CIVITTA

співпраця з німеччиною
DEUTSCHE ZUSAMMENARBEIT

UNDP

Financial costing of the human capital losses in Ukraine

Analytical materials

2023

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AGENDA

1. **Development of human capital in Ukraine**
2. Impact of full-scale invasion on human capital metrics
3. Financial costing estimation

DESPITE THE ABSENCE OF AGREED DEFINITION OF HUMAN CAPITAL MOST APPROACHES CAPTURE THREE KEY PILLARS – EDUCATION, HEALTH, LIVING CONDITIONS

WORLD BANK GROUP	OECD	WORLD ECONOMIC FORUM	UNECE
Human capital is a combination of **knowledge, skills, health, and social protection** that affect a person's potential to produce higher **economic earning**	Human capital is **education** and **work experience** which result in **knowledge and skills** that help people to be productive and to yield higher **economic returns**	Human capital is **knowledge and skills** acquired through formal and informal education that enable people to **create value in the global economic system**	Human capital is an **investment or expenditures on accumulating knowledge** in relevant areas of the economy which add to the stock of productive capital

DEFINING HUMAN CAPITAL

Human capital is defined as a combination of knowledge and skills acquired through lifetime **education, health, social support and protection**, and **employment opportunities** that help people be more productive members of society and produce higher **economic outputs**

HUMAN CAPITAL PILLARS

EDUCATION PILLAR	HEALTH PILLAR	LIVING CONDITIONS PILLAR
• **Education**	• **Health** • **Food security**	• **Living Conditions** • **Social inequalities**
• Education quality (test scores) • Education quantity (years of schooling, percent of population enrolled in education)	• Survival rate • Healthy growth and life expectancy • Accessibility of healthcare services	• Quality of life, including material resources • Standards of living • Accessibility of social protection services

ECONOMIC OUTPUT PILLAR

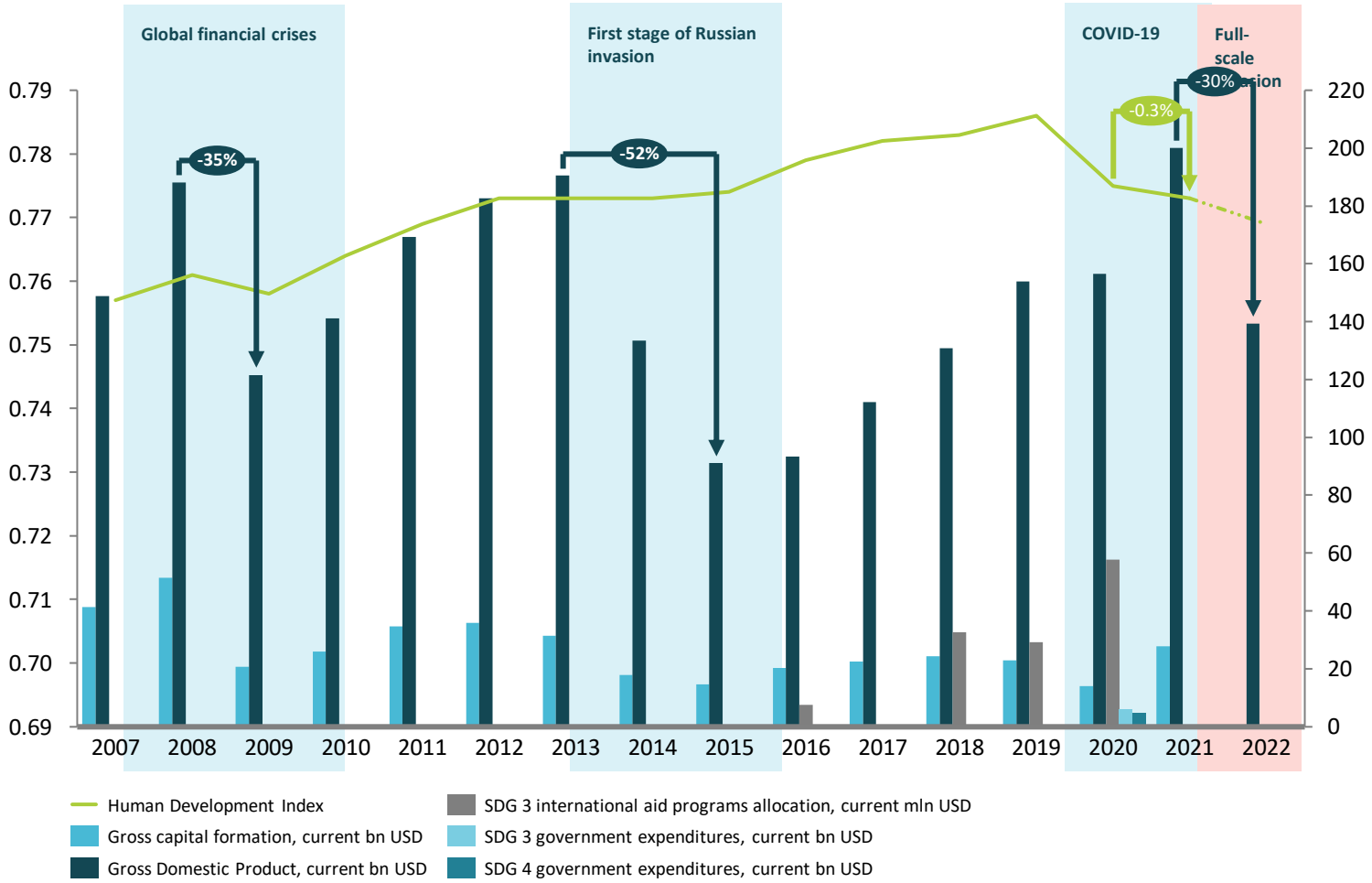
- **Labour market**

The outlined **measures of human capital** are **proxy categories** which shape the analysis of human capital according to **defined indicators** and, most importantly, enable **quantifying the assessment** of human capital changes over time or in comparison with the progress of other countries in the field of human capital development.

Sources: World Bank, OECD, World Economic Forum, UNECE

HUMAN CAPITAL METRICS CORRELATE WITH ECONOMIC GROWTH INDICATORS DURING MAJOR CRISES

GCF, GDP, SDG 3 AND SDG 4 EXPENDITURES (IN BILLION USD), SDG 3 INTERNATIONAL AID (IN MILLION USD) AND HDI (ON THE SCALE 0-1) IN 2007-2022



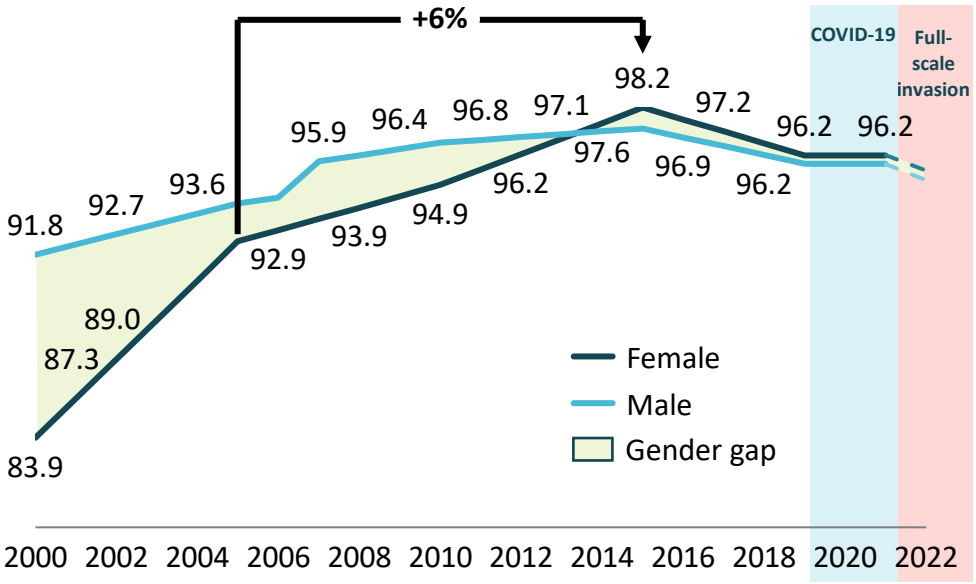
INSIGHTS

- **A 35% decrease in GDP** due to the Global financial crises was complemented by a 3 points decline of the HDI.
- **Russian aggression in Crimea and eastern Ukraine caused a 52% decline of GDP** and decrease of mean years of schooling component of HDI from 11.3 to 10.1.
- **COVID-19 pandemic** resulted in short-term consequences for human capital (3 points decrease in total HDI and decline in life expectancy at birth component from 72.6 to 71.6) and long-term damaging effects for the real economy.
- **A war in Ukraine** has already caused severe decline in all indicators of human and economic development. The NBU preliminary estimates a 30% drop in GDP in 2022, and the RDNA report measures the total loss of human capital at USD 57.5 bn.
- As of 2020, **Ukraine Government expenditures on meeting SDG 3** accounted for USD 5.8 bn, while it reached almost USD 4.7 bn for **SDG 4**. Additionally, Ukraine is a recipient of **international aid for SDG 3** which grew from USD 7.5 mln in 2016 to USD 57.6 mln in 2020.

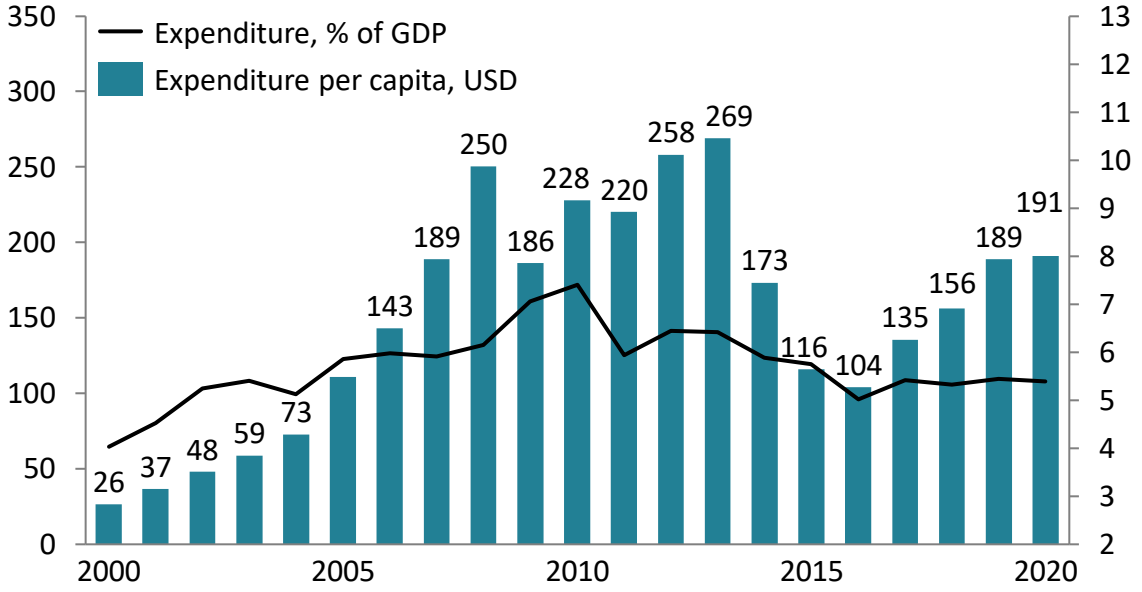
CIVITTA Source: World Bank, HDI, UNDP

EDUCATION RELATED INDICATORS DEMONSTRATE A GRADUAL DEVELOPMENT OF THE SECTOR IN UKRAINE OVER THE PAST 20 YEARS

POPULATION WITH AT LEAST SOME SECONDARY EDUCATION, % AGES 25 AND OLDER



CURRENT EDUCATION EXPENDITURE IN UKRAINE, USD AND % OF GDP



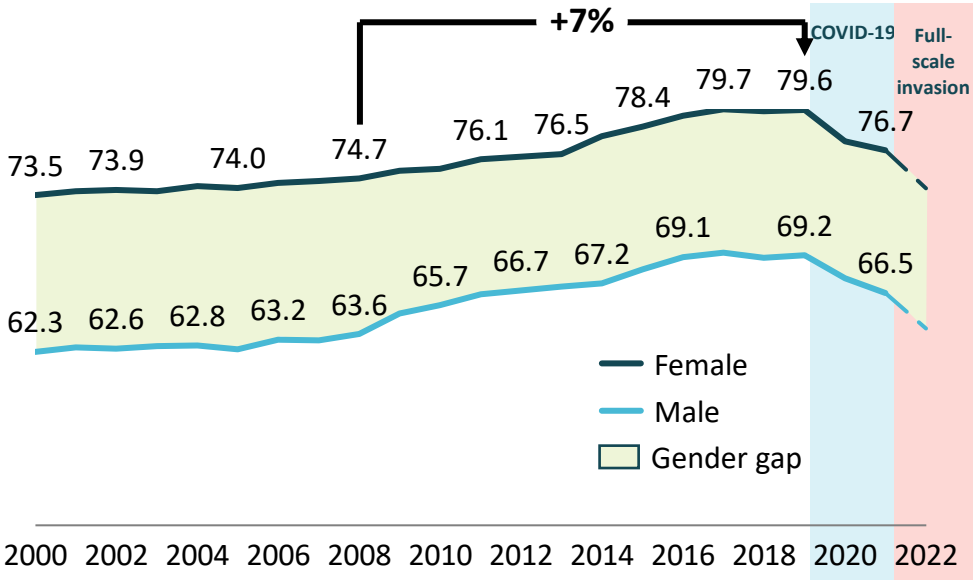
INSIGHTS

- **Higher percent of population** tends to have **at least some secondary education**: while in 2000 only 83.9% of females and 91.8% of males ages 25 and older had such level of education, by **2015** this indicator grew to **98.2% of females** and **97.3% of males** with a slight decline to **95.8% in 2021**. This also demonstrates that the gender inequality decreased in this area.
- Although the **government expenditure on education** has reached its **peak of 7.4% of GDP in 2010** compared to roughly **4% in 2000**, the indicator dropped to **5.4% of GDP in 2020**, remaining at about the average level over the whole period. **Government expenditure per capita** have increased significantly, **from only USD 26 in 2000 to USD 191 in 2020**. However, the highest number can be observed **in early 2010s** when they **surpassed yearly USD 200**, while the **major drop to USD 104 in 2016** was mainly caused by the Russian aggression and restructuring of government expenditures in the following years.

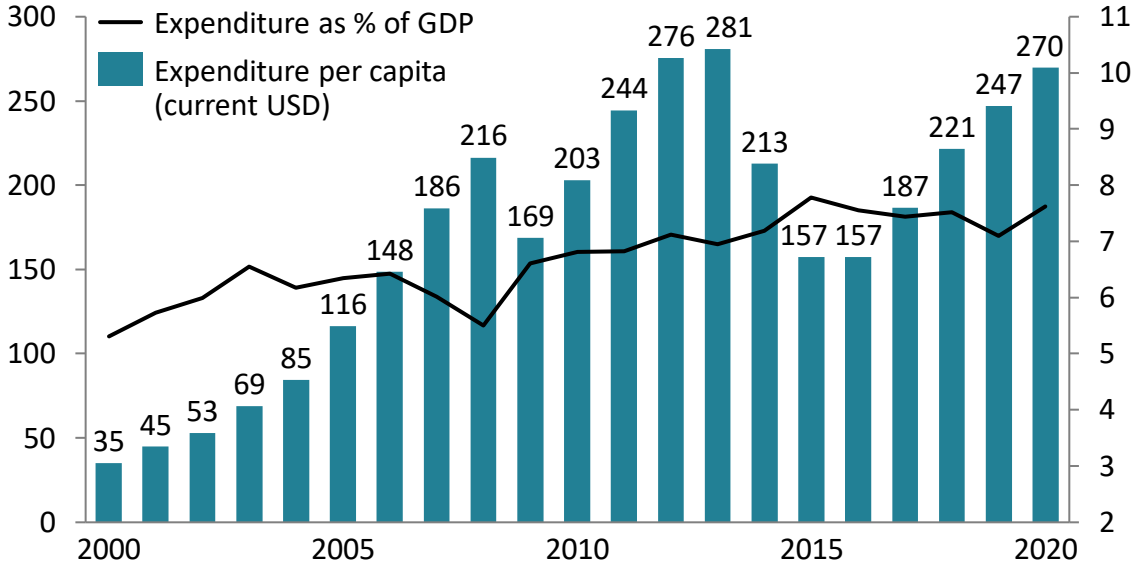
 Source: World Bank, HDI

UKRAINE OVER THE LAST 20 YEARS SHOWED LIMITED PROGRESS IN LIFE EXPECTANCY NOW ENDANGERED BY WAR

LIFE EXPECTANCY AT BIRTH IN UKRAINE, YEARS



CURRENT HEALTH EXPENDITURE IN UKRAINE, USD PER CAPITA AND % OF GDP



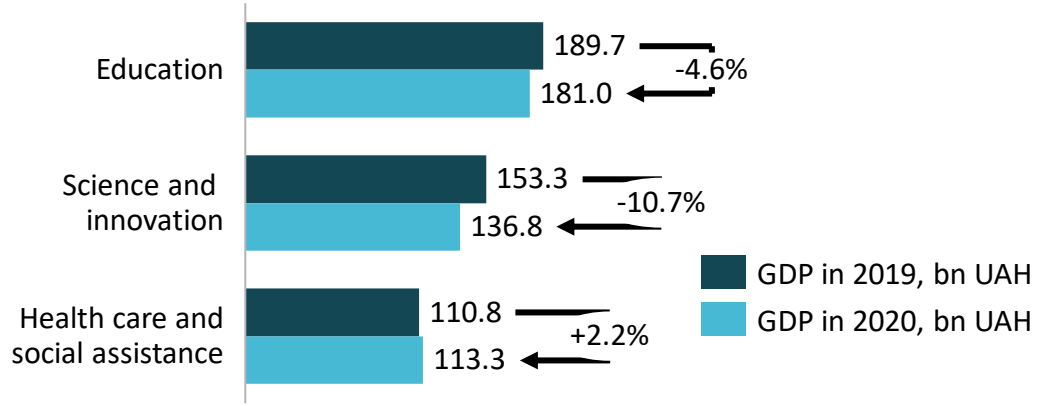
INSIGHTS

- **Life expectancy at birth** in Ukraine has increased moderately over the past two decades, with the biggest **growth by 5% in the period 2008-2019** (from 68.3 to 71.8 years). However, the **COVID-19 pandemic caused decline in life expectancy** due to increased mortality rate (69.6 years in 2021). This indicator is **expected to further decline in 2022-2023** because of human losses during full-scale Russian invasion.
- **Health expenditures per capita** in Ukraine have been increasing steadily since early 2000s, with a significant **eight-fold growth from USD 35 in 2000 to USD 270 in 2020**. An upward trend was interrupted twice, namely with drop-downs in 2009 due to financial crisis and in 2014-2016 as a reaction to Russian aggression. However, **expenditure as percent of GDP** has seen moderate change, **remaining within 5.3-7.8% range**.

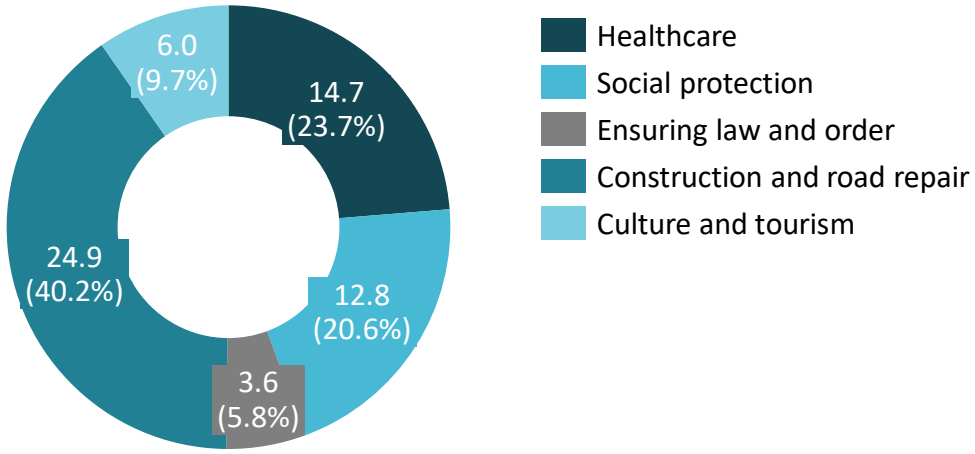
CIVITTA Source: World Bank, HDI

COVID HAS NEGATIVE IMPACT ON UKRAINE'S HUMAN CAPITAL IN TERMS OF EXCESSIVE MORTALITY RATE, EDUCATION QUALITY AND EMPLOYEMENT LEVELS

UKRAINE'S GDP IN HUMAN CAPITAL RELATED SECTORS, 2020



ALLOCATION OF FUNDS FROM ANTI-COVID-19 FUND, BN UAH



INSIGHTS

- Ukraine introduced **one of the strictest quarantine restrictions in Europe** at the beginning of the pandemic in March 2020. However, they **did not prove effective** as the spread of the disease and mortality rates remained at about the average European level.
- In 2020, due to excess mortality caused by COVID-19, the **mortality rate in Ukraine rose to 15.9 deaths per 1,000 population** (14.7 in 2019).
- The COVID-19 pandemic **encouraged external migration**, even though it forced people to return to Ukraine during lockdown. The International Organization for Migration (IOM) estimates that **1 million 167 thousand Ukrainians were abroad in 2021**, **11% more than in 2019 prior to COVID-19**. More people started to think of migration to countries with safer and more secure environment and with higher social protection level.
- When the COVID-19 restrictions were lifted, official data from the State Employment Service showed a **significant (sometimes more than 10 times) prevalence of unemployment over the number of vacancies**. This is true for both specialists and representatives of working professions.
- Introduction of remote studies had a **negative impact on the quality of education**, especially for **children in primary school**. In the long-term, it has an accelerated negative effect on the quality of acquiring knowledge, practical skills, and the formation of human capital.
- Although **healthcare sector was overloaded during the pandemic**, A significant part of expenses from the **Anti-Covid-19 Fund** was directed to **measures not related to combat the coronavirus** but rather to the support of general economic activities (infrastructure development).

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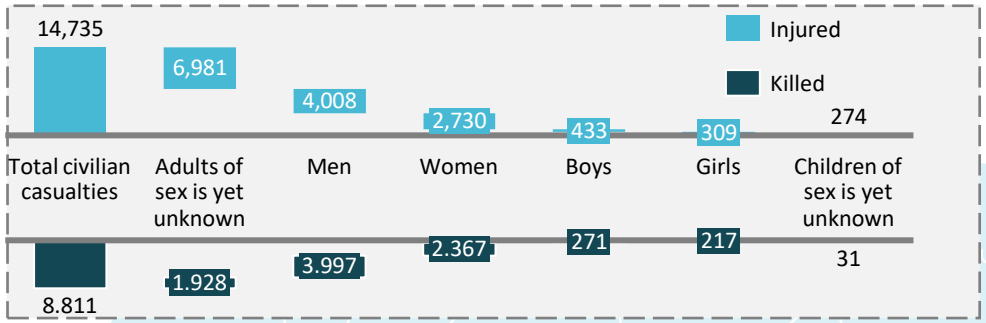
WAR CAUSED A SIGNIFICANT REDUCTION IN POPULATION DUE TO THE DISPLACEMENT OF PEOPLE AND DIRECT CASUALTIES

THE IMPACT OF A FULL-SCALE INVASION ON THE DEMOGRAPHIC SITUATION OF UKRAINE



2.9 million Ukrainians have arrived in Russia since the beginning of the invasion

Currently, **about 1.5 million Ukrainians** remain there

The population of Ukraine in the territory under the control of the Armed Forces may reach 33.6-34.5 million people based on the official estimate of the population of Ukraine in 2021

Based on the **digital census** of 2019, the population may be **29.9-30.8 million people**

Since February 24, 2022, about **13.7 million Ukrainians left abroad and 8.7 million entered the country** as of the end of 2022

By the end of 2022, **from 3.8 to 4.7 million refugees were abroad**, including in Europe

According to various estimates, **1.6 to 2.8 million people live in** Occupied Districts of Donetsk and Luhansk regions

As of September 2022, **1.2 million people were in the temporarily occupied territories**

According to the illegal census of 2021, **2.5 million people live in the Autonomous Republic of Crimea**

Temporarily occupied territories: *From 2014* *As of May 2023*

COMMENTS

- The full-scale invasion caused a **demographic shock to the Ukrainian population**, as a result of which a large proportion of Ukrainians became IDPs or received refugee status in foreign countries.
- At the same time, in the temporarily occupied territories, the **aggressor conducts an active policy of passporting the population and illegally deporting children** to the territory of the Russian Federation.
- As of May 2023, **total civilian casualties in Ukraine** since the beginning of full-scale invasion reached **23.5 thousand people**, including **8.8 thousand people killed** and **14.7 thousand people injured**.

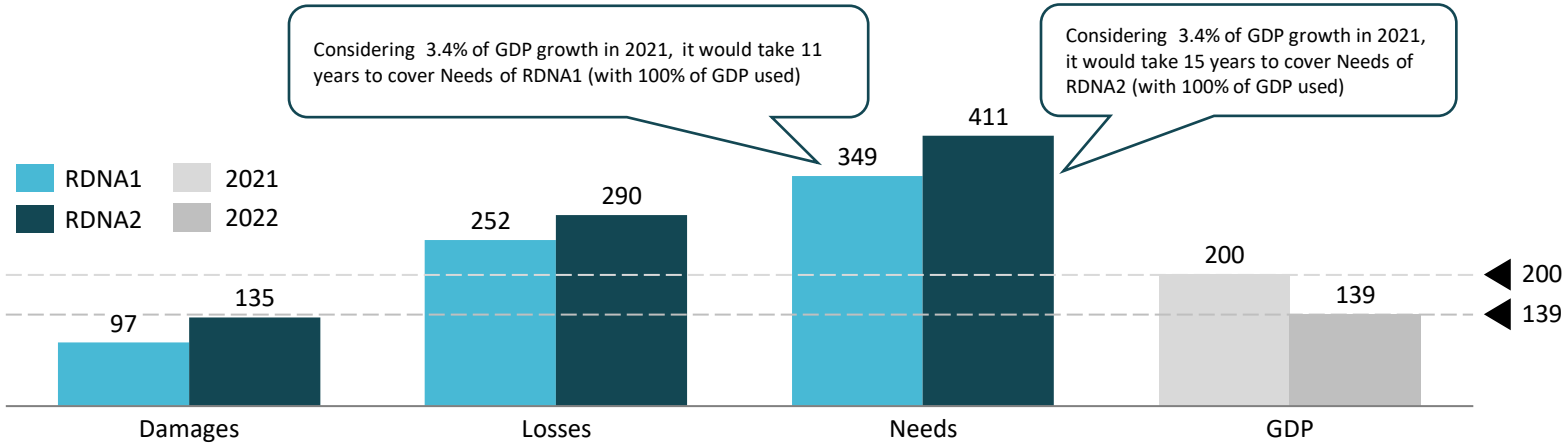
CIVITTA Sources: UNDP, Ministry of Reintegration of Temporarily Occupied Territories, CES, OHCHR

THERE WERE SEVERAL ATTEMPTS TO ASSESS THE WAR DAMAGE WITHIN SECTORS, INCLUDING THOSE DIRECTLY RELATED TO THE HUMAN CAPITAL (1/2)

Rapid Damage and Needs Assessment (RDNA) is a joint research of the Government of Ukraine, the World Bank, and the European Commission with support of other countries which aims to assess the effects of war on Ukraine by three criteria:

- **Damages**: Direct costs of destroyed or damaged physical assets.
- **Losses**: Changes in economic flows resulting from the war.
- **Needs**: Value associated with the resumption of prewar normality through activities such as repair and restoration, including a "build back better" principles

RDNA1 (24 FEBRUARY 2022 – 1 JUNE 2022) AND RDNA2 (24 FEBRUARY 2022 – 2023) TOTAL DAMAGE, LOSSES AND NEEDS, BN USD



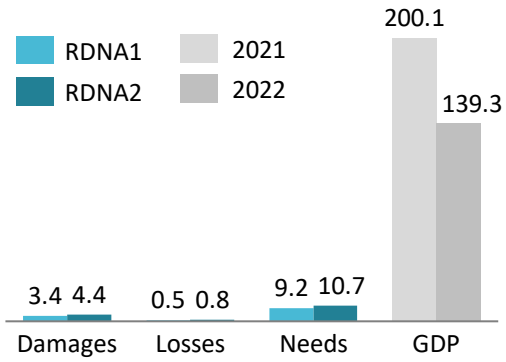
INSIGHTS

- Both RDNA1 and RDNA2 define **housing, transport, and commerce and industry** as the most damaged sectors, while RDNA2 also singles out **energy sector and agriculture**. The sectors with **largest increases** compared to the RDNA1 results include **energy, housing, transport, and agriculture**.
- Losses are dominated by land **decontamination, commerce and industry, agriculture, and transport**. Compared with RDNA1 results, the **energy sector and commerce and industry sector** have seen a significant increase in losses.
- The sectors with the highest estimated needs are **transport, land decontamination, and housing**, with energy**, social protection and livelihoods, transport, agriculture, and housing** having faced the most significant increase in needs.

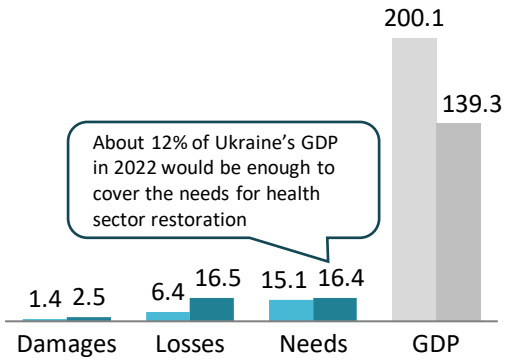
Sources: RDNA1, RDNA2

THERE WERE SEVERAL ATTEMPTS TO ASSESS THE WAR DAMAGE WITHIN SECTORS, INCLUDING THOSE DIRECTLY RELATED TO THE HUMAN CAPITAL (2/2)

EDUCATION, BN USD

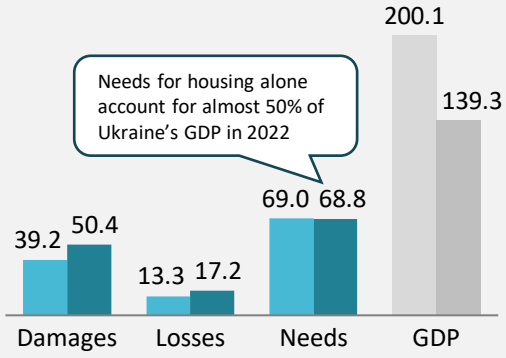


HEALTH, BN USD

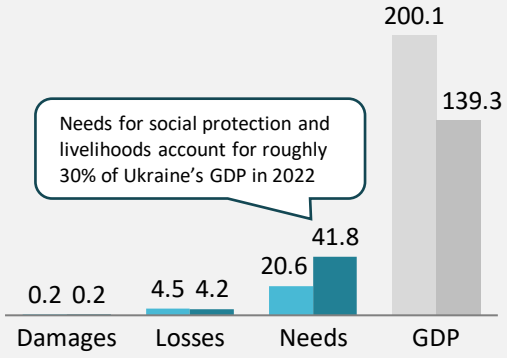


LIVING CONDITIONS, BN USD

Housing



Social protection and livelihoods



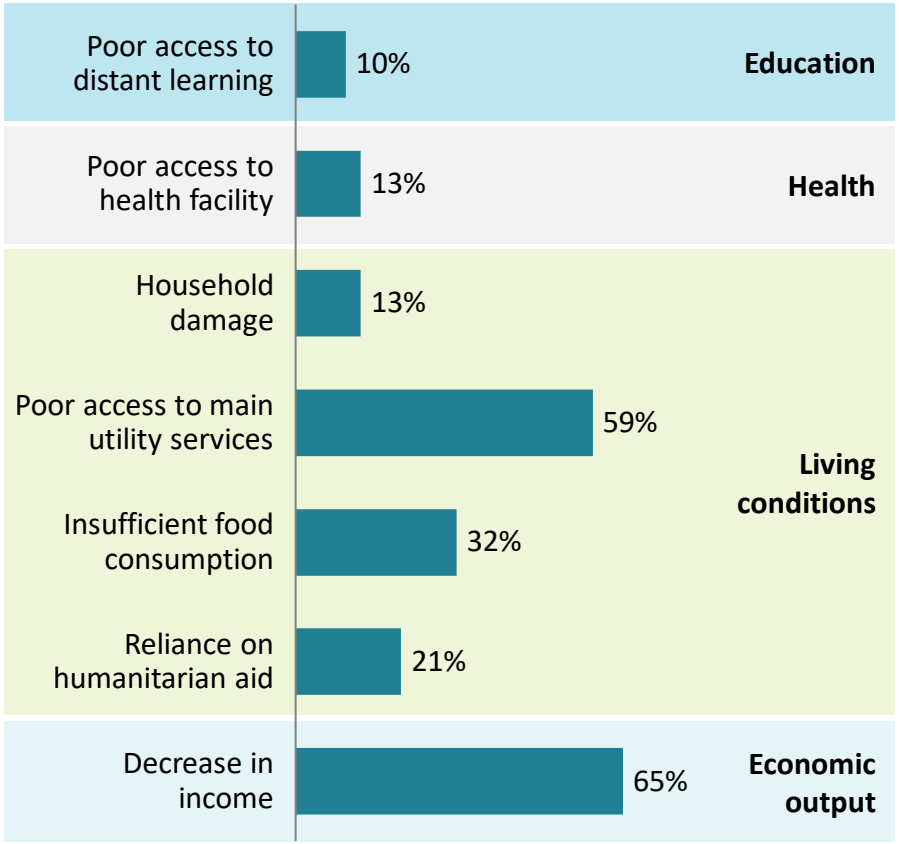
INSIGHTS

- RDNA1 and RDNA2 also assess damages, losses and needs by sectors. **Social sectors** include **housing, education and science, health, social protection and livelihoods** which can be considered as related to human capital.
- **Education accounts for the smallest proportion of damages, losses and needs** because these estimates do not include the destruction of educational equipment, so the true cost of damage is likely higher.
- **Health** sector has the **biggest increase in losses** (from USD 6.4 bn in RDNA1 to USD 16.5 bn in RDNA2) as RDNA2 includes new estimate of expenditures on strengthening the core essential public health functions.
- While most of the social sectors have demonstrated increase by all indicators compared to RDNA2, **housing sector** accounts for the **largest number of damages, losses and needs**. Also, housing faced the **largest increase in damages** (from USD 39.2 bn in RDNA1 to USD 50.4 bn in RDNA2).
- The needs of **social protection and livelihoods sector have grown two-fold** (from USD 20.6 bn in RDNA1 to USD 41.8 bn in RDNA2) due to the growing demand for restoration of jobs, providing decent wages, and assisting in matching jobs and workers.

Sources: RDNA1, RDNA2

HUMAN IMPACT ASSESSMENT (HIA) REPORTED THE NEGATIVE EFFECTS OF WAR ON THE POPULATION IN VARIOUS SECTORS

POPULATION THAT REPORTED NEGATIVE INFLUENCE BY SECTOR, % OF TOTAL



INSIGHTS

Education

- **10% of households** with school-aged children **unable to access distance learning** while schools were closed.

Health

- **33% of households** reported spending more than **25% of their total income** on healthcare services.
- **57.4% households** struggled to **afford medicines**.

Living conditions

- **817,000 residential units** were damaged between Feb to Aug 2022 (55,000 2014-2021).
- **59% of households** experienced **interruption in the main utility services** in the fall 2022.
- Share of **households with insufficient food consumption** in December 2022 reached **32%**.

Economic output

- **65% reported decrease in income** since February 2022 – especially for **IDPs** and **returnees**, and those in the Southeast macro-region.
- **60% of households**, and **73% of IDPs** responded that the **work of their household members had been affected** since the start of the full-scale war due to job loss, salary cut, and reduced working hours

HIA reported **negative influence of war** across **all pillars of human capital**, with the major effect on **living conditions** and **economic output pillar**. This is likely to cause long-term negative impact on economic and social well-being of the population in Ukraine.

CIVITTA Source: Human Impact Assessment

HUMAN IMPACT ASSESSMENT (HIA) PROVIDED GENERAL OVERVIEW OF NEGATIVE INFLUENCE OF WAR

EDUCATION PILLAR

EDUCATION

- Security conditions prevented most of the regions from operating under offline modality as only **31% of education took place offline**, mostly in the Western regions
- Some households struggle to afford proper equipment for online education, while **inclusive education has become unavailable** due to war and online learning
- Households have faced additional barriers, such as **lack of internet connectivity** and **increased anxiety of children**

HEALTH PILLAR

HEALTH

- **Accessibility of primary healthcare** has **deteriorated**, particularly for the most vulnerable populations, including due to **850 health facilities having been destroyed** as of Nov 2022
- The main **barriers** to accessing healthcare are **costs of consultation and medicines**
- Households have been affected through **degradation of mental health** (close to **15 million persons** would need psychological support)

FOOD SECURITY

- **Increasing food prices** are the primary driver of food insecurity since the full-scale war began
- Over the course of 2022, there was an increasing **gap in food consumption between displaced and non-displaced households**
- While **product scarcity** was high at the beginning of the war, it has significantly **lowered** since then
- Among households who have children, **more than 1 in 10 restricted consumption of adult members** to allow children to eat

LIVING CONDITIONS PILLAR

LIVING CONDITIONS

- Living conditions were affected by the Russian military targeting **utility infrastructure**. For instance, **59% of households** experienced **interruption in the main utility services** in the fall 2022
- **13% of households** reported their **primary accommodation had been directly damaged** by the war, especially in the North and Southeast
- **Internal displacement** led to a major **drop in living standards**, especially for those with pre-existing vulnerabilities

SOCIAL INEQUALITIES

- **IDPs**, the number of which increased from 1.6 million to over **6.5 million** since February 2022, have a **higher personal exposure to adversities** than people who were never displaced
- **IDPs** are **more likely to change job**, move to unofficial employment, experience salary cut or delay
- **Coping mechanisms** of vulnerable groups mainly involve **self-reliance and community resilience**. Some groups (such as **Roma, HIV positive, LGBT**) **are more disadvantaged** in coping with the war's impact

ECONOMIC OUTPUT PILLAR

LABOUR MARKET

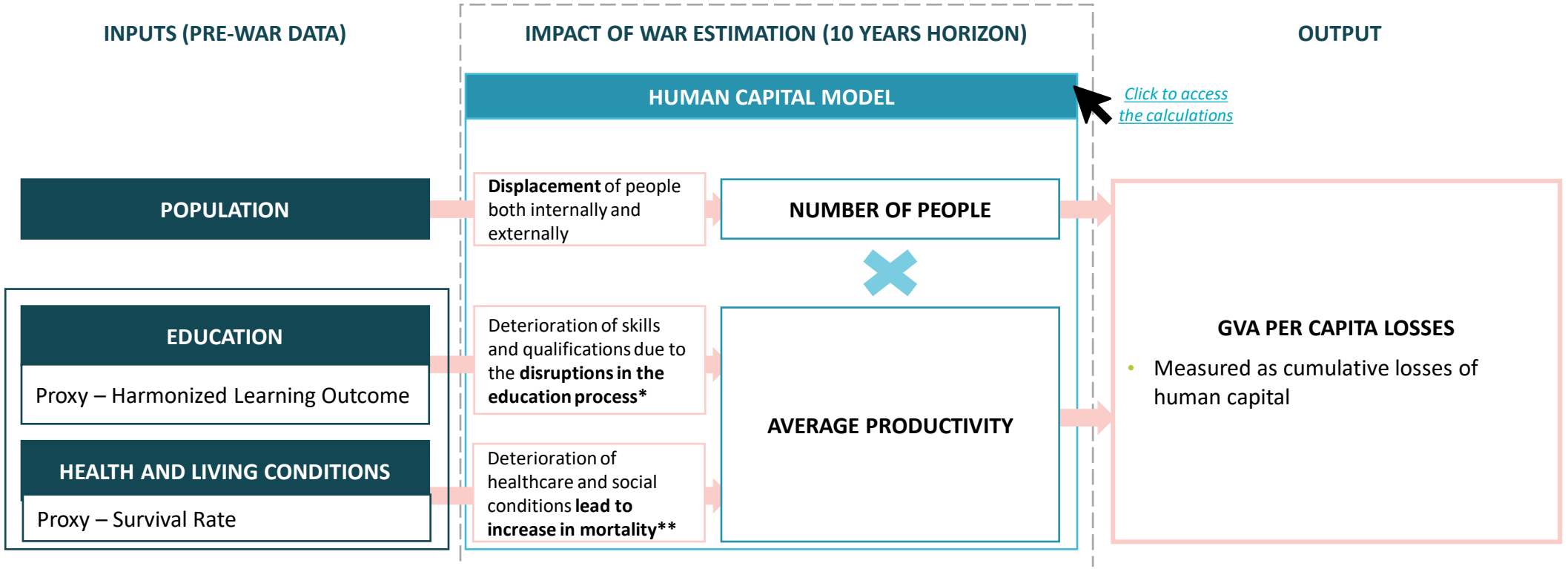
- **31% of households** have reported **loss of access to livelihoods and income earning activities** "somewhat", while 26% report "greatly", which happened due to safety and security concerns since the start of the full-scale war. This is especially true for IDPs and returnees, and those in the Southeast macro-region (**38% of households in the Southeast** reported that their livelihoods had been **affected "greatly"**)
- There has been a decrease in access to paid work as a primary source of income, especially in the Southeast. For example, Ahead of full-scale war, **67% relied on paid work** as primary source of income, **lowering to 53%** since then
- **60% of households**, and **73% of IDPs** responded that the **work of their household members had been affected** in one or more ways since the start of the full-scale war

The results of HIA did not show the full impact of human capital losses on economic output of the country. The key reasons behind this are reliance mainly on the sociological data, lack of data on temporary occupied territories, and insufficient analysis of links between human capital sectors and economic losses in Ukraine.

AGENDA

1. Development of human capital in Ukraine
2. Impact of full-scale invasion on human capital metrics
3. **Financial costing estimation**

GENERAL APPROACH TO THE FINANCIAL COSTING ESTIMATES THE IMPACT OF WAR ON AVERAGE PRODUCTIVITY AND POPULATION SIZE



COMMENT

- The negative impact of the war on human capital is twofold: 1) a direct decrease in the number of the population that was displaced outside the country's borders, 2) a deterioration in the productivity of the population that remained in the country due to losses in education, the health care system, and deterioration of living conditions.

Notes: ** - According to the RDNA2*
*** - According to the Imperial College London Research*

IMPACT OF WAR ESTIMATION MODEL INCLUDED THREE SCENARIOS BASED ON THE COEFFICIENTS VALUES

MODEL METHODOLOGY FOR ESTIMATING IMPACT OF WAR ON GVA

1) LOSSES ARISING FROM A DECREASED PRODUCTIVITY OF UKRAINIANS IN UKRAINE

Low scenario | **Basic scenario** | **High scenario**

The basic scenario represents the projected GVA per capita loss in 10 years based on the coefficient results, while the low and high scenarios are variations from the basic scenario determined by standard deviations of the coefficient.

The total GVA losses in the intermediate years are the product of the GVA per capita loss and the remaining population in a given year. The calculations of the remaining population is based on following assumptions:

a) The decrease in population accounts for refugees and people in occupied territories;
b) Refugee numbers in Europe rely on the CES refugee study and their intention to return, while the counts for people in russia and occupied territories are based on estimates from the Ministry of Reintegration;
c) The share of returning refugees from Russia is derived from the proportion of potential return refugees from Europe, which is determined by the CES survey;
d) The refugee returning period is starting from 2024 and lasts 1 year for occupied territories and 5 years for Europe and russia.

2) LOSSES CAUSED BY FLEEING REFUGEES AND OCCUPATION OF TERRITORIES

GVA per capita losses equals GVA per capita generated in 2022 by Ukrainians that are located in Ukraine, and extrapolated to 2032 based on historic GVA growth during 2015-2021.

The 2022-2023 GVA per capita is obtained and multiplied by the number of people who do not generate value-added in a given year, accounting for the number of return refugees and people in occupied territories.

GVA is converted back to GDP using the GDP/GVA coefficient, yielding the final result for the second component of losses.

According to the RDNA2, Harmonized Learning Outcomes are **expected to deteriorate by 61 points in the next 10 years.**

According to the study on the impact of wars on mortality rates over a 10-year period, wars cause an 81.5 additional all cause-related deaths per 100 thousand, which translates into **2% lower chances of survival from age 15 to 60 in Ukraine.**

GVA to GDP transition is calculated using the average historic 2015-2021 GDP/GVA ratio for Ukraine ,while natural population growth is determined by the historic growth rate for the same period of time.

CIVITTA Source: CIVITTA

REGRESSION MODEL WAS DEVELOPED FOR THE DETERMINATION OF COEFFICIENTS VALUE FOR THE FURTHER CALCULATIONS

1

SELECTION OF A TYPE OF A MODEL:

- **Random effect model** was chosen in order to consider panel data effect. It incorporates the potential for variations between entities and assumes that they are random or independent of the variables being investigated.
- Given model has shown **necessary level of significance of the overall model** (describes > 40% of cases) and coefficients (the highest significance for Survival rate from age 15-60 and Intercept and sufficient level of significance for Harmonized test score).

2

SELECTION OF A DATA SAMPLE:

- **For final data sample 20 former USSR and Balkan countries*** were chosen.
- The key goal of selection was to add counties **with similar or possibly comparable former or present practices in health and educational sectors.**
- Four years, namely 2006, 2009, 2015 and 2018, with the **maximum possible amount of presented data were included** into the model.
- Missing data were **substituted using group average method**.

3

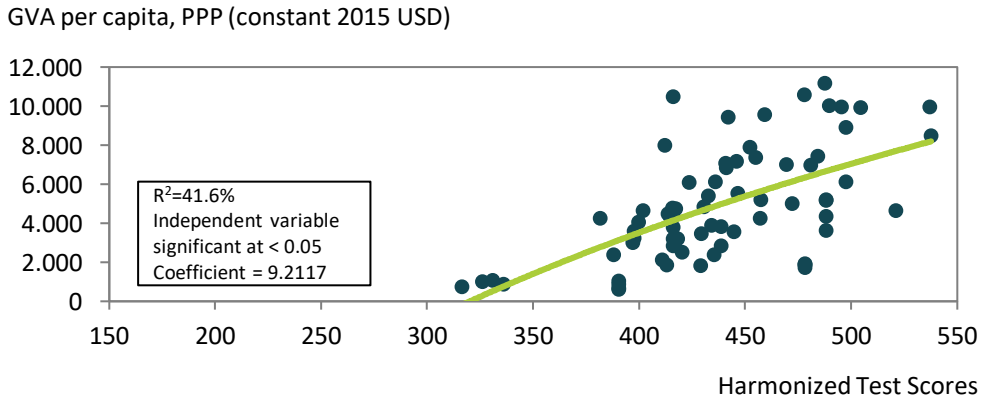
ADDITIONAL DIAGNOSTICS TESTS:

- **Lagrange Multiplier test to check existence of panel data** (confirmed). The test is used to determine whether random effects are significant in panel data models.
- **Breusch-Pagan LM test and Pesaran CD test** to check **cross-sectional dependence** (both confirmed). These tests are originally meant to use the residuals of separate estimation of one time-series regression for each cross-sectional unit in order to check for cross-sectional dependence
- **Breusch-Pagan test to check heteroscedasticity** (confirmed). If the p-value of the test is less than some significance level, then we reject the null hypothesis and conclude that heteroscedasticity is present in the regression model.

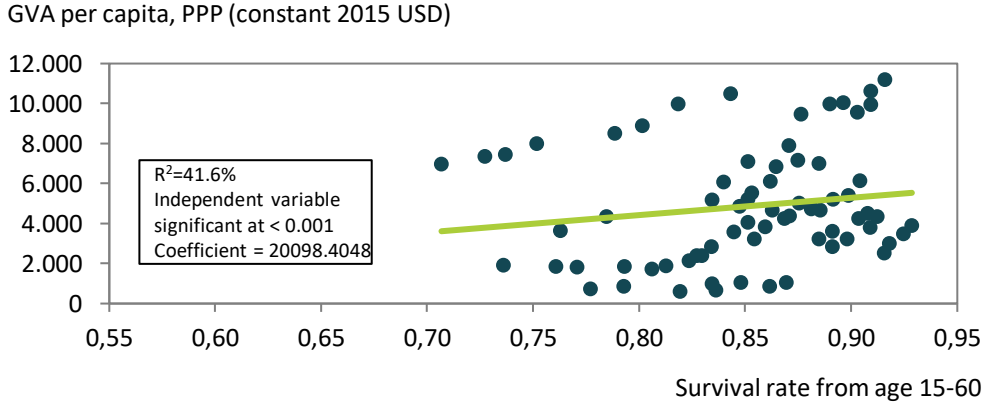
**The same countries were used by UNICEF to analyse the impact of the war in Ukraine and subsequent economic downturn on child poverty in Eastern Europe and Central Asia*

***Each point represents annual data for a sample of 20 countries over 2006, 2009, 2015 and 2018*

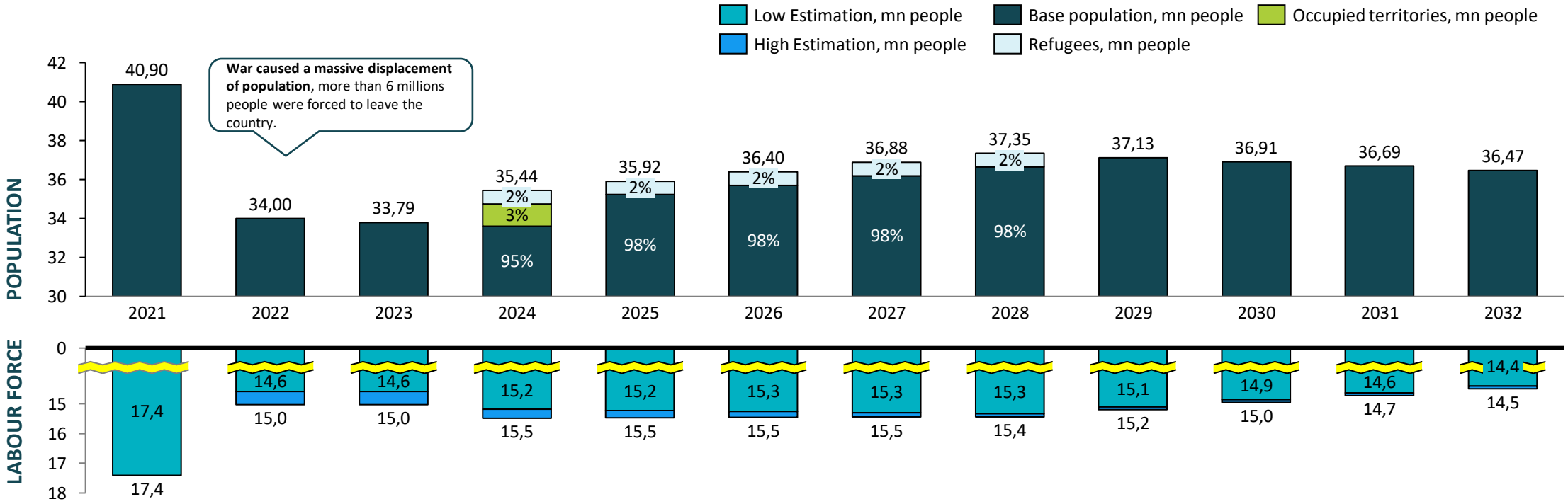
CORRELATION BETWEEN DEPENDENT VARIABLE (GVA PER CAPITA) AND HARMONIZED TEST SCORES**



CORRELATION BETWEEN DEPENDENT VARIABLE (GVA PER CAPITA) AND SURVIVAL RATE FROM AGE 15-60**



THE CONSEQUENCES OF THE WAR WILL HAVE A NEGATIVE IMPACT ON BOTH THE TOTAL POPULATION AND THE WORKFORCE

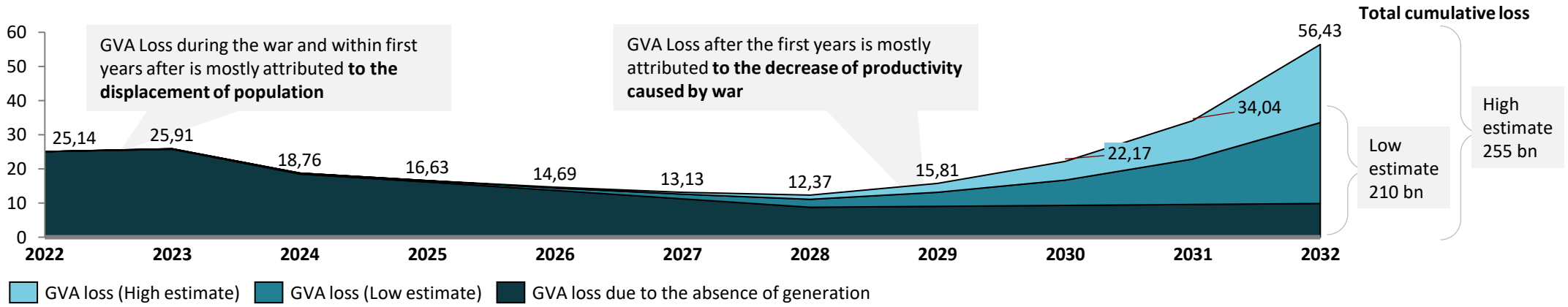


INSIGHTS

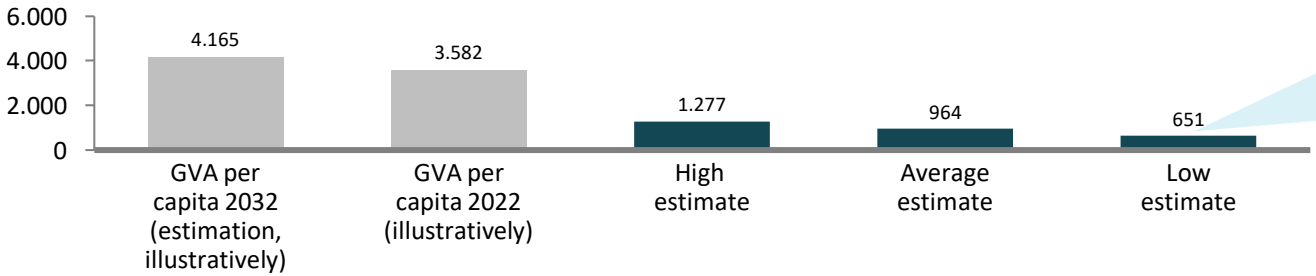
- The formation of economic policy in human capital development faces a significant challenge due to **insufficient data availability**. Currently, there is **a lack of comprehensive and adequate statistics** on population numbers and demographics, hindering policy-making efforts.
- Prior to the invasion, Ukraine had a **negative population growth** that lasted from 2015 to 2021.
- Based on CES survey, we estimate that approximately **60% of all Ukrainian refugees** that are located in Europe will return back to Ukraine after the end of the active phase of the war. The same percentage is used for estimation regarding russia and belarus.
- In case of total liberation of Ukrainian territories in **2023 it is expected that up to 1.15 million Ukrainians will** be added back to the total population.
- The amount of labour force will decrease from **15 mln people in 2022 to 14,7 mln people in 2032** due to the natural population decline.

UKRAINE COULD LOSE UP TO USD 255 BILLIONS DUE TO THE NEGATIVE IMPACT OF WAR

CUMULATIVE GVA LOSS, BLN, USD, 2022-2032



GVA PER CAPITA LOSS ESTIMATION FOR 2032, USD



	Low scenario	Basic scenario	High scenario
Education	USD 317,5	USD 561,9	USD 806,3
Survival	USD 333,6	USD 402,0	USD 470,4

INSIGHTS

- Based on the model results for the **average estimate scenario**, the expected difference between historic extrapolation and the average scenario result will reach up to USD 964 in 2032 (For **low estimate scenario – USD 651, for high estimate scenario – USD 1 268**)
- Additionally, according to the official data, the Ukrainian historic GDP/GVA ratio was relatively stable and on which the **projected total GDP losses** are **USD 271.80 bn** (GVA = USD 233.25 bn) **for average estimate scenario, USD 245.66 bn** (GVA = 210.82 bn) for **low estimate scenario** and **USD 297.24 bn** (GVA = 255.08 bn) for **high estimate scenario**.

KYIV, 2023