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Determinants of Health in Belarus: Evidence from the "Income and Expenditures of Households" Survey

Extended Abstract

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ABSTRACT

Unprecedented mortality growth emerged in the early 1990's in the countries of the former USSR has been extensively documented. It has been widely recognized that the consequences of the socio-economic crisis had a negative impact on health. Nowadays, there is a vast amount of literature about the health crisis in Russia whereas other countries of the former USSR such as Belarus have received little if any attention. Meanwhile, the notable divergence in recent mortality trends among the former Soviet republics suggests that the health crisis in these countries may not necessary mirror that in Russia. Therefore, investigating health and its determinants in Belarus appears to be a valuable contribution towards understanding of the nature of the health crisis in the whole region. On the basis of data from the "Income and Expenditures of Households" Survey conducted in Belarus annually our study aims at exploring the recent trends in health and estimating the impact of a number of demographic, socio-economic and lifestyle variables on health at individual level. Given the well-established relationship between self-rated health and mortality, our findings facilitate further research on mortality determinants in Belarus.

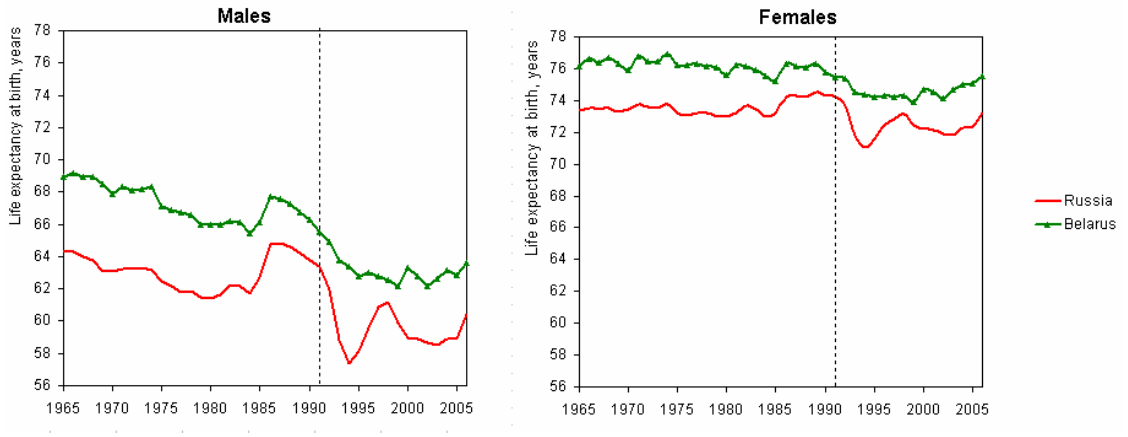
Key words: Belarus, self-perceived health, health determinants

INTRODUCTION

Unprecedented mortality growth emerged in the early 1990's in the countries of the former USSR has been extensively documented (Shkolnikov et al., 2004). It has been widely recognized that the consequences of the socio-economic crisis

had a negative impact on health (Bobak et al., 1998 and 2000; Cocerham et al, 2006; Cornia and Paniccia, 2000; Mckee, 2001). Yet, most of evidence about the nature of the health crisis in the region comes from the studies based on aggregate mortality data while health determinants at the individual level are little explored. Furthermore, there is a vast amount of literature about the health crisis in Russia while other countries of the former USSR such as Belarus have received little if any attention. Meanwhile, Belarus represents an interesting case to study. Unlike Russia this former Soviet republic avoided very dramatic decline in life expectancy in the early 1990's (Figure 1).

Figure (1)
Life expectancy at birth in Belarus and Russia during 1965-2006



Source: Human Mortality Database (HMD, www.mortality.org)

In 1990, life expectancy at birth in Belarus exceeded that in Russia by just about two years for both sexes while by 1994, the gap in the life expectancy values between two countries widened to six and more than three years for men and women, respectively. This notable divergence suggests that the nature and driving forces of the health crisis in Belarus may not necessary mirror that in Russia. It is very likely that Belarus deviates from Russia in terms of the mechanisms through which socio-economic changes influence individual's health. Unfortunately, available mortality and the socio-economic indicators are scarce and rather insufficient in exploring the mentioned above mechanisms. Thus, investigating health and its determinants in Belarus at the individual level appears to be valuable and important contribution towards understanding of the nature of the health crisis in the whole region of the former USSR.

DATA AND METHODS

Any kind of individual level data are extremely scarce in Belarus. To our knowledge the 'Income and Expenditures of Household Survey' (IEHS) is only source providing information by individuals. This cross-sectional survey has been conducted in Belarus annually since 1995 by the National office of Statistics. The survey covers all types of households with the exclusion of collective households (persons living in institutions such as nursing homes, prisons, convents, etc.). It is restricted to one calendar year and basically designed as a sequence of four quarterly interviews that cover an entire year for the same sample of households (for more details see Martini et.al, 1996). In addition to household data the IEHS is designed to collect data on individuals. The survey questionnaire contains a number of health (influence of health on ability to work, health self-evaluation, ability to get dressed without assistance, medical visits, expenditures on medical service, etc.), demographic (age, sex, place of residence), socio-economic (working status, education, income, etc.), and lifestyle (smoking, sport practicing, etc.) variables which refer to individuals living in a household.

IEHS micro-files for 1996, 2000, 2003, 2005, and 2007 were at our disposal. We restricted our analysis to the individuals older than 20; males and females were analyzed separately. The following table shows the number of individuals participated in the IEHS in these years:

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
older than 20	10443	10267	10844	10768	11853
men	4672	4517	4723	4711	5199
women	5771	5750	6121	6057	6654

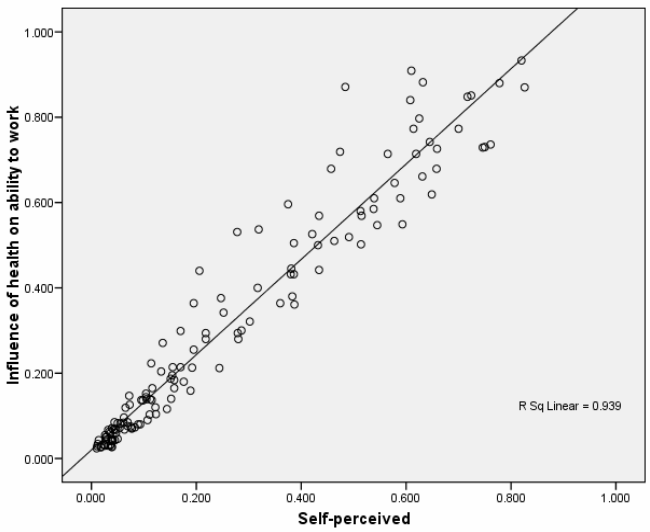
Source: from IEHS 1996, 2000, 2003, 2005 and 2007

IEHS is a representative national sample, and to our knowledge it is only one source, which can be used to estimate the prevalence rates according to the health status. The sample size is large enough to allow generalizations, especially when comparing it with one in the studies on self-perceived health conducted for Russia (Andreev et al, 2003) and Ukraine (Gilmore et al, 2002). For example, in 2000, the IEHS sample size (individuals older than 20) constituted over 10 thousand respondents versus 1600 individuals in Ukraine while (the total population size of Ukraine is about five times higher than in Belarus). Furthermore, our study is not restricted to one period. It covers five time points what makes inferences more robust. The other important factor accounting

to validity and reliability of IEHS data is the well-established system of data collection and proceeding. The IEHS has been conducted continuously since 1995 by the well trained staff.

It is very well known fact that the health status is highly subjective measure Nonetheless, it is considered as a good predictor of mortality (Greiner et al., 1996). In our study in order to estimate the prevalence of 'bad' health we preferred to split health status into two broad categories: 'good' and 'bad'. Initially, we assessed morbidity using responses to the two alternative questions which remained unchanged throughout the analyzed period. The first survey question (Q1) was stated as follows: "How do you evaluate your state of health?" Response: 'good', 'fair', 'bad', 'don't know (refuse to answer)'. The 'good' and 'fair' categories were recoded into 'good' category and 'bad' into 'bad' category, respectively. The second question (Q2) was stated as follows: "Does health influence your ability to work?" Response: 'Influences completely', 'Yes, influences', 'No, does not influence', 'don't know (refuse to answer)'. In this case responses 'Influences completely' and 'Yes, influences' were recoded into 'bad' category and responses 'No, does not influence' into 'good' category, respectively. We estimated prevalence rates using these alternative questions and compared the results afterwards (Figure 2).

Figure (2)
Age-specific prevalence rates of 'bad' health based on Q1 versus those based on Q2



Source: estimated from IEHS 1996, 2000, 2003, 2005 and 2007

It turned out that despite some variations at older ages, in overall, values of age specific prevalence rates of 'bad' health estimated from Q1 traced very close to

those estimated from Q2. Therefore, we assumed that the choice of the measure of health should not influence the results dramatically (at least, this is true for the population at working age). After some considerations, we decided to rely on the responses to the question on self-perceived health (Q1).

In order to obtain relevant life table functions and estimate health life expectancy (HALE) we relied on the widely employed in research Sullivan's method (Sullivan, 1971). Data on age-specific mortality rates were taken from the Human Mortality Database. To decompose the difference in HALE between two groups (periods) into 'mortality' and 'health' components we used the algorithm of the step-wise replacement (Andreev et al., 2003).To assess the impact of a number of socio-economic, demographic and lifestyle variables on health at the individual level we applied a binary logistic regression model. The state of health was considered as the dependant variable. Along with the independent variables included in the survey questionnaire we constructed additional covariates such as body mass index (based on height and weight of an individual), income quintile an individual belongs to, and the index of living standards (ILS). The ILS is traditionally constructed from the information on household ownership of durable goods and its housing characteristics by means of the principal components analysis. The result of principal components is an asset index (*Aj)*, calculated for each household by formula (1):

$$A_j = f_1 \times \frac{a_{j1} - a_1}{s_1} + \ldots + f_m \times \frac{a_{jm} - a_m}{s_m} \qquad (1)$$

where f_1 is the scoring factor for the first asset;
a_{j1} is the j^{th} household's value for the first asset;
a_1 and s_1 are the mean and standard deviation of the first asset variable over all households;
m is total number of assets included in the procedure.

The assumption for applying this method is that household's long-run wealth determines the most common variation in asset variables.

The advantages, limitations and applications of the ILS have been widely discussed in the literature (Filmer, Pritchett, 1998, 2001; Falkingham and Namazine, 2002; Vyas and Kumaranayake, 2006; Mishra, 2007). An important aspect of the construction of the ILS is a choice of variables to use; there is no universal solution of set to be applied. In the present work the housing conditions of the household (presence of central heating, bath or shower, hot-water and telephone), the ownership of durable goods (TV, refrigerator, washing machine

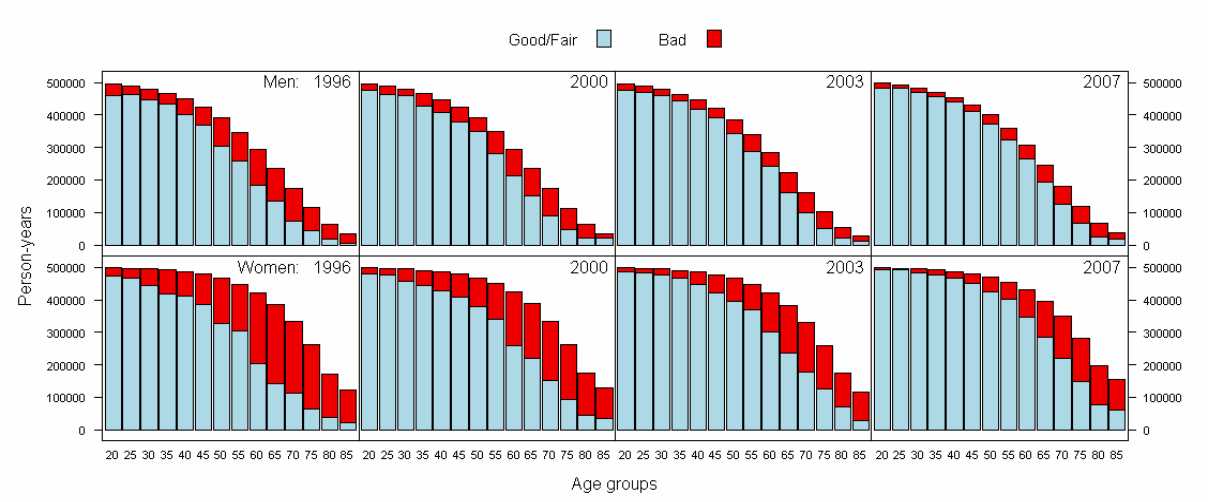
and car), the ownership of land-plots, the per capita living space and the percentage of food expenditures in total custom expenditures are used for the computation of the index.

SELECTED RESULTS

Health: General Trends

Over the last decade the share of person-years spent in good health was increasing while the total number of lived person-years remained relatively constant (Figure 3):

Figure (3)
Person-years lived in 'good/fair' and 'bad' state of health in Belarus; 1996, 2000, 2003 and 2007



Source: Estimated from IEHS

This suggests the '***compression of morbidity***' in Belarus, e.g. pushing ('compressing') morbidity to the shortest duration possible relatively to the whole life span.

IEHS data indicate that in 1996, Belorussians had substantially poorer health than in 2000 and subsequent years (Table 2):

Table (2)

Changes in life expectancy, healthy life expectancy, and healthy to life expectancy ratio at ages 20, 40, and 60 in Belarus during 1996-2007

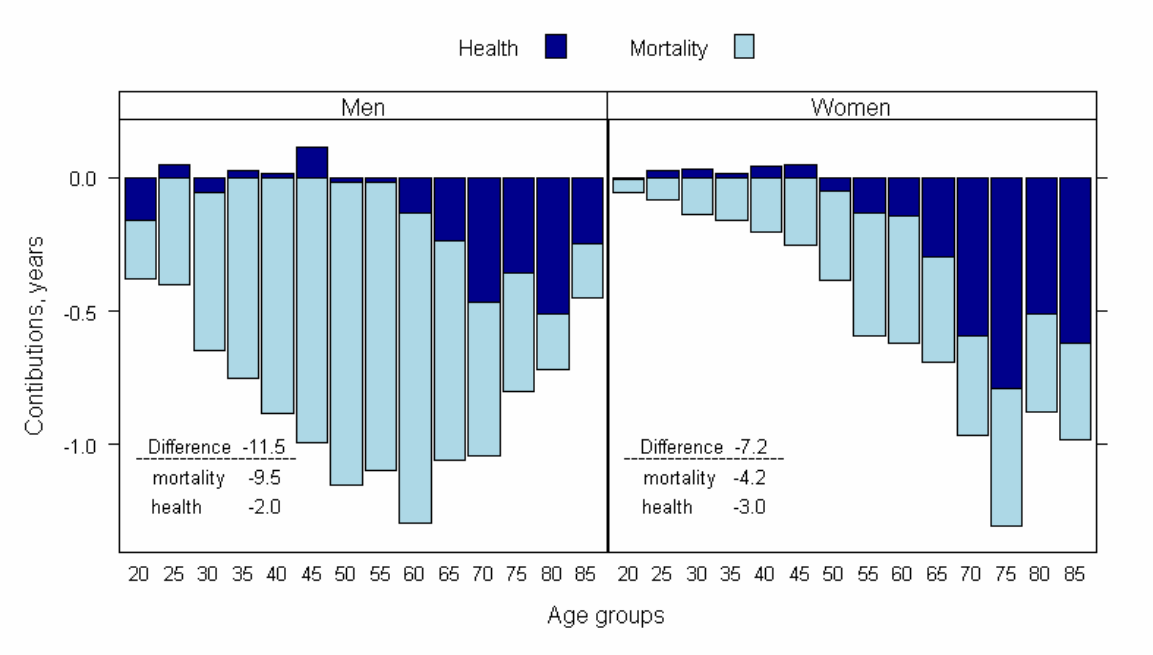
	Men					Women				
	1996	2000	2003	2005	2007	1996	2000	2003	2005	2007
	Age 20									
LE	44.63	44.61	43.77	43.88	45.46	55.59	55.76	55.46	55.78	56.85
HALE	35.95	37.89	38.81	39.52	41.31	38.12	42.18	44.87	47.35	48.27
HALE/LE	0.81	0.85	0.89	0.90	0.91	0.69	0.76	0.81	0.85	0.85
S.E.	0.24	0.22	0.19	0.18	0.17	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
HALE	19.51	21.41	22.1	22.78	24.17	20.54	24.10	26.31	28.63	29.4
HALE/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
HALE	7.08	8.33	9.16	9.43	10.29	6.68	9.17	10.80	12.54	12.82
HALE/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: 1) Human Mortality Database; 2) Estimated from IEHS;
Note: LE – life expectancy, HALE – healthy life expectancy, HALE/LE – healthy to life expectancy ratio; S.E. – standard error of the HALE estimate (p=0.05)

In more recent years, individuals tend to report better health. As a result, since 2000, HALE has been growing steadily at all ages and both sexes. Meanwhile, life expectancy has been stagnating. The increase of the share of years lived in good health was especially pronounced among women aged 60. In 1996, this category was expected to live on average only about one third of remaining life in good health while by 2007 the proportion increased to two thirds. Traditionally, women report poorer health compared to men. Healthy to life expectancy ratio is higher among men at all ages whereas life expectancy and healthy life expectancy are lower compared to women. Thus, men in Belarus appear to live shorter but healthier life.

Despite considerable improvement in health, Belarus still remains far behind Western Europe. In 2005, healthy life expectancy was by 11.5 and 7.2 years lower than in EU-15 for men and women, respectively (Figure 4).

Figure (4)
Decomposition of the difference in HALE between Belarus and EU-15 into 'mortality' and 'health' components; 2005



Source: Estimated from IEHS and EHEMU[1] data

This difference was determined by higher mortality of the population at working age and the poorer health status and mortality of the population above working age. In case of men, the gap in HALE between Belarus and EU-15 was determined by 'mortality' component, mostly due working ages. By contrast, the contribution of the 'health' component to the gap in HALE was much more pronounced for women, particularly those above working age.

Determinants of Health

The analysis of health determinants is based on the pooled data set from four cross-sectional surveys (2000, 2003, 2005, 2007) containing more than 40 000 individual records. The binary logistic model was run separately by sex and individuals at working age and those above working age. The results are presented in tables 3 and 4.

[1] EHEMU – European Health Expectancy Monitoring Unit (http://www.ehemu.eu)

Table (3)
Odds ratios for 'bad' self-perceived health; Belarus
(individuals at working age)

Covariates	Men		Women	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Age	1.05***	(1.04-1.06)	1.07***	(1.06-1.08)
Residence				
Minsk-city	1		1	
Large city	0.84	(0.67-1.05)	0.84*	(0.68-1.03)
Small city	0.72***	(0.56-0.91)	0.76**	(0.61-0.94)
Rural	0.47***	(0.36-0.61)	0.59***	(0.46-0.76)
Education				
Higher education	1		1	
Secondary specialized education	1.27*	(0.97-1.65)	1.55***	(1.25-1.93)
General secondary education/Vocational school	1.38***	(1.09-1.74)	1.63***	(1.32-2.03)
Incomplete secondary education	2.67***	(1.92-3.69)	3.96***	(2.77-5.65)
Primary and incomplete primary education	14.00***	(7.81-25.11)	22.83***	(11.71-44.53)
Index of standards of living	0.88***	(0.79-0.97)	0.95	(0.86-1.05)
Income				
First quintile(lowest income)	1		1	
Second quintile	0.90	(0.72-1.12)	0.82*	(0.66-1.02)
Third quintile	0.90	(0.72-1.13)	0.97	(0.78-1.19)
Fourth quintile	0.82*	(0.65-1.02)	1.01	(0.82-1.24)
Fifth quintile (highest income)	0.72***	(0.56-0.91)	0.70***	(0.56-0.88)
Smoking				
Yes	1		1	
No	1.37***	(1.17-1.60)	1.12	(0.87-1.44)
Sport practicing				
Yes	1		1	
No	1.83***	(1.43-2.34)	1.11	(0.89-1.39)
Body Mass Index (BMI)				
Normal weight	1			
Underweight	4.96***	(2.99-8.24)	2.41***	(1.68-3.44)
Overweight	0.60***	(0.51-0.71)	0.88	(0.74-1.04)
Obese	0.97	(0.77-1.23)	1.26**	(1.05-1.51)
Constant	0.00***		0.00***	
Overall percentage of correctly classified cases	94.0		93.5	

Note: P<0.01 ***; 0.01<P<0.05 ** ; 0.05<P<0.10 *;

Population at working age

As expected, age has a direct and significant impact on the risk of reporting poor health. Every year increase in age is associated with 5% and 7% increment of the probability of reporting poor health among men and women, respectively.

Regarding the place of residence, the results are very similar for both sexes. The lowest probability of reporting poor health is among individuals living in rural areas.

Education is a very important factor determining self-perceived health. The probability of reporting poor health decreases considerably as the level of education goes up. For instance, if men with incomplete secondary education are 2.7 times more likely to report their health as poor compared to the highly educated men, being with primary or incomplete primary men increases the odds of reporting poor health by a factor of 14. The educational gradient in health is even more pronounced among women. Those with primary and incomplete primary education have 22.83 times greater chance of reporting poor health then highly educated women.

There is a consistent association between the index of living standards and self-perceived health. For each additional unit of the index the probability to report poor health for men is expected to decrease by 12%. This association is statistically insignificant for women.

There is also a negative association between currently received income and SPH. However, only being in the fifth quintile (the highest income level) really matters. The probability of reporting poor health is by 28% lower for men in the 5^{th} quintile if compared to men in the 1^{st} quintile. Similarly, having more income is associated with the lower probability to report poor health among women.

The mixed finding emerged from the impact of smoking on SPH: non-smoking men reported worse health. This direction of association is difficult to interpret. Among the possible explanations is the one proposed by Bobak and colleagues (1998) for the case of Russia: a selection bias (those healthy enough smoke while those with poor health do not). The results for women illustrate the same direction of this association but not statistically significant.

For men there is a strong association between SPH and sport practicing; those who do not practice any sport are by 83% more likely to report poor health compared to men who do practice. This association is not statistically significant in case of women.

Regarding the impact of the BMI on SPH, the highest probability to report poor health is among men in the underweight BMI category (compared to those with normal weight). The BMI in the overweight and obese range is not associated with the higher probability of reporting worse health among men. For women, there is a U-shaped association between BMI and SPH, with the highest risk for those in underweight category followed by those who are in obese range.

Among the explanations of such relations might be selective survival, diminished importance of excess body fat, confounding influence of weight loss or smoking *(Janssen and Mark, 2006).*

Population above working age

Men and women living in a small or a large city have a greater probability to report poor health than people from the capital city (Minsk). The results, however, are not statistically significant.

There is also a clear educational gradient in health for both sexes but it is less pronounced if compared to the population at working age.

There is a significant impact of the index of living standards on SPH. As the ILS increases by one unit, the probability of reporting bad health decreases by about 10% for men and women.

With regard to smoking, like in case of the population at working age the findings still illustrate a contradicting picture: non-smoking men have higher probability to report poor health compared to the smokers.

Meanwhile, the impact of sport practicing is more pronounced. For those not practicing sport the probability of reporting poor health is by 92% and 37% higher for men and women, respectively.

The association between the BMI and SPH for people above the working age is different compared to those at working age. But, men and women of the underweight category are still very much more likely to report bad health.

Table (4)
Odds ratios for 'bad' self-perceived health; Belarus
(individuals above working age)

Covariates	Men		Women	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Age	1.08***	(1.07-1.10)	1.07***	(1.06-1.08)
Residence				
Minsk-city	1		1	
Large city	1.11	(0.85-1.45)	1.09	(0.91-1.30)
Small city	1.08	(0.81-1.43)	1.04	(0.86-1.25)
Rural	0.61***	(0.45-0.84)	0.67***	(0.55-0.83)
Education				
Higher education	1		1	
Secondary specialized education	1.04	(0.78-1.39)	1.50***	(1.23-1.84)
General secondary education/Vocational school	1.32**	(1.00-1.72)	1.64***	(1.34-2.02)
Incomplete secondary education	1.72**	(1.31-2.25)	2.04***	(1.66-2.52)
Primary and incomplete primary education	1.90***	(1.43-2.51)	2.08***	(1.68-2.57)
Index of standards of living	0.90**	(0.80-1.00)	0.89***	(0.83-0.95)
Income				
First quintile(lowest income)	1		1	
Second quintile	0.98	(0.71-1.31)	0.86*	(0.73-1.01)
Third quintile	1.05	(0.78-1.40)	0.94	(0.80-1.10)
Fourth quintile	0.93	(0.69-1.25)	0.81**	(0.69-0.96)
Fifth quintile (highest income)	0.98	(0.71-1.34)	0.74***	(0.61-0.89)
Smoking				
Yes	1		1	
No	1.15***	(0.97-1.36)	1.38	(0.82-2.33)
Sport practicing				
Yes	1		1	
No	1.92***	(1.39-2.66)	1.37***	(1.11-1.70)
Body Mass Index (BMI)				
Normal weight	1		1	
Underweight	3.28***	(1.36-7.91)	1.45	(0.74-2.87)
Overweight	0.82**	(0.69-0.96)	0.88**	(0.78-0.99)
Obese	0.79*	(0.62-1.03)	1.19***	(1.04-1.36)
Constant	0.00***			
Overall percentage of correctly classified cases	69.6		64.6	

Note: P<0.01 ***; 0.01<P<0.05 ** ; 0.05<P<0.10 *;

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