HEALTH INEQUALITIES IN
UKRAINE

by

Ganna Cherednychenko

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Abstract

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Head of the State Examination Committee: Ms.Svitlana Budagovska,
Economist, World Bank of Ukraine

The study investigates health inequalities in Ukraine on the basis of the regional data on absence rate of Ukrainian employees for 1990-2002. The results obtained for absence frequency and average duration of a case of absence differ in some aspects. The dynamics of former indicator seems to be tightly linked to changes in health status of employees and is likely to be affected by a number of physical, economic and social environment factors. This suggests that health inequities may be present in Ukraine, and policy interventions may be needed.

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Introduction

Health is not only one of the crucial indicators of economic development of a society but also an important factor influencing economic growth; health has been in the constant focus of researchers and policy makers.

The observation of significant health differences between countries and societal groups within borders of a country has resulted in a vast number of works on social determinants of health conducted for societies throughout the world.

Ukraine has been in the period of dramatic social changes for more than thirteen years already. These changes can't but have influenced health of Ukrainians. The impact was different for different societal groups, and this was reflected on the health indicators of the Ukrainian regions, which are heterogeneous in terms of economic and cultural features. During the transition period disparities in health indicators among the regions emerged and have been growing.

I am going to explore the reasons for inequalities in the health status of Ukrainians during the transition period. The annual regional data will allow to analyse the dynamics of health status of Ukrainian citizens and investigate its relation to the trends in the socioeconomic indicators which are likely to affect health. Specificity of regional economic structure and

cultural heritage will help to understand the links between social environment and health.

Furthermore, the research will reveal whether the nature of health inequalities is such that policy interventions are necessary and possible.

A considerable amount of literature trying to explain the causes of rapid changes in health status of the residents of transition countries exist. The reasons that are believed to have contributed to health changes are discussed in the work. The results obtained for Ukraine and Russia are considered in detail.

The outcome measure used in the study is absence rate. The importance of using this indicator stems from the fact that it allows to reveal factors affecting health of working population; as working population is not representative for the whole one, the results of the study are likely to differ from those obtained in research works that consider random population samples.

Literature review

The study by Macinko and Starfield (2002) is an overview of the published literature on equity in health.

The study gives the following definition of health inequalities. Health inequalities are "differences in health across individuals in the population". Not only genetic differences and freely chosen behaviour lead to differences in health. A vast group of socioeconomic factors is responsible for health differences in individuals and societal groups. World Health Organization (WHO, 2004) names the following social factors as determinants of health inequalities. High income and social status are linked to better health, and the big income disparities in a society are associated with the big differences in health. Low education levels are related to poor health, more stress and lower self-confidence. The safety of physical environment (water, air, workplace, houses, communities and roads) is important. Social support networks – support from families, friends and communities – improve health. Cultural values and traditions, beliefs of the family and community have impact on health. Finally, access to health services matters.

Macinko and Starfield (2002) explain the concept of health equity. Equity (as defined by International Society for Equity in Health) is "the absence of potentially remediable, systematic differences in one or more aspects of health across socially, economically, demographically, or geographically

defined population groups or subgroups". The World Health Organization defines inequity as "differences [in health states] which are unnecessary and avoidable, but, in addition, are considered unfair or unjust." Common to most definitions of health equity is the idea that certain health differences are unfair or unjust. The subset of health inequalities that are judged unjust or unfair constitutes health inequities. Two main forms of health equity are identified, vertical equity (preferential treatment for those with greater health needs), and horizontal equity (equal treatment for equivalent needs). Equity in health services "implies that there are no differences in health services where health needs are equal (horizontal equity) or that enhanced health services are provided where greater health needs are present (vertical equity)". Most literature concentrates on horizontal equity.

Macinko and Starfield describe a number of pathways by which inequities in health come to be. They are the following. 1) Socioeconomic status: education, occupation, income. 2) Social discrimination on the basis of gender or race/ethnicity. 3) Environment: living conditions, distribution of income in the country or state of living. 4) Political and policy context: extent of primary care, geographic distribution and mix of health services, fairness of health financing, social policies, and political, social and economic relationships.

Geyer and Peter (2000) discuss the role of the main indicators of socioeconomic status in explaining health inequalities. These indicators are income, education and occupational position. The authors emphasize that the comparisons between the impact of these factors are important due to the fact that they "refer to different facets of social stratification": while income "determines limiting material conditions necessary to satisfy the basic needs of life and above" , education is "an indicator for knowledge", and occupational status "is indicative of health related concomitants of the job like variations of control over the workplace, differing reward structures or toxic hazards". Moreover, income "provides resources for mastering demanding situations by seeking professional assistance and by determining opportunities for healthy lifestyles", and education helps to "cope successfully with demanding or potentially stressful situations". The researchers assume that the indicators are "not independent from each other", and if intercorrelations are high, it is unimportant which one is chosen as a social status indicator. However, due to the different meaning of the three measures the intercorrelations should not be too high, and "their empirical overlaps should be examined"; moreover, the role of income has to be compared with that of occupational position and qualification.

The researchers study mortality differences in the population of those participating in statutory health insurance in West Germany. The analysis is conducted for the employed men and women between 25 and 65 years

old insured between 1987 and 1995 for no less than 150 days. The methods of cross tabulations (for inspecting the data), Spearman rank correlations (for associations between the indicators) and Cox regression (to estimate relative risks in the multivariate analyses) are used. The dependent variable is risk of mortality before the age of 65. First, separate effect of each of the three indicators is estimated, and then the effects of education (qualification) with income and occupational position with income are estimated. Gender is used as a control variable. The authors find that the three indicators are "statistically associated but not strong enough to warrant the conclusion that they share the same empirical content": while the correlation between qualification and occupational position is high, the association of each of them with income is weak. The phenomenon of status inconsistency is present, and it can be explained by shift work and overtime premiums of low position workers or part-time jobs (and, therefore, lower income) of workers who hold jobs according to their status. The regression analyses show that each indicator is connected with a gradient in mortality, and income is the strongest predictor of mortality. However, lowest 20% of wage earners showed a lowered risk than 20% above, which the authors (at least partly) attribute to part-time employment. Also, this may be due to the fact that household budget (or the amount of money available per person) is not known to the researchers. Further, the authors explain that mortality effects of income can be attributed not only to material but also to psychological and behavioural factors. Concluding,

they emphasize that education is important due to the fact that "it has a placement function at least for the first occupational position".

Lynch et al. (2000) discuss three interpretations of the association between income inequality and health: the individual income, the psychosocial environment and the neo-material interpretation. The researchers give the evidence from literature and supplement it with their own analyses. According to the first interpretation, aggregate level associations between income inequality and health emerge only due to the individual level association between income and health. The curvilinear relation between income and health is enough to produce health differences between populations with the same average income but different distributions of income. This approach assumes that "determinants of population health are completely specified as attributes of independent individuals and that health effects at the population level are merely sums of individual effects". However, "research on income inequality recognises that there may also be important contextual determinants of health". The existence of "contextual health effects of income distribution" after adjustment for individual income has been found in some studies but not all, and the relation of individual income to health differences has been stronger than that of income inequality. In a study for the USA, however, it has been shown that variations in individual income explained only a small proportion of the observed aggregate variation in mortality at the level of US states. Lynch et

al. conclude that the association between income and health explains well health differences between individuals, but at the same time "individual income may be less important in understanding variation in health across aggregated units". Moreover, "statistical adjustment for individual income... may encourage underestimation of the overall population effects of unequal income distribution". Next, Lynch et al. give their opinion about the psychosocial environment interpretation. It suggests that perception of low social position causes negative emotions and stress, and this leads to poorer health not only through neuroendocrine pathways and harmful to one's own health behaviour, but also due to antisocial behaviour and low social cohesion it induces. The researchers argue that "the interpretation of links between income inequality and health must begin with the structural causes of inequalities, and not just focus on perceptions of that inequality", that is one should not ignore material conditions that influence people's lives. They further mention that tight social links "can be coercive and can be sources of strain as well as support in relationships". Also, the authors emphasize that not only horizontal social relations are important; it is not right to overlook "the crucial role of vertical, institutional social relations (political, economic, legal) play in structuring the environments in which informal relations play out". According to neo-material interpretation, "the effect of income inequality on health reflects a combination of negative exposures and lack of resources held by individuals, along with systematic underinvestment across a wide rang of human, physical, health, and social

infrastructure". In particular, in the USA income inequality is significantly related to unemployment, health insurance, social welfare, work disability, educational and medical expenditure, and library books per capita. The authors state that if income inequality is "but a one manifestation of a cluster of neo-material conditions that affect population health", an aggregate relation between income inequality and health is not necessary due to the fact that associations between income inequality and health "are contingent on the level and distribution of other aspects of social resources". Weak link between inequality and social investments may lead to the lack of association between inequality and health, which is suggested by a study on Canada. In Kerala state, India, where individual income is low, great redistributive efforts of the government are likely to explain low infant, maternal and childhood mortality, and overall mortality. In Britain, despite great increase in income inequality from the mid-1970s to the 1990s, mortality in middle age and at older ages declined dramatically. This may be due to earlier social investments, which improved social circumstances for those who were in young age then. In conclusion, the authors express an opinion that "it is strategic investment in neo-material conditions via more equitable distribution of public and private resources that are likely to have the most impact on reducing health inequalities and improving public health in both rich and poor countries in the 21st century".

Marmot and Bobak (2000) address the reasons for health inequalities between the countries of eastern and western Europe and those for inequalities between social groups within these countries. They assume that the causes of these types of inequality may be similar and suggest that understanding of causal links can be improved by studying the relation of socioeconomic circumstances to health in countries with different forms of social organization.

Marmot and Bobak report that in the mid-1990s life expectancy gap between Western and Eastern Europe was six years, and 0.9 of them are attributable to infant mortality. More than half of the gap was caused by cardiovascular disease, and one fifth was due to external causes of death. The conclusion is made that attention should be focused on mortality differences after childhood.

Marmot and Bobak describe the changes in life expectancy since 1970s. In 1970 difference in life expectancy between the countries that now belong to the European Union and the countries of Eastern Europe excluding the Soviet Union was less that 1.5 years. From 1970, life expectancy at age 15 improved continuously in Western Europe, but this did not happen in Eastern Europe. By 1990 there was a four year gap; by 1997 the gap in men was 6 years; moreover, in Eastern Europe there was a decline in male life expectancy at age 15 between the mid-1970s and mid 1990s.

At the same time, the changes in the Soviet Union were even more dramatic: in 1970 life expectancy for men was four years lower and life

expectancy for women was one year lower than in other Eastern European countries; in 1997 the gap was more than ten years for men and more than six years for women. The researchers conclude that life expectancy in the former Soviet Union declined by over five years in 1989-1997.

The authors underline that the absolute disadvantage for men was greater than for women: in Eastern Europe (excluding the Soviet Union) life expectancy of men was six years shorter and that of women was four years shorter; in the Soviet Union these figures were 10 and 6. The researchers judge the nature of mortality changes in the Soviet Union as extraordinary. They even question the reliability of data and conclude that there is support for the reported data.

Marmot and Bobak report that the analysis of 45-64 years age group shows that there is striking difference between Eastern and Western Europe in the ratio of men to women. While for the United Kingdom, there are 98 men for every 100 women, in Russia there are 84 men for every 100 women. The researchers give the name "missing men" to this phenomenon. Further, they tell that the men-women ratio is correlated with gross national product per capita: $r=0.72$ (although among Eastern European countries there is considerable spread around the regression line).

Next, the authors specify that among Eastern European countries excluding the Soviet Union there was "a remarkable consistency" between 1970 and 1980 in trends of life expectancy, and after 1989 the countries began to diverge. The researchers suggest that the divergence of mortality "may be

related to economic fortunes". While GDP grew in Poland by 5%, it decreased by 3% in Czech Republic, 13% in Hungary, 42% in Lithuania and Russia, and 60% in Ukraine. Referring to previous works, the authors report that there is correlation between changes in the mortality of middle-aged men after 1989 and GDP.

Then, the authors show the link between changes in the distribution of income and changes in life expectancy: increase in the Gini coefficient is associated with decrease in life expectancy ($r$=-0.63). The researchers consider that both the increase in poverty and the increase in income inequality have led to decrease in life expectancy in Eastern Europe.

Further, Marmot and Bobak analyze the link between age standardized death rates and number of years of education in Czech Republic. They emphasize three points. First, in 1980-1981 differences in mortality due to inequality in social position (measured by education) existed. Second, "these differences follow a social gradient (the higher place in the social hierarchy, the lower the mortality)". Third, both the magnitude of health inequalities (expressed as the slope of the gradient) and the absolute gap in mortality between the top and bottom educational groups have been increasing. The researchers state that increase in the social gradient in mortality has also been found for the former Soviet Union countries and Hungary.

The next issue under the authors' consideration is the problem of measuring socioeconomic differences. Marmot and Bobak explain that

high correlation between usual measures of social position – education, income, and occupation – has led some researchers to treat these measures as interchangeable; Bartley et al., however, are convinced that this approach is not justified on theoretical grounds, and, moreover, they consider that different measures may convey different "meaning". Concluding, Marmot and Bobak say that "analysis of the relation of different measures to health outcomes may therefore help to explain how social position affects health".

The authors propose two ways to resolve the problem of high correlation between the measures. First, multivariate analysis can be used to disaggregate their effects. Second, "separate effects can be distinguished by finding situations where the correlation between different socioeconomic measures differs from that seen in Western Europe". The finding of a social gradient in mortality in Czechoslovakia in 1980s in the presence of low level of income inequalities at that time suggests that there were other factors responsible for health inequalities.

Marmot and Bobak report that they conducted a case-control study of acute myocardial infarction for this country in the early 1990s and found a clear inverse link between education and risk of myocardial infarction. There was no relation of an index of material well-being to the risk of myocardial infarction.

The other illustration of the importance of education in the prediction of health outcomes in the Czech Republic is the strong relation of maternal education to height of 5 year old children.

Marmot and Bobak suggest that education is important due to the position of an individual in a society, and the role of education is connected with psychosocial factors.

The researchers move on to explaining the inequalities in health between Eastern and Western European countries. They give the hypotheses that have been proposed: differences in medical care, in smoking and diet, and binge drinking in the former Soviet Union.

For their part, Marmot and Bobak hypothesize that psychosocial factors have an important role. They report that the research from western countries shows the importance of psychosocial factors. Moreover, the profound changes in the societies of Eastern Europe must have greatly affected people's lives.

Marmot and Bobak argue that it is necessary to distinguish between poverty and inequality as causes of ill health. They base their argument on the finding of a gradient in mortality among civil servants who are not poor.

Furthermore, the researchers tell that numerous studies have shown that married men have lower mortality than single, widowed, or divorced men. Married women are also favoured, though the data are less consistent for them. Marmot and Bobak state that in several countries of Eastern Europe

the mortality disadvantage of unmarried men increased. (Here the authors stress that it is necessary to remember that unhealthy people may be less likely to get married.) In researchers' opinion, it may be the case that "this is a psychosocial effect acting either through unhealthy behaviours among unmarried men or through direct psychosocial pathways affecting, for example, the neuroendocrine system".

Marmot and Bobak suggest that if one tries to distinguish between the effects of material and psychosocial factors, a distinction should be made between material factors that have direct effect on health (infections, malnutrition, inadequate heating, clothing, or shelter, and pollution) and "those that affect health through reducing participation in society". The researchers refer to the study by Pikhart on Hungary, in which people were asked about household items they possessed. The items were then categorised as basic, socially oriented or luxury. While it was found that bigger material possessions were associated with better self-reported health, the adjustment for a measure of economic hardship made the relation of basic needs to poor health insignificant. At the same time, the relation of socially oriented and luxury items to health was independent of the measure of economic hardship. The conclusion is made that psychosocial pathways are important.

Marmot and Bobak are especially interested in the relation of the degree of autonomy of individuals to their health. In a previous study they showed that low control in workplace is related to increased risk of cardiovascular

disease and has a role in mediating the social gradient in coronary heart disease. This finding was replicated in the Czech Republic. In several cross-sectional studies in Eastern Europe the researchers showed that control over life was related to self-reported health. (The authors say that these results should be treated with caution, because both health and control are self report measures, and reporting bias is possible.) Further, the researchers say that numerous studies have shown that individuals who report poor health have a higher risk of subsequent death and prove that this relation holds at the population level. In the end, the authors say that "degree of autonomy may be an important factor related to inequalities in health among and within countries".

Marmot and Bobak conclude their work with the following words: "The massive health changes in Eastern Europe remind us, amid the excitement that surrounds the new research on the genetic basis for disease, that disease rates are powerfully affected by the social environment."

Walberg et al. (1998) investigate the reasons of the rapid fall in life expectancy at birth of men between 1990 and 1994 in Russia. On the basis of data from 52 regions of European Russia they conduct univariate and multivariate analyses. Univariate analyses have shown that the major reason for the fall in male life expectancy was the pace of transition, which was measured by gross job flows in medium and large enterprises between 1993 and 1994. The second by importance factor is the change in income

of the regions, with the wealthiest regions experiencing the biggest drop in male life expectancy. The other significant factors are the crime rate in 1990 and income inequality in 1994, which had negative impact on life expectancy of men. Multivariate model includes gross job flows, mean household income, and percentage increase in crime. Further, the authors conduct the analysis of fall in life expectancy by causes of death. They conclude that for both sexes and in all regions deaths of people of 30 to 60 years old contributed most to the fall in life expectancy. The prevalent causes of premature death were accidents, alcohol related causes, and cardiovascular disease.

Gilmore et al. (2002) conduct the analysis of an all-Ukrainian survey which took place in February – March 2000. The survey asked the respondents to rate their health on a 5-point scale and give information on demographic, social, and economic factors influencing their life. Odds ratios, which were calculated for less than good self-perceived health, allowed the authors to make the following conclusions. The elder respondents report worse health; women have worse health than men, and health differentials increase with age. Rural dwelling has negative effect for women. Lack of education has negative effect: respondents with less than higher education report worse health than those with higher education. Nationality of the respondents has no impact on health. Good self-assessed material situation, good family relationships and the ability to borrow one week's salary or pension have

positive effect. Unemployment, lack of control over life, deterioration in social position in the previous 5 years have negative impact on self-perceived health. No impact was found for income from principal job, marital status, and formal social networks – previous communist party membership and membership of a religion. Ever smoking has insignificant negative impact on health. Living in 11 regions most affected by Chernobyl disaster has no impact on self-perceived health. Into the fully adjusted model the authors include age, gender, self-assessed material situation, control over life and deterioration in social position. The authors explain some of their findings in the following way. First, the worse self-perceived health reported by women does not contradict the fact that their life expectancy is higher. Injuries and violence that predominate among premature deaths in men tend to lead to sudden death rather than disability, and cardiovascular disease among men is more likely to cause sudden death in former Soviet Union than in Western countries. Second, the lack of significance of smoking may be due to the fact that health effects of smoking take long to develop, and in Ukraine other causes of death and disability may intervene (including sudden death from tobacco-related diseases). Further, among women smoking is a relatively recent habit, and insufficient time may have passed for symptomatic health effects to develop; also, confounding by age is possible. Third, authors emphasize that the study gives "only a very crude analysis" of the impact of Chernobyl disaster on health. Finally, the researchers name the following

factors that were not considered in their work: deterioration in health care system, environmental pollution, alcohol consumption.

Barmby et al. (1991) investigate how sickpay scheme and personal characteristics of workers influence frequency and duration of absence. They use the data from four factories of one firm. The sickpay scheme used by the firm is such that absence from work has two consequences. First, many workers may lose earnings due to lower than full compensation for the missed days; the amount of compensation depends on how long the worker was absent from work during previous two years for reasons other than acceptable. Second, the future amount of sickpay is affected if absence is not acceptable, e.g. not medically certified. The researchers possess the information about workers' absences during 1985-1988 and analyse workers' absence behaviour for 18 months in 1987-1988. They use a discrete panel data model and Weibull hazard model to investigate the determinants of frequency and duration of absences respectively. The researchers find that women and married people are likely to be absent from work more frequently and for longer than men and single people respectively. Furthermore, acceptable absences tend to be longer than those non-acceptable. Starting week day of absence is also important for the duration of absence: even when the problem of censoring is accounted for, the longest absence periods begin on Monday. Finally, the duration of present absence negatively depends on how long the worker was absent in

the past two years for non-acceptable reasons. At the same time, frequency of absences is not affected by sickpay scheme.

Broström et al. (2002) ask whether gender differences in work absence behaviour are explained by differences in economic incentives for being absent, preferences or differences in health and work environment. Having examined microdata from a sample of blue-collar workers from the Swedish Level of Living Survey for 1990-1991, they arrive to the following conclusions. Women have higher incidence of work absence. As a result of 1991 reform of the sickness insurance, which decreased the share of labour earnings paid to the worker for the absence period (with the decrease being highest for the first three absence days), incidence of absence fell sharply for both genders. The workers with bad health status have higher frequency of absence; the difference between healthy and unhealthy workers is bigger for women. The positive effect of poor working environment on absence frequency is present only for women. The cost of absence from work measured by lost daily earnings has negative impact on incidence of absence for both genders; its effect on duration of absence is much weaker and is present only for females. Unemployment rate negatively affects the hazard from the work absence state for females, which is contrary to the hypothesis of disciplining effect of unemployment and that of health selection during unemployment. The authors provide two explanations. First, this may happen due to the fact that at the beginning of

the recession firms try to lay off their workers instead of dismissing them if they expect demand to increase again later, which is cheaper for firms. Second, rising unemployment may be financially stressful and detrimental to health. Weekday matters: most absence periods begin on Monday, and individuals are not likely to leave absence spell on Saturday, because most workers do not work on Sundays. More contracted hours of work lead to higher absence rate. Older workers have longer absence periods, but they are less frequent, which is explained either by preferences of older workers or by selection over time (the workers with high preferences for being absent either leave labour force or remain in long absence spells). Level of monitoring indicated by whether there is a time-clock on the workplace and whether it is important to be on time has unexpected positive impact on absence, which suggests that these forms of monitoring may be used when more effective forms are unavailable (e.g. in large firms). Finally, the authors make a conclusion that gender differences in absence frequency can partially be explained by differences in cost of being absent, while most gender differences can be attributed to intrinsic differences in absence behaviour. The former implies that lower wage gap between genders will decrease gender differences.

Analysis

The analysis is conducted for 25 regions of Ukraine and the cities of Kyiv and Sevastopol for the period of 1990-2002.

Dependent variables are the indicators by which absence rate is determined: number of cases of absence and duration of a case of absence. Independent variables are socioeconomic status indicators: income measured as gross value added per capita, and the percentage of workers with higher education; social environment measures: rates of marriages, divorces and crime; and physical environment measures: the percentage of employees who work under harmful conditions, air pollution per square unit, and water pollution as percentage of polluted water in the total amount of water drained into the natural water sources. Some other measures which are related to physical environment, social and economic development, and preferences are included; they are urbanization, industrial production per worker and percentage of children in the region.

I use data from WHO "Health for All" database for Ukraine and from the State Committee of Statistics of Ukraine (Derzhkomstat). The first source provides extensive information on health and some other demographic indicators. Derzhkomstat editions "Statistical Yearbook of Ukraine" and "Labour in Ukraine" contain general statistical information and detailed

data on labour market respectively. In addition, the data for ILO unemployment are taken from the Derzhkomstat edition "Economic Activity of Population in Ukraine".

Unfortunately, some of the data are unavailable for certain periods. The data for education have been provided only since 1996; they also exist for 1989 – the year after the census and are used for 1990. The data for regional value added (which in sum give GDP of Ukraine, and, therefore, may be referred to as regional GDP) have been available since 1996 but are not yet available for 2002. The data for unemployment by International Labour Organisation definition have been available since 1995; in addition, the level of unemployment was zero in 1990. As a result, the final models include the periods of 1990 and 1996-2002.

*Absence dynamics in 1990-2002*

Absence rate (the number of days of absence from work per one employee in a year) is the product of the number of cases of absence per an employee in a year and the average duration of a case.

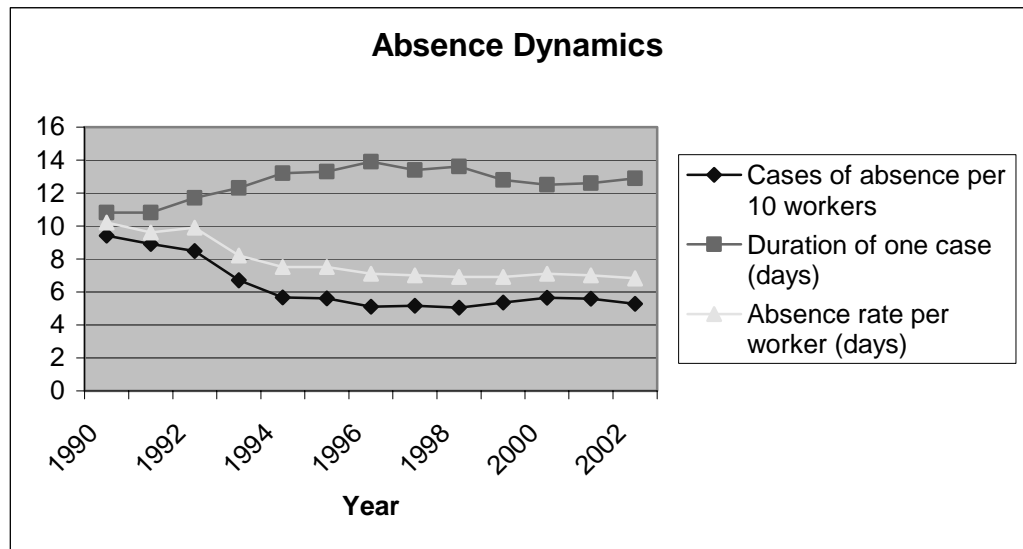The dynamics of the three indicators during 1990-2002 was the following.

**Absence Dynamics**



Figure 1. Absence dynamics in 1990-2002.

1) Cases of absence

The number of cases of sickness absence in Ukraine decreased from 94.0 per 100 employees in 1990 to 50.6 in 1998 (with a slight increase in 1997). In 1999-2000 there was an increase: 53.6 and 56.6 cases, and in 2001-2002 the number of cases fell: 55.9 and 53.0.

While the drop was not sharp in the worst (in terms of health situation) regions, it was two- or even threefold in the best regions. In Donetsk region the number of cases of absence fell from 116.8 in 1990 to 86.7 in 1998 and increased in 1999-2002 (with a fall in 2001). In Chernivtsi region (the best

one in 2002) there was a fall from 74.1 to 22.4 in 1990-1998, an increase in 1999-2000 to 26.4 and a drop in 2001-2002 to 24.4 cases.

2) Duration of a case

There was a contrary trend in the dynamics of duration of a case. While in 1990 it was 10.8, it became 13.9 in 1996. In 1997-1998 it increased from 13.4 to 13.6, in 1999-2000 it fell from 12.8 to 12.5, and in 2001-2002 it increased from 12.6 to 12.9.

Zakarpattia, Lviv and Odesa regions were lagging according to this indicator in 2002. In 1990 the average duration of a case of absence in Zakarpattia was 11.6; it then fluctuated, reached its highest value of 16.9 in 1996, and decreased to 14.3 in 2002. The Crimea and Kyiv were the best. In the Crimea, duration was 10.5 in 1990 and 10.2 in 1992, then it increased to 12.8 in 1996, fell to 11.4 in 2000 and rose to 12.1 in 2002.

3) Absence rate

Absence rate fell from 10.2 days per an employee in 1990 to 6.9 in 1998, rose from 6.9 in 1999 to 7.1 in 2000, and dropped from 7.0 to 6.8 in 2001-2002.

The worst region according to this measure is Donetsk region. Absence rate was 13.4 in 1990 there. Then it fluctuated, reaching its highest value of

14.0 in 1996 and lowest value of 12.0 in 1998 and 2001. In 2002 it was 12.9 in Donetsk region. The best region is Chernivtsi region, where absence rate was 8.2 in 1990, and was constantly falling then, reaching the value of 3.2 in 2002.

The variability of cases of absence across regions and across time was higher than that of duration; the trend of morbidity is more closely (and positively) associated with the former indicator: r=0.9545 than with the latter one: r=-0.4316. The correlation between the two indicators is r=-0.6607.

In general, health situation is relatively good in the West of Ukraine and bad in the East. Highly urbanized and industrialized Eastern regions have a big share of people working under harmful conditions, high level of environmental pollution, unfavourable social environment with low marriage rates and high divorce and crime rates. The situation is reverse in the West. Economic indicators – GDP per capita and employment – are much better in the East. But this does not compensate for the unfavourable impact of other factors.

*Predicted signs of the coefficients: health-related determinants of absence*

Air pollution (in tons per square kilometer) and water pollution (as percent of polluted water drained into natural water basins) are used as indicators for the quality of the environment workers live and work in. These variables are expected to affect health negatively.

The quality of working conditions is defined as percentage of employees working under at least one type of harmful conditions (defined according to Ukrainian legal standards of work safety). This variable must have detrimental impact on health.

Higher education is measured as percent of employees having it. The effects of bachelor and higher levels of education are analysed separately (though, in fact, the correlation between these two indicators is high: r=0.82). Education is supposed to be favourable for health not only due to usually good physical working conditions, but also due to lower level of stress educated people are exposed to and to the ability to cope with stress in "healthy" ways.

GDP is the indicator for both production and consumption. According to health studies, higher income is associated with improved health due to the increased ability for material consumption, higher freedom and lower level

of stress. However, since increase in GDP means increase in pressure at work, high GDP can be detrimental for health and increase absence.

Industrial production (in rubles of 1990 per worker) is used for two reasons. First, this is the most harmful to workers' health part of Ukrainian GDP: 35% of industrial workers were exposed to harmful working conditions in 2001 (and in coal mining this figure reached 72%). Second, Ukraine is a highly industrialized country, and GDP dynamics in 1990-2001 was connected primarily with industrial production dynamics: the correlation between these indicators in 1996-2001 (across time and regions) is 0.82. The latter fact justifies the use of industrial production as a proxy for GDP and allows to fix the problem of the lack of data on regional GDP for 1990-1995 and 2002.

Unemployment (measured as a percent of the ILO unemployed) may be favourable for the working population health due to lower work pressure during recession. On the other hand, health selection may take place during the period of high unemployment. Both effects will lead to positive association between unemployment and workers' health.

Urbanization (percent of urban residents) is supposed to adversely affect health. It is associated not only with unfavourable physical environment (environmental pollution, heavy industrial production), but also with low

social cohesion and high level of stress. In particular, in Ukraine stress effect of transition may have been lower in rural areas due to the existence of subsidiary small-holdings in rural areas, which have been the source of food and potential income. As a consequence of a rapid decline in industrial production after 1991, increase in unemployment, and the lack of alternative sources of income, industrialized urban areas must have been exposed to high level of stress.

Social environment is important due to the fact that it is connected with the level of stress that members of a society are exposed to. Bad social environment is connected with high level of stress. As one of health consequences of this, alcohol consumption may be high.

Crime and divorce rates are expected to be negatively associated with health, and the rate of marriages is expected to have positive correlation with health status.

*Absence rate determinants: economic explanation*

Brodström et al. (2002) give the following hypotheses on the association between income and absence rate.

According to efficiency wage theory, employer may pay to an employee higher than market wage to stimulate the employee not to shirk. Moreover,

there may be compensating wage differentials for the possibility of an employee to be absent from work.

Next, if workers with bad health are less productive, they will earn less than workers in good health.

Finally, if an individual has strong preferences for being absent and is absent for more hours than other workers during his or her career, he or she will have less on-the-job training and, therefore, will earn less.

All the four hypotheses imply negative correlation between income and absence rate.


High unemployment is regarded as a disincentive to shirking (Brodström et al., 2002; Askildsen et al., 2002).The risk of losing the job as a result of shirking is high under high unemployment, as well as the costs of finding a new job. Askildsen et al. (2002) consider that this explains primarily the association between short-term absences and unemployment.

Furthermore, Askildsen et al. (2002) write: "Depending on how absences affect profitability, firm survival, and wage and career development, each worker will to varying degrees internalize costs of absences". In particular, insider workers will more likely internalize costs of absences "representing a threat to the firm" in periods of high unemployment than in periods of low unemployment, which will cause procyclical pattern also in long-term absences.

Therefore, the association between unemployment and absence rate is expected to be negative.

As household composition may influence absence preferences of individuals, percentage of children in the population of a region is used in the estimation.

Marital status can also influence preferences. However, data on the share of married workers and of those divorced are unavailable. Rates may serve as proxies; still, they do not seem to be good ones due to cultural changes that have taken place since 1991. Therefore, they are treated primarily as social environment proxies.

*Estimation results*

1) Cases of absence

The final model for cases of absence is the following. The specification was chosen on the basis of the results of Breusch-Pagan test (according to which pooled regression cannot be used) and Hausman test (which rejected the hypothesis about appropriateness of using random effects).

Fixed-effects regression, n=185

R-sq.: within=   0.77

between= 0.71

overall=   0.74

Dependent variable: cases of absence (per 100 workers)

| Variable | Coef. | P-v. |
|---|---|---|
| Air pollution | 0.07 | 0.029 |
| Water pollution | 0.13 | 0.001 |
| Industrial production | 0.41 | 0.000 |
| Higher education | -0.90 | 0.000 |

| | | |
|---|---|---|
| Harmful conditions | 0.72 | 0.000 |
| Unemployment | -1.17 | 0.000 |
| Divorce rate | 2.7 | 0.070 |
| Constant | 55.97 | 0.000 |

Air and water pollution, and harmful working conditions, have detrimental impact on health.

Increase in industrial production is unfavourable for health. GDP, if included into the model instead of industrial production, is also positively and significantly associated with the number of cases of absence (however, the model becomes inefficient due to the decreased number of observations). This effect must be due to high pressure workers are exposed to during boom periods, and generally poor working conditions Ukrainian employees have to face lie in the core of the problem. (While working conditions variable accounts only for the share of employees exposed to unfavourable conditions, industrial production per worker captures duration and/or intensiveness of work.)

The present model includes percent of employees having any level of higher education. The inclusion of percentage of workers with undergraduate and higher level of education separately (simultaneous inclusion makes estimates inefficient due to high correlation between the variables) does not change the result: higher education is favourable for health.

Unemployment is negatively associated with absence rate, and this may be due to several reasons: lower pressure on workers during recession, health selection under high unemployment, or disciplining effect of unemployment on workers.

Divorce rate is positively associated with absence rate in the model.

Marriage and crime rates and urbanization are not included into the final model.

Marriage and crime rates have the signs opposite to those expected, when they are included into the model. Though it indeed was case that absence frequency fell when social environment worsened, this relationship is highly unlikely to be causal. The worsening of social environment began to take place after 1991 as a result of economic decline and drastic political changes; rapid fall in production led to decrease in the frequency of work-related diseases. Moreover, the share of registered marriages fell due to cultural changes which took place after 1991, which again contributes to the positive association between rate of marriages and absence frequency.

For the mentioned reasons, marriage and crime rates are not included into the model. Divorce rate is significantly and positively correlated with cases of absence only when marriage and crime rates are not controlled for (otherwise, it is not significant). However, due to the fact that it has theoretically justified sign, it is included into the model.

Urbanization is insignificant in the present model (and has negative sign, which is opposite to the expectations).

Percentage of children has no significant impact on the number of cases of absence.

2) Duration of a case

The evidence on the impact of the factors on the duration of a case of absence is mixed.

Due to the fact that the model for the whole period and that without 1990 give somewhat different results, I include a dummy for 1990. After the exclusion of insignificant factors the model is the following. (Percentage of children is not included in this model.) According to Breusch-Pagan and Hausman tests, the use of random effects is appropriate.

Random-effects GLS regression, n=211

R-sq:  within  =  0.7906

between = 0.0391

overall =  0.4627

Dependent variable: average duration of a case, in days

| Variable | Coefficient | P-v. |
| --- | --- | --- |
| Air pollution | 0.0036 | 0.074 |
| Water pollution | 0.0065 | 0.009 |
| Industrial production | -0.0093 | 0.021 |
| Unemployment | -0.0985 | 0.000 |
| Higher education | -0.0513 | 0.000 |
| Dummy | -4.2269 | 0.000 |
| Constant | 16.4565 | 0.000 |

This model suggests that air pollution, water pollution and education have the impact that is predicted by health theory. However, working conditions variable is not significant in the model.

Industrial production has negative impact on duration of a case, which is most likely due to the increased incentives to work in the periods of economic upheaval. (However, this correlation may have one more reason: if it is the case that industrial production is associated with a big number of minor injuries, this may decrease the average duration of a case of absence.)

Unemployment has negative impact on duration, and, as mentioned above, this can be explained in several ways.

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Social variables are jointly insignificant; urbanization is not significant as well.

The dummy is negative and significant. This is likely to reflect the changes in economic conditions: for example, it may be the case that the level of workers' freedom generally increased after 1990. If economic conditions are indeed an important determinant of the dynamics of duration, the inclusion of dummy is justified, as economic conditions in 1990 were very much different from those in 1996-2002. Furthermore, it is necessary to mention that inclusion of the dummy leads to the generally justified signs of the coefficients. Finally, it should be noted that this estimate is highly significant and robust, unlike many of other estimates; this may suggest roughly stable levels of average duration under the conditions before and after transition, with certain fluctuations driven by few variables that are likely to exert economically significant impact on the duration of absence. (However, it is difficult to test this hypothesis, as we do not possess the necessary data (those for the period before 1990) at the moment.)

Trying other sets of variables and periods leads to the following observations.

Industrial production variable is robust to almost any changes. Only inclusion of percentage of children in the total population of a region, which is positively and significantly associated with the duration of a case, makes this variable insignificant. Due to the fact that industrial production

is highly correlated with the percentage of children, it is difficult to disentangle the effects of the two factors. However, it is almost certain that industrial production does not increase the duration of a case: under no specification was such (significant) association obtained.

Unemployment and education have positive signs in the model which includes 1990 and does not include the dummy (unemployment is significant at 5.3% level). Otherwise, they have negative signs, and unemployment estimate is robust to the changes in the set of variables.

Air pollution, water pollution and working conditions estimates are susceptible to changes (if dummy is not included, these factors have unexpected negative signs for the model with 1990, and are not significant without 1990), as well as social environment estimates.

The model with the inclusion of percentage of children is the following. Again, Breusch-Pagan and Hausman test suggest the use of random effects.

Random-effects GLS regression, n=185

R-sq: within = 0.8297

between = 0.2326

overall = 0.5941

Dependent variable: average duration of a case, in days

| Variable | Coefficient | P-v. |
|----------|-------------|------|
| Water pollution | 0.0057 | 0.024 |
| Unemployment | -0.0726 | 0.000 |
| Higher education | -0.0100 | 0.430 |
| Percent of children | 0.2614 | 0.000 |
| Dummy | -4.2544 | 0.000 |
| Constant | 9.3645 | 0.000 |

Though higher education is not significant in this model, it is left in the model. Exclusion of higher education leads to decrease in within $R^2$ (it becomes 0.77). It is likely that multicollinearity is the reason for inefficiency of this estimate.

Therefore, the dynamics of the average duration of a case does not seem to be linked so tightly to changes in health status as that of cases of absence; furthermore, incentives are likely to have stronger impact on the former than on the latter indicator. This result may indeed suggest that inequalities in duration of absence are for the most part not driven by differences in social conditions; anyway, it should be remembered that beginnings of absence spells are likely to be very often caused by a number of

unfavourable social development indicators. (Furthermore, the study has been made on the basis of aggregated data, and disaggregation may provide new evidence on health inequalities.)

*Forecast*

The forecast is made on the basis of the model for cases of absence.

| Regions | Predicted rank | Real rank | Predicted value | Real value |
|---|---|---|---|---|
| The Crimea | 23 | 19 | 44,35708 | 46,6625 |
| Vinnytsia | 18 | 25 | 48,85768 | 36,15 |
| Volyn' | 19 | 21 | 47,06329 | 42,3625 |
| Dnipropetrovs'k | 3 | 3 | 83,78989 | 77,4 |
| Donetsk | 1 | 1 | 93,42125 | 97,7625 |
| Zhytomyr | 12 | 11 | 52,14382 | 54,5375 |
| Zakarpattia | 27 | 26 | 33,34954 | 33,3875 |
| Zaporizhia | 4 | 6 | 75,06985 | 61,225 |
| Ivano-Frankivs'k | 13 | 10 | 51,28962 | 55,1625 |
| Kyiv | 8 | 7 | 56,35935 | 61 |
| Kirovohrad | 21 | 8 | 45,4032 | 60,1625 |

| | | | | |
|---|---|---|---|---|
| Luhansk | 2 | 2 | 85,48161 | 83,6 |
| L'viv | 24 | 14 | 39,08501 | 52,125 |
| Mykolaiv | 6 | 20 | 57,0776 | 46,5375 |
| Odesa | 16 | 22 | 50,208 | 41,4625 |
| Poltava | 5 | 9 | 65,57564 | 55,525 |
| Rivne | 17 | 18 | 49,00645 | 48,675 |
| Sumy | 7 | 12 | 56,71849 | 53,95 |
| Ternopil' | 26 | 23 | 36,4813 | 40,5375 |
| Kharkiv | 9 | 13 | 53,5982 | 53,85 |
| Kherson | 22 | 16 | 44,76453 | 49,275 |
| Khmel'nyts'kyi | 20 | 24 | 46,62881 | 36,9125 |
| Cherkasy | 14 | 17 | 51,0669 | 49,0625 |
| Chernivtsi | 25 | 27 | 38,54978 | 30,8625 |
| Chernihiv | 11 | 15 | 52,87986 | 50,125 |
| Kyiv city | 10 | 4 | 53,4375 | 74,925 |
| Sevastopol' city | 15 | 5 | 50,71672 | 63,68571 |

*Table 1. Mean forecast and mean values of cases of absence for 1990 and 1996-2002.*

Mean absolute percentage error of the forecast is 9%. Rank correlation of the mean forecast values with the actual values is 73%.

The forecast suggests that industrialized Eastern regions with unfavourable physical and social environment have the worst health situation, and Western regions, where the situation is reverse, are the best.

While for some regions the predicted values do not differ much from the actual ones, for the others the differences are significant. This may be attributed to the failure to include certain factors that have impact on health or to the imperfect nature of the variables under consideration. In particular, physical environment variables do not inform about the degree to which the conditions are harmful; water pollution variable does not account for the volume of pollution. In addition, some data may be unreliable due to shadow production, inability to capture all the amount of pollution or register all social events: crime, marriages and divorces. The variables not considered are alcohol consumption and income inequality, the data on which are not available (income distribution data are available only for some years for the period under question). Road accidents also have not been considered. Air pollution from vehicles (which is contained in air pollution variable) may partially account for this factor.

Conclusions

The model for the cases of absence has revealed that the dynamics of this indicator depends primarily on the changes in health status of workers. This is suggested by the significance of variables showing the quality of environmental and working conditions; moreover, higher education has negative impact on absence rate, which is consistent with the expectation of favourable impact of education on health.

Increase in GDP per capita is detrimental for employees' health. Under generally poor working conditions that Ukrainians have to tolerate, the increase in intensiveness of work leads to rise in injuries and diseases. Moreover, this effect is likely to be aggravated by higher level of stress workers are exposed to in the periods of economic upheaval.

Unemployment is negatively connected with absence frequency, which is likely to be explained by unfavourable impact of boom periods on health; two other possible causes of this association are health selection during economic downturns and disciplining effect of unemployment.

The evidence on the expected impact of social environment on workers' health is not revealed by two of the three social environment variables. This does not mean that there is no such impact. Anecdotal evidence suggests that alcohol consumption is responsible for a certain share of industrial injuries. During boom periods the number of such injuries may increase as the result of higher pressure workers are exposed to; however,

this effect may be not revealed due to the fact that social relationships generally improve during the boom periods. This may mean that industry-related stress is a more influential factor for workers' health than general social situation. Furthermore, health selection taking place during recession might contribute to this result.

Duration of a case has much lower variation across time and regions than cases of absence. Its dynamics is not likely to be heavily dependent on physical environment; furthermore, there is certain evidence on the impact of preferences, in particular of those connected with economic incentives, on duration. GDP per capita is not likely to increase the duration of absence, which may be explained by efficiency wage theory; also, during the periods of rise in production, firms may compel workers to reduce the length of their absence periods. Unemployment, at least when the beginning of the period is not included into the analysis, seems to act as a disincentive to take long absence spells (if the impact of unemployment on the duration is connected primarily with incentives). Children are likely to act as an incentive to prolong absence periods.

The model of cases of absence is used for the forecast, since it is likely to capture better the factors that affect health status of individuals than the model of duration of a case. According to the forecast, Eastern highly industrialized regions with unfavourable physical and social environment are the worst in terms of their workers' health; at the same time, Western regions, where working and environmental conditions are relatively good

and social environment is favourable, are the best for the health of working population. Unfortunately, the forecast for certain regions gives systematic under- or overestimations of health situation, which suggests that the model fails to capture certain factors that influence health, and as a result, may give under- or overestimates of the impact of factors included into the model. Therefore, further research is needed; in particular, the use of disaggregated data may be illuminating.

The results of the study accord with certain findings obtained for Ukraine (Gilmore et al., 2002) and Russia (Walberg et al., 1998), and studies for some other countries of the world. The finding that economically favoured regions can be most unhealthy is present in the work on Russia (Walberg et al., 1998); however, while in the present study this result is explained primarily by working conditions as a crucial reason for the detrimental impact of GDP, the stress of transition and the quality of social environment were the explication in the case of Russia. Furthermore, the finding of positive correlation between absence rate and contracted hours of work in studies on Sweden (Brodström et al., 2002) and Norway (Askildsen et al., 2002) accords with the hypothesis that increased strain may increase absence rate. Higher education is favourable for health: this was found for Ukraine by Gilmore et al. (2002); the present study also finds this effect. The results on social environment obtained in the present work are somewhat different from the findings for Ukraine and Russia, which must be due to the fact that different population groups are

considered, and outcome measures used are different. Working population is likely to be health-selected; furthermore, work-related factors are likely to be the most important for employees' health.

Therefore, according to the results of the study, in Ukraine there exist systematic health inequalities on regional level caused by differences in living and working conditions of individuals. These inequalities are unfair in the sense that the factors that cause them cannot be easily changed by individuals that suffer. At the same time, government interventions can at least partially manage the situation. Working conditions, whose state is extremely poor in certain branches of industry, should be in the focus of attention. (Moreover, even pure economic considerations in some cases do not justify the existence of such branches; in coal mining, which is the worst branch in terms of danger of work, many enterprises are not profitable (and have no perspectives to become profitable) and survive only due to subsidies. Therefore, the need in structural changes in the economy is only confirmed by the health reasoning; for certain, high level of care about possible social consequences of policy interventions is needed.) Changes in the legislation on work safety, better monitoring, and the laws stimulating the use of mechanic devices instead of labour can improve the situation. Environmental pollution has been found to affect health detrimentally; this problem is possible to fix by stricter laws and tighter control over pollution. The finding of positive impact of education on health suggests the efficacy of policy measures aimed at the increase in the

level of education and of those stimulating higher human capital intensiveness of production. Certainly, the problem of finding appropriate policy measures to deal with health inequalities requires thorough additional analysis; the study in question has only found some possible sources of health inequities in Ukraine.

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Data Description

| Variable | Obs | Mean | Std.Dev. | Min | Max |
|---|---|---|---|---|---|
| Absence rate, days in a year | 346 | 7.25 | 2.18 | 3.20 | 13.93 |
| Cases, per 100 employees in a year | 346 | 58.43 | 20.88 | 22.4 | 116.8 |
| Average duration of a case, days | 346 | 12.72 | 1.36 | 9.8 | 16.9 |
| Air pollution, tons per square kilometre | 350 | 19.5 | 39.86 | 0.4 | 341.3 |
| Water pollution, % polluted water | 349 | 31.75 | 22.48 | 1 | 91 |
| Harmful conditions, % of employees | 294 | 19.4 | 8.42 | 6.3 | 46.4 |
| Industrial production, rubles 1990/worker | 345 | 33.62 | 19.7 | 2.38 | 110.20 |
| GDP per capita, 1996 UAH | 162 | 3.10 | 1.26 | 1.41 | 10.91 |
| Higher education, % of employees | 215 | 39.87 | 7.26 | 22.6 | 63.8 |

| | | | | | |
|---|---|---|---|---|---|
| Unemployment, % of labour force | 237 | 8.98 | 4.36 | 0 | 19.2 |
| Marriages, per 1000 adults | 319 | 9.29 | 1.77 | 5.85 | 13.49 |
| Divorces, per 1000 adults | 319 | 4.60 | 1.17 | 2.31 | 8.07 |
| Crime, per adult | 292 | 0.012 | 0.005 | 0.004 | 0.03 |
| Children (up to 14 years old), % of population | 319 | 20.09 | 2.41 | 13.9 | 26.2 |
| Urbanization, % of urban residents | 323 | 62.74 | 16.57 | 36.7 | 100 |