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Social inequalities in self-rated health in Ukraine: The role of psychosocial, material and behavioural factors

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Abstract

Background: Despite Ukraine's large population, few studies have examined social inequalities in health. This study describes Ukrainian education inequalities in self-rated health and assesses how far psychosocial, material and behavioural factors account for the education gradient in health.

Methods: Data were analysed from the 2007 wave of the Ukrainian Longitudinal Monitoring Survey. Education was categorized as: lower secondary or less, upper secondary and tertiary. In logistic regressions of 5451 complete cases, stratified by gender, declaring less than average health was regressed on education, before and after adjusting for psychosocial, material and behavioural factors.

Results: In analyses adjusted for socio-demographic characteristics, compared to those educated up to lower secondary level, tertiary education was associated with lower risk of less than average health for both men and women. Including material factors (income quintiles, housing assets, labour market status) reduced the association between education and health by 55–64% in men and 35–47% in women. Inclusion of health behaviours (physical activity, smoking, alcohol consumption and body mass index) reduced the associations by 27–30% in men and 19–27% in women; in most cases including psychosocial factors (marital status, living alone, trust in family and friends) did not reduce the size of the associations. Including all potential explanatory factors reduced the associations by 68–84% in men and 43–60% in women.

Conclusions: The education gradient in self-rated health in Ukraine was partly accounted for by material and behavioural factors. In addition to health behaviours, policy-makers should consider upstream determinants of health inequalities, such as joblessness and poverty.

Key words

Subjective health; health behaviours; socioeconomic factors; employment; income; education; health inequalities.

Social inequalities in self-rated health in Ukraine: The role of psychosocial, material and behavioural factors

1. Background

Despite momentous social and economic change and a widespread deterioration in health status in Eastern Europe [1], research using Eastern European data has occupied a marginal place in the field of social epidemiology [2]. While health behaviours, such as tobacco and alcohol use, have been implicated in the health crisis [3], declines in living standards, deterioration of public infrastructure, as well as disruptions to networks and social relationships are also likely to be important.

In Ukraine, the scant evidence available regarding socio-economic trends suggests continuing high levels of inequality reflecting the winners and losers of economic transformation. Socio-economic stratification has increased since the 1990s: Less educated Ukrainians are more likely to be out of the labour force, and higher poverty levels have been recorded in families with more children, less education or an unemployed member [4,5].

Evidence concerning health inequalities is rarer still. The only published research examining inequalities in subjective health in Ukraine uses data from the year 2000 [6]. The authors described disparities by gender, region and socioeconomic characteristics, including inequalities by education. We have found no studies examining which factors might explain social inequalities in subjective health in Ukraine while, in other countries, psychosocial, material and behavioural mechanisms have been assessed [7]. Research in post-Soviet countries has explored the role of health behaviours, particularly alcohol consumption and smoking, in relation to mortality rates [8,9], but little is known about the role of health behaviours in terms of *morbidity*.

Limited existing evidence suggests that poorer and unemployed individuals living in former Soviet countries have higher rates of alcohol abuse [10]. Evidence for smoking is mixed, showing higher smoking rates in Ukraine among men, younger people, urban dwellers, more educated (inconsistently), recently unemployed, higher income groups and those in a poor material situation [3,11–13]. The relationship between health behaviours and social position is complex, depending on context and period [14]. In this paper, we seek to examine how far health inequalities related to education are accounted for by psychosocial, material and behavioural factors. We draw on nationally representative individual-level data from the Ukrainian Longitudinal Monitoring Survey (ULMS) which covers the period immediately before the global financial crisis and the subsequent turmoil associated with the deterioration of relations with Russia.

2. Methods

2.1. Data

The Ukrainian Longitudinal Monitoring Survey is a survey conducted since 2003 by the Kiev International Institute of Sociology and the Institute for the Study of Labor, Bonn. We use the most recent (2007) publicly available wave. ULMS is based on a national multistage random household sample drawn from the 2001 Ukrainian Census and stratified by age, gender, city/town and region [15]. An interviewer visited each selected household in order to interview all household members. One household member additionally completed a household survey.

Although the ULMS samples individuals of 15–73 years, only information from respondents aged 25–73 was used in this study to exclude respondents still completing their education. After listwise deletion of 15.6% of respondents with missing data, 5451 respondents were included in the complete case sample.

2.2. Variables

The outcome variable is self-rated health. It has been shown to be a valid single-item measure of general physical and mental health [16], combining information about general health functioning, vitality, pain, and specific health problems, and being relevant at young ages when mortality rates are low [17]. ULMS respondents rated their health on a 5-point scale, which we dichotomized into: very good, good or average health (0) and poor or very poor health (1).

The key independent variable is education. It influences health behaviours and helps individuals accumulate resources; consequently, education is an important determinant of income, labour market status and material deprivation, and has often been used in earlier

studies of health inequalities in post-communist countries. Participants responded to questions about the highest grade level at school they completed, whether they had a high school diploma and whether they had obtained other diplomas. The highest level of completed education was classified into 3 categories according to the 1997 International Standard Classification of Education (ISCED) as mapped onto the Ukrainian education system: 1. Pre-primary, primary and lower secondary (ISCED 0–2), 2. Upper secondary (ISCED 3–4), and 3. Tertiary education (ISCED 5–6) [18].

Information on respondents' gender, age, nationality/ethnicity, settlement type and region of residence (oblast or autonomous republic) was recorded. A quadratic transformation of age was generated to account for any non-linear relationship between age and health. Nationality categories other than Ukrainian and Russian were collapsed into an "other" category.

Psychosocial explanations for social inequalities focus on psychologically mediated social determinants of health, examining adverse psychological stressors as well as factors that buffer their impact, such as social support [19]. Our proxies for social support are: living arrangements (marital status, whether respondent living alone) and level of trust. Self-reported marital status was collapsed into the following categories: single, married/cohabiting, widowed, divorced/separated. A single variable of trust in friends and family was created by averaging responses from 2 questions about degree of participants' trust in family members and friends on polar-labelled scales from 0–10.

Material explanations seek to explain health inequalities in terms of income and access to goods and services. Information on participants' socio-economic characteristics was obtained from household (equivalized household income, housing assets) and individual questionnaires (labour market status). To obtain a measure of equivalized household income from monetary and non-monetary sources, participants indicated whether, in the last 30 days, any member of the household had received any of a long list of sources of income, whether in

the form of money or goods and services. The total value of these income sources was calculated and adjusted for household size by dividing total income by the square root of household size. The resulting variable was converted into quintiles, in which the first quintile contained the 20% of respondents declaring the least equivalent household income.

It is frequently discussed whether widespread asset impoverishment is related to worsening health in post-communist societies [20]. Measures of housing assets reflect individuals' living standards and material resources, which may affect health directly [21]. A single summed scale of housing assets was constructed from 4 questions asking about the presence of household amenities: sewerage or indoor toilet; hot water supply or gas water heater; central heating or individual system of heating; bath, shower or sauna. A score of 4 indicates the presence of all assets. Since interviews took place in participants' homes, this information was likely reliably reported.

Labour market status is perhaps the most fundamental indicator of social participation and economic well-being. Rising unemployment as a result of rapid structural reforms has been implicated in health decline in former Soviet Union countries [22]. We constructed 6 categories of labour market status from responses to several questions concerning current activity: 1. In paid work, 2. Unemployed, 3. Discouraged job-seeker, 4. Looking after home and family, 5. Sick or disabled, 6. Pensionable age. Participants who did not have any paid work or income-generating activity, and who were engaged in a job search or waiting for an earlier agreed job to start were classified as unemployed. Participants without paid work or an income-generating activity were classified as discouraged job seekers if they indicated that they were not searching for work because of a lack of work in the local area, a belief that they could not find work or they were simply tired of unsuccessfully searching for work.

Behavioural explanations of social inequalities in health give primacy to explanations relating to health-related behaviours. This study uses several health behaviour measures: tobacco

smoking, alcohol consumption, exercise and body mass index (BMI), reflecting the main risk factors for cardiovascular disease and malignant neoplasms. Respondents indicated whether they currently or previously smoked tobacco. Some "non-smokers" were reclassified into former smokers because they had indicated previous or current smoking in previous ULMS surveys. Participants reported their alcohol consumption over the last 30 days in the following categories: high (daily, 4–6 times a week), medium (2–3 times a week, once a week), low (2–3 times in the last 30 days, once in the last 30 days) or none. Participants described their level of physical exercise outside of work as: light physical exercise for relaxation less than three times a week, medium and intensive physical exercise less than three times a week, intensive physical exercise at least three times a week for 15 minutes or more, daily exercise not less than 30 minutes a day or no engagement in physical activities. As a proxy for nutritional status and physical inactivity, BMI was calculated from self-reported height and weight, and converted into 4 categories according to World Health Organization guidelines: underweight (<18.5 kg/m^2), normal (18.5 – <25.0 kg/m^2), overweight (25.0 – <30.0 kg/m^2) and obese (≥30 kg/m^2) [23].

2.3. Empirical approach

The data were analysed using Stata 14.1 SE; all analyses included sample weights. We first describe the relationship between self-rated health and education level, by presenting the statistical associations by gender. In addition, associations between each of the psychosocial, material and health factors and both education level and self-rated health are presented. Certain variables were treated as ordered (degree of trust in family and friends, income quintiles and household assets) and the chi-squared test for linear trend was performed. In order to model non-linear relationships of the remaining psychosocial, material and behavioural factors with education level and self-rated health, the remaining variables were

treated as nominal (or dichotomous) and chi-squared tests (or t-tests) were performed as appropriate.

Next, logistic regressions of education upon less-than-average health were performed, stratified by gender. We describe these analyses as the "base model". They are adjusted for the control variables (age, age-squared, ethnicity/nationality, settlement type and oblast). Robust clustered standard errors were estimated to account for clustering of participants into households.

To examine to what degree psychosocial, material and behavioural factors attenuated the base model associations, odds ratios from models including these factors were compared with the base model containing only control variables. The percentage reduction in education differences in self-rated health was calculated as in previous studies [24,25]:

$$\frac{OR_{base\ model} - OR_{base\ model+psychosocial\ or\ material\ or\ behavioural\ factor}}{OR_{basemodel} - 1} \times 100$$

Next, models were run in which only one variable from each of the potential explanatory factors was included at a time, in order to establish whether certain aspects, for example, of participants' material situations, were more important than others. Finally, models were run after inclusion of all psychosocial, material and behavioural factors to calculate the maximum percentage reduction in education differences in self-rated health. Because logistic regression estimates also reflect the degree of unobserved heterogeneity in the model,[26] a sensitivity analysis using ordinary least squares regression was performed.

3. Results

3.1. Descriptive and bivariate statistics

Poor or very poor health was reported by 15.0% of men and 21.8% of women. Descriptive results and bivariate associations between each of the explanatory factors (psychosocial, material and behavioural) and education level and self-rated health are presented in Tables 1 (men) and 2 (women). In both genders, most people held qualifications beyond lower secondary school, with 33% of men and 44% of women having tertiary level education (ISCED 5–6). A graded association between education and self-rated health was present in both genders, which was steeper for women.

There were differences by education level in both genders in relation to marital status and, in women only, in the likelihood of living alone. Trust in family and friends was not associated with education level in either gender. In both genders, the proportion of individuals in poor or very poor health varied by marital status and whether the participant lived alone, but not by the level of trust in family and friends.

Equivalized household incomes were low: 16% of men and 19% of women were living in a household where monetary and non-monetary income per unit was under 620 hryven' per month (a sum which corresponds to about 90 euro for a single person household at the mid-2007 exchange rate). Almost half the sample had no more than two household amenities, which indicates high levels of material deprivation. In both genders, participants who were less educated and in poorer health were more likely to have lower incomes and fewer household assets. Labour market status was associated with education level and self-rated health in both genders.

Almost three-quarters of participants reported performing no physical exercise, and 45% of men and 54% of women were overweight or obese. Education level was associated with

physical exercise, smoking and alcohol consumption in both genders, and with BMI for men only. All health behaviours were associated with self-rated health; associations were U-shaped in the case of alcohol use (both genders) and BMI (men).

3.2 Multivariate modelling

Tables 3 and 4 show the contributions of the psychosocial (social support), material and behavioural factors to education differences in reporting poor or very poor self-rated health. For both genders, inclusion of material and behavioural factors into the model reduced the size of the correlation between education and health, by 55–64% in men and 35–47% in women for material factors and by 27–30% in men and 19–27% in women for health behaviours. Generally, including social support measures did not reduce the size of the associations.

The addition of each material factor, particularly income quintiles and labour market status, reduced the size of education differences in health, while the reduction from behavioural factors was largely from physical exercise and, to a much lesser extent, alcohol consumption. Inclusion of all psychosocial, material and behavioural factors in the model reduced inequalities by 68–84% in men and to a lesser extent, 43–60%, in women. Results obtained from sensitivity analyses using linear regression were similar, with inclusion of all factors reducing inequalities by 58–79% in men and 33–64% in women (Supplementary Tables A and B).

4. Discussion

This article presents an analysis of the social determinants of health inequalities from a rarely studied and populous Eastern European country, using recently available nationally representative data. For the first time, it attempts to account for education differences in health in relation to 3 potential pathways: psychosocial, material and behavioural.

The high rates of poor and very poor self-rated health reported in this study are in line with the country's elevated mortality rates, and correspond to results from other Central and Eastern European countries [27]. Comparison with a previous study suggests that self-rated health improved over the period 2000–2007 [6: Table 3]. Such an improvement in subjective health would correspond to reports of improvements in mental health [28], as well as in Ukraine's economic situation and standard of living [29], over the period.

Consistent with previous results reported for Ukraine [6] and the wider central and Eastern European region [27,30–32], socio-economic gradients in health were found in relation to education. Material and behavioural factors contributed to explaining education differences in health; social support contributed little. These factors altogether explained 43–60% of education differences in health in women and 68–84% in men. That these inequalities could be attributed to both material and behavioural factors accords with previous literature from other countries [7,33,34].

Compared to material factors, we found a relatively minor role for health behaviours: perhaps because the relationship between socio-economic status and health behaviours is not yet established in Ukraine or less concurrent. In both genders, the mid-educated were most likely to be current smokers, reflecting Ukraine's stage in the smoking transition [35]. That health behaviours did play some role in explaining health inequalities would suggest that interventions aimed at reducing the availability and desirability of alcohol and tobacco may reduce health inequalities. However, should unhealthy behaviours such as smoking and lack

of physical exercise become concentrated in less advantaged groups, health behaviours may play a greater role in explaining future socio-economic and health disparities [36].

4.1 Limitations

The conclusions should be viewed with a degree of caution since the cross-sectional nature of the data do not allow us to explore the extent or impact of unobserved heterogeneity, measurement error or reverse causality[37]. For example, labour market status, participating in paid work compared to looking after the home and family or being unemployed may be a result as well as a cause of good health. Similarly, a range of health behaviours, such as dangerous drinking styles, dietary habits, or attendance at health check-ups, could not be included and yet are likely to be correlated with other 'choice' variables in the estimates. Likewise, our measure of the psychosocial environment was restricted to social support, while and other potential mechanisms including local disparities in living costs and infrastructure, stress, work environment, and inefficiencies and inequities in healthcare are outside this study's scope.

4.2 Implications of the results

We found education inequalities in health that could be partially attributed to material and behavioural pathways. Poor health is common in Ukraine and health inequalities are related to the unequal distribution of resources, within a context of widespread poverty and lack of access to basic amenities.

Over the two decades since the break-up of the Soviet Union, its successor states have experienced increasingly divergent transformations [38]. This study describes health inequalities in an understudied society which has known lengthy economic disruption and low growth. It provides a baseline for future developments. Since the ULMS survey was

carried out, Ukraine has experienced recession related to the global financial crisis of 2007-8 and an armed conflict in the Donbass region which began in 2014, events likely to impact health inequalities. If the country is able to recover and pursue a course of economic and social development, policymakers will need to take care that health protection strategies do not excessively benefit more advantaged groups and widen existing inequalities [39].

Declarations

Acknowledgements

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Conflicts of interests

None declared.

Key points

- Despite momentous social change and the health crisis in Eastern Europe, little is known about social inequalities in subjective health in Ukraine.
- This study uses nationally representative data to describe education inequalities in health in Ukraine and assesses the extent to which psychosocial, material and behavioural factors account for the gradient.
- Material factors, and, to a lesser extent, behavioural factors contributed to explaining education differences in health; social support contributed little.
- Poor health is common in Ukraine, and health inequalities are related to the unequal distribution of resources, within the wider context of widespread poverty and lack of access to basic amenities.

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Tables

Table 1: Male respondents' education level and self-rated health in relation to psychosocial, material and behavioural factors, Ukrainian Longitudinal Monitoring Survey, 2007, *n*=2363, weighted data

	All (column %)	Education level (ISCED) (row %)			Self-rated health (row %)	
		0–2	3–4	5–6	Poor/very poor	Good/ average
Education level						
ISCED 0–2	7.0	–	–	–	30.2	69.8
ISCED 3–4	59.7	–	–	–	14.0	86.0
ISCED 5–6	33.3	–	–	–	13.5	86.5
p-value (χ^2 test for linear trend)					*p*=0.002	
Psychosocial (social support) factors						
Marital status						
Single	21.3	9.3	63.4	27.3	5.4	94.7
Married/cohabiting	70.7	6.2	58.9	34.9	15.9	84.1
Widowed	2.7	13.5	56.6	29.9	49.7	50.4
Divorced/separated	5.3	4.0	57.4	38.6	23.2	76.8
p-value (χ^2 test)			*p*=0.016		*p*=<0.001	
Living alone						
No	96.5	7.0	60.1	32.9	14.3	85.8
Yes	3.5	6.9	48.9	44.3	34.2	65.8
p-value (t-test)			*p*=0.210		*p*=0.003	
Trust in family and friends						
Low	27.1	8.3	63.1	28.7	16.4	83.6
Medium	36.9	5.8	58.2	36.1	15.1	84.9
High	36.0	7.2	58.8	34.1	13.6	86.4
p-value (χ^2 test for linear trend)			*p*=0.084		*p*=0.165	
Material factors						
Equivalized household income						
0.00 – <620.00 hryven'	16.2	9.7	71.2	19.1	24.2	75.8

620.00 – <848.70 hryven'	17.5	10.9	64.7	24.4	22.4	77.6
848.70 – <1137.00 hryven'	20.5	8.0	61.6	30.5	13.3	86.7
1137.00 – <1597.00 hryven'	22.3	4.6	57.8	37.6	11.3	88.7
1597.00 – <9900.00 hryven'	23.7	3.5	48.3	48.2	8.0	92.0
p-value (χ^2 test for linear trend)			*p*=<0.001		*p*=<0.001	
Housing assets						
0	17.4	8.9	70.9	20.2	17.8	82.2
1	16.5	10.0	63.9	26.1	18.7	81.3
2	10.4	5.9	67.5	26.6	14.0	86.0
3	15.9	7.5	58.0	34.5	13.7	86.3
4	39.8	4.8	51.8	43.4	12.9	87.1
p-value (χ^2 test for linear trend)			*p*=<0.001		*p*=0.006	
Labour market status						
In paid work	64.6	4.3	59.0	36.8	5.7	94.3
Unemployed	6.7	5.4	72.2	22.3	9.4	90.6
Discouraged job seeker	2.9	5.0	71.3	23.7	25.2	74.8
Looking after home and family	0.3	13.6	86.5	0.0	21.2	78.8
Sick or disabled	5.6	11.6	58.9	29.5	69.9	30.1
Pensionable age	13.1	18.4	48.6	33.0	43.0	57.0
Other	6.8	8.4	70.6	21.0	3.9	96.1
p-value (χ^2 test)			*p*=<0.001		*p*=<0.001	
Behavioural factors						
Physical exercise						
None	69.8	7.6	61.8	30.7	19.1	80.9
Light	10.7	6.2	50.3	43.5	8.1	91.9
Medium	7.4	5.7	62.4	31.9	3.7	96.4
Intensive	4.8	7.8	53.7	38.5	0.9	99.1
Daily	7.4	3.0	55.2	41.8	5.9	94.1
p-value (χ^2 test)			*p*=0.004		*p*=<0.001	
Smoking status						
Non-smoker	19.9	5.0	52.8	42.2	12.3	87.7
Ex-smoker	22.9	8.9	54.1	37.0	24.2	75.8
Current smoker	57.3	6.9	64.4	28.8	12.2	87.8
p-value (χ^2 test)			*p*=<0.001		*p*=<0.001	

Alcohol consumption						
Did not consume	27.6	8.7	58.0	33.3	24.0	76.0
Low alcohol consumption	30.6	5.8	56.7	37.5	9.2	90.8
Medium alcohol consumption	35.4	5.8	63.2	31.0	12.4	87.6
High alcohol consumption	6.4	10.9	62.3	26.9	17.5	82.5
p-value (χ^2 test)			p=0.011		p=<0.001	
Body mass index categories						
Underweight (<18.5 kg/m^2)	1.6	11.2	71.1	17.7	25.5	74.5
Normal (18.5 – <25.0 kg/m^2)	53.1	7.3	62.6	30.1	12.2	87.8
Overweight (25.0 – <30.0 kg/m^2)	34.9	5.8	57.6	36.7	15.6	84.4
Obese (≥30.0 kg/m^2)	10.4	8.4	50.5	41.2	25.2	74.8
p-value (χ^2 test)			p=0.002		p=<0.001	

Table 2: Female respondents' education level and self-rated health in relation to psychosocial, material and behavioural factors, Ukrainian Longitudinal Monitoring Survey, 2007, *n*=3088, weighted data

	All (column %)	Education level (ISCED) (row %)			Self-rated health (row %)	
		0–2	3–4	5–6	Poor/very poor	Good/ average
Education level						
ISCED 0–2	7.3	–	–	–	53.1	46.9
ISCED 3–4	48.3	–	–	–	21.9	78.1
ISCED 5–6	44.4	–	–	–	16.4	83.6
p-value (χ^2 test for linear trend)					*p*=<0.001	
Psychosocial (social support) factors						
Marital status						
Single	12.9	3.9	60.5	35.6	8.2	91.8
Married/cohabiting	67.3	6.5	46.7	46.8	20.5	79.6
Widowed	11.1	18.5	46.3	35.2	44.5	55.5
Divorced/separated	8.8	3.8	45.6	50.6	23.0	77.0
p-value (χ^2 test)			*p*=<0.001		*p*=<0.001	
Living alone						
No	94.1	6.6	48.8	44.6	20.4	79.7
Yes	5.9	18.3	40.6	41.1	44.2	55.8
p-value (t-test)			*p*=0.005		*p*=<0.001	
Trust in family and friends						
Low	26.9	6.7	52.2	41.1	20.4	79.6
Medium	35.8	6.7	47.3	46.0	21.2	78.8
High	37.4	8.2	46.6	45.2	23.2	76.8
p-value (χ^2 test for linear trend)			*p*=0.493		*p*=0.155	
Material factors						
Equivalized household income						
0.00 – <620.00 hryven'	19.4	12.8	59.6	27.6	32.3	67.7
620.00 – <848.70 hryven'	18.8	11.4	53.1	35.6	27.9	72.2
848.70 – <1137.00 hryven'	19.9	0.6	47.5	46.2	22.4	77.6

1137.00 – <1597.00 hryven'	21.3	3.6	44.9	51.6	15.1	84.9
1597.00 – <9900.00 hryven'	20.7	3.1	38.0	59.0	12.7	87.4
p-value (χ^2 test for linear trend)			*p*=<0.001		*p*=<0.001	
Housing assets						
0	16.6	13.4	61.2	25.5	29.3	70.7
1	16.9	11.9	55.3	32.8	26.2	73.8
2	9.7	8.3	51.7	40.0	21.6	78.5
3	16.6	5.5	47.1	47.4	20.9	79.1
4	40.3	3.3	40.0	56.8	17.2	82.8
p-value (χ^2 test for linear trend)			*p*=<0.001		*p*=<0.001	
Labour market status						
In paid work	48.4	2.0	42.2	55.8	10.9	89.1
Unemployed	5.1	5.2	59.1	35.7	11.1	88.9
Discouraged job seeker	4.4	9.7	51.8	38.5	22.0	78.0
Looking after home and family	10.3	5.5	57.4	37.2	6.9	93.1
Sick or disabled	5.1	16.9	54.7	28.4	73.5	26.5
Pensionable age	19.2	20.8	45.3	33.9	51.3	48.7
Other	7.5	2.7	69.2	28.1	8.6	91.4
p-value (χ^2 test)			*p*=<0.001		*p*=<0.001	
Behavioural factors						
Physical exercise						
None	76.5	8.8	50.1	41.2	25.4	74.6
Light	12.8	2.9	42.7	54.4	10.2	89.8
Medium	3.7	4.0	48.1	47.8	6.6	93.4
Intensive	2.7	1.0	32.4	66.7	7.3	92.7
Daily	4.4	1.0	43.9	55.1	12.8	87.2
p-value (χ^2 test)			*p*=<0.001		*p*=<0.001	
Smoking status						
Non-smoker	78.3	8.2	47.6	44.2	24.5	75.5
Ex-smoker	10.1	2.4	48.0	49.7	8.9	91.2
Current smoker	11.7	5.0	53.5	41.5	14.5	85.5
p-value (χ^2 test)			*p*=0.003		*p*=<0.001	
Alcohol consumption						
Did not consume	59.0	9.1	50.5	40.4	28.6	71.4

Low alcohol consumption	30.4	5.0	43.8	51.2	12.0	88.0
Medium alcohol consumption	9.5	3.3	50.0	46.7	11.0	89.0
High alcohol consumption	1.1	8.0	40.8	51.2	17.7	82.4
p-value (χ^2 test)			*p*=<0.001		*p*=<0.001	
Body mass index categories						
Underweight (<18.5 kg/m^2)	4.9	6.1	54.7	39.2	12.9	87.1
Normal (18.5 – <25.0 kg/m^2)	41.2	6.0	48.5	45.6	13.2	86.8
Overweight (25.0 – <30.0 kg/m^2)	31.7	7.7	47.1	45.2	25.1	74.9
Obese (≥30.0 kg/m^2)	22.1	9.4	48.4	42.2	34.9	65.1
p-value (χ^2 test)			*p*=0.155		*p*=<0.001	

Table 3: Associations between education level and less than average self-rated health, adjusting for psychosocial, material and behavioural factors, Ukrainian Longitudinal Monitoring Survey, 2007, men, *n*=2363. Odds ratios and percentage reduction in odds ratios in relation to the base model.

Socio-economic variable	Tertiary education, ISCED 5–6	Upper secondary, ISCED 3–4		Up to lower secondary, ISCED 0–2	
	OR	OR (95% CI)	Reduction %	OR (95% CI)	Reduction %
Base model	1.00	1.50 (1.10; 2.05)	–	2.46 (1.51; 4.01)	–
Psychosocial (social support) factors	*1.00*	*1.47 (1.07; 2.03)*	*6*	*2.45 (1.52; 3.94)*	*1*
Marital status	1.00	1.50 (1.09; 2.06)	0	2.51 (1.56; 4.03)	–3
Living alone	1.00	1.52 (1.11; 2.08)	–4	2.56 (1.57; 4.16)	–7
Trust in family and friends	1.00	1.48 (1.08; 2.02)	4	2.44 (1.49; 3.98)	1
Material factors	*1.00*	*1.18 (0.84; 1.68)*	*64*	*1.66 (0.99; 2.77)*	*55*
Income quintiles	1.00	1.28 (0.93; 1.76)	44	2.05 (1.27; 3.30)	28
Housing assets	1.00	1.45 (1.05; 1.99)	10	2.36 (1.45; 3.85)	7
Labour market status	1.00	1.29 (0.92; 1.80)	42	1.82 (1.09; 3.06)	44
Behavioural factors	*1.00*	*1.35 (0.98; 1.86)*	*30*	*2.06 (1.26; 3.36)*	*27*
Physical exercise	1.00	1.39 (1.01; 1.90)	22	2.23 (1.37; 3.62)	16

Smoking	1.00	1.50 (1.09; 2.06)	0	2.41 (1.47; 3.95)	3
Alcohol consumption	1.00	1.48 (1.07; 2.05)	4	2.39 (1.48; 3.88)	5
Body mass index	1.00	1.50 (1.10; 2.06)	0	2.42 (1.49; 3.95)	3
All psychosocial, material & behavioural factors	*1.00*	*1.08 (0.75; 1.55)*	*84*	*1.46 (0.87; 2.43)*	*68*

The base model is adjusted for age, age-squared, ethnicity/nationality, settlement type and oblast.

Table 4: Associations between education level and less than average self-rated health, adjusting for psychosocial, material and behavioural factors, Ukrainian Longitudinal Monitoring Survey, 2007, women, *n*=3088. Odds ratios and percentage reduction in odds ratios in relation to the base model.

Socio-economic variable	Tertiary education, ISCED 5–6	Upper secondary, ISCED 3–4		Up to lower secondary, ISCED 0–2	
	OR	OR (95% CI)	Reduction %	OR (95% CI)	Reduction %
Base model	1.00	1.60 (1.27; 2.01)	–	2.84 (1.93; 4.17)	–
Psychosocial (social support) factors	*1.00*	*1.61 (1.28; 2.03)*	*–2*	*2.87 (1.95; 4.23)*	*–2*
Marital status	1.00	1.61 (1.28; 2.02)	–2	2.87 (1.95; 4.22)	–2
Living alone	1.00	1.60 (1.28; 2.01)	0	2.83 (1.93; 4.16)	1
Trust in family and friends	1.00	1.60 (1.27; 2.02)	0	2.84 (1.93; 4.17)	0
Material factors	*1.00*	*1.32 (1.04; 1.68)*	*47*	*2.20 (1.47; 3.27)*	*35*
Income quintiles	1.00	1.46 (1.16; 1.84)	23	2.60 (1.77; 3.82)	13
Housing assets	1.00	1.56 (1.24; 1.97)	7	2.74 (1.86; 4.04)	5
Labour market status	1.00	1.40 (1.10; 1.77)	33	2.33 (1.57; 3.46)	28
Behavioural factors	*1.00*	*1.44 (1.14; 1.81)*	*27*	*2.49 (1.69; 3.66)*	*19*
Physical exercise	1.00	1.51 (1.20; 1.90)	15	2.61 (1.78; 3.83)	13

Smoking	1.00	1.60 (1.27; 2.00)	0	2.81 (1.91; 4.13)	2
Alcohol consumption	1.00	1.54 (1.22; 1.94)	10	2.76 (1.88; 4.06)	4
Body mass index	1.00	1.59 (1.26; 2.00)	2	2.80 (1.91; 4.11)	2
All psychosocial, material & behavioural factors	*1.00*	*1.24 (0.97; 1.58)*	*60*	*2.05 (1.37; 3.07)*	*43*

The base model is adjusted for age, age-squared, ethnicity/nationality, settlement type and oblast.

Social inequalities in self-rated health in Ukraine: The role of psychosocial, material and behavioural factors

Supplementary Table A: Associations between education level and less than average self-rated health, adjusting for psychosocial, material and behavioural factors, Ukrainian Longitudinal Monitoring Survey, 2007, men, *n*=2363. Beta coefficients and percentage reduction in beta coefficients in relation to the base model.

Socio-economic variable	Tertiary education, ISCED 5–6	Upper secondary, ISCED 3–4		Up to lower secondary, ISCED 0–2	
	b	*b*	Reduction %	*b*	Reduction %
Base model	0.000	0.038	–	0.111	–
Psychosocial (social support) factors	0.000	0.037	3	0.111	0
Material factors	0.000	0.014	63	0.056	50
Behavioural factors	0.000	0.027	29	0.090	19
All psychosocial, material & behavioural factors	0.000	0.008	79	0.047	58

The base model is adjusted for age, age-squared, ethnicity/nationality, settlement type and oblast.

Supplementary Table B: Associations between education level and less than average self-rated health, adjusting for psychosocial, material and behavioural factors, Ukrainian Longitudinal Monitoring Survey, 2007, women, *n*=3088. Beta coefficients and percentage reduction in beta coefficients in relation to the base model.

Socio-economic variable	Tertiary education, ISCED 5–6	Upper secondary, ISCED 3–4		Up to lower secondary, ISCED 0–2	
	b	*b*	Reduction %	*b*	Reduction %
Base model	0.000	0.061	–	0.183	–
Psychosocial (social support) factors	0.000	0.060	2	0.184	–1
Material factors	0.000	0.033	46	0.134	27
Behavioural factors	0.000	0.044	28	0.163	11
All psychosocial, material & behavioural factors	0.000	0.022	64	0.122	33

The base model is adjusted for age, age-squared, ethnicity/nationality, settlement type and oblast