

<https://doi.org/10.33271/nvngu/2026-1/166>

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POVERTY UNDER THE INFLUENCE OF COVID-19 AND THE FULL-SCALE WAR IN UKRAINE: RETROSPECTIVE MICROSIMULATION AND FORECASTING

Purpose. To implement microsimulation of hypothetical scenarios without catastrophic phenomena in order to assess how rapid and long-lasting the impact of disasters of various nature on poverty could be, as well as to produce a hypothetical and realistic forecasts to understand the specifics of the crisis processes in the context of their impact on poverty and assess the prospects for restoring positive trend.

Methodology. The method of microsimulation is the best approach to study the impact of the COVID-19 pandemic and the full-scale war on poverty in Ukraine. This method is effective for situations where statistical or econometric models cannot be used, but there is enough information about the conditions of the processes that have directly affected, are affecting or are expected to affect the phenomenon or object we are studying. The constructed algorithm is easily programmable, which allows making additional adjustments to the simulated input indicators and obtaining more reasonable results.

Findings. According to the estimates based on microsimulation using data of 2016–2021 Sample Survey of Living Conditions of Households and the 2023 Household Socio-Economic Status Survey, the pandemic has led to an increase in the number of poor people by 1.8 million. However, it was not catastrophic, as the positive trend was not disrupted. The war caused an increase of poor people by 6.1 million, reaching a total of 13.5 million people. This has reversed the gains in poverty reduction and set us back decades. According to the microsimulation results, in the absence of war, Ukraine could recover from the pandemic quite quickly, even reducing poverty to minimal rates within five years. The realistic forecast scenario is based on actual data for 2023 and assumes economic recovery starting in 2025. Under this scenario, the poverty rate is expected to reach 20.1 % in 2027, which is lower than in 2019.

Originality. The paper determines the depth of the impact of disastrous events (COVID-19 pandemic and full-scale war) on the Ukrainian population, in particular in terms of poverty growth. On this basis, the losses from disasters over the last half decade were estimated due to the increase in the number of poor people that could have been avoided in the absence of these events, and in time terms due to the number of years we were thrown back on the path of overcoming poverty. In order to develop a policy to respond to the negative consequences of crises in the future, the importance of establishing a recovery period is assessed both from the standpoint of achieving pre-crisis values and in comparison with the results that could occur in a hypothetical scenario without catastrophic events.

Practical value. The proposed comprehensive approach to the analysis of the impact of the COVID-19 pandemic and the full-scale war on the poverty rate in Ukraine provides an opportunity to form a holistic methodological framework for assessing the scale of poverty under the influence of disasters of various nature.

Keywords: *poverty, microsimulation, forecast, COVID-19, full-scale war*

Introduction. The COVID-19 pandemic contributed to the growth of monetary poverty, primarily because of limited access to full employment and a corresponding decrease in employee incomes, as well as a narrowing of demand for entire groups of goods and services in the

consumer market during the quarantine period, which led to chain stagnation processes in the economy.

From 2012 to 2020, the poverty rate in the EU was on a steady downward trend. During the pandemic, poverty rates remained fairly stable. The EU average at-risk-of-poverty rate (AROP) increased slightly in 2021 compared to 2019, from 16.5 to 16.8 % (Table 1). This stability was made possible by effective government in-

Table 1

Poverty and inequality indicators on average in EU countries, % of the population (2019–2021)

Indicator	2019	2020	2021
Share of the population at risk of poverty (AROP), % [1]	16.5	16.7	16.8
Share of the population at risk of poverty and social exclusion (AROPE), % [2]	21.1	21.5	21.7
Gini coefficient, % [3]	30.2	30.0	30.2

interventions and the implementation of state social assistance programs: the share of social benefits in household income increased to 26.6 % in 2020, which was the highest level in the last decade.

The stability of the EU average at-risk-of-poverty rate does not exclude differentiation by country. The largest increase in the AROP rate was observed in Austria (1.4 percentage points), Portugal (1.2 percentage points), Germany (1.2 percentage points), and Croatia (0.9 percentage points). However, some countries experienced a decrease in the risk of poverty – Belgium (by 2.1 pp), Sweden (1.4 percentage points), Finland (0.8 pp), Poland (0.6 percentage points).

The change of EU average at-risk-of-poverty and social exclusion rate (AROPE) in the EU has also shown a high degree of stability during the pandemic. In 2020, this indicator increased slightly – from 21.1 to 21.5 %, in 2021 this trend continued – 21.7 % of the EU population (95.4 million people) were at risk of poverty or social exclusion. However, the impact of the pandemic was uneven across the EU: the largest increase was observed in Germany (from 17.3 to 21 %), Italy, Portugal; decreases – in the Czech Republic, Estonia, Poland.

Due to effective state policy, the incomes of 84 % of the population of the EU countries did not change or increased in 2021 compared to 2020 (66.5 % of the population had a stable income, 17.5 % – had a higher income). Thus, the COVID-19 pandemic did not lead to a critical increase in poverty, but it significantly deepened the existing structural inequalities, disproportionately affecting vulnerable groups.

Overall, the negative impact of the COVID-19 pandemic on poverty in EU countries was brief, and the main indicators had returned to pre-COVID rates by 2023–2024.

In Ukraine, these processes coincided with a period of positive trends in incomes and living standards, as well as a three-year trend in poverty reduction and optimistic forecasts for the near future. According to the averaged forecasts of the Cabinet of Ministers of Ukraine [4], the World Bank [5] and the IMF [6], developed in October–November 2019, the country’s real GDP in 2020 was supposed to grow by an average of 3.5 %, and the growth of the consumer price index [7] was forecast at 5 %. Experts expected that the positive trend of poverty reduction in 2016–2019 would continue in the next period [8], although the rate of decline could be slower, depending on a number of factors. However, in 2020, there was an increase in the poverty rate (poverty threshold is the actual subsistence minimum): by income – a slight increase, within the statistical error (from 23.1 to 23.2 %), and by expenditures – a significant increase, by 14 % (from 41.3 to 47.2 %). It could be assumed that this

was a direct consequence of the pandemic and quarantine restrictions.

The economic recovery in 2021 made it possible to offset the negative consequences and reduce the poverty rate in a short period of time to values lower than in 2019 (pre-pandemic): the poverty rate (by income below the actual subsistence minimum) was 20.6 % in 2021 compared to 23.1 % in 2019. Prospects were opening up not only for a quick exit from the crisis, but also for further growth of real incomes and reduction of poverty. Based on the positive dynamics of 2021, a return to the economic growth trend in 2017–2019 was expected. But in 2022, post-pandemic recovery in Ukraine became impossible because of the full-scale invasion outbreak of Russia, which destroyed positive trends and significantly elevated challenges. In this regard, the idea arose to consider the impact of the COVID-19 pandemic on poverty in combination with the impact of a full-scale war. This will allow using methodological approach for assessment the extent of poverty under the influence of disasters of various natures – social, economic, environmental.

According to The Borgen Project, it can take countries more than 14 years to recover from the devastating effects of war. The ratio of impact on countries that have experienced war or major conflict is such that for every three years of conflict, the country is set back more than 2.7 percentage points behind the trend of improving poverty rates. Countries that have been afflicted by armed conflict during the past four decades have demonstrated more than 21 % higher poverty rates than those observed in conflict-free counterparts [9].

During the 1990s, much of the Western Balkans experienced profound social and economic upheaval resulting from armed conflicts, large-scale destruction, mass refugee movements, internal displacement, economic collapse, institutional disintegration, and widespread impoverishment. Even a decade after the cessation of hostilities, absolute poverty remained persistently high across most countries in the region, showing limited signs of decline [10]. By 2008, it was partially overcome, but from 2009 to 2012, the region’s economy suffered from a “double” recession, which extended the previous negative social consequences [11]. The large concentration of population and households just above the poverty threshold further demonstrated the challenges the region faced during precariousness of post-conflict recovery. In some countries, extreme poverty, i.e. the inability to meet even basic food needs remained widespread. Conversely, relative poverty was not very high. Nevertheless, given the relatively high standard of living enjoyed before the conflicts and the population’s elevated expectations for rapid improvement, the subjective perception of poverty became increasingly pervasive throughout the region.

Today, the Balkan countries are among the poorest countries in Europe, where the poverty rate is measured in double digits: 33 % of Macedonians live in poverty, as well as 30 % of Kosovo habitant, 20 % of Serbs and Croats. Albania had “the lowest standard of living and the lowest per capita income in all of Europe” [12]. The wars of the 1990s may have been one of the causes of poverty in the Balkans, they may have been a catalyst for the increase in poverty and the shrinking of the middle class, which has been observed in the region since then. Never-

theless, despite the high poverty rate, there is very little “youth crime” or street/gang crime, murder, theft, etc., in the region. However, according to The Borgen Project, there is still a lot of organized crime because of the geographical vulnerability of the region, as it is located between the markets of Europe and the Middle East.

Particularly vulnerable groups are the unemployed, dependents and less educated people. In some countries of the region, large families and elderly households are especially vulnerable at the household level. The poorest people often live in rural areas and underdeveloped regions. In addition, particularly vulnerable groups who cannot even be fully covered by standard surveys, but who are poor and socially excluded by many indicators, are Roma, refugees and displaced persons, as well as people with disabilities.

While experiencing transition, post-conflict reconciliation and reconstruction, countries of the Western Balkans have faced and continue to face many challenges on their path to the future in the European Union. One of the biggest is the implementation of programs and measures that will lead to equitable and sustainable economic growth, which will also positively affect the situation of vulnerable groups.

Ukraine has experienced similar consequences from a full-scale war, and today has very similar poverty profiles. In war conditions, the devastating consequences are felt not only by representatives of vulnerable groups of the population and households with traditionally high risks of poverty, but also by working and competitive people who have savings and the resilience capacity. Therefore, by creating a number of temporary support programs for targeted groups, it is impossible to counteract the impact of disasters of various nature on the scale of poverty in the country. The absence of a targeted policy can lead to a significant increase in the number of poor people and negative changes in the structure of inequality due to a bias towards the component of non-economic origin, which is difficult to transform.

Therefore, it is necessary to understand how rapid and profound the impact of catastrophic events on the population was, in particular in terms of increasing poverty, and how much the country was set back in terms of time and society on overcoming various forms of poverty. To formulate a policy to counter the negative impacts of crises in the future, it is also important to assess the recovery period, both from the perspective of achieving pre-crisis rates, and in comparison with the results that could occur in a hypothetical scenario without catastrophic events.

Literature review. Any systemic crises, such as pandemics, armed conflicts, economic downturns, natural disasters, significantly affect incomes and poverty. The availability of up-to-date statistical data on incomes is a guarantee of the possibility of prompt assessment during shocks, especially such sudden and unpredictable as the COVID-19 pandemic. The availability of prompt data allows one to quickly track changes in parameters and respond rapidly to critical situations.

In Ukraine, because of the lack of timely, high-quality microdata during the pandemic, microsimulation is the only possible method for estimating poverty indicators. This method uses individual-level data to simulate how different shocks affect households.

This study offers two counterfactual scenarios of microsimulation of the poverty rate indicator, all other things being equal, – without the COVID-19 pandemic and without war. Macroeconomic assumptions based on pre-pandemic forecasts. Microsimulation of poverty in scenario of the COVID-19 pandemic absence allows assessing the impact of the pandemic on the poverty rate in the country, as well as estimating the number of people who have additionally fallen into poverty because of the pandemic.

In the EU countries, microsimulation to assess the risk of poverty is mainly carried out on the basis of the tax-benefit microsimulation model EUROMOD [13] in combination with actual macro-level statistics. Examples of research based on EUROMOD are as follows: Bronka [14] projected the economic consequences of the COVID-19 pandemic and related lockdown measures in the United Kingdom. Canto [15] used the EUROMOD model to simulate income losses in some EU countries, finding that without emergency social policy measures, poverty would have increased significantly.

Almeida [16] analyzed the impact of the pandemic on household incomes using pre-pandemic economic forecasts, as well as taking into account the counterfactual scenario of the absence of mitigating discretionary fiscal policy measures taken by EU Member States. Microsimulation of incomes during the pandemic based on express estimates and inflation forecasts was made in the study by Leulescu [17]. O’Donoghue [18] estimated labor market shocks during COVID-19, developed crisis-specific forecasting models that combined modules for micro forecasting incomes and shocks in the labor market.

In a study by Lustig [19] in Mexico, microsimulation of incomes was carried out based on the latest available data set for 2018, taking into account macroeconomic pre-pandemic projections. However, the specificity of the microsimulation also singled out households with “at-risk” income and compared them with those who lost income. The results showed that the people who were on the poverty threshold, not the poorest, lost the most income.

Moyer’s study [20] presents a modelling of the global poverty rate according to the current trajectory of development under two baseline scenarios – with the impact of COVID-19 on GDP and a probable scenario without a COVID-19 pandemic. The simulation was based on economic growth rates obtained shortly before the pandemic in the World Economic Outlook.

Most of the simulations described are based on a comparison of expected GDP before and after the impact of COVID-19. However, the above differences in the values of macroeconomic indicators are not limited solely to the impact of COVID-19. Therefore, for example, Huber in his study [21] used the nowcasting methods in microsimulation of the impact of COVID-19 and, in addition to macroeconomic indicators, included so-called pandemic variables that did not exist before the pandemic. In general, the additional use of nowcasting methods (real-time forecasting) is effective in the current assessment of the impact of non-standard crises on poverty, as research using traditional methods has become significantly more difficult. In the context of the unexpectedness of the COVID-19 pandemic, the use of such methods has allowed researchers to create a sample

of households for income analysis in almost real time [22]. Analytics increasingly uses modern technologies, such as geospatial data from satellite images, data from mobile networks, payment financial systems, social networks, search queries, etc. [23]. And although the information obtained allows only an indirect assessment of the impact of the pandemic on poverty and inequality, the advantage of this technique is the speed of data acquisition and processing. During COVID-19, the World Bank High Frequency Surveys on data collection using high-frequency telephone surveys (HFPS) were also introduced in more than 100 countries [24]. It is currently one of the largest publicly available sources of data on the socioeconomic well-being of households during the COVID-19 crisis.

Machine learning methods have also been applied in real-time to assess the poverty impacts of two waves of the pandemic around the world. Machine learning models are used to improve the accuracy of the obtained estimates of the impact of crisis situations on poverty [25]. By identifying factors that are most strongly correlated with poverty, machine learning models can inform the design of more effective poverty alleviation programs.

One of the alternatives for microsimulation the impact of shocks in the absence of operational data is Synthetic panel techniques. They help researchers gain insight into changes in income, poverty, and vulnerability in the absence of panel surveys. These techniques involve the creation of artificial computer panels of micro level subjects for analysis based on two (or more) independent cross-sectional surveys to simulate the data set and the possibility of constructing various scenarios [26]. These allow tracking how the situation is changing at the micro level of specific households (for example, who got into poverty, who got out of poverty, etc.). However, the high cost or complexity of collecting synthetic panel data makes it inaccessible to many countries [27].

For comprehensive analysis the impact of potential future disasters, microsimulation approach models should be built taking into account both short-term shocks and long-term structural transformations.

Most of the models currently used in the world deal with the distribution of various indicators, including income, expenses, losses, etc. The main problems in using microsimulation models are the lack of high-quality information and the difficulty of assessing the impact of macroeconomic predicates on characteristics at the micro level. At the same time, microsimulation has the largest number of tools for combining macro indicators and their impact on well-being at the household level. Most publications on microsimulation of household incomes to determine poverty indicators are based on estimates of impact through the labor market [28]. At the same time, quite complicated models are used to characterize this impact at the household level.

Another rapidly developing area is nonparametric models [29], the main advantages of which are that one source of microdata is sufficient for microsimulation, and the impact of macro indicators has a certain probability for different population groups. But here another problem arises – the model changes depending on the sequence in which we assess the possible impact of macro indicators on household well-being.

To avoid these problems in our work, the authors used the rates of change of macro indicators, rather than the absolute value. In addition, the direct impact method was applied: the change in macro indicators had a clear, pre-calculated, impact value. Moreover, each indicator allowed us to simulate one of the income indicators at the household level. This made it possible, on the one hand, to avoid complicated models that can significantly increase the error, and on the other hand, to easily make adjustments to the calculations when the situation changes.

Purpose and objectives. The purpose of the study is to simulate hypothetical scenarios of the events development without catastrophic phenomena in order to assess how rapid and long-lasting the impact of disasters of various nature on poverty could be, as well as to produce hypothetical and realistic forecasts to understand the specifics of the crisis processes in the context of their impact on poverty and assess the prospects for the restoration of a positive trend.

This information is necessary for the development of future policies to prevent the growth of poverty during periods of crisis and to justify ways to counteract negative impacts on the population. The study is aimed at solving two main objectives:

1) to estimate the growth of the poor population under the influence of a pandemic and a full-scale war based on a specially developed methodology and microsimulation model;

2) to produce a poverty forecast for the needs of the policy of mitigating the social consequences of various disasters in the future.

The development of hypotheses about the evolution of the situation and microsimulation on household survey data using external macro-level data will allow assessing the impact of selected events on poverty. Microsimulation in this context allows obtaining the following estimates:

- what would be the dynamic series and trend of 2017–2021 without COVID-19;

- what are the direct losses caused by the negative impacts of COVID-19, expressed through the increased number of poor people;

- what would be the indicators of 2022 “without war”;

- what could be the speed of recovery from COVID-19 without a full-scale war;

- to model a realistic scenario regarding the prospects for overcoming the crisis in the medium term and compare it with a hypothetical scenario.

Methodology. Microsimulation is the best approach for situations where researchers cannot effectively use statistical or econometric models, but have enough information about the conditions of the processes that directly influenced, influence or are expected to influence the phenomenon or object of the study. The constructed algorithm is easily programmable, which allows one to make additional adjustments to the simulated input indicators and obtain more reasonable results.

For microsimulation, the study used microfiles of the Sample Survey of Living Conditions of Households of the State Statistics Service of Ukraine (hereinafter SLCH) for 2016–2021 [30] and a microfile of the nationwide Household Socio-Economic Status Survey in

Ukraine (hereinafter HSESS) for 2023, conducted with the technical support of UNICEF [31].

To achieve the first objective, the following methodological approaches were used. The analysis of the studies allows us to state that the main socio-economic consequences of the impact of COVID-19 are a significant decrease or loss of income sources. To assess this impact, the main indicators of the financial situation of households were modeled based on the data of the pre-pandemic year. This approach allows estimating household incomes under various simulated scenarios, in particular, without the impact of a pandemic and a full-scale war. Moreover, it makes it possible to assess not only general poverty indicators, but also indicators in the context of individual socio-economic or socio-demographic groups, which is necessary for the formation of policy directions to counteract negative impacts.

A reliable assessment of changes in the main components of income (wages, other income from economic activity, pensions and other social transfers) is necessary for income microsimulation, based on the understanding of macroeconomic trends. In addition, it should be taken into account that the rate of changes in income is different depending on its rate. For this purpose, we used a modified algorithm, which is fully described in another publication of the authors [32].

Thus, we obtained a simulated variable of total household incomes, provided that the economy develops without crises, on the basis of which poverty indicators are calculated. The difference between the poverty indicators obtained by the model variable and the indicators calculated on the basis of real data provides information about the impact of force majeure circumstances and their strength. If there are no actual microdata for the analyzed period, then it is necessary to simulate the real income variable according to a similar algorithm using the actual values of macro indicators.

For poverty assessments, the study uses the threshold at the rate of the actual subsistence minimum. In conditions of socio-economic instability, absolute poverty measurement criteria are most appropriate for analyzing dynamic shifts. Among such criteria, the criterion “Incomes below the actual subsistence minimum” was determined as the main one for assessing changes in the poverty situation in Ukraine over two years of the war, as well as for forecasting [33].

To achieve the second objective, the following methodological approaches were used. The poverty forecast was built according to two scenarios:

The first one – hypothetical scenario – provides the continuation of the trend line of 2016–2021 to 2022–2026 years. Therefore, the situation in the past is simulated according to the scenario “without a full-scale war”. We get an answer to the question of what indicators we could achieve in the absence of a full-scale war.

This extension is carried out not according to the dynamic poverty series but according to the microdata file (by the total income variable) of the Sample Survey of Living Conditions of Households of the State Statistics Service of Ukraine, which was conducted on an ongoing basis until 2022, and was suspended with the start of a full-scale war.

Based on the microfile data for 2021, the growth rate of income indicators (on the basis of which poverty rates

are calculated) is set according to the average annual income growth rate in the period 2017–2021 for each year.

The second scenario of the forecast – realistic one – is based on the actual indicators of the 2025 HSESS data, which take into account the impact of the war, and provides for the trend overlay of 2016–2019 on the first period of post-war recovery. This scenario assumes an optimistic scenario for the development of events in Ukraine, according to which post-war recovery could begin in 2025.

Therefore, the hypothetical scenario indicates what the poverty indicator would be if there were no full-scale war. This figure can be conditionally taken as a baseline when assessing losses, in particular, regarding the reduction of income and an increase in the share of the poor people as a result of the war. Calculations show that without a full-scale war, the dynamics of income and poverty rates after 2021 could have the same pace as in the period 2017–2021 [32].

The hypothetical forecast was built on the basis of a microfile of the Sample Survey of Living Conditions of Households. In the calculations for the microsimulation model at the income level, the forecast average annual growth rates were determined, similar to the period 2017–2021. External macro level data were used to calculate the poverty threshold, which depends on the consumer price index. The forecast consumer price growth rates were determined as average annual values for the same period.

In order to achieve the objectives of the study, hypotheses were formed for those scenarios that we defined as zero: 1) scenario 1 “without COVID-19 pandemic” and scenario 2) “without full-scale war”. In addition, hypotheses were formed separately for realistic scenarios.

Scenario 01 “without COVID-19 pandemic” is based on the assumption that in 2020, in the absence of COVID-19, macroeconomic indicators would grow, according to the 2019 forecasts. Thus, for microsimulation, forecasts of macroeconomic indicators for 2020 published from September 2019 to January 2020 by various national and international institutions were used; macroeconomic forecast data were summarized based on average values for all considered Scenarios.

Scenario 02 “without full-scale war”. The full-scale war had a critical impact not only on incomes and poverty, but also on all spheres of society. Indicators of socio-economic development, which partially recovered in 2021 after the pandemic, have significantly declined. The scenario “without full-scale war” uses data of macroeconomic forecast data for 2022 for calculations. Data from macro forecasts published in November–December 2021 and early 2022 were used. Based on these calculations, an estimate of losses (growth in the number of poor people) for 2022 was made.

Realistic scenario of 2022. To estimate war losses in the absence of household survey data after 2021 and the limitations of other statistical data, microdata microsimulation was performed for 2022. The final macroeconomic estimates for 2022, which became available in 2023, allow for the construction of a high-quality microsimulation model for 2022 [32].

The realistic scenario of 2027 assumes that the war would be over by the end of 2024 or early 2025, and

post-war recovery could begin in 2025. Based on the developed predictive hypotheses regarding the possible development of the situation in the future, model calculations were performed for 2025–2027 based on the OECD microdata array for 2023 [32].

Therefore, the purpose of this study is to apply the microsimulation advantages to solve the problems of assessing and predicting the impact of catastrophic events on poverty in a country under additional information constraints caused by the war.

Limitations of the study. The main limitations of the study were two factors. The first factor is based on the objective nature of socio-economic processes – we currently have an insufficient retrospective time horizon to assess direct and indirect negative impacts on poverty, starting from 2020. The second factor is related to severe information restrictions caused by the full-scale war, as all state statistical surveys were suspended for the period of wartime. Therefore, the latest microdata of the household survey, which is conducted at the national level by the State Statistics Service of Ukraine, are available for 2021 [30].

In 2023, nationwide Household Socio-Economic Status Survey in Ukraine was conducted (with the technical support of UNICEF) [14], taking into account the need to harmonize the methodology with the pre-war survey of the State Statistics Service of Ukraine. However, full comparability in terms of income and expenditure indicators could not be achieved because of a number of objective reasons. Therefore, in the presented forecast, the real values of the poverty rate for 2023 are used exclusively for contrasting with the obtained model values, and microsimulation is carried out on data for 2016–2021.

Results. The calculations of poverty rates based on simulated values at the level of household income made it possible to assess the impact of the pandemic and full-scale war on the scale of the phenomenon.

According to the general development of the economic situation in the country, there should have been a significant reduction in the poverty rate based on income below the actual subsistence minimum (ASM) from 23.1 % in 2019 to 18.6 % in 2020. The reduction in the poverty rate by 4.5 percentage points should have led to more than 1.7 million people would get out of poverty. The implementation of this scenario was prevented by the development of the COVID-19 pandemic, and instead of a decrease, we got a slight increase in the poverty rate to 23.2 %, which led to an increase in the poor people number.

In the absence of the coronavirus pandemic in 2021, the poverty rate should have been 17.0 %, while the actual value was 20.6 %, that is, by 3.6 percentage points higher. It should be noted that due to the economy's habituation to the pandemic factor, the actual poverty rate decreased by 2.6 percentage points compared to the corresponding indicator in 2020 (Fig. 1).

In the field of poverty, the losses from the pandemic in 2021 were less than in 2020. Therefore, the consequences of impacts on poverty should be assessed with a certain lag after the beginning of the crisis wave, since the patterns of socio-economic processes make adjustments to the development of the situation. The losses caused by the pandemic's impact on poverty are obvi-

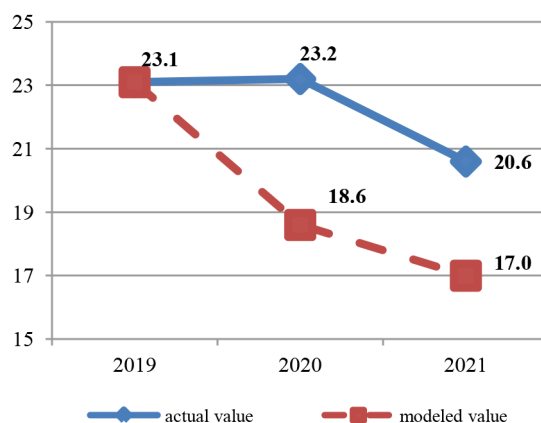


Fig. 1. Estimated impact of COVID-19 on poverty rates below the actual subsistence minimum (modeled and actual values), % [13]

ous, but as of early 2022 they were not catastrophic, as they did not disrupt the positive poverty trend formed in 2016–2019.

The year 2021 was chosen as the base year to assess the impact of the war. This choice was driven by the need to obtain the net impact of this factor on poverty. Thus, conducting simulations under a realistic scenario (estimates based on actual economic performance in 2022), the poverty rate for incomes below the ASM was 35.8 %, which is 1.7 times higher than the value in 2021. In the absence of the war factor, the poverty rate should be 19.6 %. The difference between the modeled and actual poverty indicators suggests that the full-scale war led to an increase in poverty by incomes below the ASM in 2022 by 82 % or by 16.2 percentage points (Fig. 2).

The increase in the number of poor people in Ukraine was estimated separately from the pandemic and the war. This allows one to more clearly analyze and compare the consequences of various catastrophic events on the situation of Ukrainian households. In 2020, the number of poor people without COVID-19 should have been 7 million people. The pandemic led to an increase in this value to 8.8 million or by 1.8 million people. In the absence of the pandemic, in 2021, the number of poor people should have decreased to 6.4 million people. In fact, it was 7.8 million people, i.e. 1.4 million people more than it could have been taking into account the estimates of the actual impact in 2020,

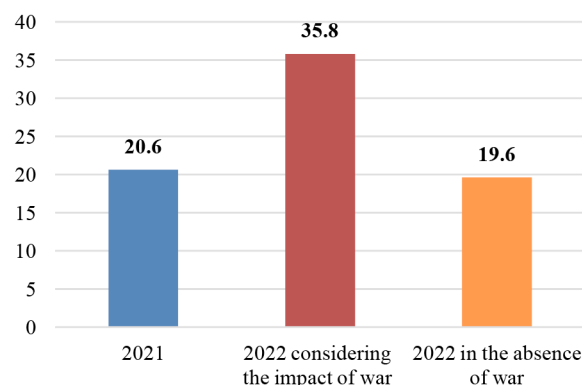


Fig. 2. Estimated impact of full-scale invasion on poverty rates below the actual subsistence minimum (modeled and actual values), % [13]

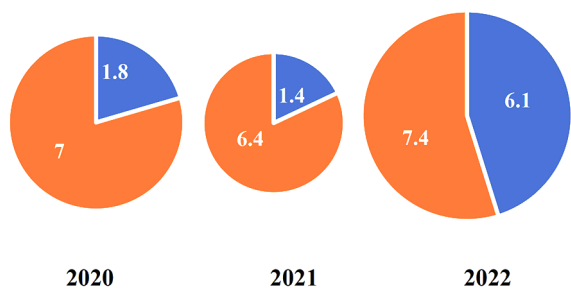


Fig. 3. Increase in the number of poor people as a result of the COVID-19 pandemic and war, million poor people (2020–2022) [13]

and 1 million people more if the pandemic had not happened at all (Fig. 3).

In 2022, there should have been a further gradual reduction in the number of poor people from 7.8 million people in 2021 to 7.4 million people. The full-scale war led to the fact that, instead of decreasing, the number of poor people increased catastrophically – to 13.5 million people. Thus, from full-scale military operations, the number of poor people increased by 6.5 million people in one year, which is twice as many as in two years of the pandemic.

According to the microsimulation results of the hypothetical scenario for 2022–2026 “without war”, the poverty rate in 2026, other things being equal, should have been about 5 % (Fig. 4). Therefore, if the Russian federation had not started a full-scale war, the country could quickly recover from the coronavirus crisis and reduce poverty to insignificant values within a short period (in this model – five years). This actually means a reduction of the poverty rate to the so-called “natural” rate (Fig. 4).

Instead, in 2023, the poverty rate increased by 1.7 times compared to 2021 – from 20.6 to 35.5 %. The first two years of the war pushed us back in terms of poverty to the beginning of a positive trend of the pre-pandemic period (to 2017), and in a longer retrospect – to the first years of economic growth after the crisis of the 1990s (to 2005). The war had an even greater impact on the scale of extreme poverty, with almost every tenth Ukrainian on the verge of survival – the extreme poverty rate increased from 1.3 % in 2021 to 8.8 % in 2023 [34].

After the first years of the Russian-Ukrainian war (2014–2015), there was a catastrophic threefold increase

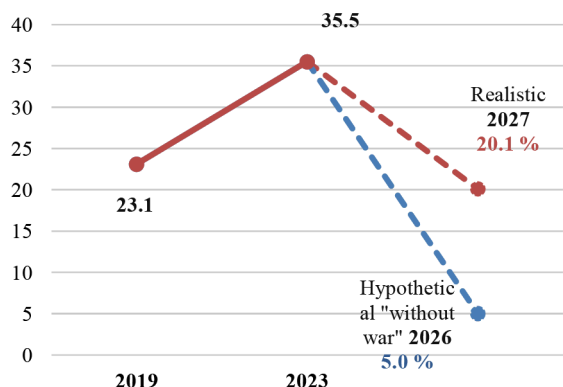


Fig. 4. Hypothetical poverty rate forecast for 2026 under a scenario without a full-scale war and a realistic forecast for 2027 (taking into account the consequences of the war), % [13, 14]

in the poverty rate – from 16.3 % in 2014 to 51.9 % in 2015. However, the recovery process began in 2016, and 2017 showed a significant decrease in poverty. Thus, the downward trend in poverty was formed in 2016–2019, then it was continued in 2021, despite the increase in the indicator in 2020.

The prolongation of the positive trend with the poverty situation in the period 2016–2021 to the stage of future post-war recovery leads to the conclusion, that, given similar rates of poverty reduction over five years, we may well reach lower values than we had in 2021 before the full-scale war. According to the defined realistic scenario, a positive trend similar to the dynamics of 2017–2019, when recovery took place after the crisis of the first stage of the Russian-Ukrainian war, could be realized in 2025–2027. According to the microsimulation results, the poverty rate in 2027 may be 20.1 % (Fig. 4).

Therefore, in a favorable scenario, first of all, the end of the active phase of the war, in 2027 it is quite possible to achieve a poverty rate close to the rate of 2021 (20.6 %). If a full-scale war had not begun, then in 2027 the scale of absolute poverty in the country could have been at least four times smaller, approaching ultra-low values. That is, Ukraine could become similar in the picture of poverty to the EU countries, which measure the phenomenon according to relative or non-monetary criteria. In terms of the time of poverty reduction, it is already clear today that the war has set us back at least six years. The consequences of a full-scale war can be minimized no earlier than three years of post-war reconstruction, so each year of active hostilities postpones the beginning of a new trend in overcoming poverty.

Nevertheless, the post-war recovery and return of poverty rates in three years to 2021 rates is positive evidence of the rapid emergence of a new positive trend. However, there are certain risks associated with the increase in inequality that traditionally accompanies periods of economic growth, unless appropriate targeted policies are implemented to prevent such processes.

According to the realistic microsimulation scenario, which assumes a decrease in the poverty rate in 2027 to the values of 2021, inequality will increase significantly (Table 2). Thus, the quintile differentiation coefficient will increase from 10.1 times in 2023 to 12.4 in 2027.

Table 2

Forecast of inequality (quintile coefficient of differentiation) in Ukraine for 2023–2027 [13]

Quintile groups	Average incomes for the group, UAH per person per month	
	Year 2023	Year 2027
1	2,548	4,394
2	5,485	10,006
3	7,980	15,257
4	11,606	22,965
5	25,743	54,503
Quintile differentiation coefficient	10.1	12.4

Given the high rates of actual differentiation in 2023, its further growth (by at least 20 %) may pose a threat not only to economic but also to social development.

In the conditions of post-war reconstruction, the public sphere may be too sensitive to various manifestations of inequality, which may be associated with, or even border on, injustice. In such a situation, state policy should take into account the risks of growing economically unjustified inequality and prevent the channels of its spread. A separate direction of social policy should be the radical reform of social programs to better support the most vulnerable segments of the population in conditions of extremely limited state resources. All this will contribute to reducing excessive inequality and relieving social tension in society.

Conclusions. The evaluation of the actual data shows that in 2020 the impact of the COVID-19 pandemic on poverty was insignificant, and this did not change the positive trend in reducing poverty in 2016–2019. At the same time, the microsimulation shows that because of the pandemic, 1.8 million new poor people appeared in 2020. Due to the adaptation of the economy to functioning during the pandemic, in 2021 the number of new poor people decreased to 1.4 million people. The impact of the war on poverty was much more significant than the pandemic, the number of poor people more than doubled; since the beginning of the war, 6.5 million people have been pushed below the poverty threshold.

The hypothetical forecast scenario shows that, in the absence of a full-scale war and the continuation of the positive trend, the poverty rate in 2026 could reach 5 %. In the context of absolute poverty, this is an extremely low value, within the so-called “natural” scale of poverty. Therefore, we could recover from the pandemic quite quickly and by 2026, in the background of a small scale of absolute poverty, move to the concept of overcoming poverty from the standpoint of relative and non-monetary approaches. The realistic forecast scenario is based on the main hypothesis that the war will end in the near future, and post-war recovery will begin in 2025. Under these conditions, the positive trend of 2016–2019, which accompanied the recovery after the deep crisis of the first years of the Russian-Ukrainian war, may be repeated during 2025–2027. The poverty rate in 2027 is expected to be 20 %, which is quite possible to achieve close to the 2021 figure (20.6 %). However, against the backdrop of a positive trend in economic growth and poverty reduction, there are risks associated with increasing inequality. If an appropriate targeted policy is not implemented to prevent the growth of inequality, the quintile differentiation coefficient will increase from 10.1 times in 2023 to 12.4 in 2027. In such a situation, state policy should facilitate minimization of the channels for the spread of economically unjustified inequality, and state social programs should be reformed to better support of the most vulnerable groups in conditions of limited resources, which will help relieve social tension in society.

Acknowledgements. *This article highlights the results of a scientific study conducted by the staff of Mykhailo Ptoukha Institute for Demography and Life Quality Research of the NAS of Ukraine within the framework of the project implementation under the Grant Support Agreement No. 33/0295 dated March 1, 2024 of the National*

Research Foundation of Ukraine No. 2021.01/0295 “Growth of Inequality and Poverty in Ukraine as a Result of the COVID-19 pandemic”.

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Бідність під впливом COVID-19 та повномасштабної війни в Україні: ретроспективне моделювання та прогноз

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Мета. Здійснити моделювання гіпотетичних сценаріїв розвитку подій без катастрофічних явищ, щоб оцінити, наскільки стрімким і тривалим може бути вплив катастроф різної природи на бідність, а також побудувати гіпотетичний і реалістичний прогнози для розуміння специфіки перебігу кризових процесів у контексті їх впливу на

бідність та оцінки перспектив відновлення позитивного тренду.

Методика. Для дослідження впливу пандемії COVID-19 і повномасштабної війни на бідність в Україні найкраще підходить метод мікроімітаційного моделювання. Цей метод ефективний для ситуацій, коли не можна використати статистичні або економетричні моделі, проте достатньо інформації про умови перебігу процесів, що напряду впливали, впливають чи очікувано будуть впливати на досліджуване нами явище або об'єкт. Побудований алгоритм легко програмується, що дозволяє вносити додаткові коригування у модельовані вхідні показники, і отримувати більш обґрунтовані результати.

Результати. Згідно із оцінками, на основі мікроімітаційного моделювання даних Обстеження умов життя домогосподарств за 2016–2021 роки та Обстеження соціально-економічного становища домогосподарств за 2023 рік, пандемія призвела до зростання чисельності бідних на 1,8 млн осіб, проте воно не було катастрофічним, оскільки не порушило позитивний тренд. Війна призвела до зростання чисельності бідного населення на 6,1 млн, загалом до 13,5 млн осіб, що знівелювало досягнення у скороченні рівня бідності й відкинуло нас на десятиліття назад. Згідно із результатами моделювання, за умови відсутності війни Україна могла б досить швидко оговтатися після пандемії, аж до скорочення масштабів бідності протягом п'яти років до мінімальних значень. Реалістичний прогнозний сценарій базується на фактичних даних 2023 року й передбачає відновлення економіки, починаючи з 2025 року. За таким сценарієм передбачається досягнення у 2027 році рівня бідності у 20,1 %, що є нижчим за значення 2019 року.

Наукова новизна. У роботі визначена глибина впливу катастрофічних подій (пандемії COVID-19 та повномасштабної війни) на українське населення, зокрема в контексті зростання бідності. На цій основі були оцінені втрати від катастроф останнього пів десятиріччя через: зростання числа бідних, якого можна було б уникнути у випадку відсутності означених подій, та у часовому вимірі через кількість років, на які нас було відкинуто назад на шляху подолання бідності. Для формування політики протидії негативним впливам криз у майбутньому оцінена важливість встановлення терміну відновлення як із позицій досягнення докризових значень, так і у порівнянні з тими результатами, що могли б статися за гіпотетичного сценарію без катастрофічних подій.

Практична значимість. Запропонований комплексний підхід до аналізу впливу пандемії COVID-19 та повномасштабної війни на рівень бідності в Україні забезпечує можливість формування цілісної методологічної рамки для оцінки масштабів бідності під впливом катастроф різної природи.

Ключові слова: бідність, мікромоделювання, прогноз, COVID-19, повномасштабна війна

The manuscript was submitted 14.09.25.