

Impact of COVID-19 on the level of energy poverty in Poland

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Introduction

The purpose of the paper is to assess whether and how COVID-19 has affected the level of energy poverty in Poland. It examines whether the economic effects, which have undoubtedly hit the Polish economy, have also aggravated the scale of energy poverty. Following Boardman, the paper assumes that energy poverty is a situation when expenditure on energy carriers accounts for more than 10% of income per person. Thus, the focus was on the economic aspect of the phenomenon, since, according to González-Eguino, in the developed and highly developed economies, energy poverty is associated with insufficient financial means to purchase energy, in contrast to the developing countries where it is related to the physical lack of access to energy. Literature reports that within the European Union, Poland is one of the countries where the scale of energy poverty has been high. At the same time, it has been pointed out that the Polish authorities take far inadequate measures to mitigate this problem. This is done only indirectly by conducting social policy which does not include direct actions to counteract energy poverty. It should be remembered that Poland, like other EU countries, will have to make an effort to increase the share of renewable energy carriers in the energy-mix. This increases the likelihood of higher costs of energy carriers. Moreover, COVID-19 coronavirus has had a negative impact on the socio-economic situation by reduced employment and wages and thus the disposable income. The pandemic has resulted in a complete loss of income for some Polish citizens. It should be remembered that poverty mainly affects people with the lowest incomes. In addition, many people worked from home at that time, which might suggest that their spending on energy carriers has increased. These arguments imply that the COVID-19 pandemic could have increased the scale of energy poverty in Poland. On the other hand, the pandemic stopped the investments in renewable energy, which may mean that there should be no increase in spending on energy carriers and, consequently, no increase in the energy poverty. All social programmes in Poland, which were intensified in the second half of 2019, have been continued, which implies that the poorest part of the society have not suffered from the economic lockdown. Therefore, it is not easy to determine whether the COVID-19 pandemic has had a positive or negative impact on the scale of the energy poverty in Poland. It is also difficult to determine without proper research what is the impact of the COVID-19 pandemic on the level of energy poverty in Poland. As it has been mentioned above, this subject has not been yet thoroughly investigated in the literature, especially with regard to Poland. So far, the literature has focused mainly on the nature of this phenomenon, measurement methods and on its diversity.

Methodology

When predicting the dependent variables for May 2020, a multiple regression equation was built $Y(1,2,...,m)=a+b1\cdot X1+b2\cdot X2+\dots +bn\cdot Xn$, where:

$Y1,2,...,m$ – dependent variables for which the following values are estimated for May 2020: disposable income per capita in households in each of the 5 quintile groups in Poland and the share of each of the 10 decile groups in the distribution of disposable income per capita in households;

$a, b1, b2, \dots, bn$ – the regression function parameters;

$X1, X2, \dots, Xn$ – data reflecting socio-economic situation in Poland during the pandemic (May 2020) that are independent variables affecting the dependent variables subject to prediction;

The following independent variables were used in the analysis:

- X1 - average paid employment in an enterprise sector (CSO data),
- X2 - registered unemployed persons (CSO data),
- X3 - average monthly real gross wages and salaries in the enterprise sector (CSO data),
- X4 - gross domestic product annual growth rate (Trading Economics data),
- X5 - people at risk of poverty or social exclusion (Eurostat data),

	Coefficients	Standard Error	t-statistic	p value
Regression analysis for dependent variable Y_1 – disposable income per capita in households in the first quintile group				
n=14	Regression statistics: R=0.9858; R ² =0.9718; Adjusted R ² =0.9695; F(1,12)=413.90; p<0.0000; Standard error: 23.899			
Constant	-1436.4292	93.3623	-15.3855	0.0000
Variable X_1	0.3386	0.0166	20.3445	0.0000
Regression analysis for dependent variable Y_2 – disposable income per capita in households in the second quintile group				
n=14	Regression statistics: R=0.9971; R ² =0.9942; Adjusted R ² =0.9931; F(2,11)=938.93; p<0.0000; Standard error: 17.771			
Constant	-1141.3389	178.2880	-6.4017	0.0001
Variable X_1	0.1650	0.0270	6.1045	0.0001
Variable X_2	0.2277	0.0512	4.4481	0.0010
Regression analysis for dependent variable Y_3 – disposable income per capita in households in the third quintile group				
n=14	Regression statistics: R=0.9985; R ² =0.9969; Adjusted R ² =0.9964; F(2,11)=1777.00; p<0.0000; Standard error: 15.810			
Constant	-190.5057	62.4736	-3.0494	0.0111
Variable X_1	-6.4813	2.3983	-2.6816	0.0213
Variable X_2	0.3257	0.0096	33.8442	0.0000
Regression analysis for dependent variable Y_4 – disposable income per capita in households in the fourth quintile group				
n=14	Regression statistics: R=0.9782; R ² =0.9568; Adjusted R ² =0.9490; F(2,11)=121.83; p<0.0000; Standard error: 71.563			
Constant	-4519.1721	762.6305	-5.9258	0.0001
Variable X_1	1.0064	0.1113	9.0461	0.0000
Variable X_2	34.9739	14.6409	2.3888	0.0359
Regression analysis for dependent variable Y_5 – disposable income per capita in households in the fifth quintile group				
n=14	Regression statistics: R=0.9965; R ² =0.9930; Adjusted R ² =0.9910; F(3,10)=476.28; p<0.0000; Standard error: 46.018			
Constant	-2220.4299	837.1228	-2.6525	0.0242
Variable X_1	0.9615	0.1159	8.2991	0.0000
Variable X_2	59.5221	9.7376	6.1126	0.0001
Variable X_3	-43.6589	5.4440	-8.0193	0.0000

Results

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Independent variables	X8	X8	X6, X1	X1	X3, X5, X6, X7	X3	-	X2	X1, X2	X1
Distribution of income	2.6	4.9	6.5	7.4	8.6	9.3	10.0	12.0	14.7	24.0

Main conclusions

When assessing the impact of COVID - 19 on the level of energy poverty, it should be stressed that the authors of this paper have shown that the present pandemic has contributed to the aggravation of difficulties for Polish households in financing expenditure on energy carriers. This fact has had a direct impact on the increase in energy poverty in Poland. Moreover, it has been proved that COVID- 19 has had a negative effect on the average disposable income of Polish households, which with the simultaneous increase in energy purchase costs has led to a higher ratio of expenditure on energy carriers to disposable income. The results obtained for Poland turn out to be similar to the data on the British economy for which calculations have been published by Aimee, Baker, Brierley, Butler, Marchand, and Sherriff. In the time of COVID-19 in the United Kingdom, energy consumption in the whole national economy has fallen due to the lockdown and in an average British household the monthly cost of energy has increased by £16. The rise in energy expenditure has been mainly due to the fact that members of households are staying at home much longer than before the pandemic as a result of the lockdown and thus use more appliances and energy carriers. Moreover, the British authors point out that a significant part of the increased households' spending on energy is the cost of heating. This is mainly due to the fact that warm homes enable human immune systems to fight viruses more effectively and that maintaining high room temperature contributes to faster recovery process for those returning from hospital after the virus treatment. Although the Polish researchers have not looked yet at increased use of energy carriers, they have found out that the reason for the increased spending on energy carriers is the rise in their prices. Consequently, higher energy costs may determine the aggravated difficulty for the households to pay their current bills. The research has indicated that at the time of COVID-19, the main factor determining the spread of energy poverty is a decrease in employment and an increase in unemployment, which is reflected in lower average income from paid work. Thus, the most considerable growth of the ratio of expenditure on energy carriers to disposable income in Poland during the pandemic has affected people with the lowest and average income.

