

NTA and NTTA approach in the estimation of the premature mortality burden. Evidence from Post-Soviet space

Vladimir Kozlov (IOS, Regensburg)

kozlov@ios-regensburg.de

*The results for NTA distribution are achieved in cooperation with Russian NTA team (M. Denisenko and A. Nazarova) Moldova NTA team (Centre for Demographic Research - CDR: O. Gagauz, V. Prohniţchi) and Kyrgyzstan team (Ch. Seitov, G. Samohleb et. al) in 2022-23

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A few words about the topic

- 1 It will be mainly descriptive results without the formal models
- As a results of discussion I expect the ideas for the papers
- X The majority of the results are preliminary, please do not quote without permission



NTA and excess mortality (C-19 pandemics) what do we know?

The mortality burden among elderly (at the age higher than pension one) should be taken into consideration:

- Vogt, Kluge & Lee (2020) high correlation between survival at the older ages and transfers => high role of the older generations in transfers
- 2 Income and consumption (esp) is not equal to 0 at the older ages
- 2 Consumption could be the highest at the older ages (consumption is an important part of GDP)
- Anly & Sharp (2014) lost time from non-market activities, especially important for Hanly et. al (2022) the same approach for Covid-19 mortality + non-market activities that is close to NTTA idea

Also:

- 2 Covid-19 mortality changed a population structure, so the long term economic effect
- 2 Due to the macro-controllers usage the NTA methodology is closer to careful economic burgen estimation



How was the "excess mortality" measured?

- ¿ Literature see e.g. in Ourworldindata resource or Karlinsky & Kobak (2021) papers
- In Russia the estimations made by different teams are close (Kobak (2021), Timonin et. al (2022), Scherbov et. al (2022), Aburto et. al (2022)):
- in abs. figures about 1 mln. for the period 2020-21
- in life expectancy -3.3: -1.8 and -1.5 years, or *from 73.3 to 70*), the mortality occurs in economic active age as well:

The excess mortality distribution (by Scherbov et al. 2022)





How did we estimate mortality losses for Russia?

We use the <u>difference between the demographic forecast</u> in the beginning of 2020 for the 1.1.2022 time point (without C-19 estimations)

And

the actual population for the 1.1.2022 period of time (after C-19 waves)

The difference between the middle variant of the forecast and the actual population is about *1 mln.*, that is close to the estimated excess mortality figures.

Not only deaths but all the demographic processes are involved in the estimation (but fertility and migration did not change dramatically). The difference between actual and



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The calculations of economic losses are based on the difference

- The Economic losses: = (Population actual: Population expected:) * NTA Indicator per capita:
- 2 Calculated for each 1-year group (i), afterwards summarized
- NTA indicator is taken from "preCovid-19" 2019 year
- More important are relative figures (% of the ,Indicator' lost)
- X The Indicators are: Income, Consumption, Private and Public transfers

!! Please note that in Russia: Public transfer balance is positive (more received than sent), and private transfer is negative (more sent than received) !!



The results based on NTA indicators

2 On the common picture (Life Circle Deficit in absolute figures, mln.) we see almost nothing



However aggregated age groups are more interesting, and we use only middle variant of demographic forecast

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The aggregated results based on NTA (short term)

№ Income, consumption, transfers

		Changes		
	Age group	Abs	%	
	All	-154.5	-0.3	
Incomo	0-19	-2.2	-0.6	
income	20-64	-132.9	-0.3	
	65+	-19.5	-1.8	
	All	-459.5	-0.7	
Concumption	0-19	-0.8	0.0	
consumption	20-64	-131.1	-0.3	
	65+	-327.5	-2.9	
	All	-304.9	-2.3	
Deficit	0-19	1.3	0.0	
Dench	20-64	1.8	0.0	
	65+	-308.0	-3.0	

The deficit is decreasing Mostly due to the age group 65+



The results based on NTA (short term) - consumption

On the common picture we see the differences for the sectors

	Public				Private			
			Change				Change	
	Projected	Actual	(abs)	Change (%)	Projected	Actual	(abs)	Change (%)
Education								
All	3298.4	3299.3	-0.9	0.0	373.6	373.8	-0.3	-0.1
0-19	2775.4	2774.6	0.9	0.0	255.9	255.8	0.1	0.0
20-64	522.1	523.8	-1.7	-0.3	117.7	118.0	-0.3	-0.3
65+	0.9	0.9	0.0	-1.7	0.0	0.0	0.0	
Health								
All	3295.4	3329.0	-33.6	-1.0	2576.5	2610.0	-33.5	-1.3
0-19	654.3	655.1	-0.8	-0.1	359.2	359.2	0.0	0.0
20-64	1701.1	1707.6	-6.6	-0.4	1317.3	1322.5	-5.2	-0.4
65+	940.1	966.3	-26.2	-2.7	900.0	928.3	-28.3	-3.0
Others								
All	13427.5	13528.7	-101.2	-0.7	41320.4	41610.5	-290.1	-0.7
0-19	2918.4	2918.3	0.1	0.0	6019.8	6020.8	-1.0	0.0
20-64	8070.7	8097.2	-26.4	-0.3	28510.0	28600.9	-90.9	-0.3
65+	2438.4	2513.2	-74.8	-3.0	6790.6	6988.8	-198.3	-2.8

We should be very careful with the healthcare, as within the pandemics the indicators pr capita grew (and we use 2019 figures)

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The results based on NTA (short term) - transfers

& More detailed picture

	Public				Private				
	Projected	Actual	Change (abs)	Change (%)	Projected	Actual	Change (abs)	Change (%)	
Received									
All	34257.1	33906.3	-350.8	-1.0	17489.5	17418.4	-71.0	-0.4	
0-19	7383.4	7383.0	-0.4	0.0	6590.6	6590.4	-0.3	0.0	
20-64	17440.6	17374.4	-66.2	-0.4	9306.6	9277.9	-28.7	-0.3	
65+	9433.1	9148.8	-284.2	-3.1	1592.2	1550.2	-42.0	-2.7	
Sent									
All	33564.1	33361.4	-202.7	-0.6	18190.0	18075.9	-114.1	-0.6	
0-19	1407.4	1406.3	-1.1	-0.1	166.7	166.0	-0.7	-0.4	
20-64	27742.9	27657.6	-85.3	-0.3	15681.1	15635.5	-45.6	-0.3	
65+	4413.9	4297.5	-116.3	-2.7	2342.1	2274.3	-67.8	-3.0	

A bit different trends in the sent and received public transfers, mainly explained by a growth of the transfers at the age 80+,

In private transfers the sent ones are dropping higher than received (higher mortality => lower redistribution)



The results based on NTA (long term)

- **\(The results of the age structures change due to mortality**
- **&** Forecasts until 2035:
- 1. Already used demographic projection from 2020
- 2. New demographic forecast from 2022 (took into consideration the C-19 changes)

We see quite a balanced situation with the Public transfer changes. As for private transfers there is a growing imbalance. Look at them more on details



The results based on NTA (long term)

Differences between 2 demographic projections in Income, consumption, transfers balances (% changes between projections)



Deficit of the public transfers is going down, as well as the proficit of the private transfers



Transfers (changes between the projections in the components) in mln.



Private transfers sent is dropping faster than received



The results based on NTA (gender based)

Demographic results:

- X The life expectancy declined for women from 78.2 to 74.5, for men from 68.2 to 65.5
- 2 Differences in absolute numbers: for women -465 th., for men -515 th.





The results based on NTA (gender based), profiles

We calculate the same indicators, but for the sexes separately !Limitation: the public tr (sent) is equally distributed





The impact of sexes on NTA indicators changes



Male Semale

!!Deficit for the age 20-64 grew for men and dropped for women
!! Consumption at the age 0-19 grew for women and dropped for men
In both cases figures are small (65+ income and consumption are more important)



The impact of sexes on NTA indicators changes



Male Female

For the Private (sent) the impact of male in the decline is higher (intensive mortality). The bigger impact of women public received



The results based on the other countries NTA (by sex)

Moldova (NTA profiles from CDR)

The data available:

- **2** Population: 2,6 mln. (sometimes overestimated as 4 mln.)
- **Excess mortality for 2020-21 (by sex)**
- In abs. figures: 4653 (male) and 5236 (female)
- In life expectancy: -1.6 (male) and -2.1 (female)
- **NTA 2019 (per capital and aggregate) by sex**

So we calculate: the losses in NTA indicators (Income, Consumption, Private and Public transfers) within pandemics (2020-21) as % from the Aggregated indicator in 2019:

 Σ (Excess deaths_i * NTA indicator per capita_i)

Aggregate NTA indicator²⁰¹⁹



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MUlu	uva,	1022	C2 11	/0	U	2019	uala	
	0-19		20-64		65+		All	
		Consumption						
Male		0.01		0.07		3.11	0.38	
Female		0.01		0.10		1.85	0.36	
				Inco	ome			
Male		0.03		0.05		2.40	0.11	
Female		0.02		0.08		1.40	0.14	
			Publi	ic trans	sfers,	inflow		
Male		0.01		0.14		3.28	0.94	
Female		0.01		0.15		1.96	0.64	
			Privat	e trans	fers,	outflow		
Male		0.01		0.06		2.87	0.24	
Female		0.01		0.09		1.83	0.25	
		Public transfers, inflow						
Male		0.01		0.07		2.68	0.20	
Female		0.01		0.07		1.54	0.15	
		Private transfers, outflow						
Male		0.03		0.05		2.40	0.16	
Female		0.02		0.08		1.47	0.17	

Moldova lossos in % to 2010 data

Older age group demonstrate the visual differences

The deficit in all the cases will go down



Kyrgyzstan losses

- NTA profiles based on data from National Statistical Committee for 2017, the SNA statistics for 2019 is used for aggregate figures calculation
- **Population: 6,7 mln. (could be overestimated, waiting for Census)**
- ★ Excess mortality for 2020-21 (by sex)*
- In life expectancy: +0.3 (male) and +0.3 (female)
- In abs. figures: 9605 (male) and 8899 (female)
- **NTA 2019 (per capital and aggregate) by sex**

* - excess mortality as a violation from the trend line



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Kyrgyzstan, losses in %

	0-19	20-64	65+	All
	Consumpti	ion		
Male	0.07	0.19	4.10	0.31
Female	0.12	0.15	4.15	0.38
	Income			
Male	0.03	0.15	2.46	0.16
Female	0.05	0.12	1.72	0.13



3 countries losses based at the same methodology (Income, Consumption), % from 2019



■ Consumption 65+ ■ Consumption All ■ Income 65+ ■ Income All

For Russia the same formula as for KG and MD is used to get the comparable results



Losses in Transfers (RU and MD only), %





Non-market work and excess mortality

Hanley at al (2022) estimations for EU with proxy good approach (PGA) - Unpaid work of employed and non-employed individuals valued by the shadow prices:

- Male costs in the beginning of pandemics were the highest in the 55-64 age group (paid work for employed), and for female costs were the highest in the 65-74 age group especially in S. Europe (unpaid work of non-employed)
- Limitations: unpaid work in institutional social care units for older persons? not a Post-Soviet space case

The advantages from NTTA: not only the unpaid work as it is, but a balance: production - consumption. (no over- or underestimation)



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Non-market production and consumption

Russian results only (for KG and MD data is also available)

- We look at the production as it was in Hanley et. al (2022) papers
- NTTA approach (balance). The main question is if we look at the consumption, do we really see losses?



Market (NTA indicator 'Income') and Non-market (in shadow prices - 2019 wages) production, mln.



Losses (bln.):

- Market: 112 (male) + 50 (female),
- Non-market: 103 (male) + 140 (female)



If we look at the balance (Production - Consumption, rub per day)



And multiply it for the general losses (mln. per year).





We see the following "Non-market balance"

- X The Losses (? Gains) are: -23.5 bln. (male) 18.3 bln. (female)
- ℵ -5.2 bln. all together
- 2.3 bln. from voluntary work for the other households
- So... How can we interpret it correctly?

Market losses (bln.): 112 (male) + 50 (female) Non-market losses, only production (bln.): 103 (male) + 140 (female)



Further work

- X There is still a work with the balancing NTA by sex for all the countries
- And NTTA model, as there were no children 10 and younger in the database, and the merging procedure was tricky
- 🔌 NTA by sex in Kyrgyzstan, and NTTA for Moldova and Kyrgyzstan
- 2020 and 2021 years for the better economic losses estimation