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POPULATION HEALTH

Estonia 1989–2000: enormous increase in mortality differences by education

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Background Having regained its political autonomy in 1991, Estonia experienced major changes in political, economic, and social realities. We aimed to analyse mortality changes by education from 1989 to 2000 in order to assess the impact of recent changes in Estonia, as well as the delayed effects of pre-transitional developments.

Methods Two census-based analyses were compared. Individual cause-specific death data for those aged 20+ for 1987–1990 (72 003 deaths) and 1999–2000 (35 477 deaths) came from the national mortality database. Population denominators came from the population censuses of 1989 and 2000. Mortality for all causes combined and for selected causes of death were analysed for high, mid, and low educational groups. The absolute differences in mortality were evaluated through life expectancy at age 25 and age-standardized mortality rates. To assess the relative differences between educational levels, mortality rate ratios with 95% CI were calculated using Poisson regression.

Results Educational differences in mortality increased tremendously from 1989 to 2000: over the 10-year period life expectancy improved considerably for graduates, and worsened for those with the lowest education. In 2000, male graduates aged 25 could expect to live 13.1 years longer than corresponding men with the lowest education; among women the difference was 8.6 years. Large differences were observed in all selected causes of death in 1989 and in 2000 and the trends were invariably much more favourable for the higher educated. Educational differences in total mortality increased in all age groups.

Conclusions Social disruption and increasing inequalities in wealth can be considered main recent determinants; however, causal processes, shaped decades before recent reforms, also contribute to this widening gap.

Keywords Cause-specific mortality, educational differences, transition, Estonia

Socioeconomic differences in mortality have been extensively reported in the West.[1–3] The last decades have witnessed an increase in relative mortality rate ratios in many countries, although absolute differences are more stable.[4–7] Less is known about ex-communist countries. Studies suggest that educational differences in mortality in Eastern Europe at the end of the communist era were at least as big as in the West.[8,9] Estonia, the smallest country in the Baltic region, regained its political autonomy in 1991 after 50 years of Soviet occupation. Estonia opted for much more far-reaching and intense free market reforms than other transition economies in Central Europe and the former Soviet Union. Deliberate policies were aimed at stimulating job creation and employment (including international trade opportunities and foreign ownership of firms), above all by low employment protection and reduced social safety nets.[10] Its mortality development over the past 40 years has been similar to other ex-communist countries: male life expectancy improved by only about 1 year and female by 4 years

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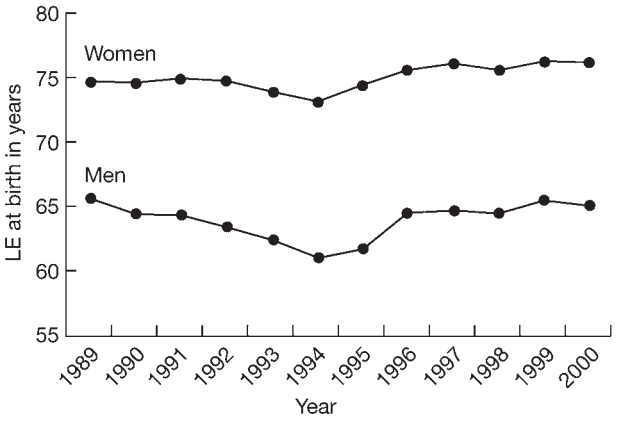

Figure 1 Average life expectancy at birth in Estonia 1989–2000

Source: Statistical Office of Estonia, 2001.[11]

from 1959 to 2000. During the first years of political and economic transition, Estonia experienced an unprecedented rise in mortality[11] (Figure 1).

After 1994, mortality rates returned to the levels found before the 1990s. To assess the impact of recent reforms and the delayed effects of pre-transitional developments we analysed mortality changes by education from 1989 to 2000.

Data and Methods

Two census-based cross-sectional analyses were performed. Individual cause-specific death data for those aged 20+ for 1987–1990 (72 003 deaths) and 1999–2000 (35 477 deaths) came from the national mortality database. Population denominators came from the population censuses of 1989 and 2000. Total mortality and selected causes of death were analysed for three educational groups (university, upper secondary, and lower secondary or less education). In 1987–1990 the abridged Soviet version of International Classification of Diseases, Ninth Revision (ICD-9) was used for coding the causes of death; a correspondence table was then used to reclassify the causes of death into ICD-9.[12] For 1999–2000 ICD-10 was used. Table 1 presents corresponding categories of ICD-9 and ICD-10 for the selected causes of death.

Educational differences in total mortality were analysed in four age groups: 20–39, 40–54, 55–69, and 70+. The absolute differences in mortality were evaluated through life expectancy at age 25 and age-standardized mortality rates (European standard population). To assess the relative differences between educational levels, mortality rate ratios with 95% CI were calculated using Poisson regression. Age was adjusted in 5-year intervals in the regression analyses.

Table 1 Correspondence of selected causes of death in 1987–1990 (ICD-9) and in 1999–2000 (ICD-10)

	1987–1990	1999–2000
Cause of death	ICD-9	ICD-10
Infectious diseases	001–139	A00–B99
Stomach cancer	151	C16
Lung cancer	162	C33–C34
Breast cancer	174–175	C50
Ischaemic heart disease	410–414	I20–I25
Cerebrovascular disease	430–438	I60–I69
Chronic respiratory disease	490–494; 496	J40–J47
Alcoholic liver cirrhosis	571.0–571.3	K70
Transport accidents	E800–E848	V01–V99
Alcohol poisoning	E860	X45
Suicide	E950–E959	X60–X84
Homicide	E960–E978	X85–Y09, Y35, Y36

Results

The proportion of the population with high and middle educational levels rose from 1989 to 2000. This was balanced by a reduction in the proportion of the population with low education (Table 2).

The educational distribution remained stable in the youngest age group.

We found a sharp increase in educational differences in mortality from 1989 to 2000 among men and women. Over the 10-year period, life expectancy improved considerably for graduates, and worsened for those with the lowest education. Life expectancy remained stable among women with middle education; for the corresponding group of men it fell (Figure 2). In 2000, male graduates aged 25 could expect to live 13.1 years longer than corresponding men with the lowest education; among women the difference was 8.6 years.

Educational differences in total mortality increased in all age groups (Table 3). These increases were largest among younger age groups, but were also to be found among the elderly. Table 4 presents educational differences in mortality by selected causes of death. Large differences were observed in all those causes in 1989 and 2000. Mortality trends were invariably much more favourable for the higher educated. Circulatory diseases had the largest impact on the widening mortality gap.

Discussion

The enormous increase in mortality differences by education raises the question of data reliability. In unlinked, census-based, cross-sectional studies, the numerator-denominator bias is of greatest concern. We carefully analysed whether there were differences between census records and death certificates with respect to the coverage of population, the reporting or non-response, or the classification of educational level. However, we were unable to identify any data problems that would seriously affect results.[13]

The small number of deaths in 1999–2000, especially for some causes of death, makes mortality estimates prone to random fluctuations. Problems with the change from ICD-9 to ICD-10 may have affected trends in cause-specific mortality for Estonia at large, but these biases are unlikely to have affected different educational groups in different ways.

An additional concern was the fact that the lowest educational stratum became much smaller during the 11 years of transition, especially in the 40–69 age group. This was due to two factors. Firstly, the rapid expansion of education in the post war period, which resulted in a smaller proportion of each new birth cohort achieving only lower secondary education or less. Secondly, the sharp rise of mortality in the 40–69 age group, especially among the lowest educated (Table 3). This excess mortality alone would have resulted in a reduction of the size of the lowest educational stratum of up to 5% between 1989 and

Table 2 Educational distribution of Estonian population in 1989 and 2000

	Men				Women			
	1989		2000		1989		2000	
	N	(%)	N	(%)	N	(%)	N	(%)
All ages 20+								
University	65 329	13.2	65 938	15.0	76 957	12.6	90 875	16.4
Upper secondary	241 965	48.9	243 624	55.4	297 062	48.7	312 500	56.5
Lower secondary or less	187 925	37.9	130 138	29.6	235 987	38.7	149 307	27.0
20–39								
University	31 269	13.6	22 043	12.2	39 369	17.1	32 442	17.6
Upper secondary	157 036	68.4	125 340	69.2	167 292	72.9	135 362	73.2
Lower secondary or less	41 134	17.9	33 634	18.6	22 903	10.0	17 046	9.2
40–54								
University	21 428	15.7	23 843	18.7	24 727	16.2	32 526	22.2
Upper secondary	54 066	39.5	74 827	58.6	76 705	50.3	96 007	65.4
Lower secondary or less	61 305	44.8	29 049	22.7	50 912	33.4	18 213	12.4
55–69								
University	10 501	11.1	15 331	16.6	11 115	7.8	19 839	15.4
Upper secondary	24 292	25.7	33 236	36.0	39 534	27.9	57 059	44.4
Lower secondary or less	59 805	63.2	43 782	47.4	91 292	64.3	51 608	40.2
70+								
University	2131	6.2	4721	12.2	1746	2.0	6068	6.6
Upper secondary	6571	19.1	10 221	26.5	13 531	15.7	24 072	26.0
Lower secondary or less	25 681	74.7	23 673	61.3	70 880	82.3	62 440	67.4

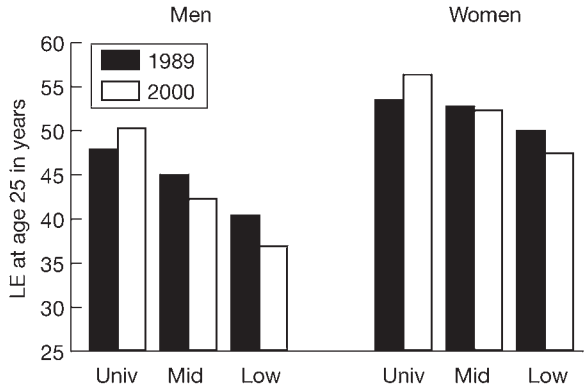

Figure 2 Average life expectancy at age 25 by educational level in Estonia 1989–2000

2000. Since the lowest educated group in 2000 was so much smaller than 1989, one could argue that it was also more extreme. Therefore, some of the widening of the educational mortality differences may simply reflect the new distribution of educational categories. However, this is unlikely to contribute much since, firstly, the shrinkage of the lowest educated group is counterbalanced by the growth of the best educated group (which is therefore less extreme) and secondly, since differences between middle and high educated groups also widened.

Educational differences in mortality in 1989 were large compared with those of Western Europe.[8] The high mortality from infectious diseases and stomach cancer among the poorly educated is one indicator of adverse living conditions before 1991. Their relatively high mortality from smoking-related or alcohol-related causes in 1989 indicates differences in lifestyle between educational groups.[14,15]

In Estonia's rapid political and economic transition, the less educated often lacked the necessary coping skills; they were thus at greater risk of unemployment and were less likely to move from unemployment and inactivity back to employment.[10] The new policies favoured graduates, who benefited both in terms of money and health[16] and for whom the psychological adjustment was easier.[17] Social disruption, poverty, and the increasing gap in wealth are likely contributors to larger educational differences in mortality in 2000. Sharply increased mortality from infectious diseases from 1989 to 2000 among the lowest educated is evidence of poverty-driven causal mechanisms. Income and poverty are linked to many other causes of death, including the most common ones,[3,18] although both the strength of association and the causal pathways vary between causes.

Changes in the diet of the population as a whole at the beginning of the 1990s may be one determinant of the overall decline of mortality from circulatory diseases.[19] Progress in medical care may also have contributed to the reduction in mortality from circulatory disease in all educational groups, particularly for graduates, who were more successful in getting specialist care.[20] The overall improvement in cancer survival rates in the 1990s,[21] known to be dependent on access to and quality of medical care, could point to improved medical care in Estonia. The reversing educational gradient for breast cancer mortality is striking and probably best explained by earlier detection, better treatment and survival among graduates, and perhaps also by differential changes in fertility.

Social disruption and poverty works also through behavioural mechanisms. Alcohol has been considered one of the main factors behind the increasing mortality in 1990s Russia.[22] Its role is similarly evident in Estonia, with an extremely liberal alcohol policy in the early 1990s. Mortality from alcohol poisoning and liver cirrhosis increased sharply in all educational groups and in both genders. These two alcohol-related causes certainly contributed to the mortality difference by education and to its increase in Estonia.

Table 3 Age-standardized[a] mortality rates per 100 000 and mortality rate ratios for different age groups by educational level in Estonia 1989–2000

	Men							**Women**						
	Mortality rates			Mortality rate ratios (95% CI)				Mortality rates			Mortality rate ratios (95% CI)			
	1989	2000	Change from 1989–2000	1989		2000		1989	2000	Change from 1989–2000	1989		2000	
All ages 20+														
University	1565.2	1194.9	−370.3	1.00		1.00		962.4	631.3	−331.1	1.00		1.00	
Upper secondary	1802.8	2094.2	+291.4	1.34	(1.27, 1.40)	1.91	(1.80, 2.03)	997.5	984.6	−12.9	1.14	(1.07, 1.21)	1.72	(1.60, 1.85)
Lower secondary or less	2331.3	2725.1	+393.8	1.73	(1.65, 1.81)	2.38	(2.25, 2.53)	1274.2	1428.0	+153.8	1.37	(1.29, 1.45)	2.23	(2.07, 2.39)
20–39														
University	155.5	111.8	−43.7	1.00		1.00		52.5	64.5	+12.0	1.00		1.00	
Upper secondary	242.9	331.7	+88.8	1.69	(1.45, 1.97)	3.69	(2.74, 4.99)	79.0	84.3	+5.3	1.50	(1.20, 1.89)	1.48	(1.07, 2.06)
Lower secondary or less	591.2	672.0	+80.8	4.13	(3.54, 4.82)	7.26	(5.31, 9.91)	224.3	317.5	+93.3	4.12	(3.21, 5.28)	5.13	(3.52, 7.48)
40–54														
University	439.0	439.4	+0.4	1.00		1.00		237.7	191.0	−46.7	1.00		1.00	
Upper secondary	831.3	1190.3	+359.0	1.89	(1.69, 2.12)	2.71	(2.34, 3.13)	309.8	408.9	+99.1	1.32	(1.14, 1.52)	2.19	(1.80, 2.66)
Lower secondary or less	1277.0	1995.4	+718.4	2.91	(2.61, 3.24)	4.50	(3.88, 5.22)	435.9	815.3	+379.4	1.81	(1.56, 2.09)	4.10	(3.31, 5.08)
55–69														
University	2089.8	1717.2	−372.5	1.00		1.00		1003.8	680.1	−323.6	1.00		1.00	
Upper secondary	2768.3	3196.4	+428.1	1.35	(1.24, 1.46)	1.86	(1.69, 2.05)	1200.0	1159.9	−40.2	1.22	(1.09, 1.36)	1.69	(1.48, 1.92)
Lower secondary or less	3276.3	3889.0	+612.6	1.60	(1.48, 1.72)	2.26	(2.06, 2.48)	1389.1	1539.2	+150.0	1.41	(1.27, 1.56)	2.20	(1.94, 2.50)
70+														
University	10 168.0	7482.6	−2685.4	1.00		1.00		6958.2	5051.8	−1906.4	1.00		1.00	
Upper secondary	10 008.5	10 292.4	+283.9	0.97	(0.90, 1.05)	1.50	(1.37, 1.65)	6748.9	6585.4	−163.4	0.96	(0.88, 1.03)	1.42	(1.28, 1.58)
Lower secondary or less	11 117.6	10 893.9	−223.7	1.09	(1.02, 1.17)	1.60	(1.47, 1.75)	7979.6	7252.0	−727.6	1.13	(1.03, 1.23)	1.57	(1.42, 1.73)

[a] European standard population.

Table 4 Age-standardized[a] mortality rates per 100 000 and mortality rate ratios for selected causes of death by educational level in Estonia 1989–2000 in age group 20+

	Men							Women						
	Mortality rates			Mortality rate ratios (95% CI)				Mortality rates			Mortality rate ratios (95% CI)			
	1989	2000	Change from 1989–2000	1989		2000		1989	2000	Change from 1989–2000	1989		2000	
Infectious diseases														
University	7.9	7.4	–0.5	1.00		1.00		5.3	2.2	–3.1	1.00		1.00	
Upper secondary	9.4	16.6	+7.2	1.26	(0.69, 2.32)	3.33	(1.53, 7.22)	4.7	6.1	+1.4	1.29	(0.60, 2.75)	2.61	(0.93, 7.36)
Lower secondary or less	24.0	50.5	+26.5	4.12	(2.34, 7.26)	7.88	(3.67, 16.92)	5.9	22.3	+16.4	1.40	(0.65, 3.02)	4.98	(1.74, 14.29)
Stomach cancer														
University	46.0	26.8	–19.2	1.00		1.00		21.2	13.9	–7.3	1.00		1.00	
Upper secondary	61.0	53.7	–7.2	1.27	(0.98, 1.65)	2.07	(1.40, 3.04)	28.4	23.0	–5.4	1.27	(0.90, 1.79)	1.55	(1.00, 2.40)
Lower secondary or less	66.6	53.1	–13.5	1.55	(1.21, 1.98)	2.12	(1.45, 3.10)	30.7	27.2	–3.5	1.37	(0.97, 1.92)	1.68	(1.09, 2.61)
Lung cancer														
University	64.3	49.6	–14.7	1.00		1.00		14.4	12.4	–2.0	1.00		1.00	
Upper secondary	117.1	126.2	+9.1	1.79	(1.45, 2.22)	2.41	(1.83, 3.17)	20.1	18.3	–1.8	1.42	(0.90, 2.23)	1.55	(0.94, 2.57)
Lower secondary or less	152.2	162.5	+10.3	2.74	(2.24, 3.36)	3.34	(2.56, 4.36)	15.5	19.5	+4.0	1.10	(0.70, 1.72)	1.27	(0.76, 2.11)
Breast cancer														
University	–	–	–	–		–		44.0	24.6	–19.4	1.00		1.00	
Upper secondary	–	–	–	–		–		33.4	46.3	+12.9	0.71	(0.56, 0.89)	1.72	(1.26, 2.35)
Lower secondary or less	–	–	–	–		–		27.3	42.3	+15.1	0.55	(0.44, 0.70)	1.33	(0.95, 1.84)
Ischaemic heart disease														
University	669.3	371.7	–297.6	1.00		1.00		360.1	200.7	–159.4	1.00		1.00	
Upper secondary	660.8	618.4	–42.4	1.07	(0.99, 1.16)	1.84	(1.65, 2.06)	348.0	299.1	–48.9	1.05	(0.93, 1.18)	1.67	(1.45, 1.93)
Lower secondary or less	862.9	781.9	–81.0	1.39	(1.30, 1.50)	2.25	(2.02, 2.50)	504.3	445.5	–58.8	1.50	(1.34, 1.68)	2.36	(2.06, 2.70)
Cerebrovascular disease														
University	257.6	161.1	–96.5	1.00		1.00		219.2	114.9	–104.3	1.00		1.00	
Upper secondary	285.8	282.1	–3.7	1.20	(1.05, 1.36)	1.88	(1.59, 2.23)	230.4	188.7	–41.7	1.17	(1.01, 1.36)	1.80	(1.51, 2.16)
Lower secondary or less	340.4	315.2	–25.2	1.45	(1.28, 1.63)	2.07	(1.76, 2.44)	290.7	244.7	–46.0	1.45	(1.26, 1.67)	2.22	(1.86, 2.64)
Chronic respiratory disease														
University	18.3	15.8	–2.5	1.00		1.00		6.5	5.1	–1.4	1.00		1.00	
Upper secondary	24.4	34.7	+10.3	1.46	(0.93, 2.31)	2.33	(1.36, 3.98)	10.7	6.6	–4.1	2.01	(1.01, 4.01)	1.28	(0.59, 2.76)
Lower secondary or less	48.7	48.1	–0.6	3.28	(2.16, 5.00)	3.32	(2.00, 5.54)	15.5	11.2	–4.3	2.87	(1.46, 5.66)	2.18	(1.04, 4.56)
Alcoholic liver cirrhosis														
University	1.2	11.3	+10.1	1.00		1.00		0.4	1.6	+1.2	1.00		1.00	
Upper secondary	2.6	17.5	+14.9	1.26	(0.42, 3.77)	1.39	(0.82, 2.37)	0.6	5.5	+4.9	1.57	(0.19, 13.07)	3.21	(0.98, 10.47)
Lower secondary or less	3.4	24.7	+21.3	2.15	(0.75, 6.22)	1.66	(0.97, 2.84)	0.5	16.8	+16.3	1.57	(0.17, 14.29)	5.54	(1.64, 18.71)
Transport accidents														
University	25.3	18.4	–7.0	1.00		1.00		15.8	6.9	–8.8	1.00		1.00	
Upper secondary	41.6	38.3	–3.3	1.68	(1.29, 2.18)	2.18	(1.40, 3.40)	12.5	8.4	–4.1	1.18	(0.80, 1.73)	1.34	(0.70, 2.57)
Lower secondary or less	65.9	62.4	–3.5	2.64	(2.03, 3.44)	3.44	(2.20, 5.40)	17.1	20.4	+3.4	1.42	(0.94, 2.13)	2.42	(1.20, 4.86)
Alcohol poisoning														
University	8.2	11.5	+3.3	1.00		1.00		0.3	2.8	+2.5	1.00		1.00	
Upper secondary	15.9	41.6	+25.7	1.69	(1.07, 2.65)	3.14	(1.94, 5.10)	2.9	9.2	+6.3	7.81	(1.07, 57.24)	2.73	(1.18, 6.34)
Lower secondary or less	36.2	62.1	+25.9	4.54	(2.93, 7.04)	3.71	(2.26, 6.07)	8.9	26.7	+17.8	32.43	(4.45, 236.48)	4.91	(2.05, 11.73)
Suicide														
University	25.6	33.4	+7.8	1.00		1.00		11.5	8.8	–2.7	1.00		1.00	
Upper secondary	42.7	71.5	+28.8	1.58	(1.21, 2.06)	1.99	(1.47, 2.69)	16.2	11.6	–4.6	1.13	(0.79, 1.60)	1.34	(0.78, 2.30)
Lower secondary or less	89.7	95.0	+5.2	3.45	(2.67, 4.47)	2.40	(1.76, 3.28)	20.5	20.0	–0.5	1.28	(0.89, 1.85)	2.20	(1.25, 3.85)
Homicide														
University	6.2	15.7	+9.5	1.00		1.00		1.6	3.5	+1.9	1.00		1.00	
Upper secondary	13.2	32.3	+19.1	2.90	(1.61, 5.24)	2.13	(1.35, 3.36)	3.7	5.9	+2.2	2.80	(1.01, 7.79)	2.05	(0.81, 5.22)
Lower secondary or less	25.1	38.6	+13.5	5.71	(3.16, 10.30)	2.21	(1.37, 3.56)	9.0	23.1	+14.1	5.40	(1.90, 15.37)	5.46	(2.09, 14.25)

[a] European standard population.

From 1989 to 2000 the declining mortality of the higher educated and the rising mortality of the lower educated resulted in an enormous mortality gap. The increasing differentiation of wealth and opportunity, partly resulting from recent reforms, can be considered a main, recent underlying factor. However, the situation was partly determined long before the transition period. The fairly high contribution of neoplasms to the widening mortality gap suggests that some underlying factors originated decades before recent reforms. Stomach cancer, determined early in life,[23] and lung cancer, with a long latency time,[24] are two examples. Cerebrovascular deaths also contribute to the widening gap and, again, this group of diseases, especially haemorrhagic stroke, are believed to be partly determined early in life.[23,25] Early life factors linked to education interacting with factors later in life also linked to education (alcohol for example) could result in the widening mortality gap for certain causes of death.

We conclude that there is a particular need to tackle health inequalities in countries in transition. Three such areas could be suggested. Those with a low educational achievement need to be pulled into the new economic developments and allowed to benefit from economic change; the distribution and consumption of alcohol need to be more tightly controlled, and thirdly, a modernized, comprehensive medical care system equally accessible for all would counteract some of the forces now creating a widening of the educational mortality divide.

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KEY MESSAGES

- Educational differences in mortality increased tremendously in Estonia from 1989 to 2000.
- From 1989 to 2000 mortality decreased considerably for those with university education and increased for those with the lowest education. Increasing inequalities were observed for all age groups and for most causes of death.
- The available evidence suggests that social disruption and increasing inequalities in wealth can be considered main recent determinants; however causal processes, shaped decades before recent reforms, also contribute to this widening gap.

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Commentary: Winners and losers

Martin McKee

It has almost become a cliché to talk of winners and losers in the transition to democracy in the former Soviet Union. Like the men in grey suits (the arms dealers) who did well out of the First World War, some have seen their fortunes improve beyond their wildest dreams. Some of the most extreme examples are in Russia where a small group of oligarchs effectively appropriated the assets of the state for their own private gain. At the same time, many of their compatriots have seen once secure jobs disappear, or more often continue but with payment in arrears or not at all, recalling the old joke that communism was where 'you pretend to work and we pretend to pay you.'

It is not just at the level of individuals that there have been winners and losers. Some of the newly independent countries that emerged from the Soviet Union have also fared better than others. The most tragic examples are Tajikistan, Moldova, and the countries of the Caucasus, which have been wracked by wars. Others escaped this fate but, as in Belarus and Turkmenistan, were denied the promise of democratic reform as the former communist leaders reinvented themselves, installing regimes that were at least as repressive as those in the communist era. But some have, on the surface at least, done well. The three Baltic states are already members of NATO and they stand on the brink of European Union membership. They have stable democratic structures and have aligned their laws with those in Western Europe.

Yet there is a paradox. A visitor to a large Finnish owned supermarket in Tallinn, the capital of Estonia, could be forgiven for thinking he or she was in Helsinki. However, Estonia's health statistics more closely resemble those of Russia, and indeed until 1998 the trajectory of life expectancy in Russia and Estonia was almost parallel (Figure 1). Estonia (in common with its Baltic neighbours) is at last achieving sustained improvements in health. But is everyone gaining to the same extent? By taking advantage of data from the 2000 census, Leinsalu *et al.* have shown us that even in Estonia, which has fared relatively well, transition has also brought winners and losers.[1]

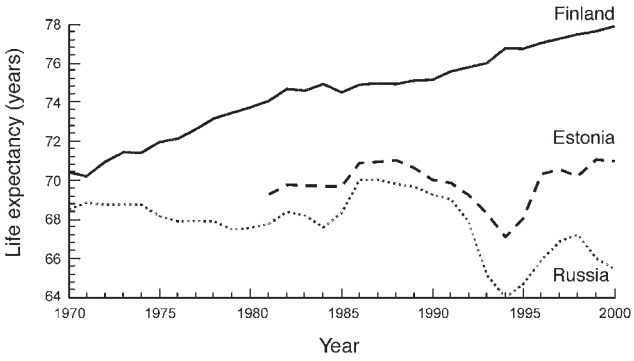

Figure 1 Life expectancy at birth (years) for males and females combined (Source: WHO HFA database)

Overall, life expectancy at birth may have increased between 1989 and 2000 but it is now apparent that this has been driven by gains among those with university education, while it has actually fallen for those with middle or lower levels of education. This is an alarming finding that should attract at least as much attention from governments as a fall in economic performance would. The obvious question for Estonian policy makers is what should be done to tackle this problem?

It is possible to gain valuable insights from the authors' analysis by cause of death. It is apparent that even in the best educated group gains have been uneven. Deaths from ischaemic heart disease have fallen extremely rapidly, at a rate that questions once again our understanding of the aetiology of this disease. It is increasingly clear that traditional explanatory models, largely derived from studies such as that in Framingham, do not predict mortality well in many other populations,[2] and nor do they predict the changes that have been seen in Eastern Europe in the last decade. In countries where the potential scope for prescribing expensive statins is enormous there is an urgent need to understand better the inter-related roles played by lipids and by other dietary components, in particular fruit and vegetables.[3]

This very large decline in deaths from ischaemic heart disease tends to obscure the fact that deaths from alcoholic liver cirrhosis, alcohol poisoning, and homicide have all increased, even

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