

*dr Małgorzata Ćwiek*¹ 

Department of Statistics
Cracow University of Economics

*dr Kamila Trzcńska*² 

Department of Statistical Methods
University of Lodz

The economic situation of households in Poland and the Czech Republic. Comparative analysis³

INTRODUCTION

The household is a central but underestimated participator in the economy. The economy could not develop without work, which is the most important production factor provided by households (Costantini, Seccareccia, 2020). At the same time, households and their members are consumers of goods and services produced in the economy. The measure for the efficiency of functioning of households is possibly a high level of satisfaction of needs – both individual and common to the entire household. This function is realised through the consumption of goods and services (Borowska et al., 2020; Bywalec, 2012). The condition for consumption is to have sufficient resources to purchase the goods and services mentioned (Canberra Group, 2011). The knowledge of the income distribution is the basis for assessing the material situation of socio-economic groups of households (Dolls et al., 2019; Trzcńska, 2020; Trzcńska, 2021; Kuznets, 2019; Bartošová, Bína, 2009). A lack of funds to meet the needs at the desired level implies a risk of

¹ Correspondence address: 27 Rakowicka St., 31-510 Cracow, Poland; e-mail: malgorzata.cwiek@uek.krakow.pl. ORCID: 0000-0002-6375-098X.

² Correspondence address: 41 Rewolucji 1905 r. St., 92-2014 Lodz, Poland; e-mail: kamila.trzinska@uni.lodz.pl. ORCID: 0000-0002-4714-4074.

³ The Project has been financed by the Ministry of Science and Higher Education within “Regional Initiative of Excellence” Programme for 2019–2022. Project no.: 021/RID/2018/19. Total financing: 11 897 131,40 PLN.

poverty for households and may lead to social exclusion of its members due to the inability to participate in social life (Ledić, Rubil, 2019; Mysíková et al., 2019; Forster, Pearson, 2018; Salejko-Szyszczak, Szczepaniak, 2017; Wolf, 2009). In a broader sense, poverty is understood not only as an inadequate level of income, insufficient to purchase appropriate goods or services, but also a lack of prospects for changing the situation for the better in the near future (Liberati et al., 2022; Biernat-Jarka, Trębska, 2018). Multidimensional poverty is also associated with deprivation of higher needs, including living conditions in a broader perspective (Ulman, Ćwiek, 2014; Iftimoaei et al., 2021; Golinowska, Broda-Wysocki, 2005; Ferreira, Lugo, 2013). Thus, not only does the level and quality of life of their members depend on the financial condition of households, but indirectly also on the condition of the entire economy.

The aim of the paper is to compare the economic situation of households in Poland and the Czech Republic. The level and the dispersion of income distributions of households and the level of poverty due to selected socio-economic characteristics of a respondent or a household are analysed. All the conclusions are based on the results of European Quality of Life Surveys. Poland and the Czech Republic were selected for the analysis because, on the one hand, they are countries that share a similar geographic location and geopolitical conditions, and on the other hand, are characterised by different economic situations (Michálek, Výbošťok, 2019; Sompolska-Rzechuła, Kurdyś-Kujawska, 2022). The paper deals with the issue of the distribution of equivalent income, inequality, and poverty, which constitute an important and current socio-economic problem. The originality of the work is based on the use of microdata obtained from the Eurostat database to compare patterns in terms of disadvantaged groups of households in Poland and the Czech Republic due to the selected socio-economic characteristics.

The structure of the study is derived from the above-mentioned objective. The first part includes the methodology of the conducted research and the description of the data. The second part demonstrates the results of the conducted analysis. The paper is concluded with a summary, which contains the most important conclusions of the analyses, and identifies potential directions for further research.

METHODOLOGY AND STATISTICAL DATA

To describe the economic situation of Czech and Polish households, statistical data from the European Quality of Life Survey (EQLS) was used. The survey conducted by Eurostat contains information about the living conditions and social situation of people in Europe. So far, four rounds of this survey have been carried out: in 2003, 2007, 2012 and 2016. In this paper, the latest data was used. The EQLS uses a statistical sample to examine a population of adults (aged 18 or

above) who live in private households. The sample size was 733 households in Poland and 686 households in the Czech Republic.

In this paper, all calculations are based on net equivalent income expressed in the Euro according to the purchasing power parity (PPP). Equivalent income is the total income of a household that is available for spending, divided by the number of household members converted into equivalised adults (Mysiková et al., 2021). Net equivalent income is after-tax income, enabling income comparisons in countries with different tax systems. Household members are equivalised or made equivalent by the following so-called modified OECD (Organisation for Economic Cooperation and Development) equivalence scale:

- the first household member aged 14 years or more counts as 1 person;
- each other household member aged 14 years or more counts as 0.5;
- each household member aged 13 years or less counts as 0.3.

All analyses are carried out for households in general including the following socio-economic characteristics: the size of the household's locality (large town or city, small or medium-sized town, rural area or village), age group of the reference person (18–24, 25–34, 35–49, 50–64, 65+), and education level of the reference person (lower secondary or below, upper secondary or post-secondary, tertiary).

Income distribution can be described empirically or using theoretical models, i.e. density functions. The Singh-Maddala model was introduced in economics in the context of modelling income distribution by Singh and Maddala (1976). In statistics, this distribution appeared first in the system of distributions of Burr (1942) and is known as the Burr XII distribution. The Singh-Maddala model is characterised by high flexibility. The Singh-Maddala distribution is described by the probability density function (Kleiber, Kotz, 2003):

$$f(x; a, b, q) = \frac{aqx^{a-1}}{b^a \left[1 + \left(\frac{x}{b}\right)^a\right]^{1+q}}, \quad x > 0 \quad (1)$$

The cumulative distribution function takes the form:

$$F(x; a, b, q) = 1 - \left[1 + \left(\frac{x}{b}\right)^a\right]^{-q}, \quad x > 0 \quad (2)$$

The theoretical properties of the Singh-Maddala are very well known (Kleiber, Kotz 2003).

The mean of the Singh-Maddala model takes the form:

$$E(X) = \frac{b\Gamma\left(1 + \frac{1}{a}\right)\Gamma\left(q - \frac{1}{a}\right)}{\Gamma(q)} \quad (3)$$

And the variance is equal:

$$\text{var}(X) = \frac{b^2 \{ \Gamma(q) \Gamma(1 + \frac{2}{a}) \Gamma(q - \frac{2}{a}) - \Gamma^2(1 + \frac{1}{a}) \Gamma^2(q - \frac{1}{a}) \}}{\Gamma^2(q)} \quad (4)$$

The mode is described by the formula:

$$x_{\text{mode}} = b \left(\frac{a - 1}{aq + 1} \right)^{1/a}, \quad a > 1 \quad (5)$$

The Gini coefficient for a country is often displayed visually using a graph called the Lorenz curve (Lorenz, 1905). Higher values of the Gini coefficient indicate greater income inequalities in society. The Gini coefficient for the considered model can be expressed by the following formula:

$$G = 1 - \frac{\Gamma(q) \Gamma(2q - \frac{1}{a})}{\Gamma(q - \frac{1}{a}) \Gamma(2q)} \quad (6)$$

The situation in which households have insufficient funds to meet their basic needs at an appropriate level is associated with poverty (Panek, 2011; Wolf, 2009). The broadest application in measuring poverty is aggregated poverty indices. Headcount Ratio (HR) determines the extent of poverty (poverty incidence), i.e., the percentage of households below the poverty line (Panek, 2011):

$$HR = \frac{n_p}{n} \quad (7)$$

n_p – number of households below the poverty line,
 n – total number of households.

This index takes the value of 0 when there are no poor households and 1 when all households have an income equivalent below the poverty line. The poverty rate does not explain the depth of poverty in the poor population. It has the same value regardless of the difference between the equivalent income of households and the poverty line.

The primary measure for assessing the depth of poverty is the Poverty Gap Index (PGI). It measures the average distance between the equalised income of the poor and the poverty line. It is calculated by the formula:

$$PGI = \frac{1}{n_p} \sum_{i=1}^{n_p} \frac{z - y_i}{z} \quad (8)$$

y_i – the income equivalent to the i -th household,
 z – the value of the poverty line.

The Income Gap Index (IGI) is a primary measure of poverty intensity. Together with the Poverty Gap Index, it describes the scope and depth of poverty. The main difference from the Poverty Gap Index is that it applies to the entire surveyed population, not just poor households. It is calculated according to the formula:

$$IGI = \frac{1}{n} \sum_{i=1}^{n_p} \frac{z - y_i}{z} \quad (9)$$

The fourth group of measures, apart from the scope and depth of poverty, takes into account income inequalities among the poor. The Poverty Severity Index (PSI) is the most widely used. It is a measure in which a given household has the greater weight, the greater the distance of its equivalent income from the poverty line:

$$PSI = \frac{1}{n} \sum_{i=1}^{n_p} \left(\frac{z - y_i}{z} \right)^2 \quad (10)$$

Poverty analysis was carried out based on the relative poverty line (60% of the median estimated using the Singh-Maddala model).

RESULTS AND DISCUSSION

Tables 1 and 2 contain the estimates of the Singh-Maddala distribution parameters for the equivalent income of the Czech Republic and Poland, respectively (total and selected socio-economic breakdowns). Parameters a and q on the Singh-Maddala income model are the shape parameters, and b is the scale parameter (Kleiber, Kotz, 2003).

Table 1. Estimation results for income distributions in the Czech Republic based on EQLS data

Parameter	a	b	q
Total			
Czech Republic	3.4227	954.1190	0.7520
Size of the household's locality			
Large town or city	4.1177	905.6390	0.5031
Small or medium-sized town	2.9499	1059.2400	1.0058
Rural area or village	3.5044	951.5040	0.8825
Age group of the reference person			
18–24	20.2685	603.9851	0.0738
25–34	4.2546	1071.5000	0.5424
35–49	3.6194	1175.8800	0.8682
50–64	3.2273	1679.4500	2.3139
65+	6.6003	703.5520	0.4460
Education level of the reference person			
Lower secondary or below	4.0015	631.6290	0.5749
Upper secondary or post-secondary	4.0827	884.4330	0.6258
Tertiary	2.1949	2608.0200	2.7058

Source: own calculations.

Table 2. Estimation results for income distributions in Poland based on EQLS data

Parameters	a	b	q
Total			
Poland	2.3976	917.0210	1.0649
Size of the household's locality			
Large town or city	3.1562	567.6382	1.2129
Small or medium-sized town	2.3209	883.3600	0.9983
Rural area or village	2.4081	838.5190	1.1186
Age group of the reference person			
18–24	3.4849	614.8794	0.3670
25–34	2.0634	1589.1100	1.8714
35–49	2.0466	1262.8300	1.5484
50–64	2.1920	921.1010	1.1694
65+	4.2008	598.3070	0.5011
Education level of the reference person			
Lower secondary or below	4.3644	396.0777	0.3193
Upper secondary or post-secondary	2.3696	924.8460	1.0953
Tertiary	2.7560	1319.4000	1.1192

Source: own calculations.

Figure 1 shows the density functions of the Singh-Maddala distribution of equivalent incomes for the Czech Republic and Poland. Both distributions are characterised by a strong skewness to the right. The distribution of the incomes of Czech households is shifted to the right compared to Polish households. This means that Czech households have, on average, greater amounts at their disposal. Apart from this shift, the shape of both density functions is very similar.

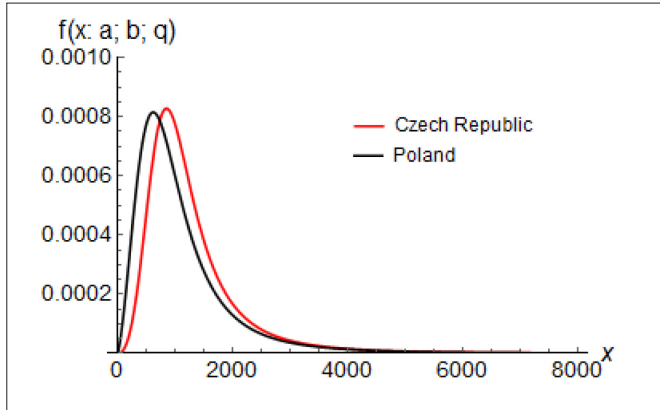


Figure 1. Density function for net equivalent income in Euro (PPP) for Poland and the Czech Republic

Source: own elaboration.

Tables 3 and 4 present the descriptive characteristics of net equivalent income in the Czech Republic and in Poland. The analyses show that the average income in the Czech Republic is over 15% higher than in Poland. An even greater disproportion concerns the median and the mode – in the Czech Republic, the median is higher by over 20% than in Poland, and the mode by as much as 37%. On the other hand, income in Poland is characterised by a greater standard deviation and a greater level of inequality.

Table 3. Descriptive statistics of net equivalent income for total households in the Czech Republic and in selected socio-economic groups

Specification	Mean	Median	Mode	Standard deviation	Gini coefficient
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Czech Republic Total	1350.59	1076.98	851.68	1359.81	0.3445
Size of the household's locality					
Large town or city	1621.83	1179.30	908.92	1566.40	0.3854
Small or medium-sized town	1283.91	1056.36	832.58	1061.95	0.3380
Rural area or village	1182.31	1000.73	827.08	860.58	0.3048

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Age group of the reference person					
18–24	1338.49	705.77	491.00	1541.70	0.5053
25–34	1735.69	1340.04	1067.45	2293.55	0.3475
35–49	1458.84	1242.85	1036.04	1026.80	0.2976
50–64	1280.88	1212.03	1110.16	554.39	0.2345
65+	1007.79	858.881	741.97	668.61	0.2502
Education level of the reference person					
Lower secondary or below	1016.15	781.03	616.81	1374.00	0.3547
Upper secondary or post-secondary	1306.74	1051.58	854.10	1276.83	0.3247
Tertiary	1686.50	1488.39	1170.14	1044.88	0.3228

Source: own calculations.

In the Czech Republic, households in large towns do best – their income is 26% higher than in small and medium-sized towns and 37% higher than in rural areas. Comparing the median incomes, households in cities have incomes higher by 12% as compared to small and medium-sized towns and by 18% as compared to households in rural areas. Lower average incomes in households in rural areas and in small and medium-sized towns are also accompanied by significantly lower dispersion. In rural areas, the standard deviation is as much as 45% lower than in large towns.

Taking into account the breakdown of households according to the age of the reference person, households of young people (25–34) in the Czech Republic are in the best situation. With the increase in the age of the reference person, the average equivalent income decreases. Compared to households of older people (65+), households of people aged 25–34 have an average income higher by 72%. The youngest households have a surprisingly high income – compared to households whose reference person is 25–34 years of age, their average income is 23% lower. The same trend is noticeable for the median income, but the median values for individual age groups are lower by an average of EUR 292 than the average value. On the other hand, the mode in the youngest group of households is the lowest, and it is the highest in households where the reference person is aged 50–64. It is 126% higher than the modal income of the youngest households and 50% higher than the modal equivalent income of older households.

All measures of central tendency calculated for the equivalent income show an increase with the increase of the reference person’s education. Households whose reference person has upper secondary or post-secondary education have an equivalent income higher, on average, by less than 30% compared to households whose reference person has lower secondary education or below. In the case of

households of people with higher education, the disproportion is even greater – they have an income higher by 66% as compared to households of people with lower secondary education or below. On the other hand, the standard deviation is the highest in the households of people with the lowest education and decreases with the increase in the reference person's education.

Table 4. Descriptive statistics for net equivalent income for total households in Poland and in selected socio-economic groups

Specification	Mean	Median	Mode	Standard deviation	Gini coefficient
Total	1168.30	884.59	621.38	1366.21	0.4031
Size of the household's locality					
Large town or city	1226.79	884.28	439.69	1891.13	0.4313
Small or medium-sized town	1017.94	786.96	561.80	1071.98	0.3914
Rural area or village	595.28	522.73	439.70	363.70	0.2900
Age group of the reference person					
18–24	1298.75	486.90	305.10	1368.95	0.6738
25–34	1312.76	1077.19	760.79	1034.57	0.3715
35–49	1219.57	955.11	642.77	1133.19	0.3977
50–64	1124.47	836.47	558.92	1360.18	0.4195
65+	1056.53	778.41	602.66	1441.40	0.3779
Education level of the reference person					
Lower secondary or below	894.57	657.92	492.99	1602.41	0.3954
Upper secondary or post-secondary	1154.34	877.52	615.43	1312.13	0.4018
Tertiary	1513.95	1247.89	971.29	1228.46	0.3429

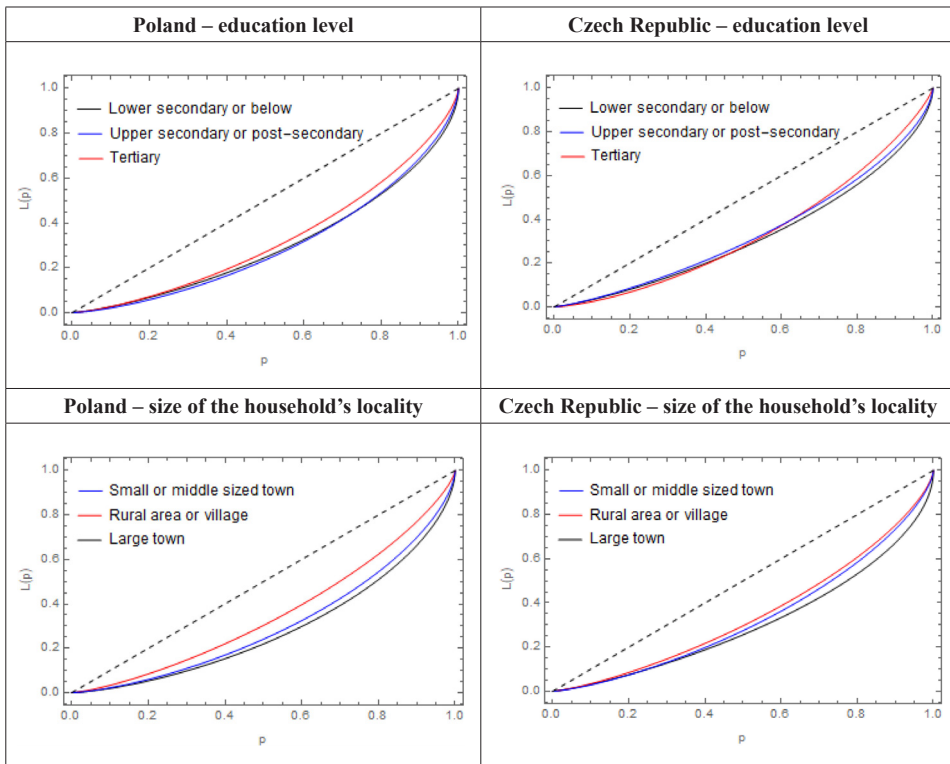
Source: own calculations.

In Poland, as in the Czech Republic, households in cities are in the best financial situation. Their average income is higher by over 20% than households in medium and small towns and by over 100% than households in rural areas. The median and mode also decrease as the size of the place of residence decreases. Ćwiek and Ulman (2019) present similar results.

Taking into account the division of households according to the age of the reference person, it should be noted that households of people aged 25–34 are in the best situation. However, with the increase in the age of the reference persons, the average equivalent income decreases. Households of older people have an average income lower by almost 20% as compared to households of people aged 25–34. Households of people aged 18–24 are also in a very good situation – their

average income is only 1% lower than that of the best-off households. However, when comparing the median and mode of both discussed groups of households, it should be noted that in the lowest age group, they are respectively 55% and 60% lower than for households aged 25–34. It is accompanied by a high value of the standard deviation in households of people aged 18–24 – it is higher than the average of the equivalent income.

The conducted research shows that the average equivalent income increases with the education level of the reference person. Households with tertiary education have an income that is 30% higher than those with an upper secondary or post-secondary education and 70% as compared to households with lower secondary education or below. In the case of the median, the variability is even greater – the median equivalent income for households with higher education is over 40% higher than the median equivalent income for households with upper secondary or post-secondary education, and 90% as compared to households where the reference person has lower secondary education or below. On the other hand, income inequality, measured by the standard deviation, decreases along with the increase in the level of education of the reference person. Similar results can be found in the work of Ulman and Čwiek (2021).



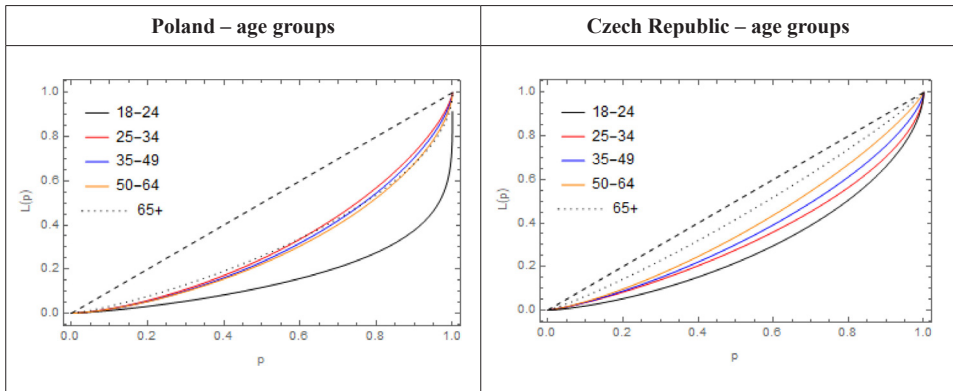


Figure 2. Lorenz curve $L(p)$ for the Czech Republic and Poland in selected socio-economic groups

Source: own calculations.

Figure 2 shows graphs of the Lorenz curve $L(p)$. The values of Gini index estimators were obtained by means of the Singh-Maddala income model. Comparing the Czech Republic and Poland, it can be noted that there is a greater income inequality in Poland (Tables 3 and 4). These results are confirmed by (Bilan et al., 2020). Taking into account the size of a household's locality in the Czech Republic, the highest inequalities are in large towns, while the Gini coefficient in small or medium-sized towns and rural areas is similar. The situation is different in the case of Poland. The income inequality level is similar for large towns and small or medium-sized towns. Considering the age of the reference person in the Czech Republic, the highest inequalities occur for households with the reference person's age of 18–24 and the lowest for the 50–64 age group. In Poland, the situation is similar to the Czech Republic: the highest inequalities occur for the age of 18–24, while the lowest for ages 25–34 and 65+. Income inequalities for the ages of 35–49 and 50–64 are similar. Considering the education level of the reference person, the highest income inequalities in the Czech Republic are observable for people with lower secondary education or below. For Poland, the level of equivalent income inequality among people with lower secondary education or below, and upper secondary or post-secondary education are very similar. In the Czech Republic, people with upper secondary or post-secondary and tertiary education are on a very similar level. It should be noted that in Poland, the lowest income inequality is among people with tertiary education.

Tables 5 and 6 present the values of aggregate poverty measures, i.e. Headcount Ratio (HR), Poverty Gap Index (PGI), Income Gap Index (IGI) and Poverty Severity Index (PSI), which describe the range, depth, intensity, and severity of poverty in the examined countries, i.e. the Czech Republic and Poland.

Table 5. Poverty criteria in the Czech Republic in total and in selected socio-economic groups

Dimension	HR	PGI	IGI	PSI
Total	0.1166	0.2790	0.0325	0.0178
Size of the household's locality				
Large town or city	0.1000	0.2356	0.0236	0.0102
Small or medium-sized town	0.1191	0.2978	0.0355	0.0214
Rural area or village	0.1299	0.2932	0.0381	0.0213
Age group of the reference person				
18–24	0.1200	0.0749	0.0090	0.0010
25–34	0.0909	0.1533	0.0139	0.0040
35–49	0.0929	0.2484	0.0231	0.0090
50–64	0.1453	0.4303	0.0625	0.0424
65+	0.1256	0.2205	0.0277	0.0136
Education level of the reference person				
Lower secondary or below	0.3077	0.2517	0.0775	0.0365
Upper secondary	0.1047	0.2639	0.0276	0.0145
Tertiary	0.0571	0.5061	0.0289	0.0221

Source: own calculations.

Table 6. Poverty criteria in Poland in total and in selected socio-economic groups

Dimension	HR	PGI	IGI	PSI
Total	0.1937	0.3346	0.0648	0.0348
Size of the household's locality				
Large town or city	0.1298	0.3060	0.0397	0.0197
Small or medium-sized town	0.1914	0.3932	0.0753	0.0417
Rural area or village	0.2373	0.3137	0.0745	0.0402
Age group of the reference person				
18–24	0.1818	0.3104	0.0564	0.0256
25–34	0.1589	0.3656	0.0581	0.0323
35–49	0.1944	0.3950	0.0768	0.0440
50–64	0.2116	0.3768	0.0797	0.0456
65+	0.1939	0.2249	0.0436	0.0185
Education level of the reference person				
Lower secondary or below	0.3158	0.2989	0.0944	0.0429
Upper secondary	0.1861	0.3488	0.0649	0.0370
Tertiary	0.0811	0.3576	0.0290	0.0157

Source: own calculations.

The research shows that 12% of Czech households were at risk of poverty and the average equivalent income of households experiencing poverty was 28% below the poverty line. Taking into account the size of the place of residence, it can be noticed that the extent of poverty increases with the decrease in the size of the town. However, the difference between the extent of poverty in different types of localities is not large – in rural areas, the percentage of households at risk of poverty is only 3 percentage points (pp) higher than in cities. A greater difference is observed in terms of the depth of poverty. In the countryside, the average equivalent income of households experiencing poverty was 29% below the poverty line, and in large towns, the average equivalent income of households experiencing poverty was 24% below the poverty line. When it comes to small or medium-sized town households, they have a lower poverty incidence than rural households, but the depth and severity indicators of poverty are essentially the same.

The greatest extent of poverty is observed among households whose reference persons are aged 50–64 (15%). This age group is also characterised by the highest values of poverty depth and severity indicators. A slightly better situation was recorded for households of people aged 18–24 and 65+. For these age groups, the percentage of households at risk of poverty is very similar (approx. 12%), but in the 65+ age group, the depth and severity of poverty are much greater. The lowest percentage of poor households was observed in the 25–34 and 35–49 age groups, and these are the age groups for which the highest average income was observed. Poverty in various age groups in the Czech Republic was also studied, among others, by Sirovátka and Mareš (2006).

The analysis shows a very strong correlation between the education level of the reference person and the headcount ratio. In households of people with higher education, the at-risk-of-poverty rate is only 6%. In the case of households of people with upper secondary or post-secondary education, this rate is at 10%, and for households of people with lower secondary education or below, it amounts to 31%. The impact of the level of education on the risk of poverty is confirmed by research (among others Szymkowiak et al., 2014; Brzezińska, 2018; Sirovátka, Mareš, 2006). Liu *et al.* (2021) proved that education significantly reduces the level of poverty, and higher education seems to be a significant tool for alleviating poverty.

In Poland, the risk of poverty also decreases along with the size of the town in which the household is found, but the percentage of households with incomes below the poverty line is much higher. The difference increases with the decrease in the size of the town. In the case of large towns, the difference is 3 pp, for small and medium-sized towns, it is 7 pp, in the case of villages, as much as 11 pp. Similar results were obtained by Piwowar and Dzikuć (2020). Using the relative poverty indicator and the aggregate indicator proved that in many households in rural areas, the financial resources are insufficient to cover the basic needs in the

Visegrad Group countries. Poverty is often related to rural, peripheral areas with poor access to services of general interest. Sączkowska-Piotrowska (2016), using nonparametric estimators of hazard function and logit models to study poverty and non-poverty survival time of urban and rural households, concluded that rural households' survival is shorter in non-poverty and simultaneously longer in poverty than urban households. Besides, urban households have more chance of poverty exit and less risk of poverty entry than rural households. Analyses of Nordregio and of the James Hutton Institute proved that poverty is related to the situation in rural areas in the new Member States and in the east and south of Europe, as well as in urban districts in the old Member States (*The Territorial Dimension of Poverty...*, 2014). Living in a rural area with limited access to education and the labour market, as well as a lack of appropriate infrastructure combined with often poor or expensive public transport may be factors that can affect the feeling of social exclusion.

The lowest value of the HR indicator, similar to the Czech Republic, is found for households whose reference persons are aged 25–34, and it amounts to 16%, which is a value of 7 pp higher than for the Czech Republic. On the other hand, the lowest depth and severity of poverty concerns households of older people (65+). The greatest extent of poverty concerns households of people aged 50–64 (21%). The average equivalent income of households experiencing poverty was 38% below the poverty line.

As in the Czech Republic, in Poland too the risk of poverty decreases along with the increase in the education level of the reference person. For households of people with lower secondary education or below, the headcount ratio is over 30%; for households of people with upper secondary or post-secondary education, it is 19%; and for households of people with higher education – only 8%.

CONCLUSIONS

The analyses show that the distribution of equivalent income in the Czech Republic and Poland is characterised by a strong skewness to the right. The shape of the designated density functions based on the Singh-Maddala model is very similar. The biggest difference concerns the shift to the right of the distribution of equivalent income for the Czech Republic. This means that Czech households are characterised by a higher average, median and mode of equivalent income. In Poland, on the other hand, a higher level of inequality was observed. In both of the analysed countries, the highest income is achieved by households living in cities and those whose reference person has tertiary education and is aged 25–34. In both countries, the highest income inequalities are found in households of young people (18–24).

Czech households face a low risk of poverty. Monetary poverty concerns about 12% of the surveyed entities, and in Poland, this value is at 19%. In both surveyed countries, a higher risk of poverty was observed for rural households. Households whose reference person has lower secondary education or below, or is aged 50–64, are also more likely to earn below the poverty line.

The conducted research indicates a high similarity both to the distribution of income and the groups particularly exposed to monetary poverty. It should be remembered that the financial situation of households is a result of many variables, and therefore it should be constantly monitored to ensure complete and objective data for the conduct of social policy. The implementation of an effective social policy in order to reduce poverty requires not only monitoring its changes over time, but also in-depth analyses. Due to the ongoing demographic changes (related to an increase in life expectancy and ageing of society), particular attention should be paid to the living conditions of the elderly and disabled people.

The limitations of the paper should also be pointed out. Due to the available data, net equivalent income was used in the research, which may be a source of potential problems in assessing poverty criteria. Income does not take into account accumulated savings and wealth (with the exception of interest generated by them), which can be equally used to purchase goods and services (Ward, 2009). Furthermore, the value reported for any period does not consider any fluctuations that affect the level of income in the long term. When analysing the results of the conducted research, it is also worth remembering that they only concern monetary poverty and do not take into account housing deprivation, energy poverty, lack of access to education or health care, and many other aspects of multidimensional poverty.

BIBLIOGRAPHY

- Bartošová, J., Bína, V. (2009). Modelling of Income Distribution of Czech Households in Years 1996–2005. *Acta Oeconomica Pragensia*, 17, 3–18. DOI: 10.18267/j.aop.275.
- Bilan, Y., Mishchuk, H., Samoliuk, N., Yurchyk, H. (2020). Impact of Income Distribution on Social and Economic Well-Being of the State. *Sustainability*, 12, 429. DOI: 10.3390/su12010429.
- Biernat-Jarka, A., Trębska, P. (2018). Poverty in Poland and the European Union and the Forms of Overcome it, in the Context of Sustainable Development and the EU Experience. Scientific Journal Warsaw University of Life Sciences – SGGW. *Problemy Rolnictwa Światowego*, 18, 38–47.
- Borowska, A., Mięka, A., Raczkowska, M., Utzig, M. (2020). *Konsumpcja dóbr i usług w gospodarstwach domowych w Polsce*. Warszawa: Wydawnictwo SGGW.
- Brzezińska, J. (2018). Statistical analysis of economic poverty in Poland using R. *Econometrics*, 22(2), 45–53. DOI:10.15611/ead.2018.2.04.

- Bywalec, C. (2012). *Ekonomika i finanse gospodarstw domowych*. Warszawa: Wydawnictwo Naukowe PWN.
- Canberra Group (2011). *Handbook on household income statistics*, 2nd Edition, Geneva: United Nations Economic Commission for Europe.
- Costantini, O., Seccareccia, M. (2020). Income Distribution, Household Debt and Growth in Modern Financialized Economies. *Journal of Economic Issues*, 54(2), 444–453. DOI: 10.1080/00213624.2020.1752537.
- Ćwiek, M., Ulman, P. (2019). Income and Poverty in Households in Selected European Countries. *Acta Universitatis Lodzianis. Folia Oeconomica*, 6(345), 7–25. DOI: 10.18778/0208-6018.345.01.
- Dolls, M., Doorley, K., Paulus, A., Schneider, H., Sommer, E. (2019). Demographic change and the European income distribution. *The Journal of Economic Inequality*, 17, 337–357. DOI: 10.1007/s10888-019-09411-z.
- Ferreira, F.H.G., Lugo, M.A. (2013). Multidimensional poverty analysis: Looking for a middle ground. *World Bank Research Observer*, 28(2), 220–235.
- Forster, M.F., Pearson, M. (2018). Income distribution and poverty in the OECD area: trends and driving forces. In: *Combating Poverty in Europe* (pp. 169–198). London: Routledge.
- Golinowska, S., Broda-Wysocki, P. (2005). Kategorie ubóstwa i wykluczenia społecznego. Przegląd ujęć. In: S. Golinowska, E. Tarkowska, I. Topińska (eds.), *Ubóstwo i wykluczenie społeczne. Badania, metody, wyniki* (pp. 15–74). Warszawa: Instytut Pracy i Spraw Socjalnych.
- Ifțimoaei, C., Baciuc, I.C., Gabor, V.R. (2021). Typologies of Poverty in EU-28 before Covid-19 Pandemic. A Multivariate Statistical Analysis. *Romanian Statistical Review*, 4, 3–26.
- Kleiber, C., Kotz, S. (2003). *Statistical Size Distribution in Economics and Actuarial Sciences*. New Jersey: Wiley-Interscience.
- Kuznets, S. (2019). Economic growth and income inequality. In: *The gap between rich and poor* (pp. 25–37). New York: Routledge.
- Ledić, M., Rubil, I. (2019). Decomposing the difference between well-being inequality and income inequality: Method and application. *What Drives Inequality?*, 27, 105–122. DOI: 10.1108/S1049-258520190000027008.
- Liberati, P., Resce, G., Tosi, F. (2022). The probability of multidimensional poverty: A new approach and an empirical application to EU-SILC data. *Review of Income and Wealth*. DOI: 10.1111/roiw.12598.
- Liu, F., Li, L., Zhang, Y., Ngo, Q-H., Iqbal, W. (2021). Role of education in poverty reduction: macroeconomic and social determinants form developing economies. *Environmental Science and Pollution Research*, 28, 63163–63177. DOI: 10.1007/s11356-021-15252-z.
- Lorenz, M.O. (1905). Methods of Measuring the Concentration of Wealth. *Publications of the American Statistical Association*, 9, 209–219. DOI: 10.2307/2276207.
- Michálek, A., Výbošťok, J. (2019). Economic growth, inequality and poverty in the EU. *Social Indicators Research*, 141(2), 611–630. DOI: 10.1007/s11205-018-1858-7.

- Mysíková, M., Želinský, T., Jirková, M., Večerník, J. (2021). Equivalence Scale and Income Poverty: Two Approaches to Estimate Country-specific Scale for the Czech Republic. *Social Indicators Research*, 156, 21–45. DOI: 10.1007/s11205-021-02636-4.
- Mysíková, M., Želinský, T., Garner, T.I., Večerník, J. (2019). Subjective Perceptions of Poverty and Objective Economic Conditions: Czechia and Slovakia a Quarter Century After the Dissolution of Czechoslovakia. *Social Indicators Research*, 145, 523–550. DOI: 10.1007/s11205-019-02102-2.
- Panek, T. (2011). *Ubóstwo, wykluczenie społeczne i nierówności. Teoria i praktyka pomiaru*. Warszawa: Oficyna Wydawnicza SGH.
- Piwowar, A., Dzikuć, M. (2020). Poverty and Social Exclusion: Is this a Problem in Rural Areas in the Visegrad Group Countries? *European Research Studies Journal*, 23(2), 45–54.
- Sompolska-Rzechuła, A., Kurdyś-Kujawska, A. (2022). Assessment of the Development of Poverty in EU Countries. *International Journal of Environmental Research and Public Health*, 19(7), 3950. DOI: 10.3390/ijerph19073950.
- Sączewska-Piotrowska, A. (2016). Dynamika ubóstwa w miejskich i wiejskich gospodarstwach domowych. *Wiadomości Statystyczne*, 7, 39–59.
- Szymkowiak, M., Beręsewicz, M., Bieńkuńska, A., Jastrzębski, P., Józefowski, T., Klimanek, T., Kowalewski, J., Kraj, M., Łyson, P., Małasiewicz, A., Młodak, A., Panek, T., Piasecki, T., Pietrzak, M., Wawrowski, Ł. (2014). *Pomiar ubóstwa na poziomie powiatów – etap I*. Jachranka: Centrum Badań i Edukacji Statystycznej GUS.
- Salejko-Szyszcak, I., Szczepaniak, M. (2017). The risk of poverty and social exclusion in Poland in the period 2006–2015 in the comparison to the European Union countries. *Ekonomia i Prawo. Economics and Law*, 16(2), 201–217. DOI: 10.12775/EiP.2017.014.
- Sirovátka, T., Mareš, P. (2006). Poverty, Social Exclusion and Social Policy in the Czech Republic. *Social Policy and Administration*, 40(3), 288–303. DOI: 10.1111/j.1467-9515.2006.00490.x.
- The Territorial Dimension of Poverty and Social Exclusion in Europe. Applied Research 2013/1/24. Draft Final Report* (2014). Luxembourg: Nordregio and James Hutton Institute.
- Trzcińska, K. (2020). Analysis of household income in Poland based on the Zenga distribution and selected income inequality measure. *Folia Oeconomica Stetinensia*, 20(1), 421–436. DOI: 10.2478/fofi-2020-0025.
- Trzcińska, K. (2021). Analysis of Household Income in Poland by Regions Based on Selected Income Distribution. *Acta Universitatis Lodziensis. Folia Oeconomica*, 1(352), 111–126. DOI: 10.18778/0208-6018.352.06.
- Ulman, P., Ćwiek, M. (2014). Poverty of households due to their biological type in a multidimensional approach. *Proceedings of the 8th Professor Aleksander Zelias International Conference on Modelling and Forecasting of Socio-Economic Phenomena* (pp. 214–222). Cracow: Foundation of the Cracow University of Economics.
- Ulman, P., Ćwiek, M. (2021). Income distribution and income inequalities in Polish households. *Statistica & Applicazioni*, 19(1), 49–60.

- Ward, T. (2009). Material deprivation. In: T. Ward, O. Lelkes, H. Sutherland, I.G. Tóth (eds.), *European Inequalities: Social Inclusion and Income Distribution in the European Union*. Budapest: TÁRKI Social Research Institute.
- Wolf, E.N. (2009). *Poverty and Income Distribution*. Malden MA, Chichester: Wiley-Blackwell.

Summary

Income distribution can cause large-scale transformations in social structure, as well as in the quality of life. The aim of the paper is to compare the economic situation of households in Poland and the Czech Republic. The level and the dispersion of income distributions of households and the level of poverty due to the selected socio-economic characteristics of a respondent or a household are analysed. All the conclusions are based on the results of European Quality of Life Surveys. To describe the distribution of net equivalent income, the Singh-Maddala model is used. The estimation parameters are obtained by means of the maximum likelihood method. The descriptive statistics characterising the total situation in the Czech Republic and Poland, as well as in selected socio-economic groups, are calculated. To analyse the extent, depth and severity of poverty in the countries in question, the aggregate indices are obtained. The conducted research shows a high similarity for both distribution of equivalent income and the socio-economic groups particularly exposed to monetary poverty.

Keywords: income distribution, Singh-Maddala model, Gini index, poverty, measuring poverty.

Sytuacja ekonomiczna gospodarstw domowych w Polsce i Czechach. Analiza porównawcza

Streszczenie

Rozkłady dochodów mogą powodować zakrojone na szeroką skalę przemiany w strukturze społecznej, a także w jakości życia. Celem artykułu jest porównanie sytuacji ekonomicznej gospodarstw domowych w Polsce i Czechach. Analizie poddano poziom i zróżnicowanie rozkładów dochodów gospodarstw domowych oraz poziom ubóstwa ze względu na wybrane cechy społeczno-ekonomiczne respondenta lub gospodarstwa domowego. Wszystkie wnioski oparte są na wynikach European Quality of Life Surveys. Do opisu rozkładu dochodu ekwiwalentnego netto zastosowano model Singha-Maddali. Parametry estymacji uzyskano metodą największej wiarygodności. Obliczono statystyki opisowe charakteryzujące ogólną sytuację w Czechach i Polsce oraz w wybranych grupach społeczno-ekonomicznych. W celu przeanalizowania zasięgu, głębokości i nasilenia ubóstwa w rozważanych krajach obliczono wskaźniki zagregowane. Przeprowadzone badania wskazują na duże podobieństwo zarówno rozkładu dochodów ekwiwalentnych, jak i grup społeczno-ekonomicznych szczególnie narażonych na ubóstwo monetarne.

Słowa kluczowe: rozkład dochodów, model Singha-Maddali, indeks Giniego, ubóstwo, pomiar ubóstwa.

JEL: C10, D31, I32.