.30	67.46_b	20.70	90.20			
	Do not have	$.09_a$	7.14	3.09_b	92.86	.92	699.01	0.000	**0.678 Strong**
	Toilet / Pipe-Septic pipe system	5.91_a	18.62	67.46_b	81.38	22.95			
	Sewage	94.00_a	89.29	29.45_b	10.71	76.13			
	Do not have	$.46_a$	8.62	12.80_b	91.38	3.85	398.30	0.000	**0.514 Moderate**
	Do not reach the home	$.18_a$	2.08	22.71_b	97.92	6.37			
	Do reach the home	99.36_a	80.25	64.49_b	19.75	89.77			

Source: Authors

5 CONCLUSION

This study discussed whether access to essential utilities is associated with the socioeconomic status of the BoP, also whether access is associated with the area of residence in the region of study. The results confirm other BoP studies in emerging countries, with 63.5% of all homes analyzed in the study region belonging to the BoP.

Access to essential household utilities is precarious at BoP levels 1 and 2, despite being the responsibility of the State. The findings also confirm that there is an association between Access to essential utilities and BoP levels. The cooking fuel, excreta disposal and urban waste management services have a high association; while for the drinking water service the association is moderate, with a Cramer V value of 0.47. As for the association between Area of residence and Access to essential utilities, it is moderate.

Little interest was evident on the part of public and private organizations in the essential services sector in serving this market segment, by not including it in their marketing targeting strategies. The finding was also that people from the BoP in Norte de Santander, Colombia, who reside in urban areas, have better access to these services than those in rural areas,

confirming the hypotheses raised based on similar studies carried out in regions from Asia. This result leads to recommending that companies in the essential services sector that have the BoP as their target market make a distinction in marketing strategies between the urban and rural markets of the BoP.

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