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**INCOME INEQUALITY OF RURAL HOUSEHOLDS
IN POLAND – ANALYSIS BY SOURCE OF INCOME**

Key words: income inequality, Theil-T index, Theil-T decomposition,
household income sources, rural households

ABSTRACT. Rural households live on income much lower than the national average and experience income inequality much higher than the general population. This excess inequality is primarily due to the internal heterogeneity caused by the different nature of household income sources. The purpose of the study was then to assess the level of rural household income inequality and to decompose the inequality index by the main sources of income. The chosen inequality index was Theil-T. The research drew on unidentifiable microdata from the Household Budget Survey conducted by the CSO in 2019-2021. The study found that rural household inequality was slightly higher than that of all Polish households over the analyzed period. Among the various income-source groups, the highest inequality affected farmer households. This group also contributed most to the overall level of inequality in rural areas (44% in 2019 and over 46% in 2021). The pandemic saw an increase in inequality for all identified groups of rural households (the largest – for farmer households) and a decrease in between-group inequality.

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INTRODUCTION

In itself, income inequality is not only natural but also socially acceptable. It is not the occurrence of income inequality but its scale and aggravation that poses a risk to social cohesion. Excessive growth of income inequality triggered by uneven economic improvements across selected groups of society can lead to built-up tensions and intensification of demographic and social processes unfavorable to local and regional development [Urban 2012, Wołoszyn and Wysocki 2014, Wołoszyn and Głowicka-Wołoszyn 2015].

In rural areas, two manifest examples of such processes are migration and peripheral depopulation, which affect particularly the younger population. As Andrzej Wołoszyn [2020] notes in his research, the channels that link income inequality to those processes are rather obvious. High-productivity companies offering relatively high wages are in areas with abundant supply and strong demand for quality human capital, mainly in the largest cities with well-developed scientific, technical, economic, and social infrastructure. Jobs in those companies attract the best educated and most industrious from the periphery. Moreover, it is not only specialists who can expect relatively higher wages. The hubs of the modern economy produce *spill-over* effects, where even workers with lower productivity receive wages higher than their counterparts in smaller towns. Thus, the outflow of young people from rural areas peripheral to large cities transforms the demographic structure and contributes to the acceleration of aging and depopulation processes in their old communities. As a result, at the local and regional level, one can observe growing income inequalities concurrent with inhibited demographic development.

Today, Poland's rural areas are very diverse. Ongoing suburbanization makes the rural areas influenced by urban centers lose their agricultural function and take on a residential or service character. These are gentrified areas, often facing rapid and spontaneous urbanization processes. On the other hand, peripheral rural areas with an agricultural character more often face demographic and socioeconomic problems of depopulation, poverty, and social exclusion. Of the few factors that can mitigate those problems, the most important is the presence of natural resources. They contribute to the multifunctional or industrial development but at the same time generate environmental issues that can but rarely be solved through the implementation of modern technologies [Wołoszyn et al. 2016, Kozera and Głowicka-Wołoszyn 2018, Stanny et. al. 2021, Heffner and Twardzik 2022, Kalinowski 2023, Stanny et al. 2023].

Rural areas are marked by relatively high income inequality. As shown in a study by Andrzej Wołoszyn and Feliks Wysocki [2020], despite the decline in the level of income inequality of rural households between 2010 and 2017, its contribution to the formation of the overall level of inequality of Polish households was still the largest, and still increasing.

The degree of inequality in household income distribution is often due to internal heterogeneities. One – and arguably most relevant heterogeneity – comes from the nature of income sources, be it hired labor, self-employment, farming, or social benefits. A household's primary source of income defines its membership in a socioeconomic group [GUS 2018]. Hence, apart from assessing rural household inequality against all household inequality in Poland, the study aimed to analyze the inequality within and between separate socioeconomic groups of rural households.

MATERIALS AND RESEARCH METHODS

The study drew on anonymous microdata from the Household Budget Survey (BBGD) conducted by the Polish Central Statistical Office in 2019-2021. The office carries out these surveys annually using a representative sampling method, covering about 30,000 households, which enables the results to be generalized for all households in Poland [GUS 2018]. The study used household as the unit of statistical analysis.

Rural households accounted for over 32% of all households throughout the study period. Table 1 shows the structure of rural households by socioeconomic group or the primary source of income. Between 2019 and 2021, one can see a decreasing share of farmer

Table 1. Household structure by place of residence and socio-economic groups in 2019 and 2021

Household group	Household share [%]			
	in 2019		in 2021	
	of all HH	of rural HH	of all HH	of rural HH
Rural, including:	32.6	→100.0	32.6	→100.0
		↓		↓
– farmers		10.4		9.2
– blue-collar employees		29.8		29.6
– white-collar employees		17.8		21.9
– self-employed		7.1		8.3
– retirees		26.5		24.1
– pensioners		5.0		4.1
– living on unearned sources		3.4		2.8
Urban	67.4	–	67.4	–
All	100.0	–	100.0	–

Source: own elaboration based on anonymous microdata [GUS 2019, 2021]

households and an increasing share of self-employed and white-collar workers – the two most affluent socioeconomic groups. These changes are a consequence of the functional transformation of rural areas in Poland, which has been going on for years, and the gradual process of suburbanization. One of the most visible expression of the transformation is the long-lasting farm concentration trend showing as the declining number of farms with a simultaneous increase in their economic power [GUS 2020b].

The Theil index² was used to assess the level of income inequality throughout the article [Theil 1967]. It belongs to a popular parametric family of inequality measures – generalized GE(α) entropy indices [Shorrocks 1980]:

$$T = \frac{1}{N} \sum_i \frac{y_i}{\mu} \ln \frac{y_i}{\mu}$$

here y_i denotes the income of the i^{th} household, μ arithmetic mean of the incomes and N – the number of households.

The Theil index has the important property of additive decomposability – with K different groups of households:

$$T = \sum_{k=1}^K w_k T_k + T_B$$

where w_k is the share of the k^{th} group's income. The product $w_k T_k$ can be viewed as the k^{th} group's component in overall inequality, their sum represents the within-group component, and the last term:

$$T_B = \sum_{k=1}^K w_k \ln \left(\frac{\mu_k}{\mu} \right)$$

is the between-group component, μ_k being the average income of the k^{th} group.

² The Theil index takes values from 0 (for egalitarian distribution) to the logarithm of the sample size (for perfectly unequal distribution). Thus, higher values of the index correspond with greater degree of inequality.

EMPIRICAL RESEARCH RESULTS

Between 2019 and 2021, the average monthly real equivalent³ income of Polish households stood above 3,000 PLN and on an upward trend that increased it by 4.4% (Table 2). The trend applied to rural and urban households, though proceeding at different paces of growth. Among rural households, the growth was slower and its rate in 2022 even decreased, while that of urban households increased. As a result, income growth of rural households was 3.7% – 1 percentage point (p.p.) lower than for urban households. The average income of rural households thus remained relatively low, accounting for 83-84% of urban households' income and 89-90% of the total.

The outbreak of the COVID-19 in 2020 and the introduction of many restrictions⁴ aimed at maintaining social distance and preventing the rapid spread of the epidemic worsened the situation in the labor market. Restrictions on business activities of service, trade, transportation, catering, tourism, and entertainment required employers to reduce working hours, jobs, or wages. The epidemic itself also affected the market, leading to an unprecedented wave of sick leaves and quarantine absences that disrupted business operations throughout the economy. However, as shown in a study by Agnieszka Słomba and Piotr Palac [2023], at the outbreak the unemployment rate increased but slightly and only in the first quarter of 2021 was a significant upsurge recorded, followed in subsequent quarters of 2021 by a steady reduction to a level lower than in 2020.

Despite the emergence of factors that could negatively affect household income – such as the deterioration of conditions in the labor market – there was a non-intuitive improvement in the income condition of Polish households [cf. Stantcheva 2022, Korzeniowska et al. 2023, Słomba and Palac 2023]. This improvement can be attributed to the solutions introduced by the government to counteract the effects of the pandemic. Several organizational and legal solutions, collectively called the Crisis Shield, were introduced to guarantee support for the preservation of jobs and assistance to companies [Act of April 16, 2020, Journal of Laws, 2020, item 695]. The Crisis Shield included wage subsidies (up to 40%) for vulnerable jobs, payment of one-time benefits for the self-employed and those working on commission and freelance contracts, care allowance for parents of

³ Income comparisons between households of different sizes and demographic composition were possible using equivalence scales that account for scale effects [Dudek 2011]. In assessing income inequality, EUROSTAT and Polish CSO recommend the modified OECD scale, which assigns the first adult in the household a weight of 1, subsequent adults a weight of 0.5, and children a weight of 0.3.

⁴ From March 14 to 20, 2020, a state of epidemic emergency was declared in Poland [Ordinance of the Minister of Health of March 13, 2020. Journal of Laws, 2020, item 433]. From March 20, 2020 to May 15, 2022, an state of epidemic was in effect [Ordinance of the Minister of Health of March 20, 2020. Journal of Laws, 2022, item 340], which was changed to a state of epidemic emergency on May 16, 2022, and revoked on July 1, 2023 [Ordinance of the Minister of Health of June 14, 2023. Journal of Laws, 2023, item 1118].

Table 2. Real equivalent disposable income of rural and urban households in 2019-2021

Household group	Years			Year-to-year changes		Changes 2019-2021
	2019	2020	2021	2020	2021	
Average income [PLN]				%		
Rural	2,786	2,842	2,888	2.0	1.6	3.7
Urban	3,303	3,373	3,460	2.1	2.6	4.7
All	3,101	3,166	3,237	2.1	2.2	4.4
Percentage of all [%]				p.p.		
Rural	89.8	89.8	89.2	-0.1	-0.5	-0.6
Urban	106.5	106.5	106.9	0.0	0.3	0.4

Source: own elaboration based on anonymous microdata [GUS 2019, 2020a, 2021]

children under eight due to the suspension of kindergarten and school classes, deferral for three months of loan repayments, a non-refundable loan for micro-businesses in the amount of 5,000 PLN, a 3-month exemption from Social Security contributions for micro-entrepreneurs and the self-employed, and the possibility of accounting for losses incurred in 2020 by those whose income fell by half in the 2019 PIT and CIT adjustment.

The improvement of the income situation of Polish households in the first year of the pandemic can also be inferred from the research conducted by Hanna Dudek [2021], which showed a decrease in the risk of material deprivation symptoms in 2020 compared to the year before the pandemic. Interestingly, this research also showed that the risk was lower in rural areas than in urban ones.

Among households living in rural areas, the three most affluent groups were white-collar workers, the self-employed, and farmers, in that order. Of these, only the white-collar workers saw a 2.6% decrease in average real disposable income between 2019 and 2021. The other two groups recorded an increase – the largest, of 10%, in farmer households. The remaining groups of rural households, except for pensioners, also witnessed growth (Table 3).

A comparison of the position and shape of the density curves for real equivalent disposable income of rural households with the distribution densities for all households (Figure 1) shows that:

1. In each year from 2019 to 2021:
 - the average income of rural households was lower than that of all households (the curves were to the left of the curves for all households),
 - the incomes of rural households were less varied than those of all households (the curves were less flat than those for all households),

Table 3. Real equivalent disposable income in socio-economic groups of rural households in 2019-2021

Socio-economic groups of rural households	Average income [PLN]			Year-to-year changes [%]		Changes 2019-21 [%]
	2019	2020	2021	2020	2021	
Farmers	3,159	3,369	3,478	6.7	3.2	10.1
Blue-collar workers	2,647	2,663	2,708	0.6	1.7	2.3
White-collar workers	3,328	3,333	3,240	0.2	-2.8	-2.6
Self-employed	3,311	3,235	3,350	-2.3	3.5	1.2
Retirees	2,302	2,328	2,397	1.1	3.0	4.1
Pensioners	1,743	1,716	1,760	-1.6	2.6	0.9
Living on unearned income	1,782	1,768	1,745	-0.8	-1.3	-2.1
Rural	2,786	2,842	2,888	2.0	1.6	3.7

Source: own elaboration based on anonymous microdata [GUS 2019, 2020a, 2021]

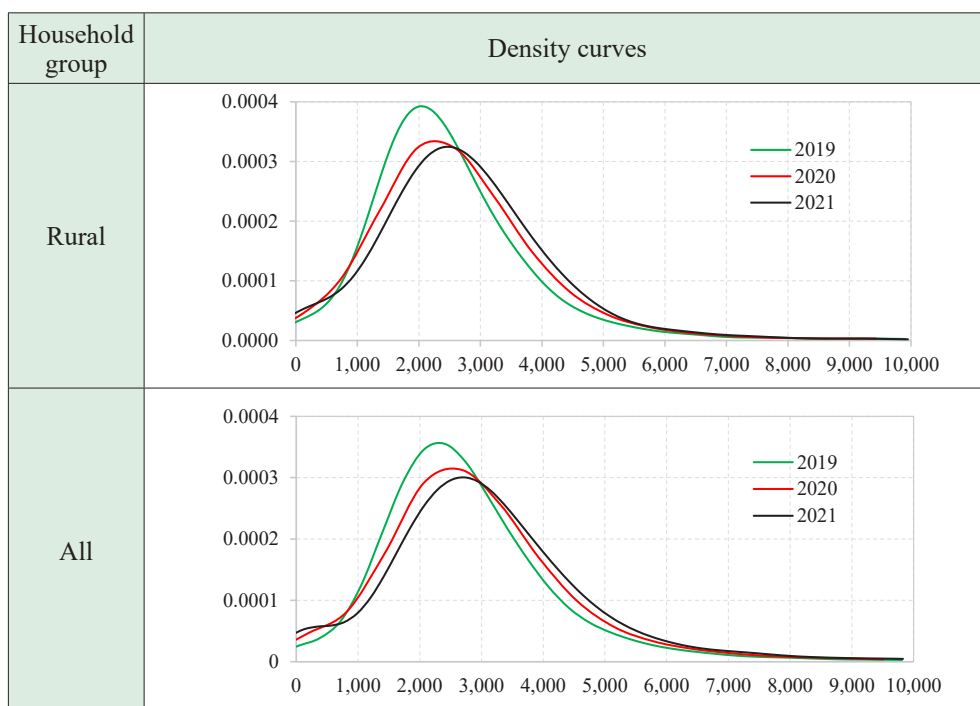


Figure 1. Density curves of the empirical distribution of real equivalent disposable income of rural and all households in 2019-2021

Source: own elaboration based on anonymous microdata [GUS 2019, 2020a, 2021]

2. In subsequent years of the pandemic relative to 2019:
 - the average income of both rural and all households increased (the curves for 2020 and 2021 were shifted to the right of the curves for 2019),
 - variation of rural and all household incomes also increased (the curves for 2020 and 2021 were more flat than those for 2019).

Moreover, in the very lowest part of the income distribution of rural and all households both, the curve for 2021 lay above the curves from 2019 and 2020 (Figure 1), indicating an increase in extreme poverty in the second year of the pandemic.

The analysis of the Theil-T index values revealed that income inequality among rural households in Poland consistently exceeded that of all households during the analyzed period (Figure 2). Additionally, pandemic years witnessed a rise in income inequality for all households and those residing in rural areas.

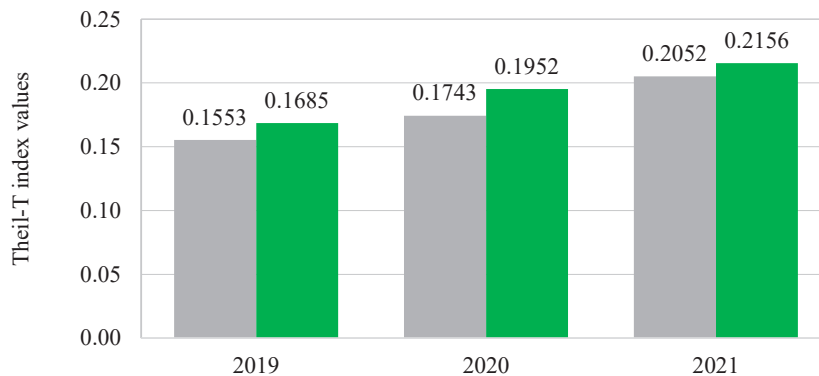


Figure 2. Theil-T index values of real equivalent disposable income of rural and all households in 2019-2021

Source: own elaboration based on anonymous microdata [GUS 2019, 2020a, 2021]

The decomposition of the Theil-T index showed that the increase in income inequality of rural households between 2019 and 2021 was driven by buildups of inequality in almost all socioeconomic groups; the exception was two poorest ones – of pensioners and living from unearned sources (Figure 3). The wealthiest group (white-collar workers) saw a 41% increase in Theil-T, while the less affluent groups (farmers and blue-collar workers) experienced about a 35% rise. Despite the financial support and overall improvement in household income conditions, a rise in income inequality continued. Among the factors that may have contributed to the inequality persistence, Stefanie Stantcheva [2022] emphasizes the development of digitization – which favors better-paid occupations – and changes in the business sector – where selected industries are gaining an advantage in the market.

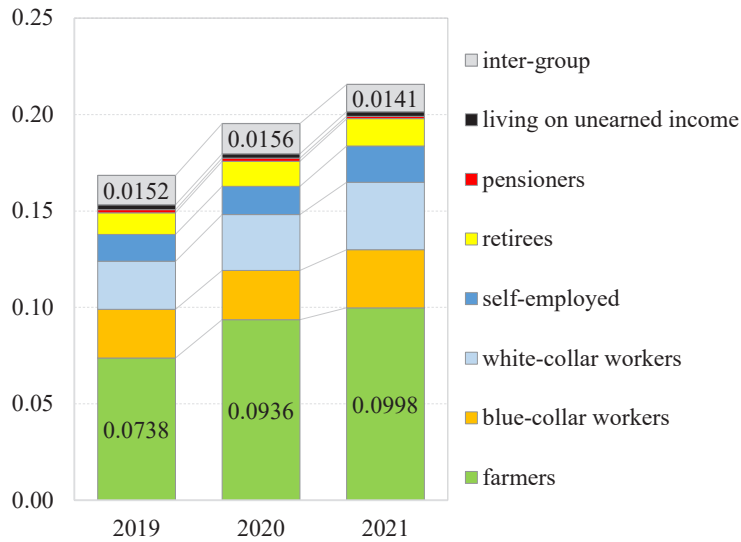


Figure 3. Decomposition of Theil-T index of rural household income by socio-economic groups in 2019-2021

Source: own elaboration based on anonymous microdata [GUS 2019, 2020a, 2021]

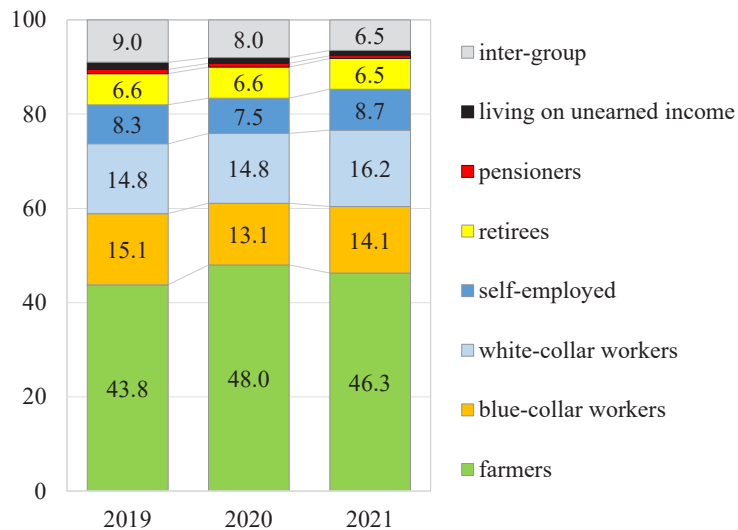


Figure 4. Structure of Theil-T index decomposition into inter- and intragroup contributions in 2019-21

Source: own elaboration based on anonymous microdata [GUS 2019, 2020a, 2021]

Devire's report [2021] points to wage growth despite the slowdown in IT, construction, real estate, e-commerce, and digital marketing. Stefanie Stantcheva's [2022] research also argues that digital exclusion and unemployment widened income stratification and affected the poorest sections of society.

Simultaneously with rising income inequality among socio-economic groups of rural households, intergroup inequality slightly decreased (Figure 3), so its share in the overall inequality also declined (Figure 4). Before the pandemic, intergroup inequality represented 9% of the Theil-T index value, and during the second year of the pandemic, that share decreased by 2.5 p.p.

The most significant impact on income inequality among rural households came from inequality within the subgroup of farmer households. In 2019, they accounted for 43.8% of the Theil-T index value, while in 2021 for 2.5 p.p. more. The other two socio-economic groups with substantial contributions to rural inequality were blue-collar and white-collar workers. In 2019, inequalities within each group constituted approximately 15% of rural inequality. By 2021, the contribution from blue-collar worker households decreased by 1.0 p.p., while from white-collar increased by 2.4 p.p. (Figure 4).

SUMMARY AND CONCLUSIONS

The first two years of the COVID-19 pandemic showed no negative impact on the income condition of either rural or all households in Poland. It was successfully accomplished through direct and indirect transfer policies, although their effect on rural households slightly diminished in the second year of the pandemic, unlike households living in cities. As a result, the pandemic period slightly deepened the income disparities between rural and urban households in Poland.

Subgroups of rural households identified by their primary source of income were highly diverse in terms of income changes. In the wealthiest one (white-collar workers), real income declined by 2.6%. Conversely, the second most affluent group of farmer households saw a 10.1% increase.

During the analyzed period, income inequality in rural households was slightly higher than in all Polish households. Within this group, the highest inequality levels were observed in farmer households. They also contributed most to the overall income inequality in rural areas (44% in 2019 and over 46% in 2021).

Despite the government's efforts, income inequality among Polish households did not decline. In fact, after two years of the pandemic, inequality increased in rural and among all households in Poland. All distinct socio-economic groups within rural households also saw this increase, except the two poorest ones: pensioners and living on unearned sources. Simultaneously, intergroup inequalities slightly decreased. The highest inequality – and the major contribution to its overall rural level – was found among farmer households.

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NIERÓWNOŚCI DOCHODOWE WIEJSKICH GOSPODARSTW DOMOWYCH A ŹRÓDŁA ICH DOCHODÓW

Słowa kluczowe: nierówności dochodowe, indeks Theila-T, dekompozycja indeksu Theila-T, źródła dochodów gospodarstw domowych, wiejskie gospodarstwa domowe

ABSTRAKT. Gospodarstwa domowe zlokalizowane na obszarach wiejskich nadal cechuje niższy poziom dochodów i relatywnie wysoki poziom nierówności dochodowych. Stopień nierównomierności rozkładu dochodów dla gospodarstw domowych związany jest często z występowaniem w nim wewnętrznych niejednorodności. Jedną z ich przyczyn jest różny charakter źródeł dochodów. Celem badań była ocena poziomu nierówności dochodowych wiejskich gospodarstw domowych na tle ich ogółu oraz dekompozycja współczynników nierówności ze względu na główne źródło dochodów wiejskich gospodarstw domowych. Do oceny poziomu nierówności wykorzystano indeks Theila-T. Źródłem danych były jednostkowe nieidentyfikowalne dane pochodzące z „Badania budżetów gospodarstw domowych” przeprowadzonych przez GUS w latach 2019-2021. Na podstawie badań stwierdzono, że w analizowanym okresie nierówności w wiejskich gospodarstwach domowych kształtowały się na nieco wyższym poziomie niż ogółu gospodarstw domowych w Polsce. Najwyższy poziom nierówności cechował gospodarstwa domowe rolników. Nierówności tej grupy wiejskich gospodarstw domowych miały również największy udział w kształtowaniu ogólnego poziomu nierówności na obszarach wiejskich (od 44% w 2019 roku do ponad 46% w 2021 roku). Okres pandemii przyczynił się do wzrostu poziomu nierówności dla wszystkich wyodrębnionych grup wiejskich gospodarstw domowych (największy – dla gospodarstw domowych rolników) oraz spadku nierówności międzygrupowych.

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