



# Regional employment – the working poor in Bulgaria

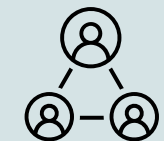
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# Multidimensional Regional Inequalities in Bulgaria:

**Demographic Dynamics, Labour Market Disparities,  
and the Role of Education**

# Introduction

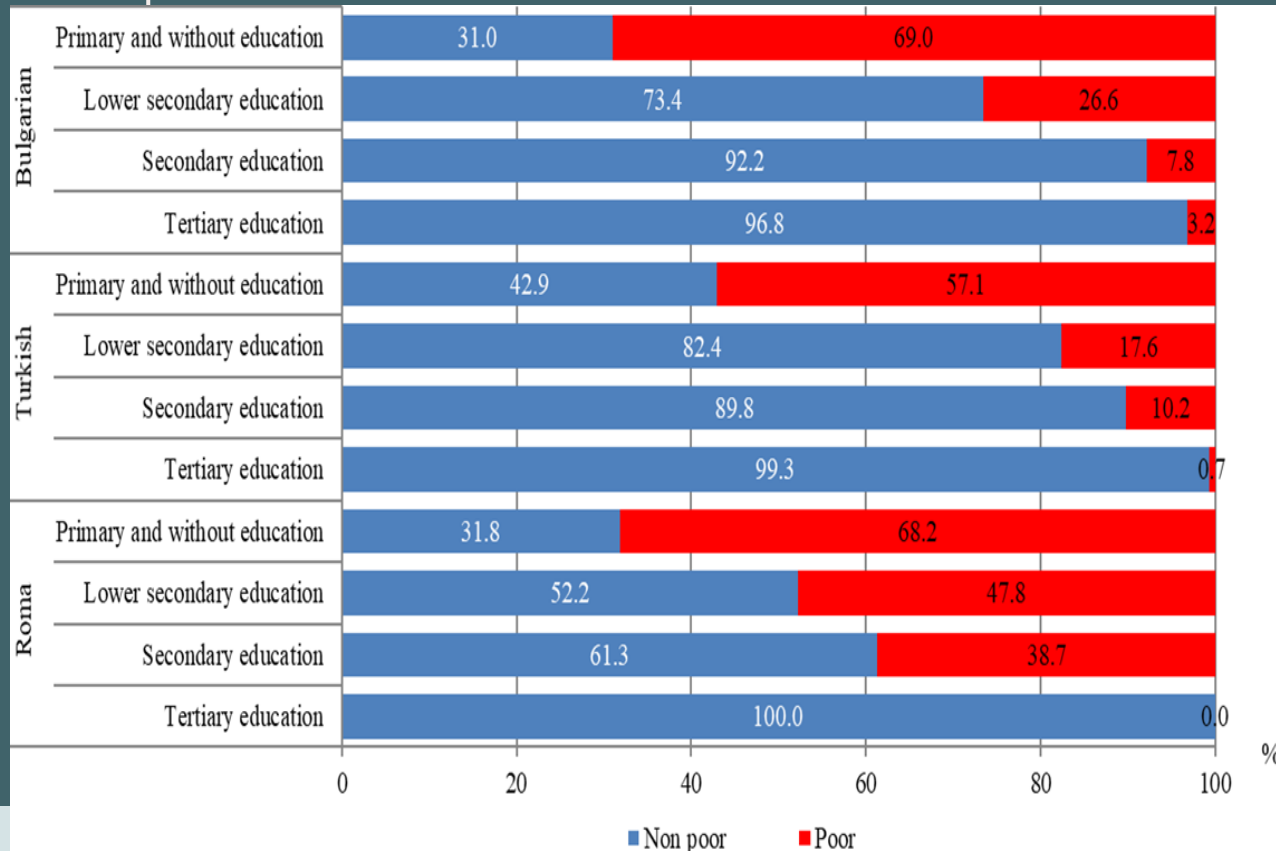


- ✓ The territorial distribution of the population, with its demographic and ethno-religious features, combined with the historical and contemporary economic development of Bulgaria, shapes the regional disparities in educational attainment, distribution of incomes and unemployment rates, as well as the share of the working poor.
- ✓ The labor market is formed and functions under the influence of two main groups of factors - demographic and socio-economic. At lower territorial levels, it reflects their interaction in a local context and plays a key role in regional development.
- ✓ Currently, the rise of the working poor and the deepening wealth gap generate serious challenges to socioeconomic development, and these issues are closely linked to extensive European research on spatial inequalities and labor market segmentation.
- ✓ The interrelation between the quantitative and qualitative characteristics of the population, the educational infrastructure of a territorial unit on the one hand, and its economic specialization on the other, is one of the most important factors for regional differences in the labor market and poverty levels.
- ✓ Examining the impact of the educational structure on poverty and incomes of the population, the study builds on prior studies in Bulgaria and abroad, applying a strong spatial approach and a variety of indicators (demographic, economic, and social).
- ✓ The research aim is to examine the multidimensional structure and temporal dynamics of regional inequalities in Bulgaria at the district (NUTS 3) level over the period 2019–2023, by integrating demographic, labour market, and educational indicators and identifying regional typologies through cluster analysis.



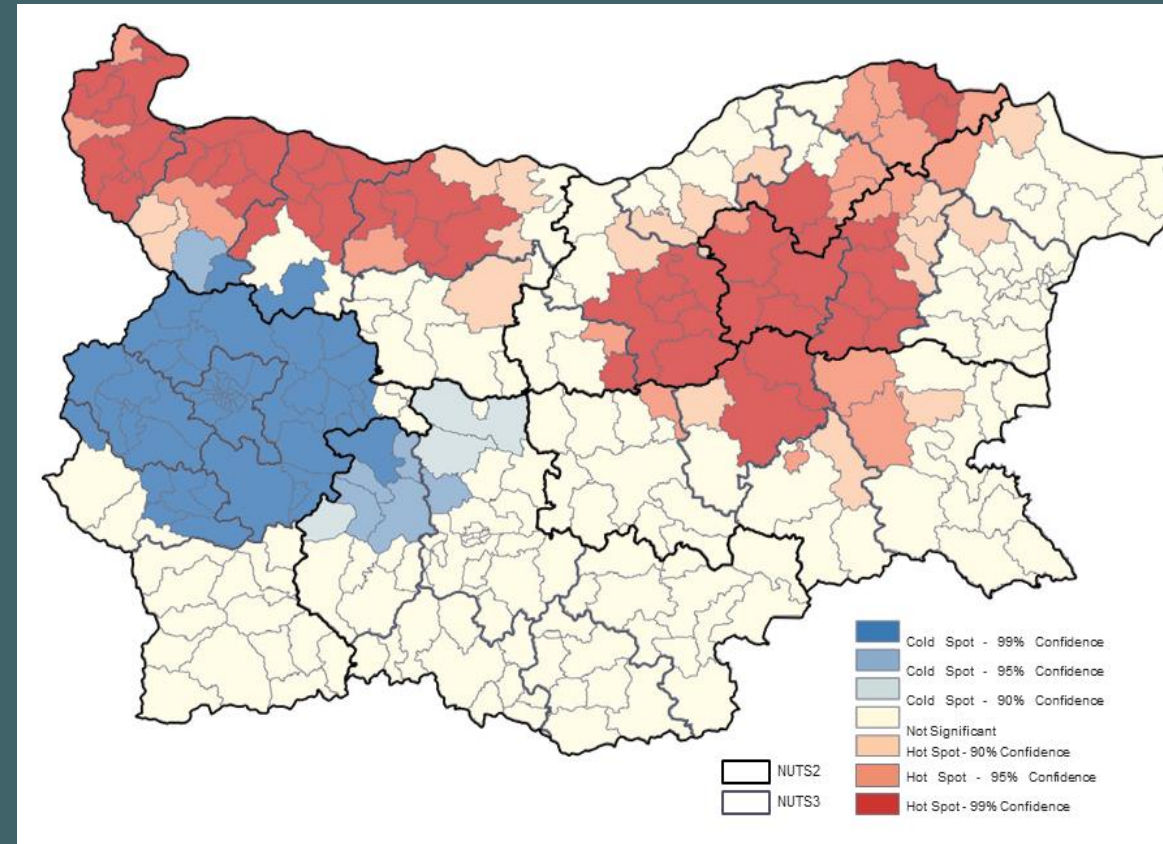
# Introduction

**Figure 1. Share of the employed by education attainment, risk of poverty, and ethnic groups in 2022**

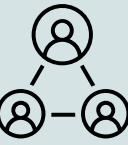


Source: Poverty and social inclusion indicators in 2022, National Statistical Institute of the Republic of Bulgaria, [https://www.nsi.bg/en/file/24256/SILC2022\\_en\\_4UPGZS4.pdf](https://www.nsi.bg/en/file/24256/SILC2022_en_4UPGZS4.pdf)

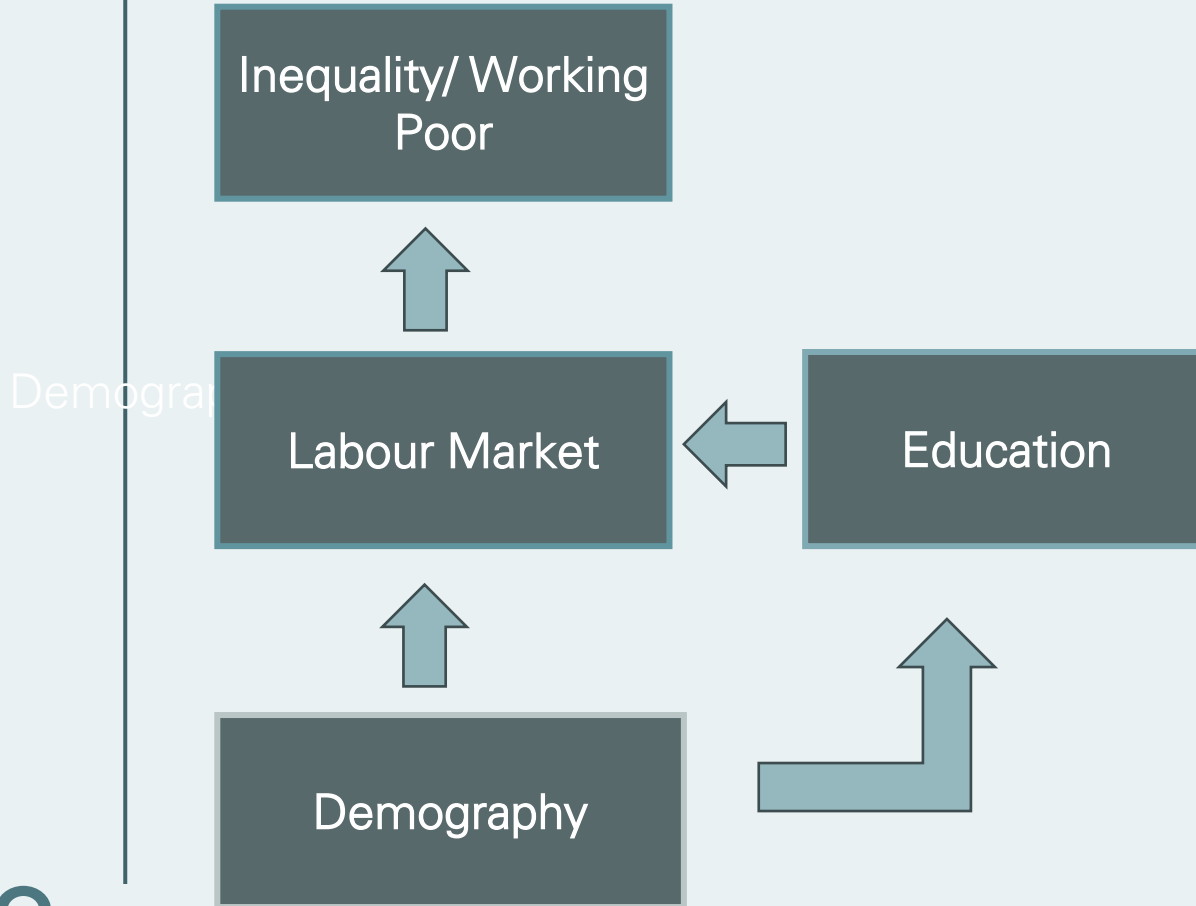
**Figure 2. Getis-Ord's analysis (Hot-Spot analysis) of share of poor by municipalities in Bulgaria**



Source: Poverty mapping in the Republic of Bulgaria, National Statistical Institute, World Bank Group, 2018



# Conceptual Framework of Regional Inequality



**Demographic processes** (population decline, ageing, migration, etc.) shape the size, structure, and spatial distribution of the labour force. The population characteristics affect labour supply and the capacity of regions to attract and retain economic activity.

**Education** determines the quality of human capital, influencing employability, productivity, and access to better-paid jobs, while also reflecting underlying demographic patterns. In this way, education plays a dual role: an intermediate factor and a strategic lever that can reduce regional disparities.

**Labour market conditions** (employment, unemployment, economic activity, wages, etc.) translate structural differences into uneven socioeconomic outcomes and labour segmentation.

These interactions result in spatial disparities in **income inequality, poverty risk, and the working poor**.



# Data and Methods

- ✓ **Studied territory:** Bulgaria
- ✓ **Spatial level:** NUTS 3 regions according to Eurostat  
28 districts (oblasti)
- ✓ **Source of statistical data:** National Statistical Institute of the Republic of Bulgaria ([www.nsi.bg](http://www.nsi.bg)) and Employment Agency of Bulgaria – Ministry of Labour and Social Policy (<https://www.az.government.bg>).
- ✓ **Cluster analysis: Dynamics (1) - 10 indicators** divided into 2 groups (2019 and 2023):

**Demographic indicators** – population number (in persons), natural growth (in ‰), migratory growth (in persons), demographic dependency ratio (in %), and relative share of population aged 25-64 with tertiary education (in %).

**Indicators for labor market and socioeconomic disparity:** unemployment rate (in %), income inequality/Gini coefficient, relative share of the poor to the poverty line for the district (in %), employment rate of the population aged 15-64 (in %), and economic activity rate of the population aged 15-64 (in %).

- ✓ **Applied statistical methods**

K-Means cluster analysis – K=5

Hierarchical clustering using Ward's method – 5 groups

**Pearson's correlation coefficient (3)**



Figure 3. Administrative division of Bulgaria at NUTS 3 level (28 districts/"oblasti")

- ✓ **Cluster analysis: Integrated typology (2) - 12 indicators** divided into 2 groups (data for 2023):

**Indicators for socioeconomic inequality** – income inequality(Gini coefficient), relative share of the poor to the poverty line for the district (%), relative share of the population living in material and social deprivation (%), relative share of population living in households with low economic activity intensity aged 18 to 64 years (%), relative share of population at risk of poverty or social exclusion (%), average annual salary of employees under labor and service laws (lv)

**Indicators for labor market and education:** unemployment rate (%), employment rate of the population aged 15-64 (%), economic activity rate of the population aged 15-64 (%), relative share of population aged 25-64 with tertiary education (%), relative share of population aged 25-64 with primary and lower education (%), number of people not in the labor force (inactive population).



# Demographic cluster profiles (K-means, 2023)



Cluster	Population (in persons)	Natural growth (in ‰)	Migratory growth (in persons)	Demographic dependency ratio (in %)	Relative share of population aged 25-64 with tertiary education (in %)	Districts
<b>Cluster 1</b> Transitional demographic regions	221 834	- 6.59	1 254	63.88	19.91	Blagoevgrad, Pazardzhik, Kardzhali, Sofia, Stara Zagora, Haskovo, Sliven (7)
<b>Cluster 2</b> Urban growth regions	484 074	- 4.93	6 107	58.73	30.30	Plovdiv, Burgas, Varna (3)
<b>Cluster 3</b> Demographically declining regions	115 000	-12.61	139	70.98	21.06	Vidin, Montana, Kyustendil, Yambol, Gabrovo, Silistra, Pleven, Lovech (8)
<b>Cluster 4</b> Metropolitan core	1 286 965	- 1.50	8 502	51.49	54.10	Sofia (capital)
<b>Cluster 5</b> Demographically vulnerable regions	137 051	- 10.70	541	64.25	23.96	Vratsa, Smolyan, Pernik, Dobrich, Targovishte, Shumen, Razgrad, Ruse, Veliko Tarnovo (9)

# Labor market and socioeconomic disparity cluster profiles

## (K-means, 2023)

Cluster	Income inequality/ Gini coefficient	Relative share of the poor to the poverty line for the district (in %)	Unemployment rate (in %)	Employment rate of the population aged 15-64 (in %)	Economic activity rate of the population aged 15-64 (in %)	Districts
<b>Cluster 1</b> Moderately developed regions	34.10	17.03	3.13	68.86	71.16	Plovdiv, Burgas, Blagoevgrad, Pazardzhik, Kardzhali, Sofia, Haskovo, Pleven, Ruse, Lovech (10)
<b>Cluster 2</b> Lagging regions	36.49	17.22	10.19	60.91	68.44	Vidin, Montana, Vratsa, Sliven, Dobrich, Targovishte, Silistra, Razgrad (8)
<b>Cluster 3</b> High- employment regions	35.51	23.18	1.70	75.22	76.55	Kyustendil, Stara Zagora, Sofia (capital), Varna (4)
<b>Cluster 4</b> Extreme outlier region	28.20	32.10	12.40	67.80	77.70	Pernik
<b>Cluster 5</b> Stable labour regions	28.31	13.36	7.00	70.66	76.08	Smolyan, Yambol, Gabrovo, Veliko Tarnovo, Shumen (5)



# Main conclusions – Cluster analysis: Dynamics (1)



- ✓ Regional clustering patterns have evolved across both labor market and demographic indicators between 2019 and 2023.
- ✓ The negative demographic processes in Bulgaria, such as declining population (due to low birth and high mortality rates, and intensive emigration) and fast ageing, emerge as some of the most important problems facing the national, regional, and local labor markets. Their consequences are reflected in a reduction in the size of the labor force, a deterioration in its structures, and a decline in potential labor supply in the medium and long term.
- ✓ Demographic clusters, in contrast to those of labor market and socioeconomic disparity, showed reduced alignment in 2023, indicating increasing diversity and region-specific trajectories in population structure, migration, or aging patterns across districts.
- ✓ In both years, **Sofia (capital)** has unique features and is highly distinctive from other districts in Bulgaria (**cluster 4**) - very large population number, lowest demographic burden, and the highest tertiary education rate (above 50.0%).
- ✓ **Plovdiv, Burgas, and Varna** formed another **cluster 2** with indicators quite different from the other districts – it is in the second place in population numbers after the capital, with favorable values of natural growth (although negative), and demographic dependency ratio, attracting a sizable number of migrants, improving the educational structure, and increasing the number of graduates.
- ✓ On the contrary, **cluster 3 (Vidin, Montana, Kyustendil, Yambol, Gabrovo, Silistra, Pleven, and Lovech)** has the most unfavorable demographic indicators: a rapidly dropping population due to severe negative natural growth, a weak draw for migrants, and an aging population.
- ✓ The other districts show quite diverse development patterns after 2019. They split into 2 clusters (**1 and 5**) mainly based on the differences in population number, ethno-cultural specifics, and values of natural growth.



# Main conclusions – Cluster analysis: Dynamics (1)



- ✓ The labour market and socioeconomic clusters in 2023 exhibit greater structural coherence, as indicated by increased agreement between clustering methods. However, a comparison with 2019 reveals substantial reconfiguration in cluster membership, suggesting that regional disparities are evolving dynamically rather than remaining spatially fixed.
- ✓ In contrast to demographic patterns, which show increasing fragmentation, labour market and socioeconomic disparities reveal a more stable underlying structure in 2023. However, this structural stability does not imply spatial persistence, as significant shifts in cluster membership indicate ongoing regional adjustments and transformations.
- ✓ Transition to a weaker cluster (deterioration): relatively negative → more vulnerable and deepening the unfavourable features

**Vidin, Montana, Vratsa, Sliven, Dobrich, Targovishte, Silistra, and Razgrad** show sustainable negative trends in both labor market and socioeconomic disparity indicators for the period 2019-2023 - the highest inequality (Gini index) and moderate poverty rate, high unemployment, the lowest employment and economic activity rates among other districts in Bulgaria.

- ✓ Transition to a better cluster (improvement) for the period 2019-2023:
  - ✓ **Stara Zagora, Varna, Kyustendil** - move to cluster 3 (high employment regions)
  - ✓ **Gabrovo, Shumen, Smolyan, Yambol** - to cluster 5 (socially balanced)
- ✓ Transition to cluster of similar strength: **Blagoevgrad, Pazardzhik, Kardzhali, Haskovo, Sofia, Ruse, Lovech** - between clusters 1, 3 and 5.
- ✓ Despite having quite lower unemployment rate, the district of **Sofia (the capital)** stands out for having higher income disparities and a higher population share living below the district poverty line. However, rates of economic activity and employment are also high.



# Main conclusions – Cluster analysis: Integrated typology (2)

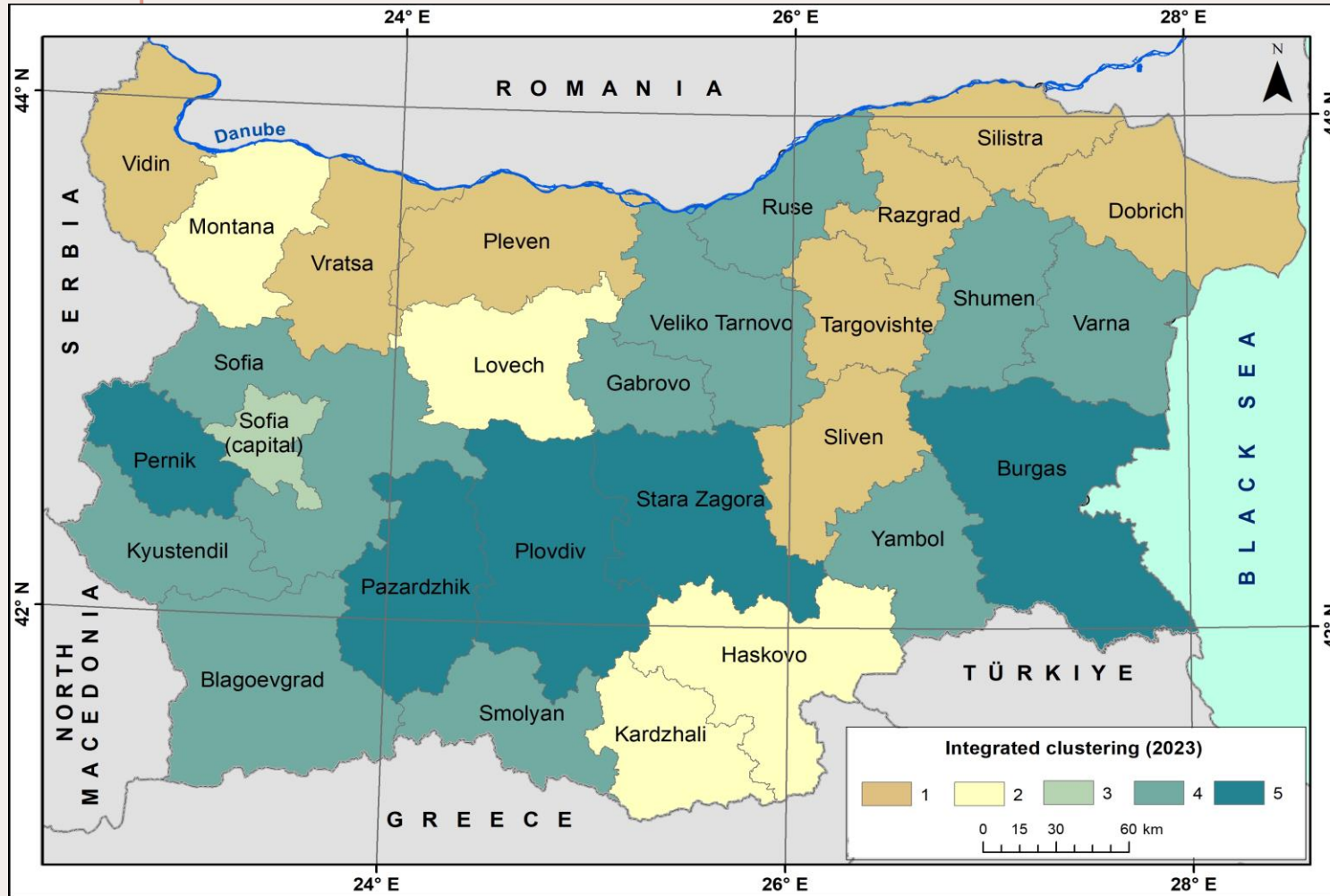


Figure 4. Multivariate regional clustering (based on 12 indicators) in Bulgaria (2023)

**Cluster 1. Most socially and economically vulnerable regions:** 8 districts (Razgrad, Silistra, Vidin, Dobrich, Vratsa, Pleven, Targovishte, and Sliven)

- ✓ The highest levels of poverty and socioeconomic deprivation (population living in social and material deprivation – 24.3 % and at risk of poverty and social exclusion – 34.3%)
- ✓ Unfavorable educational structure of the population (the highest share of people with primary and lower education - 23%) and share of university graduates below the average for Bulgaria (~24%)
- ✓ The highest rates of unemployment (~8%) and significantly lower incomes compared to the country's average (BGN 18500)
- ✓ Low economic activity (69 %) and employment (62 %) rates
- ✓ Moderate inequality in income distribution (Gini index ~ 38)

**Cluster 2. Less developed regions:** 4 districts (Lovech, Haskovo, Montana, Kardzhali)

- ✓ Relatively low economic activity (~66.5%) and employment (~63.6%) rates, but low unemployment (4.3%)
- ✓ Moderate levels of poverty and socioeconomic deprivation (population living in social and material deprivation – 10.4% and at risk of poverty and social exclusion – 25.7%)
- ✓ Relatively high levels of population with primary or lower education (17.9%) and university graduates are below the average for Bulgaria
- ✓ Lower incomes compared with other clusters and the average of the country (BGN 17500), and a higher share of people living in households with low work intensity



# Main conclusions – Cluster analysis: Integrated typology (2)

## Cluster 3. Urban core region with increasing inequalities: Sofia (capital) district

- ✓ The highest economic activity and employment – over 76.5% employed and 78.7% economic activity rate
- ✓ The highest proportion of university graduates – over 54%
- ✓ Low share of population living in social and material deprivation (8.4%)
- ✓ Highest incomes in the country – average annual salary over BGN 34000
- ✓ The lowest unemployment rate - 2.7%
- ✓ The highest value of the Gini index (39.3) and more than 22.2. % below the district poverty line

## Cluster 4. Developed regions with low inequalities: 10 districts (Varna, Veliko Tarnovo, Sofia, Smolyan, Blagoevgrad, Ruse, Kystendil, Gabrovo, Shumen, Yambol)

- ✓ Lower levels of poverty (15.9%) and share of the population living in socioeconomic deprivation (12.6%) than in cluster 1
- ✓ Incomes are lower than the country's average (18900), but higher than in clusters 1 and 2
- ✓ High economic activity (75.5%) and moderate employment rates (71.9%), but with a larger number of the population outside the labor force
- ✓ Relatively good educational structure (25.6% university graduates), combined with lower levels of population with primary or lower education (13.7%)

## Cluster 5. Developed regions with high inequalities: 5 districts (Plovdiv, Pernik, Stara Zagora, Pazardzhik, and Burgas)

- ✓ Favorable educational structure (34.1% of the population has a tertiary education), but higher levels of population with primary or lower education (17.6%) than in cluster 4
- ✓ Moderate economic activity (74.2%) and lower employment rates (70.2%), and the largest number of the population outside the labor force
- ✓ Higher average salary (BGN 19906) than cluster 4, but still below the country's average (BGN 24500)
- ✓ Higher disparities compared to cluster 4:
  - share of the population at risk of social exclusion and poverty - 34.1%
  - share of the population living in socioeconomic deprivation – 22.0%





# Main conclusions: Results correlation coefficients (3)

2023	Relative share of the population living in material and social deprivation (%)	Inequality in income distribution/ Gini coefficient	Relative share of poor people in relation to the poverty line for the region (%)	Average annual salary of employees under labor and service laws (lv)	Persons living in households with low economic activity intensity aged 18 to 64 years (%)	Population at risk of poverty or social exclusion (%)	Relative share of the population aged 25 to 64 with tertiary education (%)	Unemployment rate (%)	Employment rate of the population aged 15-64 (%)	Economic activity rate of the population aged 15-64 (%)	Persons outside the labor force - thousand persons	Relative share of the population aged 25 to 64 with primary and lower education (%)
Relative share	1	0.25	-0.07	-0.06	0.48	0.84	-0.09	0.19	-0.26	-0.22	-0.04	0.49
Inequality in in	0.25	1	0.12	0.34	0.31	0.17	0.2	0	-0.29	-0.4	0.32	0.2
Relative share	-0.07	0.12	1	0.26	-0.18	0.35	0.1	-0.02	0.21	0.28	0.24	-0.15
Average annua	-0.06	0.34	0.26	1	-0.34	-0.01	0.76	-0.3	0.42	0.38	0.83	-0.34
Persons living	0.48	0.31	-0.18	-0.34	1	0.51	-0.32	0.48	-0.71	-0.66	-0.28	0.48
Population at	0.84	0.17	0.35	-0.01	0.51	1	-0.08	0.28	-0.27	-0.18	-0.02	0.34
Relative share	-0.09	0.2	0.1	0.76	-0.32	-0.08	1	-0.35	0.56	0.51	0.79	-0.42
Unemploymer	0.19	0	-0.02	-0.3	0.48	0.28	-0.35	1	-0.68	-0.2	-0.44	0.51
Employment r	-0.26	-0.29	0.21	0.42	-0.71	-0.27	0.56	-0.68	1	0.85	0.48	-0.54
Economic activ	-0.22	-0.4	0.28	0.38	-0.66	-0.18	0.51	-0.2	0.85	1	0.33	-0.39
Persons outsid	-0.04	0.32	0.24	0.83	-0.28	-0.02	0.79	-0.44	0.48	0.33	1	-0.37
Relative share	0.49	0.2	-0.15	-0.34	0.48	0.34	-0.42	0.51	-0.54	-0.39	-0.37	1





# Main conclusions: Results correlation coefficients (3)

## 1. Employment rate ↔ Economic activity rate ( $r=0.85$ )

A very strong positive relationship, indicating that regions with higher labour force participation also exhibit higher employment levels.

## 2. Material and social deprivation ↔ Population at risk of poverty or social exclusion ( $r=0.84$ )

This confirms a strong overlap between different dimensions of poverty, suggesting that deprivation and poverty risk are closely intertwined spatially.

## 3. Average annual salary ↔ Persons outside the labour force ( $r = 0.83$ )

A strong positive relationship, indicating that regions with higher wages also tend to have larger inactive populations, likely reflecting structural labour market segmentation.

## 4. Tertiary education ↔ Persons outside the labour force ( $r = 0.79$ )

Regions with higher shares of highly educated populations also show higher numbers of economically inactive individuals, possibly due to ageing, more students or urban agglomeration effect.

## 5. Average annual salary ↔ Tertiary education ( $r = 0.76$ )

A strong and expected relationship, confirming that higher educational attainment is associated with higher income levels across regions.

## 1. Persons in low economic activity households ↔ Employment rate ( $r = -0.71$ )

A strong negative relationship is observed, indicating that low work intensity is directly linked to weak employment performance.

## 2. Unemployment rate ↔ Employment rate ( $r = -0.68$ )

A strong inverse relationship, confirming the structural opposition between unemployment and employment levels.

## 3. Persons in low economic activity households ↔ Economic activity rate ( $r = -0.66$ )

Regions with higher shares of low work intensity households tend to have significantly lower overall labour market participation.

## 4. Employment rate ↔ Population with primary or lower education ( $r = -0.54$ )

A strong negative relationship, indicating that lower educational attainment is associated with weaker labour market integration.

## 5. Tertiary education ↔ Population with primary or lower education ( $r = -0.42$ )

A moderate-to-strong inverse relationship, reflecting the structural educational divide across regions.





# Conclusions

- ✓ These findings suggest that regional inequalities in Bulgaria are not merely persistent but are being actively reshaped through reinforcing demographic and socioeconomic processes, leading to a more polarized and structurally differentiated spatial system.
- ✓ The integrated clustering reveals a clear spatial differentiation of regions in Bulgaria. Northern and peripheral districts are concentrated in the most vulnerable cluster, characterized by unfavorable demographic trends and weak labour market performance. In contrast, major urban and economically dynamic regions form clusters of higher development, although often accompanied by increased inequalities. Sofia (capital) stands out as a distinct cluster due to its exceptional demographic and socioeconomic profile. The remaining regions occupy intermediate positions, reflecting diverse development trajectories and transitional characteristics.
- ✓ Education is a key predictor of income and poverty. There is a strong positive correlation between the proportion of university graduates and the average annual salary ( $r = +0.76$ ).
- ✓ Districts with a higher proportion of people with higher education have lower levels of poverty, unemployment, and social deprivation.
- ✓ Conversely, a high proportion of the population with primary or lower education is associated with lower wages ( $r = -0.34$ ), higher poverty and social exclusion ( $r = +0.34$ ), and higher unemployment ( $r = +0.50$ ).
- ✓ Population with lower education is often associated with low economic activity intensity ( $r = +0.48$ ).
- ✓ Weaker correlation of the educational level of the population and inequality in income distribution (Gini coefficient), suggesting that it is influenced by other factors ( $r = +0.20$ ).





# Thank you!

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## Funding program

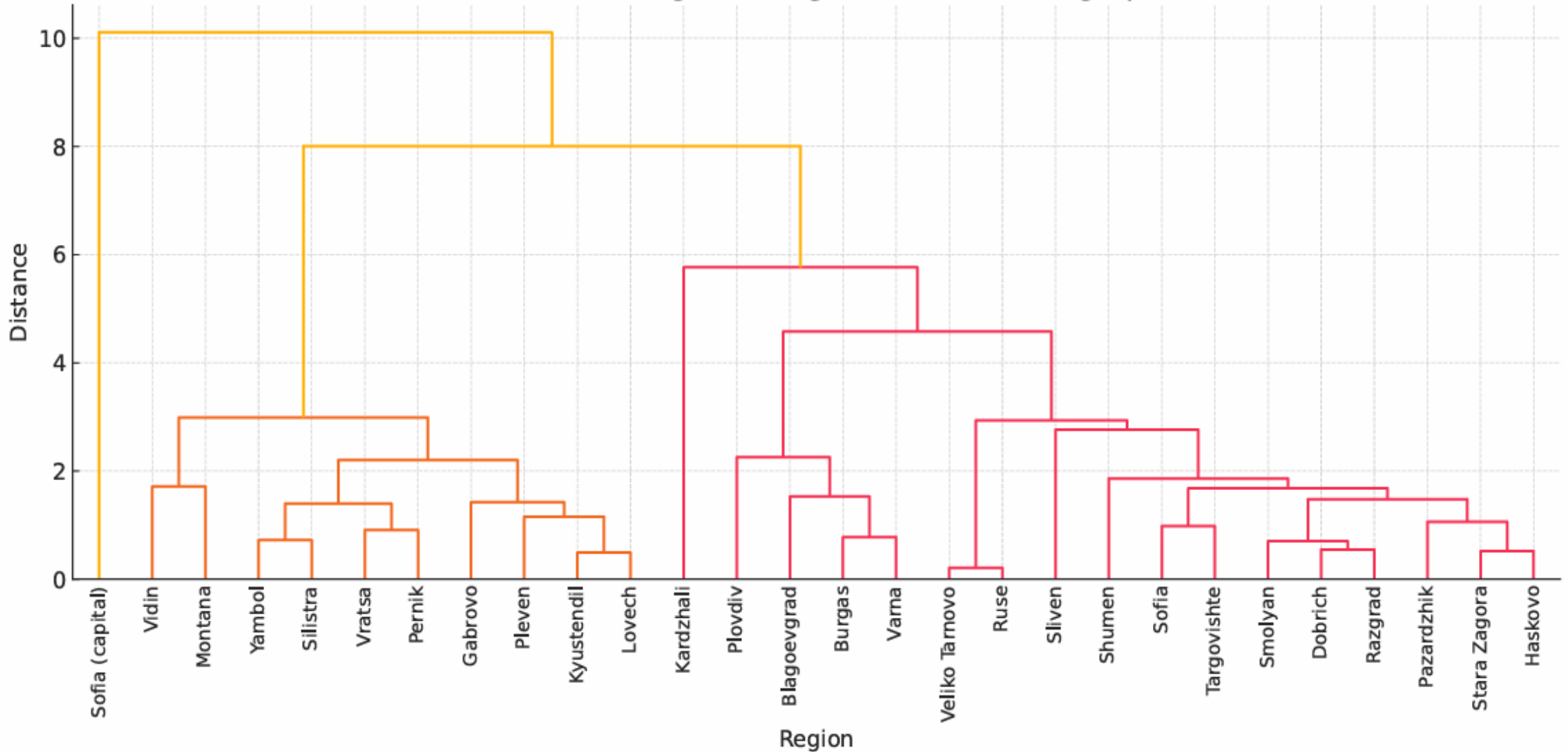
This paper presents the results of the project “Regional employment - working poor in Bulgaria”

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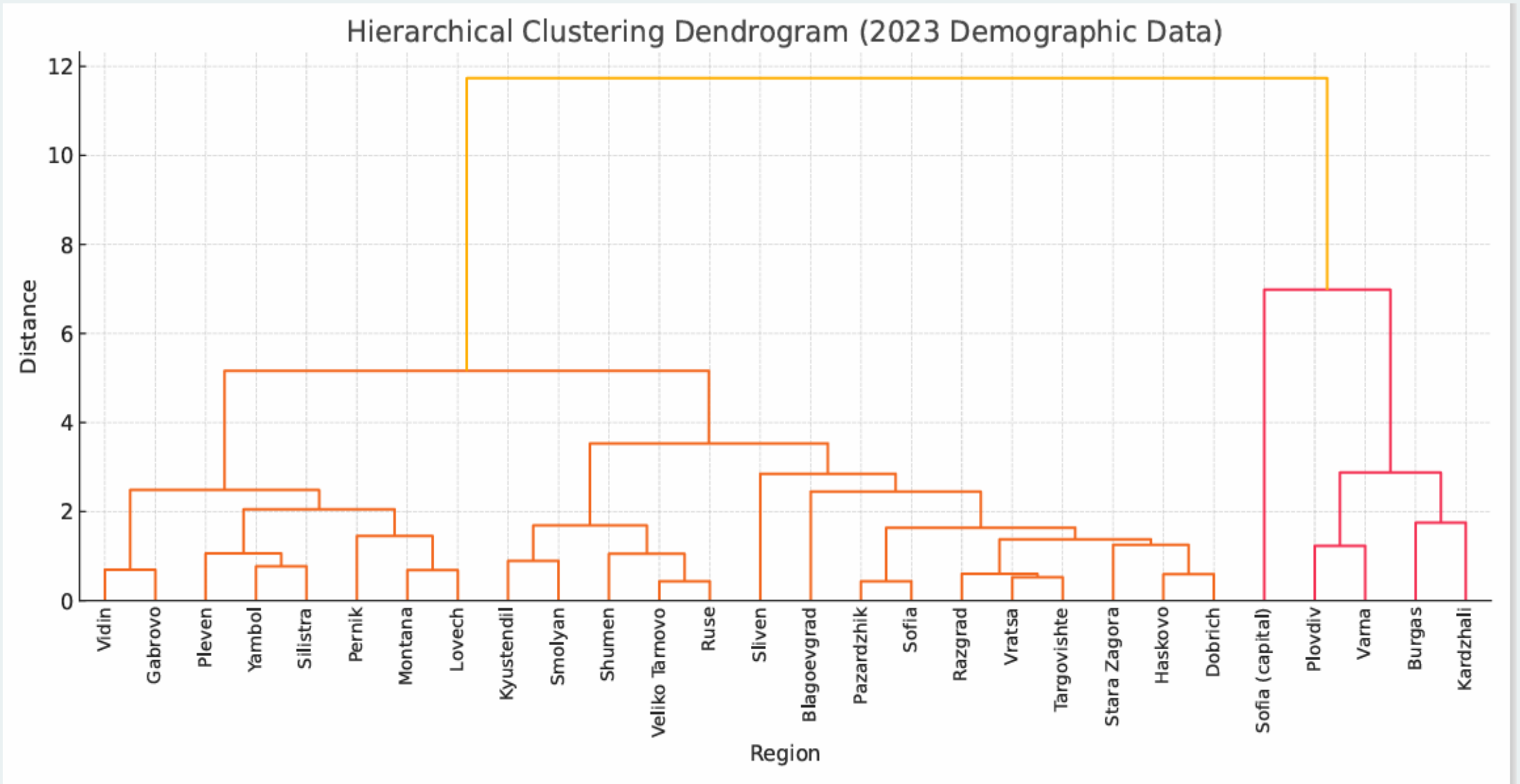


# Results and Discussion

Hierarchical Clustering Dendrogram (2019 Demographic Data)



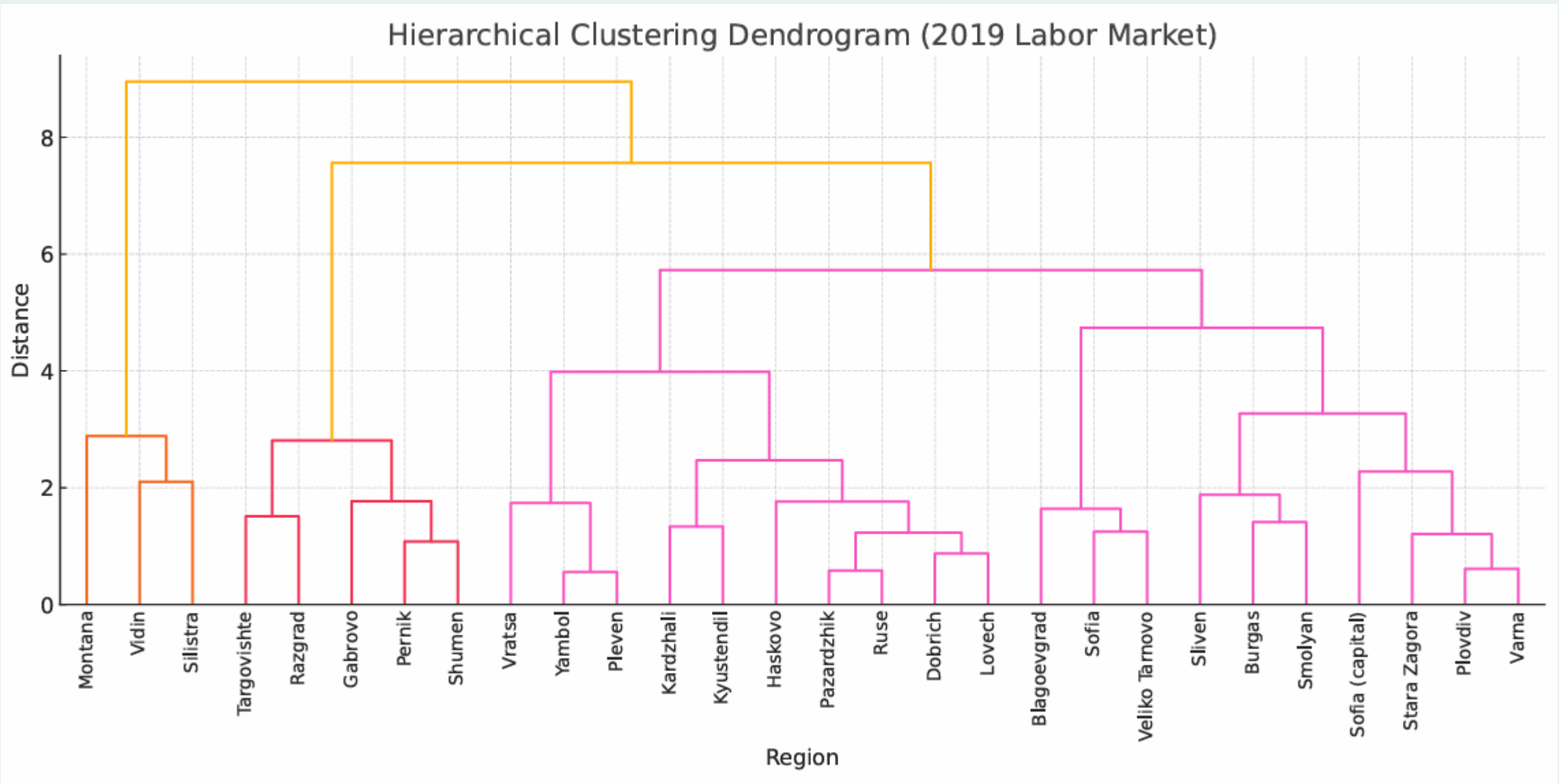
# Results and Discussion



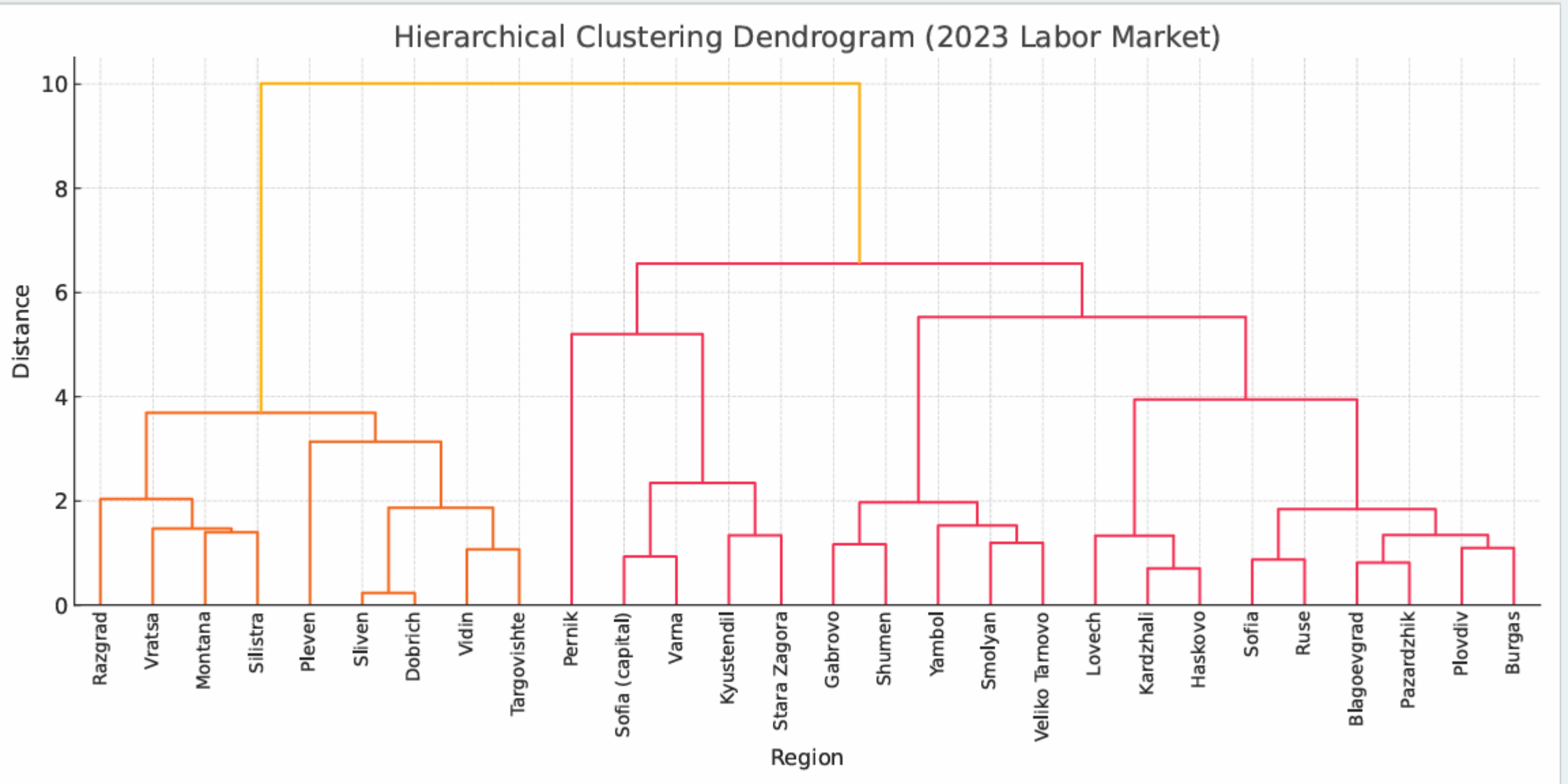
# Demographic cluster profiles (K-means, 2019)

Cluster	Population (in persons)	Natural growth (in ‰)	Migratory growth (in persons)	Demographic dependency ratio (in %)	Relative share of population aged 25-64 with tertiary education (in %)	Districts
Cluster 1	148 658.67	-12.68	- 722.11	66.43	20.46	Vidin, Montana, Vratsa, Kyustendil, Pernik, Yambol, Gabrovo, Pleven, Lovech (9)
Cluster 2	158 204.00	- 3.60	5888.00	53.86	18.60	Kardzhali
Cluster 3	1 328 790.00	- 2.00	3230.00	48.06	52.80	Sofia (capital)
Cluster 4	186 742.15	- 8.38	- 514.46	58.45	21.17	Pazardzhik, Sofia, Stara Zagora, Haskovo, Smolyan, Sliven, Dobrich, Targovishte, Veliko Tarnovo, Shumen, Silistra, Razgrad, Ruse (13)
Cluster 5	462 161.25	- 4.43	514.25	53.99	23.90	Plovdiv, Burgas, Blagoevgrad, Varna (4)

# Results and Discussion



# Results and Discussion



# Labor market and socioeconomic disparity cluster profiles

(K-means, 2019)

Cluster	Income inequality/Gini coefficient	Relative share of the poor to the poverty line for the district (in %)	Unemployment rate (in %)*	Employment rate of the population aged 15-64 (in %)	Economic activity rate of the population aged 15-64 (in %)	Districts
Cluster 1	38.08	26.50	3.08	55.65	73.02	Plovdiv, Burgas, Stara Zagora, Sliven, Sofia (capital), Varna (6)
Cluster 2	34.92	21.46	5.24	50.03	70.56	Pazardzhik, Kardzhali, Kyustendil, Haskovo, Smolyan, Yambol, Dobrich, Pleven, Ruse, Lovech (10)
Cluster 3	38.38	26.50	15.12	40.22	65.70	Silistra, Montana, Vidin, Vratsa (4)
Cluster 4	27.90	15.42	8.58	49.76	72.18	Pernik, Targovishte, Gabrovo, Shumen, Razgrad (5)
Cluster 5	31.62	21.73	2.17	58.77	78.97	Blagoevgrad, Sofia, Veliko Tarnovo (3)

