

ADULT MORTALITY DIFFERENTIATION ACCORDING TO EDUCATIONAL LEVEL IN RUSSIA

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Background. Socio-economic gradient in adult mortality is the well-known and widely analyzed phenomenon (Kitagawa & Hauser, 1973; Kunst et al., 1998; Huisman et al., 2004; Mishra et al., 2004; Cutler et al., 2006; Valkonen, 2006; Klotz, 2010; Luy, Di Giulio, Caselli, 2011). The majority of studies on social differentiation of mortality describe its educational differentiation. In Russia there were rare mortality studies in relation to educational level belonging to "Soviet" period based on censuses data for 1979 and 1989 (Andreev, Dobrovolskaya, 1993) or covering early 1990s (Shkolnikov et al., 1998; Shkolnikov, Andreev, Maleva, 2000). Later studies were focused on certain regions (Ivanova, Semenova, Zemlyanova, 2006) or selected death causes (Konstantinov, 2007; Klodov, 2008).

The aim of the study is to determine current variations in mortality levels and cause structure of mortality of adult population in Russia related to educational level.

Methods and data

The study is based on data of All-Russia population census 2010 including data on population distribution by sex, age and educational level. Data from death certificates with information about educational level for 2011 were used for indicators calculation. To adjust data on number of population and number of deaths for the same year, census population distribution according to educational level was applied to average annual population number for 2011.

Standardized mortality rates (European standard) were calculated per 100,000 population for age intervals: 25-69 years, 25-39 years, 40-54 years and 55-69 years. 25 years were selected as starting point of the age interval because the majority of population completes their education at that age (at least higher (university) education). End point of the age interval was determined by tabulation of census educational data.

Mortality rates were calculated for 7 main causes accounting for 95% of all deaths in selected age groups: cardio-vascular diseases, neoplasms, external causes, respiratory diseases, digestive diseases, infections and ill-defined conditions.

The following educational groups were identified: higher including post-university (15 years of education and over); incomplete higher education (13-14 years of education), secondary professional (11-12) and general secondary education (10-11 years of education), basic vocational training (10-11) and basic general education (8-9 years of education), elementary education and people without education (7 years of education or less).

According to census data 2.4% of men and 3.4% of women didn't provide information on their educational level. Among the deceased from the same age interval information on their educational level is not available in 30-38% of cases depending upon the death cause.

Results.

Two hypotheses are being discussed. The first hypothesis is that among the deceased with unknown educational distribution by educational level is the same as the distribution among those with the specified educational level. If so, the calculation results only for the group with known educational level should reveal the well-known regularity: mortality level mainly due to avoidable causes increases while educational level decreases.

The second hypothesis is that distribution according to educational level differs in the group with known level of education and in the group with unknown level of education. At that, the group with the unknown level education mainly includes people with lower education or even without any education. If so, the mortality rates calculated only for the group with known educational level should be lower (of similar to) among people with lower education in comparison with those with higher educational level.

Thus, if we calculate mortality rates only for those with known level of education, regularity of increased mortality along with decreased number of years of education is observed only in the first four groups (persons with general secondary education and higher). The minimal rates in all age groups both in men and women are observed in population with higher and post-university education. In those who didn't complete their higher education the mortality rates from 7 main death causes are nearly twice higher than in the previous group. Mortality in people with secondary professional education i.e. who studied for 11-12 years is even higher than in population with incomplete higher education.

Further analysis of mortality by educational level shows impaired regularity. Those with basic vocational training (10-11 years) demonstrate similar or even lower (in some ages) mortality rates than people with incomplete higher education. And people with elementary education or without education demonstrate mortality rates similar to those with general secondary or secondary professional education.

Thus, the analysis shows that educational distribution among those with known level of education and those with unknown level of education differs. Furthermore, the group with unknown level of education includes lower educated people because their mortality rates turned out to be unreasonably low.

To obtain at least a generalized estimate of mortality for lower educated groups we suggest the following approach. Since we know the mortality rate for general population in corresponding age groups of men and women as well as the rates for high and secondary educated groups, in which underestimation is minimal, we could receive a summarized estimation for lower educated groups. To those groups we attribute people who studied for 8-9 years and those who studied less than 7 years or have not education at all (tab. 2).

	Higher (15 years and over)	Incomplete higher (13-14 years)	Secondary professional (11-12 years)	General secondary (10-11 years)	Lower educated (9 years and less)	Total
men						
20-39	99.9	191.3	450.5	770.8	1449.2	568.8
40-54	347.1	643.3	954.1	1274.4	3336.1	1261.5
55-69	1156.0	2327.0	2743.3	2907.7	5658.6	3086.9
women						
20-39	33.0	56.1	128.8	266.9	462.8	142.9
40-54	133.2	308.8	276.2	486.7	1567.2	408.2
55-69	433.5	1034.1	826.6	506.8	3076.5	1124.2

Table 2. Mortality from 7 main causes in educational groups and in general population of corresponding age and sex (with summarized estimate for lower educated), per 100,000 population. Russian Federation, 2011.

The mortality in lower educated men is by 2.5 times higher than in age groups 25-39 and 40-54 years of general population; at age interval 55-69 years the overrun reduces to 1.8 times. In women maximal mortality increase in lower educated groups over average rate for general women population is mainly found in the age group 40-54 years and ads up to 3.8 times. In age group 20-39 years it equals to 3.2 times and in age group 55-69 years - 2.7 times. Mortality differences between polar higher and lower educated groups are really huge: in age group 25-39 years the difference exceeds 14 times (!); in age group 40-54 years - 9.6 times in men and 11.8 times in women; in age group over 55 years - 4.9 times and 7.1 times correspondingly. These results suggest that in younger ages mortality is predominantly formed by lower educated population groups that corresponds to the previously obtained results (Ivanova AE, Semyonova VG., 2004; Zemlyanova E., Ivanova A., 2012).

At the same time, mortality differences in women according to educational level appeared to be larger than in men. This finding contradicts to results of the majority of studies conducted in European countries (Luy, Di Giulio, Caselli, 2011).

Age differences of mortality according to educational level give us indirect insight about death causes forming these differences. In all age groups maximal differences are formed by socially sound diseases and death causes which are totally or partially avoidable.

Among 25-39 years old with higher education infections accounted for 3.0% of deaths in men and 4.5% in women; among their lower educated peers the share of deaths from infections was 13.1% and 15.3% correspondingly.

Input of respiratory diseases in the lower educated was 2 times higher (5.9% and 2.5% in men; and 7.8% and 3.2% in women), input of digestive diseases was 1.4 times higher in men (8.4% and 6.8% correspondingly) and nearly 2 times higher in women (10.1% and 5.5% correspondingly).

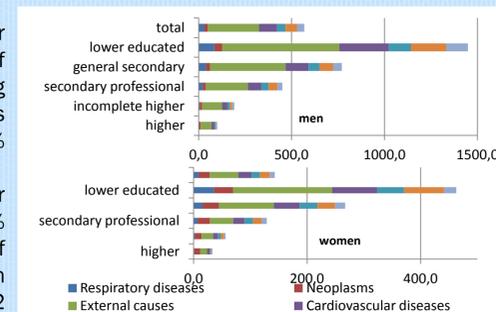


Fig. 1. Mortality in age group 25-39 years from main death causes per 100,000 population, standardized rate. Russian Federation, 2011.

As a result, 58.1% of all deaths in the mortality structure of young men with higher education is accounted for by traumas, 15.6% - by cardiovascular diseases and 8.6% - by neoplasms, whereas in the less educated traumas account for 43.5% of deaths, cardiovascular diseases - 18.2%, infections - 13.1% and neoplasms rank seventh with their share adding up to 2.9%.

In young women structural differences of mortality depending upon educational level are even more impressive. Among higher educated women traumas and neoplasms have similar shares in mortality structure (36.3% and 32.6% correspondingly) and altogether account for about two thirds of all deaths. Among their lower educated peers one third of deaths is formed by external causes (37.7%), and cardiovascular diseases and infections rank second and third (17.3% Fig.3. Mortality in age group 55-69 years from main death causes per 100,000 population, standardized rate. Russian Federation, 2011. and 15.3% correspondingly).

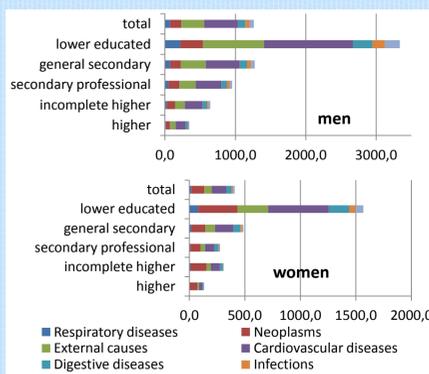


Fig.2. Mortality in age group 40-54 years from main death causes per 100,000 population, standardized rate. Russian Federation, 2011.

Mortality from ill-defined and unknown causes in men with higher education equals to 12.3 per 100,000 and in lower educated men - 212.4 per 100,000; in women - 2.6 and 70.4 per 100,000 of corresponding population. Taking into account mortality from ill-defined and unknown causes in lower educated persons, the mortality structure seems rather questionable with the role of external causes is likely to be underestimated (Semyonova V., Ivanova A., Sabgayda T., Gavrilova N., Evdokushkina G., Zemlyanova E., Zaporozhchenko V., Antonova O., Nikitina S., 2012).

In the ages 55-70 years the structure of death causes is hinged on cardio-vascular diseases and neoplasms. However, their proportion in the educational groups essentially differs. Thus, neoplasms in men with higher education account for more than a quarter of deaths (27.7%) and only less than one fifth of cases (19.7%) in their lower educated peers. In women variance is even greater. In the group with higher education neoplasms account for nearly half of deaths (45.4%), but in lower educated women their proportion is nearly twice less - 25.7%. While the importance of death causes other than cardio-vascular diseases and neoplasms in this age group visibly decreases mortality from socially sound diseases in the lower educated of this age group and younger ages as well remains significantly high in comparison with people with higher education. Therefore, summary (total) input of respiratory, digestive diseases and infections adds up to 12.1% and 9.7% in men and women with higher education compared to 17.2% and 14.8% in their lower educated peers.

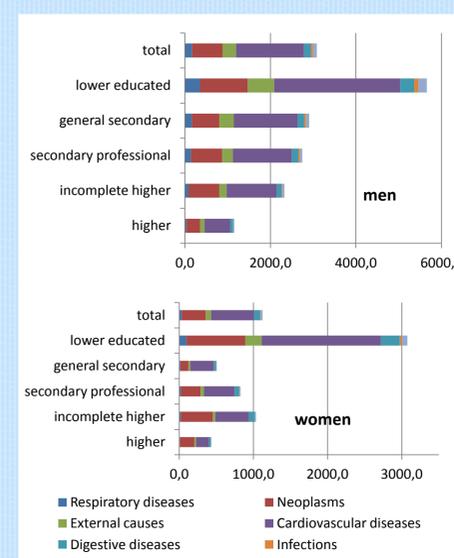


Fig.3. Mortality in age group 55-69 years from main death causes per 100,000 population, standardized rate. Russian Federation, 2011.

Conclusions.

In Russia there are significant mortality differences by the level of education with the maximal magnitudes in young ages. This situation suggests that in this population group mortality is mainly formed by people with lower education.

In lower educated groups mortality from all causes is higher regardless of age, but maximal differences are formed due to socially sound diseases and fully or partially avoidable death causes.

The observed regularities allow to suppose that in the 1990s and early 2000s mortality in Russia grew mainly due to lower educated population groups. This is supported by the outstripping growth rate of mortality from socially conditioned avoidable death causes in the youngsters as well as in all age groups.