

Poverty Is Not a Choice, but a Consequence of Socio-Economic Factors

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Abstract – Income poverty has long represented a serious socio-economic challenge in Slovakia, with its prevalence and intensity varying markedly across different segments of the population. The purpose of this paper is to examine the impact of three selected socio-economic factors on the risk of income poverty in Slovakia. The research applies a quantitative approach, drawing on secondary data analysis covering the period from 2013 to 2024. The analysis employs methods of descriptive statistics, the Shapiro–Wilk test of normality, Welch’s ANOVA with subsequent Games–Howell post-hoc tests, the Mann–Whitney U test, and simple linear regression. The findings reveal statistically significant differences between regions and educational attainment levels, with the lowest risk of income poverty observed in the Bratislava region and among individuals with tertiary education. Economic activity emerged as the strongest predictor. The results underline the need for targeted regional and educational policies and highlight the critical role of employment as a means of social inclusion.

Keywords – Income poverty, regional disparities, level of education, economic activity.

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1. Introduction

Poverty constitutes a long-standing and socially significant phenomenon that exerts profound effects on individuals, families, and the wider social environment. Despite economic growth and the development of public policies aimed at ensuring social protection for the population, the risk of income poverty remains a persistent issue in Slovakia, with its prevalence and intensity differing according to a range of socio-economic characteristics.

Poverty is not the outcome of individual failure but rather the consequence of structural inequalities and disparate living conditions that shape individuals’ opportunities for a dignified life. Among the factors that may substantially influence the likelihood of experiencing income poverty are the region of residence, the level of educational attainment, and an individual’s economic activity.

This article focuses on analysing the impact of three selected factors – region, education, and economic activity – on the risk of income poverty in Slovakia. Each factor is examined separately to determine whether statistically significant differences exist between categories in terms of the probability of poverty occurrence. The chosen approach enables a deeper understanding of how specific socio-economic factors contribute to population vulnerability and which groups are most at risk. The findings may serve as a basis for the design of targeted measures aimed at reducing the risk of income poverty and promoting social inclusion, particularly in the regions and population groups most severely affected.

Poverty and social exclusion are complex societal phenomena that affect the lives of individuals, communities, and society at large [7]. Poverty is commonly understood as a serious phenomenon typically linked to low-income levels, restricted access to resources, and the inability of individuals or households to secure basic living conditions [5].

Contemporary research conceptualises poverty as a multidimensional phenomenon, encompassing not only material deprivation but also social isolation, discrimination, and inadequate education [28].

These factors contribute to a diminished quality of life and to the intergenerational reproduction of vulnerability [4]. Empirical evidence indicates that the interplay between individual disadvantages [8] and ineffective institutional frameworks creates “poverty traps”, which are difficult to escape without targeted interventions [18], [26], [14].

The socio-economic, financial, and health crises triggered by the COVID-19 pandemic and the war in Ukraine have deepened existing inequalities and disproportionately affected vulnerable population groups [17], [13]. These developments have underscored the necessity of analysing poverty within territorial and temporal contexts and of formulating adaptive policy responses. The long-standing significance of poverty and social exclusion has also been acknowledged by European institutions, which highlight the need to identify and examine key risk factors of poverty at both national and regional levels [9], [25]. The global relevance of the issue is confirmed by the fact that eradicating poverty was designated as the first Sustainable Development Goal (SDG) within the 2030 Agenda. On 25 September 2015, the UN General Assembly adopted a resolution with the aim of transforming the world and improving living standards. One of the principal objectives set therein is the eradication of extreme poverty worldwide by 2030, defined as living on less than USD 1.25 per day.

The regional dimension constitutes a crucial determinant of poverty, as spatial inequalities substantially shape the socio-economic conditions of populations [29]. Disparities between regions – in access to employment, the quality of infrastructure, the availability of public services, or investment attractiveness – may generate environments that perpetuate and exacerbate poverty [20]. Many of these are structurally disadvantaged areas marked by persistently high unemployment, low levels of educational attainment, and limited opportunities for social mobility [21], [22]. Such conditions result in the regional concentration of poverty, which calls for targeted interventions aimed at reducing territorial disparities and fostering endogenous development [2]. From this perspective, the analysis of regional contexts is essential to the effective planning of policies designed to alleviate poverty and promote social inclusion. In Slovakia, considerable disparities have long persisted between western and eastern regions, as well as between urban and rural areas [11].

Education is widely regarded as one of the most fundamental determinants of poverty, as it directly shapes an individual’s prospects of integrating into the labour market, earning adequate income, and gaining social recognition [12].

Insufficient educational attainment is frequently associated with limited employment opportunities, particularly in sectors requiring specialised knowledge and skills, which increases the likelihood of long-term unemployment and economic marginalisation [3], [27]. Education, however, fulfils not only an economic role but also serves as a means of strengthening social capital, fostering critical thinking, and enabling individuals to navigate societal processes, thereby helping to prevent the intergenerational transmission of poverty [16], [19]. Investment in education – especially in early childhood and in disadvantaged communities – represents an effective poverty-prevention measure and is simultaneously a key factor in the long-term sustainability of social and economic development [1], [6].

Economic activity represents another major determinant of poverty, as access to stable and adequately remunerated employment is a prerequisite for the economic self-sufficiency of individuals and households [23]. Unemployment, particularly long-term, markedly increases the risk of falling into poverty, as it entails the loss of regular income, the erosion of work-related skills, and reduced chances of re-employment. Although employment generally acts as a protective factor, low-paid or insecure jobs – commonly described as working poor – may not provide sufficient protection against poverty [24]. Elevated levels of economic inactivity, especially in certain regions or social groups, create conditions conducive to deepening social exclusion and transmitting poverty across generations [10]. For this reason, the promotion of quality and inclusive employment is considered a central element of effective poverty-reduction strategies and of strengthening social cohesion [15].

The literature thus clearly demonstrates the significance of region, education, and economic activity as three principal factors influencing the risk of income poverty. Each of these determinants plays a vital role in the dynamics of poverty, ranging from spatial inequalities to restricted access to education and the challenges of unemployment and labour market instability. Their mutual interconnections form a complex picture of the socio-economic reality in which poverty emerges and persists. The analysis presented in this paper therefore concentrates on these three selected determinants, with the aim of deepening understanding of their impact and identifying potential pathways for effective policy interventions aimed at mitigating poverty.

2. Methodology

The methodology section outlines the overall research design and approach used to address the research objectives and questions. It describes the methods applied for data collection, analysis, and interpretation, ensuring transparency and reproducibility of the research process. The selected methodological framework is designed to systematically examine the research problem and to provide reliable and valid results.

The research questions were formulated as follows:

1. Are there statistically significant differences in the risk of income poverty between regions in Slovakia?
2. How does the risk of income poverty differ according to the level of educational attainment in Slovakia?
3. Does economic activity have a statistically significant effect on the risk of income poverty?

The research has a quantitative character and is based on a secondary analysis of data from the Statistical Office of the Slovak Republic covering the period 2013–2024. This type of secondary data analysis does not involve direct manipulation of research conditions by the researcher and is methodologically classified among non-experimental *ex post facto* studies. The analysis was conducted using the statistical software JASP 0.19.3.0, which enables clear data processing and visualisation, including robust parametric and non-parametric tests. All tests were evaluated at a significance level of $\alpha = 0.05$.

The study employed aggregated annual data that allowed for the monitoring of the development of income poverty risk across different social and demographic groups of the population. Three main variables were observed in the analysis. The first variable was region, defined as the territorial division of Slovakia according to self-governing regions. Each region was denoted by its standard two-letter abbreviation: BA – Bratislava, BB – Banská Bystrica, KE – Košice, NR – Nitra, PO – Prešov, TN – Trenčín, TT – Trnava, ZA – Žilina. The second variable was educational attainment, categorised according to the International Standard Classification of Education (ISCED) into three levels:

- Levels 0-2: low education (pre-primary, primary and lower secondary),
- Levels 3-4: medium education (upper secondary and post-secondary non-tertiary),
- Levels 5-8: tertiary education.

The third variable was economic activity, divided into two groups: employed and not employed.

For all three variables, the risk of income poverty was observed, defined as the proportion of individuals whose equivalised disposable income is below 60% of the median equivalised disposable income of the total population.

The initial stage of the analysis consisted of calculating basic descriptive statistics (mean, median, standard deviation) and visualising the distribution of values of the observed parameters using boxplots and time series.

In the second stage, assumptions of normality were tested using the Shapiro–Wilk test, and homogeneity of variances was examined by Levene’s test. For the variables region and educational attainment, the data were normally distributed, but variances differed across groups. Therefore, Welch’s one-way analysis of variance (ANOVA) was applied, as it is robust to violations of the homogeneity assumption. Pairwise comparisons between groups were subsequently conducted using the Games–Howell post hoc test, which is suitable in the case of unequal variances and different group sizes.

For the variable economic activity, the distribution in one group was found to be non-normal. Consequently, instead of the classical t-test, the Mann–Whitney U test was applied, confirming statistically significant differences between the two groups. To further verify the effect of economic activity on the risk of income poverty, a simple linear regression analysis was performed. The regression model was highly statistically significant and explained as much as 95.9% of the variance in the dependent variable.

3. Results and Discussion

Region, level of educational attainment, and economic activity are variables that represent distinct dimensions of an individual’s or household’s position within society, and their interplay may significantly influence the degree of income inequality.

3.1. Region

Regional disparities in income poverty represent an important indicator of social inequality and the overall level of economic and social cohesion within a country. In the context of the Slovak Republic, these disparities acquire particular significance due to the historical, geographical, and economic specificities of individual regions. The Bratislava Region has consistently recorded the lowest rate of income poverty risk, reaching a historic minimum of 3.7% in 2020. Conversely, the highest values of this indicator have been persistently observed in the Prešov, Banská Bystrica, and Košice Regions (Figure 1).

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Bratislava region	8,6%	7,8%	7,3%	5,4%	4,6%	4,3%	4,3%	3,7%	4,0%	7,7%	7,7%	7,0%
Tmava region	9,2%	8,5%	7,9%	9,0%	9,8%	7,9%	10,7%	9,0%	9,9%	8,9%	8,4%	8,3%
Trenčín region	7,4%	8,9%	8,7%	7,8%	7,7%	6,6%	5,1%	5,2%	5,8%	7,8%	8,3%	8,9%
Nitra region	16,3%	13,2%	13,2%	14,6%	12,1%	10,8%	6,6%	7,2%	8,2%	11,3%	13,2%	14,8%
Žilina region	11,1%	13,5%	13,4%	14,1%	13,7%	12,9%	12,1%	11,6%	12,4%	9,6%	11,7%	11,4%
Banská Bystrica region	15,6%	17,1%	16,4%	15,3%	14,2%	17,6%	19,3%	18,3%	19,1%	17,8%	17,6%	16,3%
Prešov region	19,2%	16,0%	16,4%	18,6%	18,1%	18,4%	17,5%	17,2%	19,2%	22,4%	22,6%	24,2%
Košice region	12,3%	13,7%	12,5%	13,8%	15,5%	15,8%	16,6%	15,8%	16,2%	20,3%	21,1%	21,2%

Figure 1. Development of the risk of income poverty in individual regions in Slovakia

The analysis confirms significant and statistically robust regional disparities in the risk of income poverty in Slovakia. Both graphical and statistical analyses indicate that the Bratislava Region has consistently exhibited the lowest values of this

indicator (median 0.062), whereas the highest risk of income poverty has been recorded in the Prešov Region (median 0.185), followed by the Banská Bystrica Region (0.173) and the Košice Region (0.158) (Table 1).

Table 1. Descriptive statistics – region

	BA	BB	KE	NR	PO	TN	TT	ZA
Median	0.062	0.173	0.158	0.127	0.185	0.077	0.089	0.122
Mean	0.060	0.170	0.162	0.118	0.192	0.073	0.090	0.123
Std. Deviation	0.018	0.015	0.031	0.031	0.026	0.014	0.008	0.013
Shapiro-Wilk	0.869	0.972	0.890	0.935	0.898	0.893	0.942	0.958
P-value of Shapiro-Wilk	0.064	0.931	0.118	0.433	0.149	0.130	0.525	0.754
Alpha	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Normal.	yes	yes	yes	yes	yes	yes	yes	yes

Figure 2 presents the boxplots illustrating the distribution of the risk of income poverty across the regions of Slovakia. The graph clearly demonstrates substantial differences between the individual regions. The Bratislava Region exhibited the lowest poverty risk with the median value, whereas the highest risk was recorded in the Prešov Region. Greater variability can be observed in the Banská Bystrica, Košice, and Prešov Regions, while the lowest variability is evident in the Tmava and Žilina Regions.

Prior to the variance analysis, the basic assumptions for the application of parametric tests were verified. The results of the Shapiro–Wilk normality test, presented in Table 1, indicated that all regions achieved p-values above 0.05, implying that the null hypothesis of normally distributed data could not be rejected. Despite the fulfilment of the normality assumption, the test of homogeneity of variances (Levene's test) suggested inequality of variances across groups. For this reason, the Welch one-way analysis of variance was employed.

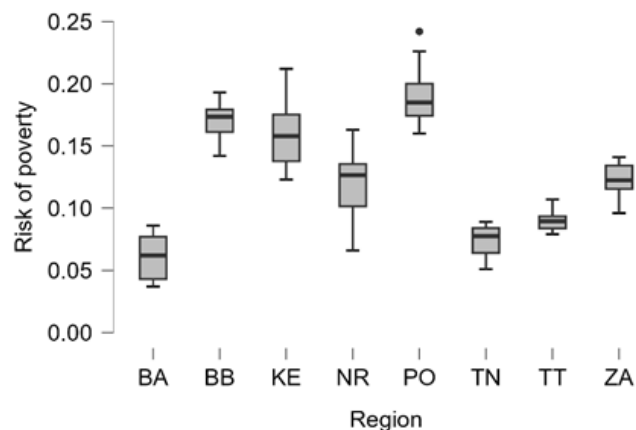


Figure 2. Boxplots - region

For the subsequent pairwise comparisons between the regions, the Games–Howell post hoc test was applied, as it is particularly suitable in cases where the assumptions of homogeneity of variances are violated and group sizes differ.

The one-way analysis of variance (Table 2) confirmed a strong effect of the region on the risk of income poverty ($F = 76.016$, $p < 0.001$, $\eta^2 = 0.829$), with the region as a factor explaining as much as 82.9% of the variability in the risk of income poverty.

This result underscores the significance of the geographical dimension in assessing socio-economic inequality.

The post hoc tests revealed statistically significant differences between several pairs of regions. For instance, the difference between the Bratislava and Prešov regions reached a value of -0.131 ($p < 0.001$), representing one of the most pronounced contrasts within the entire comparison.

Table 2. ANOVA – region

Homogeneity Correction	Cases	Sum of Squares	df	Mean Square	F	p	η^2
Welch	Region	0.192	7.000	0.027	76.016	< .001	0.829
	Residuals	0.040	37.119	0.001			

Note: Type III sum of squares

Statistically non-significant differences were observed only between certain pairs (e.g., Košice - Prešov, Nitra - Trnava), which may indicate similarities in their socio-economic profiles (Table 3).

Table 3. Games-Howell post hoc comparisons – region

Comparison	Mean Difference	Lower	Upper	SE	t	df	p_{tukey}
BA - BB	-0.110	-0.133	-0.087	0.007	-16.060	21.489	< .001
BA - KE	-0.102	-0.138	-0.066	0.010	-9.782	17.593	< .001
BA - NR	-0.058	-0.093	-0.022	0.010	-5.565	17.703	< .001
BA - PO	-0.131	-0.162	-0.100	0.009	-14.382	19.635	< .001
BA - TN	-0.013	-0.035	0.009	0.007	-2.012	20.529	0.498
BA - TT	-0.029	-0.049	-0.009	0.006	-5.082	15.618	0.002
BA - ZA	-0.063	-0.084	-0.041	0.006	-9.740	20.008	< .001
BB - KE	0.008	-0.027	0.043	0.010	0.811	16.065	0.990
BB - NR	0.053	0.018	0.087	0.010	5.264	16.160	0.001
BB - PO	-0.021	-0.051	0.009	0.009	-2.410	17.940	0.294
BB - TN	0.097	0.077	0.117	0.006	16.259	21.696	< .001
BB - TT	0.081	0.063	0.098	0.005	15.906	17.060	< .001
BB - ZA	0.048	0.028	0.067	0.006	8.157	21.384	< .001
KE - NR	0.044	0.002	0.087	0.013	3.495	21.998	0.036
KE - PO	-0.029	-0.068	0.010	0.012	-2.486	21.266	0.253
KE - TN	0.089	0.054	0.123	0.010	9.007	15.080	< .001
KE - TT	0.073	0.039	0.106	0.009	7.775	12.603	< .001
KE - ZA	0.039	0.005	0.074	0.010	4.029	14.699	0.019
NR - PO	-0.074	-0.113	-0.035	0.012	-6.311	21.341	< .001
NR - TN	0.044	0.010	0.079	0.010	4.543	15.160	0.007
NR - TT	0.028	-0.005	0.062	0.009	3.057	12.636	0.119
NR - ZA	-0.005	-0.039	0.029	0.010	-0.516	14.772	0.999
PO - TN	0.118	0.089	0.147	0.008	13.934	16.713	< .001
PO - TT	0.102	0.074	0.130	0.008	12.943	13.321	< .001
PO - ZA	0.069	0.040	0.098	0.008	8.188	16.216	< .001
TN - TT	-0.016	-0.032	-2.374×1	0.005	-3.455	18.319	0.045
TN - ZA	-0.049	-0.068	-0.031	0.005	-9.050	21.940	< .001
TT - ZA	-0.033	-0.049	-0.018	0.004	-7.434	18.894	< .001

Note: Results based on uncorrected means

Figure 3 graphically summarises the results of the pairwise comparisons between the regions. The visualisation substantially facilitates the identification of regions in which statistically significant differences in the risk of income poverty are present. It clearly distinguishes the Bratislava Region from the other regions and confirms its statistical distinctiveness in terms of the lowest level of risk.

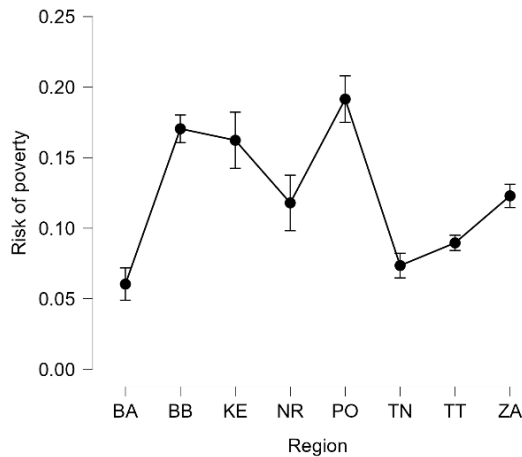


Figure 3. Descriptive plots – region

Gender	Level of education	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	Levels 0-2	21.9%	23.4%	22.3%	24.3%	24.4%	24.9%	29.1%	28.8%	28.4%	31.9%	29.8%	30.8%
Total	Levels 3-4	10.8%	10.8%	10.0%	10.1%	9.8%	9.0%	8.7%	8.7%	9.6%	10.0%	10.9%	12.0%
Total	Levels 5-8	4.8%	4.6%	5.5%	5.8%	5.7%	6.1%	3.7%	4.5%	6.4%	6.9%	8.1%	8.3%
Males	Levels 0-2	26.3%	27.4%	26.8%	28.4%	29.4%	29.0%	33.5%	33.4%	30.8%	37.3%	35.6%	35.6%
Males	Levels 3-4	10.2%	11.2%	10.2%	10.2%	9.5%	8.8%	8.2%	8.4%	8.9%	9.2%	10.8%	11.4%
Males	Levels 5-8	4.6%	3.4%	5.4%	5.1%	5.2%	5.4%	2.8%	4.1%	6.1%	7.5%	8.4%	7.9%
Females	Levels 0-2	19.4%	21.1%	20.0%	22.1%	21.7%	22.5%	26.6%	26.2%	26.9%	28.6%	26.5%	27.8%
Females	Levels 3-4	11.3%	10.3%	9.9%	9.9%	10.0%	9.2%	9.2%	9.1%	10.4%	10.9%	11.0%	12.7%
Females	Levels 5-8	5.0%	5.6%	5.5%	6.2%	6.1%	6.6%	4.4%	4.8%	6.6%	6.3%	7.9%	8.6%

Figure 4. Development of income poverty risk by level of education and gender in Slovakia

Individuals with completed upper secondary or post-secondary non-tertiary education in Slovakia exhibited a substantially lower at-risk-of-poverty rate. This level of education reduces the risk of socio-economic marginalisation; however, secondary education alone may not always be sufficient to ensure full economic security and competitiveness in the labour market, particularly during periods of economic crisis.

The lowest at-risk-of-poverty rates in Slovakia were recorded among individuals with tertiary education. Throughout the observed period, their at-risk-of-poverty rate remained stable, ranging from 3.7% to 8.3%, with men ranging from 2.8% to 8.4% and women from 4.4% to 8.6% (Table 4). Tertiary education constitutes the most effective safeguard against poverty, thereby underscoring its significance not only for individual prosperity but also for the broader socio-economic stability of the country.

3.2. Level of Education

A higher level of attained education has traditionally been associated with better employment opportunities, higher wages, and a lower probability of unemployment or economic marginalisation. Individuals whose highest level of education was below primary, primary, or lower secondary schooling exhibited the highest at-risk-of-poverty rates in Slovakia during the observed period (Figure 4). Between 2013 and 2023, the at-risk-of-poverty rate in this group ranged from 21.9% to 30.8%, with men ranging from 26.3% to 35.6% and women from 19.4% to 27.8%. This trend highlights the pronounced vulnerability of low-skilled individuals in the labour market and their limited capacity to secure an income above the poverty threshold.

Table 4. Descriptive statistics – level of education

	Lvl 0-2	Lvl 3-4	Lvl 5-8
Median	0.272	0.100	0.057
Mean	0.273	0.100	0.058
Std. Deviation	0.045	0.010	0.015
Shapiro-Wilk	0.975	0.978	0.973
P-value of Shapiro-Wilk	0.561	0.678	0.516
Alpha	0.05	0.05	0.05
Normal	yes	yes	yes

Figure 5 presents boxplots illustrating the at-risk-of-poverty rate by level of attained education in Slovakia. The figure clearly demonstrates that education exerts a substantial influence on the likelihood of income poverty.

The highest risk is associated with low levels of education, where the median risk exceeds 25%. Conversely, individuals with tertiary education exhibited the lowest risk, with the median remaining below 10%. These findings provide clear evidence of a strong negative correlation between educational attainment and the risk of income poverty, underscoring the importance of investment in education as a tool for preventing social exclusion.

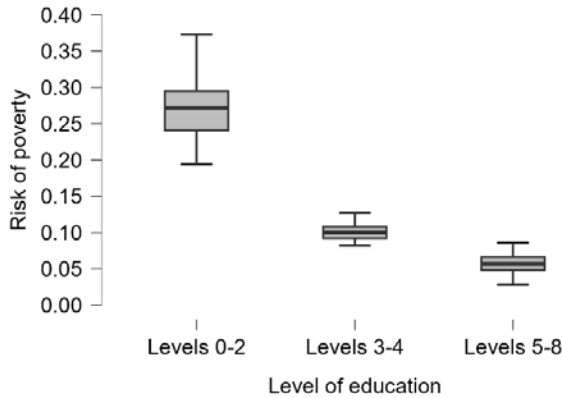


Figure 5. Boxplots – level of education

Table 5. ANOVA – level of education

Homogeneity Correction	Cases	Sum of Squares	df	Mean Square	F	p	η^2
Welch	Level of education	0.932	2.000	0.466	393.166	< .001	0.919
	Residuals	0.083	61.446	0.001			

Note: Type III sum of squares

Subsequent pairwise comparisons between educational groups were conducted using the Games–Howell post hoc test, which is particularly appropriate in cases of unequal variances and unequal group sizes. Although considered conservative, this test accurately evaluates differences between all pairs of educational groups without introducing bias into the results. The one-way analysis of variance (Table 5) confirmed a strong effect of educational attainment on the risk of income poverty ($F = 393.166$, $p < 0.001$, $\eta^2 = 0.919$), with education alone accounting for as much as 91.9% of the variance in income poverty risk. This finding underscores the exceptional importance of education as a determinant in explaining socio-economic inequality.

The post hoc tests (Games–Howell) revealed statistically significant differences between all pairs of educational groups. The largest disparity was observed between individuals with the lowest level of education (Levels 0–2) and those with tertiary education (Levels 5–8), where the difference in the at-risk-of-poverty rate reached 0.215 ($p < 0.001$), representing the most pronounced contrast within the entire comparison.

Prior to conducting the analysis of variance, the fundamental assumptions required for the application of parametric tests were verified. The results of the Shapiro–Wilk test of normality, presented in Table 4, indicated that all groups defined by educational attainment achieved p-values greater than 0.05, suggesting that the null hypothesis of normally distributed data could not be rejected. Despite the fulfilment of the normality assumption, the test of homogeneity of variances (Levene’s test) revealed unequal variances across groups ($F = 28.675$, $p < 0.001$). For this reason, Welch’s one-way analysis of variance was employed, as it is robust to violations of this assumption and provides a reliable test of mean differences under conditions of heteroscedasticity (Table 5).

Significant differences were also identified between Levels 0–2 and 3–4 (difference of 0.173, $p < 0.001$), as well as between Levels 3–4 and 5–8 (difference of 0.042, $p < 0.001$), albeit with lower intensity.

These findings point to a clearly defined gradient effect of education, whereby each successive educational tier is associated with a statistically significant reduction in the risk of income poverty. The results are consistent with theoretical assumptions regarding the influence of education on an individual’s socio-economic situation and support the conclusion that raising educational attainment constitutes an effective instrument for poverty prevention.

Figure 6 provides a graphical summary of the pairwise comparisons between educational groups. The visualisation considerably facilitates the identification of statistically significant differences in the at-risk-of-poverty rate across educational levels. It is evident from the figure that individuals with low levels of education (Levels 0–2) exhibit the highest poverty risk, being clearly separated from groups with higher educational attainment.

A marked decline in risk is already observable at the medium level of education (Levels 3–4), with an even more pronounced reduction at the tertiary level (Levels 5–8), thereby confirming the gradual and statistically significant effect of education on poverty risk.

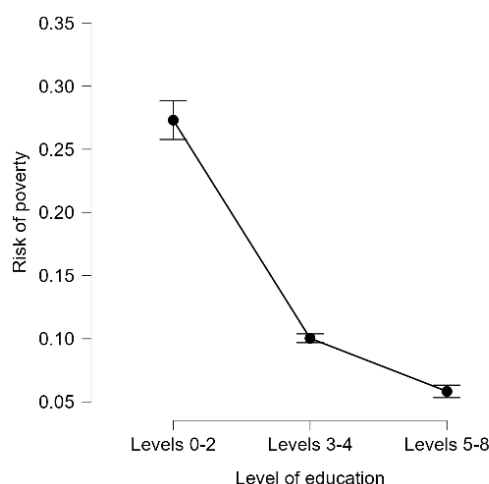


Figure 6. Descriptive plots – level of education

Table 6. Games-Howell post hoc comparisons – level of education

Comparison	Mean Difference	SE	t	df	p _{Tukey}
Levels 0-2 - Levels 3-4	0.173	0.008	22.356	38.643	< .001
Levels 0-2 - Levels 5-8	0.215	0.008	27.146	42.172	< .001
Levels 3-4 - Levels 5-8	0.042	0.003	14.153	63.133	< .001

Note: Results based on uncorrected means

3.3. Economic Activity

The at-risk-of-poverty rate by economic activity provides essential insights into the disparities between employed and unemployed individuals, as well as between men and women, which are crucial for understanding the dynamics of social inequality in Slovakia. Between 2013 and 2024, the risk of income poverty among the employed in Slovakia remained low and stable, with a slight decline observed in 2019.

However, after 2020, the at-risk-of-poverty rate among the employed began to increase.

This trend reflects the adverse socio-economic impacts of the COVID-19 pandemic, which disproportionately affected low-income occupations and exacerbated the problem of poor job quality.

In contrast, the unemployed faced a substantially higher risk of income poverty than the employed throughout the entire period under review. The temporal development indicates that between 2013 and 2019 the at-risk-of-poverty rate among the unemployed was high, with only moderate year-on-year fluctuations (Figure 7). Following the onset of the COVID-19 pandemic in 2020, however, a surprising trend emerged – the risk of income poverty among the unemployed declined.

Gender	Economic activity	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	Employed	5.7%	5.7%	6.0%	6.5%	6.3%	6.0%	4.4%	5.2%	6.7%	7.1%	9.1%	10.3%
Total	Not employed	43.8%	48.7%	45.5%	47.6%	49.2%	51.0%	56.7%	56.1%	52.7%	53.6%	52.9%	64.1%
Males	Employed	5.9%	6.1%	6.5%	6.9%	6.8%	6.2%	5.2%	6.0%	7.2%	7.9%	10.1%	11.4%
Males	Not employed	48.5%	53.6%	48.5%	49.8%	53.2%	54.9%	60.3%	61.5%	55.9%	57.2%	59.1%	57.6%
Females	Employed	5.5%	5.3%	5.5%	6.0%	5.8%	5.8%	3.4%	4.2%	6.0%	6.2%	7.9%	8.8%
Females	Not employed	39.0%	43.7%	42.0%	45.2%	45.1%	46.6%	52.6%	50.7%	48.8%	50.0%	47.5%	69.8%

Figure 7. Development of income poverty risk by economic activity and gender in Slovakia

This phenomenon is atypical, as under normal conditions of economic disruption an increase in the risk of income poverty within this group would be expected.

The decline is attributable to active state interventions, which included the expansion of the social protection system, the introduction of extraordinary allowances, and more flexible eligibility conditions for unemployment benefits.

Together, these measures temporarily stabilized household incomes and mitigated the transmission of labor market shocks into immediate poverty outcomes.

Table 7 presents descriptive statistics of income poverty risk by economic activity, comparing employed and unemployed individuals. The table highlights substantial differences in central tendency and variability between the two groups, indicating a markedly higher risk of income poverty among unemployed individuals.

Table 7. Descriptive Statistics – Economic activity

	Employed	Not employed
Median	0.060	0.508
Mean	0.065	0.517
Std. Deviation	0.017	0.065
Shapiro-Wilk	0.894	0.980
P-value of Shapiro-Wilk	0.002	0.749
Alpha	0.05	0.05
Normal.	no	yes

Figure 8 presents boxplots illustrating the at-risk-of-poverty rate by individual economic activity. Unemployed persons exhibited the highest risk of income poverty, with the median value fluctuating around 50% and a considerable degree of dispersion.

By contrast, employed individuals faced a very low risk of income poverty – the median lies below 10%, with values showing far less variability. These disparities indicate a strong association between labour market activity and the likelihood of experiencing income poverty, thereby underscoring the importance of employment as a key instrument for preventing social exclusion.

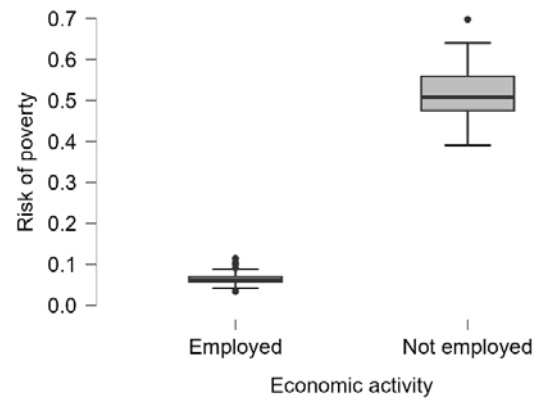


Figure 8. Boxplots – economic activity

Prior to conducting the analysis, the assumptions of normality were tested using the Shapiro–Wilk test. The results indicated that the distribution of the at-risk-of-poverty rate among employed individuals deviated significantly from normality ($p = 0.002$).

Consequently, instead of a parametric T-test, the non-parametric Mann–Whitney U test was applied, which confirmed statistically significant differences between the groups ($U = 0$, $p < .001$) (Table 8).

Table 8. Independent samples T-test – economic activity

Test	Statistic	df	p
Student	-40.452	70	< .001
Mann-Whitney	0.000		< .001

To assess the effect of economic activity on the risk of income poverty, a simple linear regression analysis was applied. The results demonstrate that economic activity exerts an exceptionally strong influence on the occurrence of income poverty risk, and this effect is highly statistically significant ($R^2 = 0.959$, $p < 0.001$) (Table 9). The model compared a null model (without predictors) with an extended model including economic activity as a predictor. The RMSE (Root Mean Square Error) decreased from 0.232 in the null model to 0.047 in the extended model, indicating a substantial improvement in predictive accuracy.

Table 9. Model summary – economic activity

	R	R ²	Adjusted R ²	RMSE
M ₀	0.000	0.000	0.000	0.232
M ₁	0.979	0.959	0.958	0.047

Note: M₁ includes economic activity

The regression output also included an ANOVA table, which confirmed the overall statistical significance of the model ($F = 1636.373$, $p < 0.001$) (Table 10).

Table 10. ANOVA – economic activity

Model		Sum of Squares	df	Mean Square	F	p
M ₁	Regression	3.678	1	3.678	1636.373	< .001
	Residual	0.157	70	0.002		
	Total	3.836	71			

Note: M₁ includes Economic activity

The intercept model is omitted, as no meaningful information can be shown

The regression coefficients further revealed that economic inactivity (unemployment) constitutes a strong and statistically significant predictor of the risk of income poverty. The coefficient $B = 0.452$ ($p < 0.001$) indicates that unemployed individuals are substantially more likely to face the risk of income poverty. This finding once again underscores the importance of economic activity in mitigating poverty.

Figure 9 presents the diagnostic plots of the regression model – the residuals versus predicted values plot and Figure 10 the histogram of standardised residuals. The “Residuals vs Predicted” plot shows no systematic pattern, suggesting that the assumptions of linearity and homoscedasticity are satisfied. Most residuals cluster around the zero axis, which supports the reliability of the model. The histogram of standardised residuals displays an approximately normal shape centred near zero, indicating that the assumption of residual normality is broadly met. Both outputs confirm that the model is appropriately specified and that no serious deviations are present, which would undermine its validity.

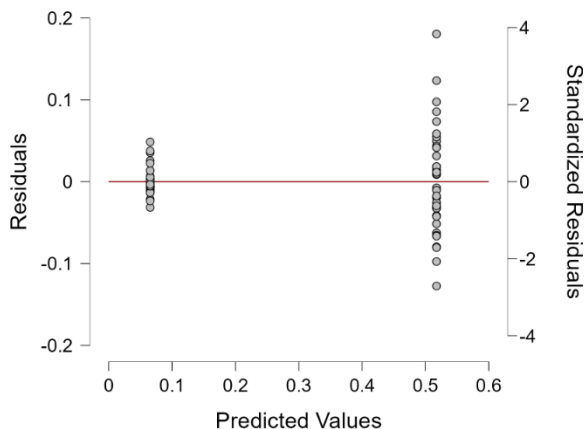


Figure 9. Residuals vs predicted – economic activity

This result supports the conclusion that the inclusion of economic activity significantly reduces the unexplained variability in the at-risk-of-poverty rate.

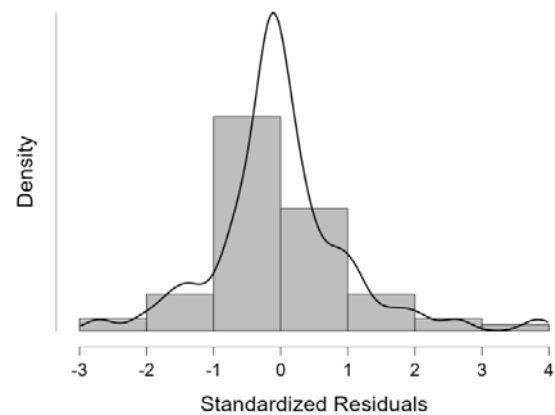


Figure 10. Standardized residuals histogram – economic activity

The results of the regression analysis unequivocally confirmed that economic activity is a key determinant of the risk of income poverty. The detailed regression coefficients for economic activity are presented in Table 11. Unemployment substantially increases the likelihood of poverty, with the median risk among unemployed individuals reaching as high as 50%, compared with 6% among the employed. This pronounced disparity highlights the critical role of labour market participation in reducing social exclusion.

The regression model demonstrated a high level of explained variability ($R^2 = 0.959$), while diagnostic tests and graphical outputs confirmed the appropriateness of the model specification and the fulfilment of the key assumptions of linear regression. Moreover, the coefficient for economic inactivity ($B = 0.452$, $p < 0.001$) indicates a strong positive relationship between unemployment and the risk of poverty.

Table 11. Coefficients – economic activity

Model		Unstandardized	Standard Error	t	p
M ₀	(Intercept)	0.291	0.027	10.641	< .001
M ₁	(Intercept)	0.065	0.008	8.282	< .001
	Economic activity	0.452	0.011	40.452	< .001
	(Not employed)				

4. Conclusion

The research yielded unambiguous answers to the formulated research questions and provided a deeper understanding of the mechanisms underpinning the risk of income poverty in Slovakia.

First, the analysis confirmed the existence of statistically significant regional disparities in the risk of income poverty. The lowest risk was consistently observed in the Bratislava Region, whereas the Prešov, Banská Bystrica, and Košice Regions displayed the highest levels. These differences reflect deeper structural inequalities between regions and highlight the need for targeted regional policies aimed at reducing disparities and supporting endogenous development, particularly in the least developed areas of Slovakia.

Second, the results demonstrated that education constitutes a key determinant of income poverty risk. Individuals with low levels of education faced the highest risk, while tertiary education was confirmed as the strongest protective factor. This pronounced gradient clearly indicates that investments in education, particularly in the early stages of life and within disadvantaged communities, represent an effective instrument for preventing social exclusion and the intergenerational transmission of poverty.

Third, the research established that economic activity is the strongest predictor of income poverty risk. Unemployment substantially increases the likelihood of falling into poverty, with the difference between the employed (median risk of 6%) and the unemployed (median risk of 50%) reaching extreme values. Regression analysis confirmed that economic activity accounts for as much as 95.9% of the variability in income poverty risk. These findings underscore the necessity of active employment policies and the expansion of access to high-quality jobs as a fundamental mechanism of social inclusion.

Overall, the study concludes that poverty is not a matter of individual choice but rather the outcome of socio-economic factors, among which region, education, and economic activity play a decisive role. Their interplay creates a complex picture of income inequality in Slovakia and demonstrates that its mitigation requires an integrated approach combining regional, educational, and employment policies.

Based on the findings, several policy recommendations can be made:

Regional policy: Introduce more targeted measures to support the least developed regions (Prešov, Banská Bystrica, and Košice), combining investments in infrastructure, entrepreneurship promotion, and job creation.

Educational policy: Strengthen access to quality education in disadvantaged areas, expand pre-school education and second-chance programs, and motivate young people to attain tertiary education.

Employment policy: Develop active labour market measures that promote not only employment but also job quality. At the same time, policies should address vulnerable groups such as the long-term unemployed, low-skilled workers, and recent graduates.

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