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Descriptive Findings

Self-perceived health in Belarus: Evidence from the income and expenditures of households survey

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Self-perceived health in Belarus: Evidence from the income and expenditures of households survey

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Abstract

Based on data from five cross-sectional household surveys conducted during 1996-2007, this study provides initial results of an analysis of self-perceived health in Belarus. The findings suggest that there has been a compression of morbidity. Self-perceived health has been improving steadily for both sexes and at all ages. Despite this notable improvement, Belarus still remains far behind Western Europe in terms of healthy life expectancy. This disadvantage is mainly due to higher mortality among the working-age population, but health at older ages also plays an important role. Education appears to be the most important factor associated with self-rated health.

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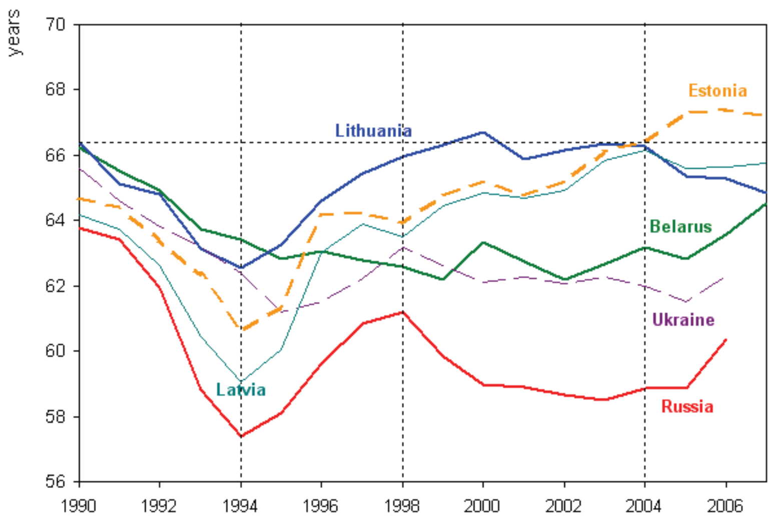
1. Introduction

The dramatic increase in mortality that began in the early 1990s in the countries of the former Soviet Union (FSU) has been extensively documented (Bobadilla and Costello 1997; Shkolnikov et al. 2004; Brainerd and Cutler 2005; Nolte, McKee, and Gilmore 2005). It has been widely recognized that the consequences of the socioeconomic crisis had a negative impact on health (Brainerd 1998; Bobak et al. 1998, 2000; Cockerham, Hinotea, and Abbot 2006; Cornia and Paniccia 2000; McKee 2001, Gilmore, McKee, and Rose 2002). Like other FSU countries, Belarus faced a significant deterioration in the health of its population immediately after the dissolution of the USSR, as indicated by the trends in male life expectancy (Figure 1). However, likely due to a postponement of market reforms, the toll of the crisis during the very early transition years appears to have been less dramatic and acute in Belarus than in the neighboring states. The policy of gradualism chosen by the Belarusian authorities seems to have eased social pressure, and somewhat slowed mortality growth in the early 1990s. However, the long-term problem of deteriorating health was not resolved. Life expectancy continued to decline, and then stagnated in the 2000s. Despite some slight improvements in very recent years, Belarus still does not seem to have overcome the health crisis, which has deep roots in the Soviet past. High mortality from cardiovascular diseases and premature male mortality from external causes of death have remained the main features of the decades-long health crisis in Belarus (Grigoriev et al. 2010).

While there is extensive research on health and mortality in the FSU, less is known about health at the individual level, and a fairly limited number of studies provide evidence on self-rated health and its determinants (see Bobak et al. 1998, 2000; Gilmore, McKee, and Rose 2002; Andreev, Mckee, and Shkolnikov 2003; Gaumé and Wunsch 2010). Furthermore, there is a large amount of literature devoted to Russia, while other FSU countries have received less attention. The present study seeks to fill these gaps by providing new evidence from Belarus. Our objective is to analyze recent trends in self-perceived health (SPH), and to assess the factors that have been associated with it over the past decade. Exploring health in Belarus will help us to better understand health in other transition countries as well. Belarus represents a unique case for researchers because, unlike the other transition countries, it still largely maintains the socioeconomic system inherited from the Soviet era. Evidence from Belarus would be valuable for comparative studies of the effects of different policies on health. Moreover, because SPH is known to predict mortality, albeit imperfectly (Appels et al. 1996; Perlman and Bobak 2008), the assessment of factors associated with SPH facilitates research on mortality determinants.

Figure 1: Male life expectancy at birth in Belarus and selected FSU countries, 1990-2007



Source: Human Mortality Database.

2. Data and methods

One of the few data sources in Belarus that provides information on individuals is the Income and Expenditures of Household Survey (IEHS). This cross-sectional survey has been conducted in Belarus annually since 1995 by the National Statistical Committee (Belstat). The survey covers all types of households, with the exception of those individuals living in institutions (e.g., nursing homes, prisons, convents). It is restricted to a single calendar year, and is designed as a sequence of four quarterly interviews of the same sample of households (for more details, see Martini, Ivanova, and Novosyolova 1996). The survey questionnaire contains a number of variables, including health (e.g., the influence of health on the ability to work, health self-evaluation, the ability to get dressed without assistance, medical visits, expenditures on medical service), demographic (e.g., age, sex, place of residence), socioeconomic (e.g., working status, education, income), and lifestyle (e.g., smoking, sport practicing).

IEHS micro-files for 1996, 2000, 2003, 2005, and 2007 were at our disposal. We restricted our analysis to individuals older than 20 years; males and females were analyzed separately. The number of individuals participating in the IEHS in these years are shown in Table 1. Unfortunately, we were not able to obtain the official information about the subjects approached in the sample, nor were we able to estimate precisely the response rate from the micro-files. Our indirect estimates for the five surveys suggest that the response rate for the households was well over 80%, or close to the estimates made by Martini (Martini, Ivanova, and Novosyolova 1996): in 1996, the baseline response rate for households was 87.7%. No information about the response rate among individuals was available to us.

Table 1: Main characteristics of IEHS data used in the analysis

	1996	2000	2003	2005	2007
Total number of respondents	14893	13994	14575	14379	15566
among them: older than 20	10443	10267	10844	10768	11853
share of men, %	44.7	44.0	43.6	43.8	43.9
share of women, %	55.3	56.0	56.4	56.2	56.1

Source: IEHS 1996, 2000, 2003, 2005, and 2007.

The IEHS is a representative national sample, which can be used in estimating prevalence rates based on health status. It is widely understood that health status is a highly subjective concept that can be measured in different ways (Greiner et al. 1996). In our study we assessed health using responses to the following question: “How do you evaluate your state of health?” On the basis of the response “bad,” we estimated the prevalence of poor health. We also considered an alternative approach to categorizing health states: namely, merging the “bad” and “fair” categories into a single “bad” category. However, the prevalence rates estimated in this way turned out to be implausible. We shall return to this point later when discussing the results.

To obtain relevant life table functions and to estimate healthy life expectancy (HLE), we relied on Sullivan’s method (Sullivan 1971), which is widely used in research. In our computations we followed a calculation guide developed by the European Health Expectancy Monitoring Unit (Jagger et al. 2006). Data on age-specific mortality rates were taken from the Human Mortality Database. To decompose the difference in HLE between the two groups into mortality and health components, we used the algorithm of the step-wise replacement (Andreev, Shkolnikov, and Begun 2002). The general algorithm assumes that any aggregate indicator calculated for two population groups from two similar matrices can be decomposed through estimating the effects of the replacement for each elementary cell of one matrix by the respective cell of another matrix. To decompose the difference in HLE, the age components of the difference in two life expectancies should be estimated first. Afterwards, each age component is split into mortality and health effects[3].

To assess the association between a number of socioeconomic, demographic, and lifestyle variables and self-perceived health, we used a binary logistic regression model. The variables entered in the regression models are described below:

Demographic

Two variables are considered: age and the place of residence. The first covariate is a continuous variable measured in years, while the second is divided into those who live in the capital (Minsk), large cities, small cities, and rural settlements.

Socioeconomic

Four socioeconomic proxies are included in the models: *level of education, working status, income,* and *index of living standards (ILS)*. Five educational categories are defined: higher, secondary specialized, general secondary or vocational school, incomplete secondary, and primary and incomplete primary education. *Working status* is divided into four groups: working at present (plus students), pensioners, the unemployed, and others. The group of others includes housewives, the disabled, and others who were not working at the time of the interview. Unfortunately, we could not distinguish between the disabled and pensioners who had retired due to disability because different categories were used in different years of the survey (the disabled constituted a separate category in 2000, while in 2003 and 2005 pensioners were divided into those who retired due to disability, and those who retired following long and meritorious service).

Income is a variable which consists of five groups, ranking individuals according to their household's per capita income, from the lowest 20% to the highest 20%. Due to the difficulty in obtaining unbiased and reliable data on monetary income, in this study we rely on the indicator of per capita disposable resources (throughout the paper it is referred to as income). In addition to the total amount of money household members have available for their consumption and savings, disposable resources include the value of consumed in-kind income obtained from individual plots of land (minus the expenses of its production), and also the value of in-kind subsidies and benefits granted to a household for the acquisition of in-kind goods and services. In-kind income from plots is valued at the average purchase price, while the estimation of in-kind privileges is based on information provided by respondents. The *index of living standards* is

[3] Andreev and colleagues (2002) provide a thorough description of the algorithm, accompanied by practical examples.

traditionally constructed from the information on household ownership of durable goods and its housing characteristics, by means of the principal components analysis. The advantages, limitations, the choice of variables, and the applications of the ILS have been widely discussed in the literature (Filmer and Pritchett 1998, 2001; Falkingham and Namazine 2002; Vyas and Kumaranayake 2006; Mishra 2007). The housing conditions of the household (the presence of central heating, a bath or shower, hot water, and a telephone), the ownership of durable goods (having a TV, a refrigerator, a washing machine, and a car), the ownership of land, the per capita living space, and the percentage of food expenditures in total consumer expenditures are used for the computation of this index.

Lifestyle variables

Three explanatory variables are added here: *sport practicing, smoking*, and *body mass index* (BMI). *Sport practicing* is split into those who exercise, and those who do not. *Smoking* defines the current status of a respondent, and compares current smokers with non-smokers.

The *BMI* is defined as the individual's weight in kilograms over the square of the height in metres. For the present analysis the index values are reclassified as recommended by the World Health Organization (WHO, Global Database on Body Mass Index) into four groups (underweight, normal weight, overweight, and obese). Although recent epidemiological research suggests that using a linear plus quadratic term is the better approach for operationalizing BMI (Kivimäki et al. 2008), we prefer to rely on the WHO approach, as it allows us to split individuals into clear categories which can be meaningfully compared.

The analysis of factors associated with health is based on the pooled data from four cross-sectional surveys (2000, 2003, 2005, 2007) containing in total more than 40,000 individual records. Since this dataset contains independent but not identically distributed observations, we incorporated year dummies to account for aggregate changes over time. The analysis was conducted separately by sex and by individuals of working age and above working age[4]. The summary statistics for all independent variables are shown in Table 2.

[4] In Belarus the retirement age for women is 55, and for men 60.

Table 2: Descriptive statistics for the samples

	Working age		Above working age	
	men	**women**	**men**	**women**
Number of cases	15312	15888	3838	8694
Age				
Mean	38.5	37.6	69.4	68.2
Standard deviation	11.2	10.0	6.7	8.7
Residence (%)				
Minsk	15.8	16.7	13.6	13.3
Large city	28.2	29.8	24.9	25.0
Small city	24.0	24.6	20.6	20.8
Rural	32.0	28.9	40.9	40.9
Education (%)				
Higher education	17.5	20.6	17.6	11.9
Secondary specialized education	21.3	33.7	15.6	21.1
General secondary education/Vocational school	55.5	42.6	20.9	20.6
Incomplete secondary education	5.2	2.8	21.6	18.5
Primary and incomplete primary education	0.5	0.3	24.3	27.9
Index of living standards				
Mean	0.18	0.25	-0.37	-0.39
Standard deviation	0.89	0.83	1.03	1.07
Income (%)				
First quintile (lowest income)	23.8	24.5	8.8	15.4
Second quintile	18.7	19.4	20.7	21.8
Third quintile	17.9	17.3	25.6	23.8
Fourth quintile	19.4	19.2	24.3	21.5
Fifth quintile (highest income)	20.2	19.6	20.6	17.5
Smoking (%)				
Yes	61.6	10.0	34.6	1.4
No	38.4	90.0	65.4	98.6
Sport practicing (%)				
Yes	20.6	15.0	8.4	7.3
No	79.4	85.0	91.6	92.7
Body mass index (BMI) (%)				
Normal weight (18.50-24.99)	51.8	50.9	42.3	31.8
Underweight (<18.50)	0.8	3.8	0.8	0.6
Overweight (25.00-29.99)	37.8	28.9	44.4	40.1
Obese (≥30)	9.6	16.4	12.5	27.5
Working status* (%)				
Working at present	84.2	86.3	-	-
Pensioner	3.6	1.9	-	-
Unemployed	7.7	4.5	-	-
Others	4.5	7.3	-	-

Source: IEHS.
Note: *This variable is applicable to individuals of working age only.

3. Results

3.1 Health status

The IEHS data indicate that, in 1996, Belarusians had substantially worse health than in 2000 and subsequent years (Table 3). In more recent years individuals have been reporting better health. Since 2000 healthy life expectancy (HLE) has been growing steadily at all ages and for both sexes. Meanwhile, life expectancy has been stagnating, except in the most recent years, when it improved slightly. As a result, regardless of sex, the healthy to life expectancy ratio has been increasing for all age groups, particularly older ages. The increase in the share of years lived in good health has been especially pronounced among women. In 1996, for example, women aged 60 were expected to live on average about one-third of their remaining life in good health, while by 2007 the proportion had increased to about two-thirds. In the case of males, the corresponding improvement has also been substantial. Over the course of the decade the HLE/LE ratio has increased from 50% to 72%. The more rapid progress among women than among men has resulted in a widening of the sex differential in HLE. In 2007 the sex difference in HLE at age 20 was about seven years (48.3 – 41.3); while in 1996, it was around two years (38.1-36). Because of the lower life expectancy, and also the lower prevalence of “bad” self-perceived health, men exhibited a higher HLE/LE ratio throughout the analyzed period. That is, relative to their whole life span, men in Belarus spent more time in good health than women.

The health trends in Belarus suggest there has been a compression of morbidity, a phenomenon in which the postponement of illness pushes (compresses) morbidity to the shortest duration possible, relative to the whole life span (Fries 1980). The process of the compression of morbidity in Belarus is illustrated by Figure 2: we can see that the share of person-years spent in good health increases, even as the total number of remaining person-years lived by individuals remains relatively constant. Following the significant improvement in 2000, the proportion of person-years lived in good health gradually increases across all ages. Meanwhile, the shape of the survival curve (hypothetical line above the bars) does not change much over time.

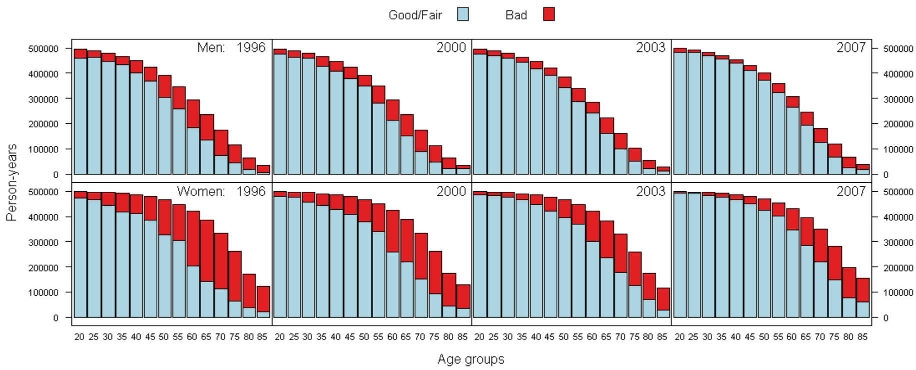
Despite considerable improvements in health in recent years, Belarus still remains far behind Western Europe. For example, in 2005 healthy life expectancy was 11.5 and 7.2 years lower than in the EU-15 for men and women, respectively (Figure 3). The decomposition of the difference in HLE into mortality and health components between Belarus and the EU-15 shows that the disadvantageous position of Belarus is driven by higher mortality among the working-age population, and by the poorer health status and mortality of the population above working age. In the case of men, the gap in HLE is almost entirely determined by the mortality component, mostly at working ages. By contrast, the contribution of the health component to the gap in HLE is much more pronounced among women, particularly those above working age.

Table 3: Life expectancy, healthy life expectancy, and healthy to life expectancy ratio at ages 20, 40, and 60 in Belarus, 1996-2007

	Men					Women				
	1996	**2000**	**2003**	**2005**	**2007**	**1996**	**2000**	**2003**	**2005**	**2007**
					Age 20					
LE	44.63	44.61	43.77	43.88	45.46	55.59	55.76	55.46	55.78	56.85
HLE	35.95	37.89	38.81	39.52	41.31	38.12	42.18	44.87	47.35	48.27
HLE/LE	0.81	0.85	0.89	0.90	0.91	0.69	0.76	0.81	0.85	0.85
S.E.	0.24	0.22	0.19	0.18	0.17	0.30	0.28	0.25	0.24	0.23
					Age 40					
LE	27.53	27.64	26.77	26.87	28.12	36.50	36.73	36.43	36.80	37.75
HLE	19.51	21.41	22.1	22.78	24.17	20.54	24.10	26.31	28.63	29.4
HLE/LE	0.71	0.77	0.83	0.85	0.86	0.56	0.66	0.72	0.78	0.78
S.E.	0.24	0.22	0.18	0.17	0.17	0.28	0.27	0.24	0.23	0.22
					Age 60					
LE	14.23	14.10	13.44	13.51	14.22	19.40	19.54	19.33	19.65	20.40
HLE	7.08	8.33	9.16	9.43	10.29	6.68	9.17	10.80	12.54	12.82
HLE/LE	0.50	0.59	0.68	0.70	0.72	0.34	0.47	0.56	0.64	0.63
S.E.	0.24	0.22	0.19	0.20	0.19	0.23	0.23	0.22	0.22	0.22

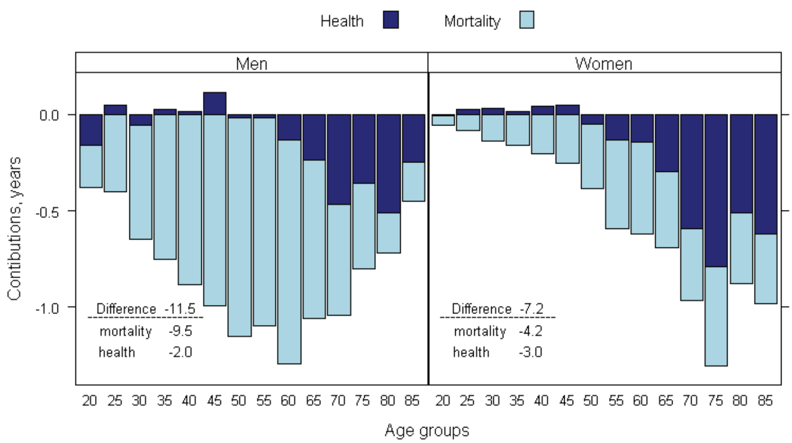
Sources: Human Mortality Database and the estimations from IEHS;
Notes: LE – life expectancy, HLE – healthy life expectancy, HLE/LE – healthy to life expectancy ratio, S.E. – standard error of the HLE estimate (p=0.05)

Figure 2: Person-years lived in "good/fair" and "bad" state of health in Belarus; 1996, 2000, 2003, and 2007



Source: Estimated from the IEHS

Figure 3: Decomposition of the difference in HLE between Belarus and EU-15 into mortality and health components, 2005



Source: Estimated from the IEHS and EHEMU data.

Notes:
1) EU-15 refers to the 15 member states of the European Union (EU): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.
2) Data on prevalence rates (self-perceived health from SILC (Statistics on Income and Living Conditions) survey), as well as mortality data for the EU-15, were extracted from the EHEMU database (www.ehemu.eu).

3.2 Factors associated with self-perceived health

3.2.1 Individuals of working age

The results suggest that education and working status are most strongly associated with self-evaluated health, regardless of sex and the number of covariates entered into the models (Table 4). The risk of reporting poor health decreases considerably as the level of education rises, and when a person is not currently working. For example, when we control only for age, we find that men with incomplete secondary education are three times more likely to report that their health status is poor than are men with higher education. Meanwhile, having primary or incomplete primary education increases the odds of reporting poor health by a factor of 22. The odds ratio (OR) declines slightly after income and the ILS are added to the model. Applying the whole set of covariates does not significantly attenuate the strength of the association. The educational gradient in health is more pronounced among women. In all four models the OR of reporting poor health are highly significant. Controlling for different sets of factors does not have a notable influence on the odds ratios, with the exception of the lowest level of educational attainment. In the fully adjusted model, those with primary and incomplete primary education are seven times more likely to report being in poor health, whereas in the other models, the corresponding OR exceeds 20.

Regarding working status, the highest risk of reporting poor health is among working age pensioners. For example, when we control only for age, men are 18.6 times (p=0.01) more likely to report having poor health than working men. The OR slightly decreases as more variables are added to the analysis. For women the odds ratios vary from 12.5 to 15.4, depending on the number of additional variables entered into the model. Unemployed men and women are also more likely to report poor health. The odds ratios are slightly higher in the case of men, but they decrease slightly as we control for more covariates. Other non-working individuals are much more likely to report being in poor health than working people. The association is particularly strong for men, with an odds ratio of 8.1 (p=0.01) when only age is adjusted for, and 6.3 (p=0.01) in a fully adjusted model. In the case of women, the odds ratios vary from 1.9 in a fully adjusted model to 2.2 in an age-adjusted model.

The association between income and SPH is rather complex. Among men, when income is considered alone (adjusted only for age), the OR of reporting poor health decreases from the first to the fourth income quintile (although the OR for the fourth quintile is not statistically significant). Among women the corresponding odds ratios are also higher than one, but unlike in the case of men, all of them are statistically significant, and no income gradient can be seen. Controlling for education yields insignificant results for men (except in the first quintile), but it does not change much for women. Allowing for the ILS does not influence the income-SPH association. The odds ratios of reporting poor health in the fully adjusted model are statistically significant only for women (except for the second quintile). All of them are higher than one, but the likelihood of reporting poor health does not decrease with the increase in income.

The association between the index of living standards (ILS) and SPH is statistically significant only in the age-adjusted model, and only for men. The odds ratio of 0.912 (p=0.05) suggests that an increase in the ILS by one unit is associated with a 9% decrease in the chances of reporting poor health. This association becomes insignificant (and even changes its direction) when education is controlled for.

Regarding the relationship between BMI and the SPH, the results reveal that the highest probability of reporting poor health is among men in the underweight BMI category (compared to those with normal weight). The highest OR is in the age-adjusted model, but it becomes considerably lower as all of the covariates are allowed for. Having a BMI in the overweight range is associated with a lower probability of reporting poor health. In all models the ORs are highly significant for men. In the case of women the corresponding ORs are marginally significant only in two models, but not in the age- and fully adjusted models. Obesity is not associated with poor SPH in men, but this association is statistically significant in women in all models.

The association between sport practicing and SPH is more clearly pronounced among men than women. In all models for men, not exercising is associated with a higher chance of reporting poor health (about two times). For women the result is significant (OR=1.257, p=0.05) only in the age-adjusted model. Once education is allowed for, the association becomes insignificant.

Unexpected findings emerge for two variables: the place of residence and smoking. The results of the fully adjusted model suggest that both men and women who live in rural areas and in large or small cities are less likely to report poor health than individuals who live in the capital, Minsk. The notably lower and statistically significant ORs observed for rural men and women in all models are surprising, given the higher mortality usually found in rural areas. Another surprising finding is the association between smoking and SPH. There is an inverse association between smoking and SPH: non-smoking men are more likely to report poor health than smokers. The odds ratios increase as more variables are allowed for. There is no statistically significant association between smoking and SPH in women.

Table 4: Odds ratios (95% standard errors) of "bad" self-perceived health (individuals of working age)

Variables	Adjusted for age	Adjusted for age and education	Adjusted for age, education, income, and ILS	Fully adjusted
Men				
Age	1.048*** (0.003)	1.047*** (0.003)	1.050*** (0.004)	1.035*** (0.004)
Residence				
Minsk	1	1	1	1
Large city	1.007 (0.106)	0.950 (0.108)	0.812* (0.115)	0.769** (0.124)
Small city	0.918 (0.111)	0.831 (0.113)	0.697*** (0.122)	0.679*** (0.131)
Rural	0.772** (0.107)	0.629*** (0.111)	0.461*** (0.135)	0.495*** (0.147)
Education				
Higher education	1	1	1	1
Secondary specialized education	1.449*** (0.125)	1.449*** (0.125)	1.280* (0.132)	1.390** (0.142)
General secondary education/Vocational school	1.487*** (0.109)	1.487*** (0.109)	1.388*** (0.118)	1.486*** (0.127)
Incomplete secondary education	2.995*** (0.151)	2.995*** (0.151)	2.772*** (0.163)	2.074*** (0.181)
Primary and incomplete primary education	22.283*** (0.270)	2.283*** (0.270)	18.675*** (0.293)	4.527*** (0.335)
Income				
First quintile (lowest income)	1.622*** (0.113)	1.372*** (0.118)	1.403*** (0.120)	1.250* (0.132)
Second quintile	1.416*** (0.121)	1.222 (0.124)	1.237* (0.125)	1.137 (0.136)
Third quintile	1.339** (0.121)	1.210 (0.124)	1.219 (0.124)	1.173 (0.134)
Fourth quintile	1.203 (0.120)	1.112 (0.122)	1.115 (0.122)	1.125 (0.131)
Fifth quintile (highest income)	1	1	1	1
Index of living standards (ILS)	0.912** (0.039)	1.010 (0.041)	1.039 (0.043)	0.953 (0.056)
Working status				
Working at present	1	1	1	1
Pensioner	18.558*** (0.101)	16.728*** (0.103)	16.471*** (0.107)	16.951*** (0.112)
Unemployed	1.515*** (0.138)	1.453*** (0.139)	1.474*** (0.144)	1.398** (0.146)
Others	8.129*** (0.143)	6.970*** (0.146)	6.993*** (0.157)	6.289*** (0.161)
Smoking				
Yes	1	1	1	1
No	1.156** (0.071)	1.231*** (0.073)	1.270*** (0.076)	1.288*** (0.084)
Sport practicing				
Yes	1	1	1	1
No	1.910*** (0.116)	1.710*** (0.118)	1.659*** (0.124)	1.776*** (0.130)
Body mass index (BMI)				
Normal weight (18.50-24.99)	1	1	1	1
Underweight (<18.50)	7.647*** (0.231)	6.165*** (0.241)	5.458*** (0.258)	4.068*** (0.293)
Overweight (25.00-29.99)	0.612*** (0.081)	0.632*** (0.082)	0.616*** (0.085)	0.674*** (0.092)
Obese (≥30)	0.935 (0.112)	0.980 (0.113)	1.020 (0.117)	1.189 (0.129)

Table 4: (Continued)

Variables	Adjusted for age	Adjusted for age and education	Adjusted for age, education, income, and ILS	Fully adjusted
Women				
Age	1.068*** (0.004)	1.069*** (0.004)	1.069*** (0.004)	1.063*** (0.005)
Residence				
Minsk	1	1	1	1
Large city	0.957 (0.096)	0.902 (0.097)	0.847 (0.106)	0.837 (0.110)
Small city	0.881 (0.101)	0.797** (0.103)	0.768** (0.112)	0.800* (0.118)
Rural	0.762*** (0.100)	0.646*** (0.103)	0.603*** (0.125)	0.639*** (0.132)
Education				
Higher education	1	1	1	1
Secondary specialized education	1.477*** (0.102)	1.477*** (0.102)	1.519*** (0.110)	1.445*** (0.114)
General secondary education/Vocational school	1.623*** (0.099)	1.623*** (0.099)	1.651*** (0.109)	1.471*** (0.113)
Incomplete secondary education	3.692*** (0.167)	3.692*** (0.167)	4.016*** (0.180)	2.501*** (0.196)
Primary and incomplete primary education	21.218*** (0.333)	21.218*** (0.333)	22.940*** (0.337)	7.230*** (0.367)
Income				
First quintile (lowest income)	1.655*** (0.108)	1.316** (0.113)	1.358*** (0.115)	1.399*** (0.122)
Second quintile	1.267** (0.118)	1.100 (0.121)	1.119 (0.121)	1.114 (0.127)
Third quintile	1.432*** (0.115)	1.299** (0.117)	1.313** (0.117)	1.398*** (0.122)
Fourth quintile	1.503*** (0.110)	1.410*** (0.111)	1.415*** (0.111)	1.458*** (0.116)
Fifth quintile (highest income)	1	1	1	1
Index of living standards (ILS)	0.952 (0.040)	1.057 (0.042)	1.068 (0.043)	0.999 (0.054)
Working status				
Working at present	1	1	1	1
Pensioner	15.355*** (0.126)	12.604*** (0.129)	12.511*** (0.134)	14.278*** (0.139)
Unemployed	1.461** (0.159)	1.390** (0.160)	1.384* (0.170)	1.360* (0.173)
Others	2.155*** (0.120)	2.007*** (0.122)	2.133*** (0.127)	1.919*** (0.129)
Smoking				
Yes	1	1	1	1
No	0.972 (0.117)	1.003 (0.119)	1.045 (0.126)	1.008 (0.132)
Sport practicing				
Yes	1	1	1	1
No	1.257** (0.107)	1.112 (0.108)	1.079 (0.113)	0.972 (0.117)
Body mass index (BMI)				
Normal weight (18.50-24.99)	1	1	1	1
Underweight (<18.50)	2.566*** (0.171)	2.590*** (0.172)	2.451*** (0.182)	2.145*** (0.193)
Overweight (25.00-29.99)	0.885 (0.082)	0.870* (0.083)	0.864* (0.086)	0.940 (0.090)
Obese (≥30)	1.290*** (0.087)	1.252** (0.088)	1.236** (0.092)	1.441*** (0.097)

Source: estimated from IEHS.

Notes:
1) P<0.01 ***; 0.01<P<0.05 ** ; 0.05<P<0.10 *;
2) Column “adjusted for age” shows the results of the regression analysis when age and each of the present independent variables were entered into the model separately. Similarly, column “adjusted for age and education” presents the results after variable “education” was allowed for. In the “fully adjusted” models all variables are entered simultaneously;
3) In the fully adjusted models, the percentage of correctly predicted cases is 94.0% for men, and 93.6% for women

3.2.2 Individuals above working age

As in the two previous models, an education gradient can be observed for both men and women above working age (Table 5). For this group, however, the ORs for secondary specialized education are not statistically significant for men, and the ORs for primary and incomplete primary education are not as high (1.801 and 1.951, versus 4.527 and 7.230 in the fully adjusted models for men and women, respectively).

As for men of working age, there is an income gradient in the age-adjusted model among men of retirement age. Again, the statistical significance disappears once education is controlled for. However, this is not the case for women: controlling for education has little influence on the income-SPH association. When we allow for all variables the significance of the association holds only for women belonging to the two lowest income quintiles (OR=1.427, p=0.01 and OR=1.210, p=0.05).

The ILS seems to play a more important role for individuals above working age. However, the significance and the direction of its association with SPH depend on the covariates allowed for. In the fully adjusted model an increase of the ILS by one unit is associated with a decrease of around 10%-11% in the probability of reporting poor health (for both men and women).

The results show that men belonging to the underweight BMI category are more likely to evaluate their health status as poor. However, this is not the case for women in the corresponding BMI category, where the BMI-SPH association is not statistically significant. Being overweight is associated with a lower chance of reporting poor health for both sexes in all models (except women in the fully adjusted model). For women obesity increases the likelihood of reporting poor health in all models. In the case of men being obese is not associated with poor SPH. In the age-adjusted model the association has a rather unexpected direction: obese men are even less likely to report being in poor health (OR=0.806, p=0.1).

For both men and women not exercising is associated with a higher likelihood of reporting poor health, and this result holds for all models. No statistically significant association between smoking and SPH is found for either gender.

In the fully adjusted models men and women living in rural areas again have a lower probability of reporting poor health than their counterparts in Minsk. Older men and women from small or large cities have a slightly higher risk of reporting poor health, but these results are not statistically significant.

Table 5: Odds ratios (95% standard errors) of "bad" self-perceived health (individuals at above working age)

Variables	Adjusted for age	Adjusted for age and education	Adjusted for age, education, income, and ILS	Fully adjusted
Men				
Age	1.094*** (0.005)	1.086*** (0.006)	1.087*** (0.006)	1.090*** (0.007)
Residence				
Minsk	1	1	1	1
Large city	1.270* (0.123)	1.167 (0.125)	1.044 (0.135)	1.124 (0.138)
Small city	1.398*** (0.127)	1.191 (0.131)	1.065 (0.144)	1.100 (0.146)
Rural	1.071 (0.115)	0.767** (0.124)	0.601*** (0.160)	0.622*** (0.162)
Education				
Higher education	1	1	1	1
Secondary specialized education	1.073 (0.135)	1.073 (0.135)	1.073 (0.144)	1.038 (0.148)
General secondary education/Vocational school	1.362** (0.125)	1.362** (0.125)	1.352** (0.135)	1.325** (0.138)
Incomplete secondary education	1.728*** (0.120)	1.728*** (0.120)	1.773*** (0.135)	1.650*** (0.138)
Primary and incomplete primary education	1.929*** (0.117)	1.929*** (0.117)	1.929*** (0.139)	1.801*** (0.145)
Income				
First quintile (lowest income)	1.365** (0.152)	1.102 (0.158)	1.113 (0.159)	1.057 (0.162)
Second quintile	1.289** (0.118)	1.035 (0.124)	1.045 (0.124)	1.040 (0.127)
Third quintile	1.220* (0.113)	1.066 (0.117)	1.075 (0.117)	1.103 (0.120)
Fourth quintile	1.015 (0.115)	0.930 (0.117)	0.938 (0.118)	0.938 (0.121)
Fifth quintile (highest income)	1	1	1	1
Index of living standards (ILS)	0.930** (0.036)	1.044 (0.042)	1.045 (0.042)	0.899* (0.056)
Smoking				
Yes	1	1	1	1
No	0.980 (0.077)	1.076 (0.080)	1.060 (0.083)	1.143 (0.087)
Sport practicing				
Yes	1	1	1	1
No	2.140*** (0.151)	1.768*** (0.155)	1.740*** (0.163)	1.910*** (0.166)
Body mass index (BMI)				
Normal weight (18.50-24.99)	1	1	1	1
Underweight (<18.50)	3.823*** (0.422)	3.528*** (0.422)	3.457*** (0.448)	3.129** (0.457)
Overweight (25.00-29.99)	0.824** (0.077)	0.850** (0.078)	0.831** (0.081)	0.832** (0.084)
Obese (≥30)	0.806* (0.119)	0.845 (0.120)	0.835 (0.125)	0.817 (0.129)

Table 5: (Continued)

Variables	Adjusted for age	Adjusted for age and education	Adjusted for age, education, income, and ILS	Fully adjusted
Women				
Age	1.083*** (0.003)	1.074*** (0.003)	1.072*** (0.003)	1.075*** (0.004)
Residence				
Minsk	1	1	1	1
Large city	1.296*** (0.082)	1.201** (0.083)	1.076 (0.090)	1.082 (0.092)
Small city	1.373*** (0.084)	1.226** (0.086)	1.053 (0.096)	1.049 (0.097)
Rural	1.081 (0.077)	0.873* (0.082)	0.684*** (0.104)	0.699*** (0.105)
Education				
Higher education	1	1	1	1
Secondary specialized education	1.528*** (0.097)	1.528*** (0.097)	1.520*** (0.103)	1.495*** (0.105)
General secondary education/Vocational school	1.717*** (0.097)	1.717*** (0.097)	1.688*** (0.104)	1.663*** (0.106)
Incomplete secondary education	2.125*** (0.097)	2.125*** (0.097)	2.048*** (0.105)	1.906*** (0.107)
Primary and incomplete primary education	2.084*** (0.094)	2.084*** (0.094)	1.999*** (0.106)	1.951*** (0.109)
Income				
First quintile (lowest income)	1.709*** (0.089)	1.445*** (0.093)	1.450*** (0.093)	1.427*** (0.096)
Second quintile	1.394*** (0.083)	1.217** (0.086)	1.221** (0.086)	1.210** (0.088)
Third quintile	1.372*** (0.081)	1.288*** (0.084)	1.292*** (0.084)	1.316 (0.085)
Fourth quintile	1.185** (0.084)	1.108 (0.086)	1.111 (0.086)	1.106 (0.088)
Fifth quintile (highest income)	1	1	1	1
Index of living standards (ILS)	0.935*** (0.023)	0.999 (0.026)	1.010 (0.026)	0.893*** (0.034)
Smoking				
Yes	1	1	1	1
No	1.489 (0.247)	1.278 (0.249)	1.399 (0.267)	1.208 (0.273)
Sport practicing				
Yes	1	1	1	1
No	1.522*** (0.101)	1.330*** (0.103)	1.295** (0.108)	1.298** (0.110)
Body mass index (BMI)				
Normal weight (18.50-24.99)	1	1	1	1
Underweight (<18.50)	1.669 (0.314)	1.479 (0.327)	1.369 (0.342)	1.588 (0.349)
Overweight (25.00-29.99)	0.886** (0.056)	0.879** (0.058)	0.888** (0.061)	0.909 (0.061)
Obese (≥30)	1.147** (0.062)	1.176** (0.063)	1.199*** (0.067)	1.287*** (0.068)

Source: estimated from IEHS

Notes:
1) P<0.01 ***; 0.01<P<0.05 ** ; 0.05<P<0.10 *;
2) Column “adjusted for age” shows the results of the regression analysis when age and each of the present independent variables were entered into the model separately. Similarly, column “adjusted for age and education” presents the results after variable “education” was allowed for. In the “fully adjusted” models all variables are entered simultaneously;
3) In the fully adjusted models the percentage of correctly predicted cases is 69.7% for men, and 68.1% for women.

4. Summary and discussion

Before we discuss the results, several limitations of the present study should be mentioned. First, since the IEHS does not cover the institutionalized population, the prevalence of poor health might be slightly underestimated. However, this should not influence the interpretation of HLE trends. Second, the cross-sectional nature of the sample places some limits on the conclusions that can be drawn from the analysis of factors associated with health: no causality can be confirmed between the independent variables and the response variable (Bobak et al. 1998). Third, because the validity of the regression models used in this study is affected by methodological hazards, such as endogeneity and reverse causation, the results should be interpreted with caution. In an attempt to overcome this problem we ran separate regressions for each of the independent variables, gradually incorporating other covariates. But the specification of the models requires further refinement. For the above-mentioned reasons we have interpreted the results of the regression models in terms of the direction and the strength of associations, rather than in terms of causal links.

Among the advantages of the data used in the analysis is the relatively large sample size. It is clearly sufficient to allow us to make generalizations, especially when compared to the datasets used in similar studies on SPH conducted in Russia (Andreev, McKee, and Shkolnikov 2003) and Ukraine (Gilmore, McKee, and Rose 2002). In addition, our study is not restricted to one period. It covers five time points, which allows us to make more robust inferences. Another important factor that contributes to the validity of the findings is the well-established system of data collection.

In this paper we analyzed the trends in SPH and assessed the factors associated with it in Belarus between 1996 and 2007. The results suggest that, in recent years, there has been a steady improvement in self-perceived health in Belarus. The proportion of person-years lived in good health has been increasing for both sexes and different age groups. This result holds even if the “fair” and “bad” health categories are combined together into a single “bad” category. When divided up in this way there is still a notable increase in the share of person-years lived in a purely “good” state of health, especially among women (see appendix, Figure A-1). Throughout the analyzed period,women in Belarus were reporting worse health status than men. Previous studies have repeatedly demonstrated that women tend to report poorer health and to suffer more from chronic illness and functional limitations than men (Anson et al. 1993; Macintyre, Hunt, and Sweeting 1996; Chen, Chang, and Yang 2008).

A notable increase in HLE between 1996 and 2000 deserves particular attention. This likely occurred not only because of actual improvements in health, but also because of possible changes in the reporting of health status. Generally, self-rated health might reflect optimism or a general sense of control (Bobak et al. 1998), and this phenomenon could also be relevant to the Belarusian case. In the mid-1990s the perception of health among Belarusians may have been influenced by a more pessimistic view of life that arose in response to the difficulties of the early transition years. By 2000, with the stabilization of the socioeconomic situation in the country, expectations for the future were becoming more optimistic and positive, and this may have contributed to more positive self-ratings of health. We believe, however, that the steady improvement in self-rated health is real, rather than psychological. The findings derived from the IEHS are consistent with Belarusian morbidity statistics, which indicate a significant decline in the number of newly registered cases of disability over the period 1995-2007 (Appendix, Table A-1). The incidence of disability by group of disabled (except among the first group, which consists of individuals with the most severe impairments), and also by cause of disability (particularly childhood disability), was much lower in 2007 than it was in 1995.

The compression of morbidity observed in Belarus will have social consequences in the future. With the shift of morbidity toward older ages, the number of elderly people who need support will increase in the coming years. The situation might become even more complex as the baby boom generation reaches the age of retirement. All of these developments represent serious challenges for the health care system of Belarus. For the most part Belarus continues to maintain the Soviet-era health care system, which provides free basic care to the entire population. While the system can claim some achievements, such as a reduction in infant and maternal mortality, it has been not very successful in tackling non-communicable diseases. More fundamental changes are required to improve the quality and efficiency of services (Richardson et al. 2008). Our findings suggest that the health care provided in Belarus has been more important for the older population, particularly for women. Nevertheless, in terms of healthy life expectancy, it is not only the quality of the health care provision, but also the excess premature mortality that seem to distinguish Belarus from the advanced industrialized countries. The huge gap in healthy life expectancy between Belarus and Western Europe is largely due to higher mortality among the working-age population, and it especially affects men, whose reported health status does not in fact differ greatly from that of men residing in the EU-15.

Among all the variables considered, education appears to be the most important factor associated with self-perceived health. A clear educational gradient was found in both men and women. It is particularly noticeable in the working-age population. The huge odds ratios for the working-age population with primary and incomplete primary education are particularly striking. This population group is very specific, as today it is very unusual to have such a low level of education given the system of universal education in Belarus. In the past, however, having only primary and incomplete primary education was quite common. According to descriptive statistics from our sample, one-fourth of all individuals above working age have the lowest level of educational attainment, while among working-age individuals this share does not exceed 0.5%. The education gradient is expected to be even more pronounced than reported. More educated individuals are more likely to report illness because of their greater degree of self-awareness, and thus the effect of education on SPH can be underestimated. Our findings regarding the importance of education are consistent with previous research suggesting that education is a very reliable and stable predictor of health and mortality (Kunst, Geurts, and van den Berg 1995; Bobak et al. 1998; Shkolnikov et al. 1998; Bobak et al. 2000; Perlman and Bobak 2008).

As expected, individuals who were not working at the time of the interview had a much higher risk of reporting poor health than those who were. Working-age pensioners were more likely to report being in poor health than working individuals. The huge odds ratios can be explained by the fact that this group includes people receiving pensions due to disability, and thus have severe impairments that have been confirmed medically. Moreover, we can assume that some working-age pensioners previously held jobs with high occupational hazards. Such individuals retire earlier than others, and they are more likely to experience various health problems. The strong direct association between unemployment and SPH was also anticipated. Regardless of the type of model, unemployed men and women were more likely to report being in poor health. Although the relationship between unemployment and health is intuitive, and is also well supported scientifically, the causal links of this association are not straightforward (Jin, Shah, and Svoboda 1997). There are many confounding factors mediating the relationship which are difficult to control for. The obvious reverse causation (when health causes unemployment), which also needs to be accounted for, complicates the matter. Reporting bias can influence the association as well. Adverse life conditions, such as unemployment, can cause depression and apathy. These conditions can lead to a more pessimistic perception of reality, including of the state of health.

The relationship between individual current income and SPH is also far from straightforward. When considered alone, income is clearly associated with SPH. Except among women of working age, there is an even income gradient: the chances of reporting being in poor health decrease with an increase in income. After education is controlled for the association is drastically attenuated for men, but not for women. When the whole set of variables is allowed for, the association is significant for women (though not for all income quintiles), but no income gradient can be seen. Regardless of the set of variables that is controlled for, the poorest people (individuals who belong to the first income quintile) are shown to be more likely to report being in poor health. There are several reasons for the absence of an association between income and SPH. First, there is an expected interaction between income and education. Second, as has been suggested by previous studies in the FSU, reported income does not adequately reflect actual people's well-being because of the importance of the informal economy

(Gilmore, McKee, and Rose 2002). Third, it is reasonable to assume that in surveys such as the IEHS, people situated at the bottom (very poor) and the top (very rich) of the income distribution are under-represented. Finally, even if it is measured correctly, in a command economy (and this is the case in Belarus), income is not as crucial in obtaining benefits as it is in Western societies (Bobak et al. 2000).

Like the association between income and SPH, the association between the measure of long-term well-being (the index of living standards) and health lacks consistency. It seems, however, that the ILS is important for people above working age. In the fully adjusted model for both males and females, there is a statistically significant inverse association between the ILS and SPH.

One of the surprising results of our study is that individuals who live in rural areas reported being in better health than people who live in the capital, even though vital statistics indicate that mortality is much higher among the rural population. For example, in 2007 life expectancy in the rural settlements of Belarus was 60.3 years for males and 73.9 years for females, while the corresponding figures in Minsk were 67.4 and 77.8 years, respectively (Belstat 2009). The better SPH among the rural population might to some extent be explained by the reporting bias. The difference in the perception of health per se between the two population groups might be influenced by a number of factors, including social circumstances (Bobak et al. 2000). However, reporting bias does not appear to be an explicit explanation. Seemingly, mortality from external causes of death (which is much higher in the rural areas of Belarus than in the capital) is involved, and further research is needed to explore its impact on the urban-rural gap in self-reported health. So far, the fact that people who live in rural areas have better SPH, even though mortality in these areas is higher, suggests that the share of individuals who die while in good health is higher in rural areas than in the capital. These deaths can and should be prevented, and priority should be given to measures that tackle mortality from external causes.

The unexpected direction of the association between smoking and health is also worth discussing. Similar results have been reported in studies of SPH in Russia (Bobak et al. 1998) and Ukraine (Gilmore, McKee, and Rose 2002). Gilmore, McKee, and Rose (2002) have suggested that the impact on health is a long-term process. Clearly, the design of the cross-sectional survey does not allow us to assess the impact of long-term factors. The other explanation, a selection bias, was proposed by Bobak et al. (1998) for the case of Russia: those who are healthy smoke, while those who are in poor health do not. In other words, some of the respondents might have quit smoking, or did not start smoking in the first place, for health reasons. Higher mortality among smokers might also contribute to the selection bias.

This study represents a first step towards understanding self-perceived health in Belarus. Further research should place more emphasis on explanations of the observed trends and patterns. In this respect comparative cross-national studies based on the analogues to the IEHS data can be very useful. The analysis of regional SPH trends within Belarus could be another promising research direction, especially if it is supplemented by the assessment of morbidity trends and the cross-regional variation in economic conditions. Such analyses will help to unravel the factors responsible for the upward trends in SPH in Belarus over the last decade.

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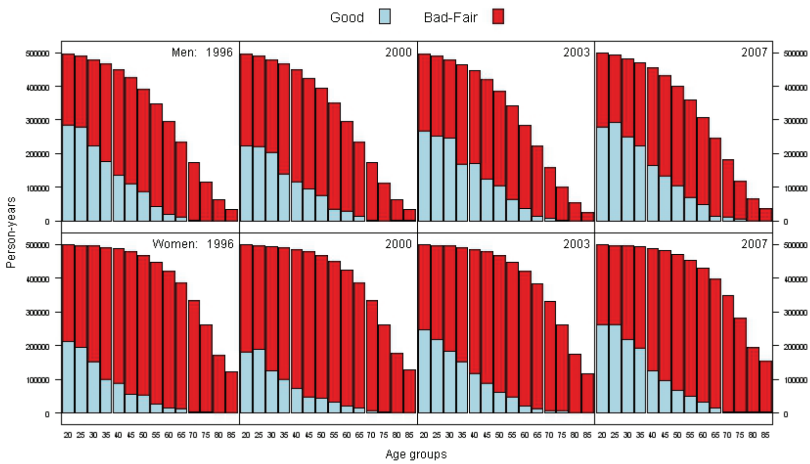
Appendix

Figure A-1: Person-years lived in "good" and "fair/bad" state of health in Belarus; 1996, 2000, 2003 and 2007



Source: Estimated from the IEHS.

Table A-1: New cases of disability in persons aged 18 and over by group and cause of disability

	Number of cases				per 1 000 000 population[1]			
	1995[2]	2000	2005	2007	1995	2000	2005	2007
Total	64953	55495	52048	43689	6368	5547	5324	4503
Disabled by group								
group I	8694	8194	9415	8569	852	819	963	883
group II	36644	30631	26526	22364	3593	3062	2714	2305
group III	19615	16670	16107	12756	1923	1666	1648	1315
Disabled by cause								
general disease	60169	53041	50054	42437	5899	5301	5120	4374
occupational injury or disease	751	536	475	367	74	54	49	38
childhood disability	2221	760	485	351	218	76	50	36
disabled of military service	910	512	435	248	89	51	44	26
disabled of the WWII and equivalent categories	556	124	75	20	55	12	8	2
disabled as a result of Chernobyl accident	346	522	524	266	34	52	54	27
Disability for indefinite term	44508	32611	29856	24120	4363	3259	3054	2486

Source: Belstat (2008)
Notes: [1] Our own calculations
[2] Aged 16 and over