

INEQUALITIES IN WOMEN'S MORTALITY BY EDUCATION NEENAKOSTI V UMRLJIVOSTI ŽENSK PO IZOBRAZBI

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Abstract

Background: Researchers have found that mortality is decreasing in all socioeconomic population groups but the relative differences in mortality between lower and higher social classes remain unchanged or have even increased. In Slovenia this has not yet been studied.

Methods: The analysis included all women in Slovenia who died in the 2005-2010 period and were recorded in the Registry of deaths. Cause of death data was linked to data on the educational attainment of the deceased person, which was applied successfully in 98.8% of cases. The rate ratios (RR) for age-standardised death rates were calculated for women with a low and high educational attainment.

Results: The calculated gap in life expectancy at age 30 between women with low and high educational attainment stood at 5.5 years. Women aged 0-84 with a low educational attainment had a statistically significant higher risk of death than women with a high educational attainment (RR=1.65; 95% CI: 1.57-1.73). Inequalities in premature mortality were even greater (1.78; 1.65-1.93). Educational inequalities in premature mortality were revealed in the majority of causes of death, e.g. cervical cancer (1.99; 1.22-3.67), lung cancer (1.70; 1.30-2.26), cardiovascular diseases (3.02; 2.41-3.91), causes directly attributable to alcohol (7.34; 4.96-12.27), motor vehicle accidents (2.23; 1.21-4.45) and suicide (1.68; 1.19-2.41).

Conclusions: Significant socioeconomic gaps in women's mortality in Slovenia obligate us to more systematic monitoring of health inequalities in the future. Further research is required in order to clarify specific reasons for the major gaps in mortality from specific causes of death.

Key words: socioeconomic inequality, causes of death, premature mortality, education

Izvorni znanstveni članek
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Izvleček

Izhodišče: Raziskovalci ugotavljajo, da v vseh socialno-ekonomskih skupinah prebivalcev umrljivost pada, vendar relativne razlike v umrljivosti med nižjimi in višjimi socialnimi sloji ostajajo nespremenjene ali so se celo povečale. V Sloveniji doslej to še ni bilo raziskano.

Metode: V analizo so bile vključene vse ženske v Sloveniji, ki so umrle v obdobju 2005–2010. Uporabljeno je bilo povezovanje podatkov o vzrokih smrti s podatki o izobrazbi umrlih oseb, ki je bilo uspešno v 98,8 % primerov. Izračunano je bilo razmerje stopenj (RR) starostno standardizirane umrljivosti med nizko in visoko izobraženimi ženskami.

Rezultati: Vrzel v pričakovanem trajanju življenja pri starosti 30 let med nizko in visoko izobraženimi ženskami je bila 5,5 let. Nizko izobražene ženske v starosti 0–84 let so imele statistično značilno večje tveganje za smrt kot visoko izobražene (RR=1,65; 95% CI: 1,57–1,73), še večje pa so bile razlike v prezgodnji umrljivosti (1,78; 1,65–1,93). Izobrazbene neenakosti v prezgodnji umrljivosti so se razkrile pri večini vzrokov smrti, npr. rak materničnega vratu (1,99; 1,22–3,67), rak pljuč (1,70; 1,30–2,26), bolezni srca in žilja (3,02; 2,41–3,91), alkoholu neposredno pripisljivi vzroki (7,34; 4,96–12,27), nezgode z motornimi vozili (2,23; 1,21–4,45), samomor (1,68; 1,19–2,41).

Zaključki: Velike socialno-ekonomske razlike v umrljivosti žensk v Sloveniji nas zavezujejo k bolj sistematičnemu spremljanju neenakosti v zdravju v prihodnje. Potrebno je nadaljnje raziskovanje, da bi razjasnili specifične razloge za velike razlike v umrljivosti zaradi posameznih vzrokov smrti.

Ključne besede: socialno-ekonomska neenakost, vzroki smrti, prezgodnja umrljivost, izobrazba

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1 INTRODUCTION

Various welfare indicators, social exclusion indicators and income inequality indicators position Slovenia among the group of EU member states with the lowest rates of social inequality (1). Nevertheless, in the last 30 years we have been witnessing persistent inequalities in self-assessed health between educational groups in our population (2). And health inequalities are actually among the most obvious indicators of social inequalities (3).

Earlier analyses of inequalities in mortality in Slovenia have shown a mortality gap between geographical areas of the country (4), which is related to the socioeconomic characteristics of these areas. Mortality is higher among the residents of less developed municipalities with a lower average income tax base per capita and a higher unemployment rate. There are also significant differences with regard to gender (5). The causes of premature mortality relate to gender and the socioeconomic characteristics of population groups and of the area of residence (6).

Women's health reflects the health of the society and is sensitive to social changes (7). Inequalities in mortality by education and other social determinants are less prominent in women than in men (8). This was also confirmed by the Eurostat study, which has shown that life expectancy gaps between women with regard to educational attainment in Slovenia are among the lowest compared to other European countries included in the survey (9). However, mortality gaps by educational attainment in specific causes of death vary widely both in women and men (10-12). Education distinctly reflects the socioeconomic status of the individual and provides numerous advantages in analysing differences in mortality compared to the position of employment, occupation or household income (10). So far in Slovenia, no study of the inequalities in life expectancy and the calculation of inequality indicators for cause-specific mortality by educational attainment has been carried out. Shedding light on specific causes of inequalities in women's mortality can help find levers that will reduce socioeconomic inequalities in health or at least prevent at least prevent them from increasing (5).

2 METHODOLOGY

The Registry of deaths database of the residents of Slovenia managed by the National Institute of Public Health (NIPH) was the main source of the analysis. Data for the 2005 to 2010 period was used. The

database contains the underlying cause of death chosen and classified according to the International Statistical Classification of Diseases and Related Health Problems; tenth revision (ICD-10). The Statistical Office of the Republic of Slovenia (SORS) completed this data with data on individual educational attainment. Data on deceased children up to and including the age of 20 were supplemented with the educational attainment of their mothers. In this way, the data on 98.8% of deceased women and 98.6% of deceased men was completed with the data on their educational attainment. Data on the educational attainment of all Slovenian residents in 5-year age groups, which were used as the denominator, was calculated from the average levels in two population censuses conducted in 2002 and 2011. The level of educational attainment was converted into three categories, whereby *low* represents primary school or less, *middle* represents vocational or secondary school and *high* represents the higher education level and all subsequent levels.

In order to calculate life expectancy by educational attainment, Eurostat's method was used (9). In Slovenia, life expectancy at birth for women was 82.7 years in 2008 (13). To be able to present the inequalities by causes of death that contribute the most to mortality before a women's life expectancy at birth, the analysis covered only deceased women aged up to 85 years. In order to show disparities in premature mortality, the rates for deceased women aged up to 65 years are shown separately.

For the calculation of age-standardised death rates (SDR), the direct standardisation method using the European standard population was used. The rate ratios (RR) (14-16) were calculated for the age-standardised death rates for women with low and high educational attainment. In calculating confidence intervals, the Monte Carlo simulation was used (17). The assumption was considered that for the chosen cause of death, the number of deceased women with a specific educational attainment in a specific age group follows a Poisson distribution. Values of $p < 0.05$ were interpreted as statistically significant.

The paper presents causes of death by selected chapters, and blocks or groups of diagnosis that together represent 95.1% of total women's mortality and which can be influenced with known and efficient public health measures. The chosen causes of death were defined using ICD-10 codes as can be seen in Table 1. The group of causes directly attributable to alcohol includes codes G32.1, G62.1, G72.1, I42.6, K29.2, K70.0-K70.9, K86.0, O35.4, P04.3, Q86.0, R78.0, and when alcohol is not classified as the underlying cause

of death, also codes T51.0, T51.1, T51.9, X45.0-X45.9, X65.0-X65.9, Y15.0-Y15.9.

The age-specific death rates by educational attainment for specific causes are presented in figures where the LOESS method of smoothing the curves was used (18). SPSS (version 19), R (version 2.14.1) and Excel were used in the data analysis.

3 RESULTS

3.1 Life expectancy

In 2010, women's life expectancy at birth in Slovenia was 83.4 years and for men 76.7 years. The life expectancy at age 30 for women (53.9 years) was also higher compared to men (47.4 years).

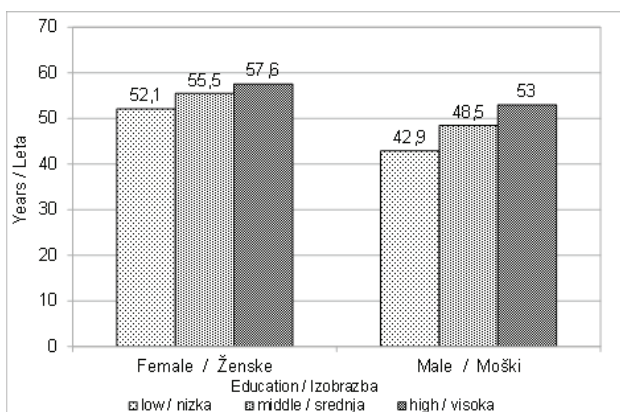


Figure 1. Life expectancy at age 30 by educational attainment and sex in Slovenia, 2010.

Slika 1. Pričakovano trajanje življenja pri starosti 30 let v Sloveniji po izobrazbi in spolu, 2010.

Source: NIPH, Registry of deaths 2010; SORS, Population census 2011

Vir: IVZ, Baza umrlih 2010; SURS Popis 2011

The gap in life expectancy at age 30 between low- and high-educated women in Slovenia stood at

5.5 years and between men with a low and a high educational attainment it stood at 10.1 years. In the lowest educational class, disparities in life expectancy between men and women were twice as high as in the highest class. The life expectancy of women with a high educational attainment and men with a low educational attainment differed by 14.7 years (Figure 1).

3.2 The mortality of women by cause of death

In the 2005-2010 period, 54,655 women died in Slovenia, of which 66.1 % were in the 0-84 age group and 13.2 % were in the 0-64 age group. Women aged 0-84 with a low educational attainment were exposed to a 1.7 times higher risk and women aged 0-64 years to a 1.8 times higher risk of death from all causes than women with a high educational attainment. Statistically significant differences were found in all age groups from 25 to 84 years (Figure 2).

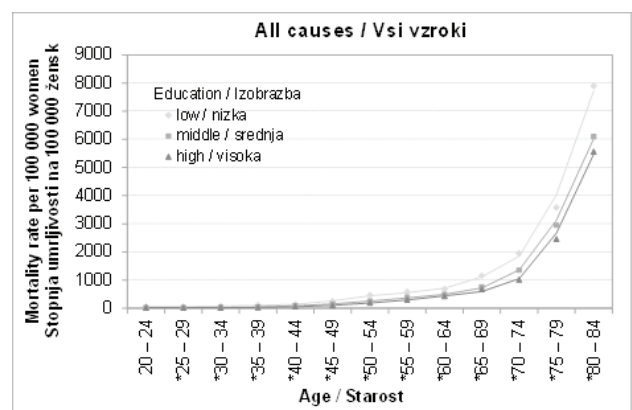


Figure 2. Age-specific mortality rates of women by educational attainment, Slovenia, 2005-2010.

Slika 2. Starostno specifične stopnje umrljivosti žensk po izobrazbi, Slovenija, 2005-2010.

*statistically significant difference between low- and high-educated women / statistično značilna razlika med nizko in visoko izobraženimi ženskami

Table 1. The number of deceased women aged 0-84 and 0-64, age-standardised mortality rates by educational attainment, rate ratio between low and high educational attainment, Slovenia, 2005-2010.

Tabela 1. Število umrlih žensk 0-84 let in 0-64 let, starostno standardizirana stopnja umrljivosti (SSU) po izobrazbi, razmerje stopenj med nizko in visoko izobrazbo (RR), Slovenija, 2005-2010.

Causes of death Vzroki smrti	ICD 10 MKB 10	Women (0-84 years)/ Ženske (0-84 let) Women (0-64 years)/ Ženske (0-64 let)						
		Number of deaths Število smrti	SDR per 100 000 by education SSU na 100 000 po izobrazbi				Rate ratio Razmerje stopenj	
			ALL SKUPAJ	LOW NIZKA	MIDDLE SREDNJA	HIGH VISOKA	RR (LOW/HIGH NIZKA/VISOKA)	95% CI
Neoplasms Rak	Chapter II Poglavje II	12484 3667	134.2 63.6	146.7 74.5	127.7 60.1	117.9 53.2	1.25 1.40	(1.16-1.34) (1.26-1.56)
breast cancer rak dojke	C50	2058 788	23.4 13.6	24.5 15.0	23.4 13.0	23.3 13.4	1.05 1.12	(0.90-1.24) (0.91-1.40)
cancers of female genital organs rak rodil	C51-C58	1604 580	18.2 10.0	20.8 12.3	16.3 8.6	14.5 9.0	1.44 1.37	(1.19-1.77) (1.07-1.79)
cancer of cervix uteri rak materničnega vratu	C53	261 142	3.3 2.5	4.5 3.7	2.7 2.0	2.2 1.9	2.08 1.99	(1.31-3.57) (1.22-3.67)
lung cancer rak pljuč	C33-C34	1567 602	18.2 10.4	19.1 12.7	19.8 10.3	18.9 7.5	1.01 1.70	(0.85-1.23) (1.30-2.26)
colorectal cancer rak debelega črevesa in danke	C18-C20	1582 335	15.9 5.7	17.8 6.6	14.0 5.3	13.2 4.8	1.35 1.40	(1.10-1.70) (1.00-2.04)
stomach cancer rak želodca	C16	685 152	6.9 2.6	8.6 3.8	5.7 2.3	2.9 1.5	2.97 2.62	(2.00-4.91) (1.51-5.34)
Diseases of circulatory system Bolezni srca in žilja	Chapter IX Poglavje IX	13895 1055	113.7 18.1	136.8 27.6	85.3 13.9	64.2 9.2	2.13 3.02	(1.93-2.36) (2.41-3.91)
acute ischaemic heart disease akutna ishemična bolezen srca	I20-I24	1561 183	13.8 3.1	16.8 4.9	10.7 2.0	7.9 2.0	2.14 2.41	(1.66-2.9) (1.52-4.37)
chronic ischaemic heart disease kronična ishemična bolezen srca	I25	1884 95	15.0 1.6	17.3 2.6	12.2 0.9	10.4 1.2	1.68 2.15	(1.33-2.19) (1.17-5.10)
other forms of heart disease druge bolezni srca	I30-I52	3990 225	31.4 3.9	38.1 5.7	22.1 3.3	15.3 2.1	2.49 2.79	(2.06-3.07) (1.73-5.23)
cerebrovascular disease cerebrovaskularne bol	I60-I69	3895 371	32.7 6.4	39.4 9.4	24.9 5.4	19.4 3.0	2.04 3.17	(1.72-2.46) (2.14-5.16)
Diseases of respiratory system Bolezni dihal	Chapter X Poglavje X	1843 139	15.0 2.4	18.4 4.4	11.8 2.0	8.8 0.7	2.09 6.89	(1.64-2.84) (3.13-29.45)
chronic lower respiratory diseases kronične bolezni spodnjih dihal	J40-J47	629 60	5.4 1.0	6.2 1.6	4.7 0.9	3.7 ***	1.69 0.00	(1.15-2.73) (0.00-0.00)
Diabetes mellitus Sladkorna bolezen	E10-E14	810 72	6.9 1.2	8.7 1.9	4.8 1.1	2.3 ****	3.78 15.11	(2.39-7.14) (4.54-23.36)
Diseases of digestive system Bolezni prebavil	Chapter XI Poglavje XI	2134 645	22.5 11.1	34.8 22.6	15.7 7.1	10.6 2.1	3.3 11.08	(2.63-4.25) (7.25-19.50)
Alcohol directly attributable causes** Alkoholno neposredno pripisljivi vzroki**		900 509	11.8 8.8	20.3 17.0	7.4 5.7	3.9 2.3	5.21 7.34	(3.73-7.83) (4.96-12.27)
External causes Zunanji vzroki smrti	Chapter XX Poglavje XX	2159 844	24.9 15.5	31.3 21.2	21.8 14.3	17.9 12.4	1.75 1.71	(1.46-2.12) (1.37-2.17)
unintentional injuries nenamerne poškodbe	V01-X59	1168 358	12.5 6.8	15.2 9.0	11.1 6.3	8.7 5.8	1.76 1.57	(1.37-2.33) (1.12-2.28)
traffic accidents prometne nezgode	V01-V99	286 189	4.2 3.7	5.6 5.1	3.8 3.3	3.7 3.8	1.51 1.35	(1.00-2.42) (0.85-2.21)
falls padci	W00-W19	690 68	5.8 1.2	6.5 1.4	4.8 1.2	3.5 0.7	1.88 2.04	(1.3-3.06) (0.94-6.57)
suicides samomori	X60-X84	561 357	7.7 6.4	9.6 8.2	7.0 6.0	5.4 4.9	1.79 1.68	(1.33-2.52) (1.19-2.41)
All deaths Vse smrti		36143 7205	348.4 128.4	413.8 173.2	294.1 112.5	251.3 97.1	1.65 1.78	(1.57-1.73) (1.65-1.93)

**codes listed in Methodology are included / vključene so kode našete v Metodologiji

no cases / ni primerov, *very low number of cases / zelo malo primerov

The differences in death rates by specific causes of death in women aged 0-84 and 0-64 by educational attainment are shown in Table 1. The greatest inequalities in women's mortality by educational attainment are evident in causes directly attributable to alcohol, diseases of the digestive system, diabetes, specific cancer types, cardiovascular diseases and

deaths due to falls. A detailed analysis of external causes has additionally shown a substantial gap in premature mortality due to motor vehicle accidents (RR=2.23 (95% CI=1.21-4.45)). Alcohol-related liver disease stands out among the causes directly attributable to alcohol and also represents the largest proportion of mortality from digestive diseases.

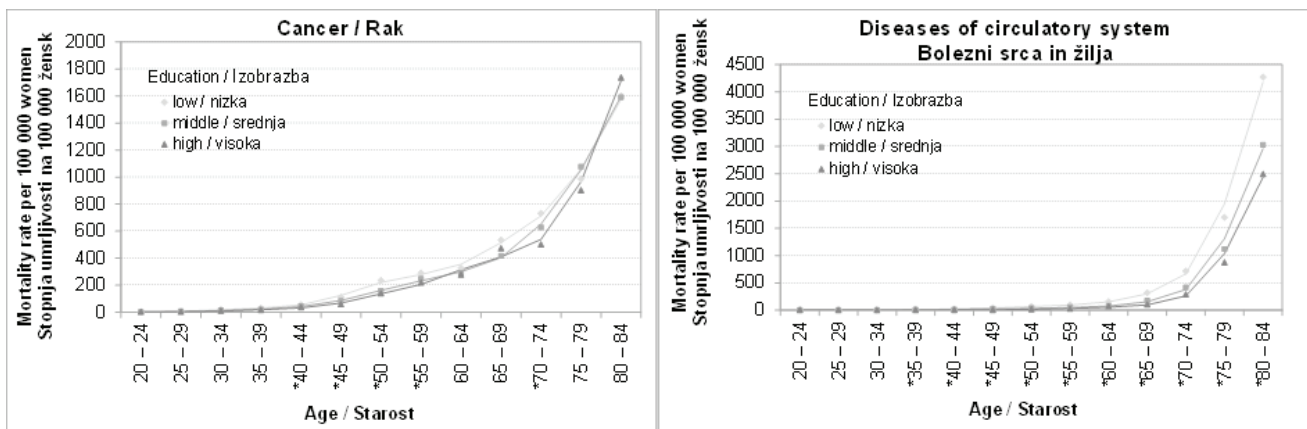


Figure 3. Age-specific mortality rates due to cancer and diseases of the circulatory system of women by educational attainment, Slovenia, 2005-2010.

Slika 3. Starostno specifične stopnje umrljivosti žensk zaradi raka in bolezni srca in žilja po izobrazbi, Slovenija, 2005-2010.

*statistically significant difference between low- and high- educated women / statistično značilna razlika med nizko in visoko izobraženimi ženskami

In various groups of causes of death, e.g. all cancers, lung cancer, cardiovascular diseases and causes directly attributable to alcohol, statistically significant differences in mortality between low- and highly-educated women were seen in different age groups (Figure 3, 4); in diabetes for example, only in women over the age of 70. Significant differences were also seen in both types of stroke in the over 50 age group, in other diseases of the heart in the over 65 age group, in acute ischemic heart disease in the over 70 age group

and in chronic ischemic heart disease in the over 80 age group.

In some causes of death – e.g. cervical cancer, stomach cancer, colorectal cancer, diseases of the respiratory system, unintentional injuries and suicide – statistically significant differences were detected in the ages 0-84 and 0-64. After detailed analysis by 5-year age groups, statistically significant difference is evident in some age groups (Figure 4).

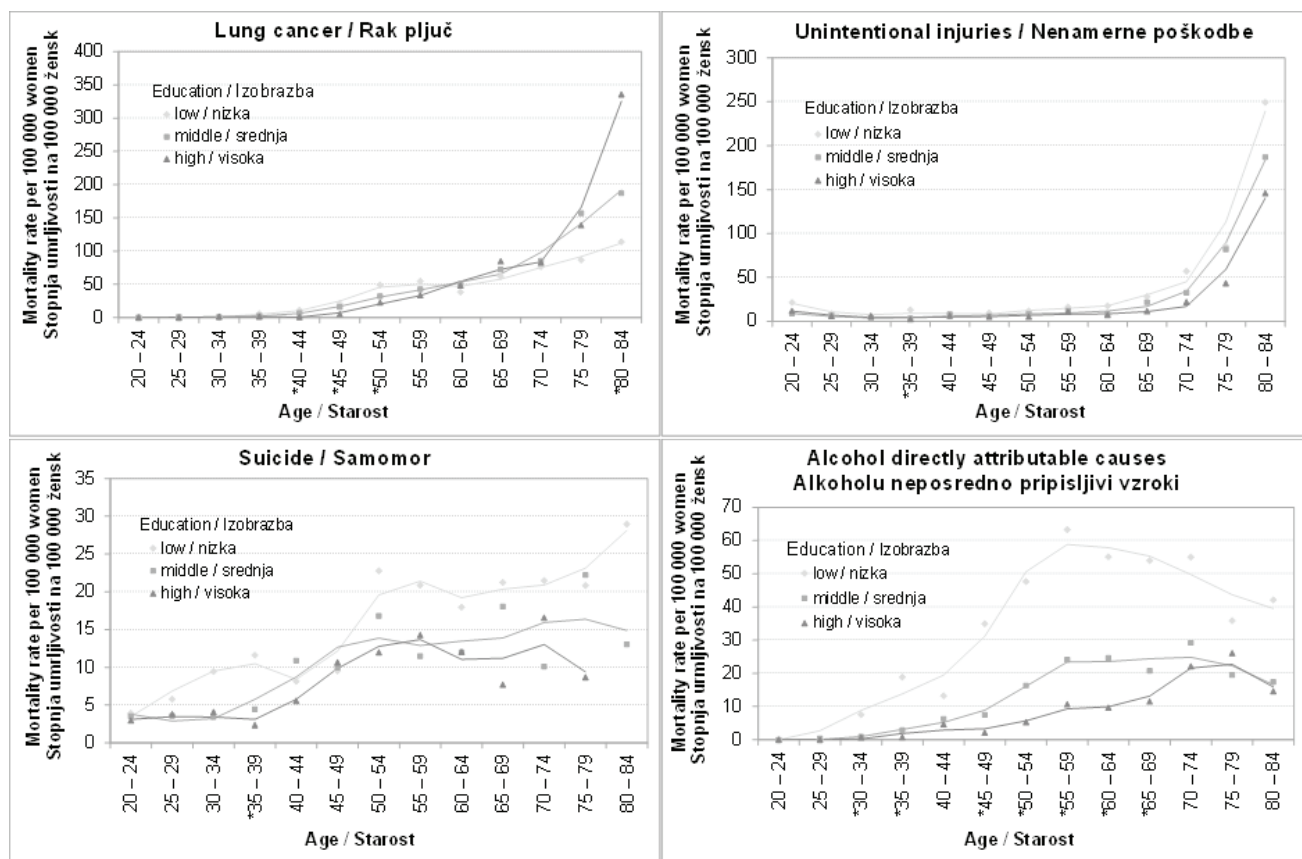


Figure 4. Age-specific mortality rates for women by selected causes of death and educational attainment, Slovenia, 2005-2010.

Slika 4. Starostno specifične stopnje umrljivosti žensk zaradi izbranih vzrokov smrti po izobrazbi, Slovenija, 2005-2010.

*statistically significant difference between low- and high- educated women / statistično značilna razlika med nizko in visoko izobraženimi ženskami

4 DISCUSSION

This study has confirmed the assumption that education is an important socioeconomic factor that is related to inequalities in the risk of death. Education as an important indicator of socioeconomic position does not influence health directly, but it influences access to more or less dominant social positions (19). A better education enables a better job, more autonomy and consequently a better reputation, higher income, better social position and at the same time a better ability to gather and use new knowledge to improve life in general (20).

In Slovenia, disparities in the life expectancy of women by educational attainment are among the lowest compared to other European countries (9), but our detailed analysis of women's mortality has shown substantial educational inequalities in mortality by specific causes of death.

Even in cases where there is no statistically significant difference in mortality, this in itself does not mean that there is no inequality. For example, our study did not find any disparities in breast cancer mortality in women with different educational attainments, while foreign and domestic research shows a higher incidence of this type of cancer in women with a high socioeconomic status (3, 21). One of the reasons might be that women with a high educational attainment experience a higher incidence of breast cancer but have better survival rates. Better survival rates might be the result of earlier detection of cancer in this population. Prior to the introduction of the national screening program for breast cancer in 2008, women in Slovenia had the possibility of opportunistic breast cancer screening by mammography. This option was probably utilised more by women with a higher educational attainment, similar to cervical cancer screening (22). In cervical cancer, the noted poorer

response of women with low educational attainment to the screening programme and consequently the diagnosis of the disease at a more advanced stage (22) at least partially causes the higher risk of death in women with a low educational attainment. Other risk factors are also more common in this educational group, such as early first sexual intercourse and riskier sexual behaviour, which may lead to a higher incidence of this type of cancer (23).

Social differences in health-related risk behaviour also provide an explanation of why lung cancer among younger women (40-55 years) is more often a cause of death for women with a low educational attainment and after the age of 80 for women with a high educational attainment even though the mortality at the age 0-84 years shows no significant inequalities. Smoking patterns in Slovenia show that in the middle of the last century smoking among Slovenian women first spread among women with a high educational attainment. This pattern still reflects in the total adult women population where the proportion of smokers remains the lowest among women with a low educational attainment. On the other hand, the proportion of female smokers in the younger age groups is the highest among women with low educational attainment (24).

The socioeconomic position of an individual is related to mortality from all causes but most strongly to mortality from cardiovascular diseases (25). The inverse relationship between the socioeconomic status and the risks of death from cardiovascular diseases is the result of the high prevalence and numerous risk factors, both behavioural and psychosocial, among people with a low socioeconomic status (24, 26, 27). Poorer access to health services and systematic underestimation of risk factors among people with a lower socioeconomic status in clinical practice are also reported (28, 29). Higher risks of cardiovascular diseases are present among people with diabetes and at least two thirds of diabetic patients die from these diseases (30). Due to the often incorrect coding of the underlying cause of death, the share of diabetes among causes of death is underestimated. In Slovenia, women with a low educational attainment have a higher incidence and mortality from diabetes and also show a higher prevalence of risk factors such as obesity, an unhealthy diet and lack of physical activity (24).

The biggest disparity in the mortality of women in Slovenia is the result of causes directly attributable to alcohol and is related to the low educational attainment of women and the poor socioeconomic status of the area of residence (24, 31). Persons with a low educational attainment experience greater social stress,

which contributes to a greater prevalence of unhealthy lifestyles including alcohol abuse to overcome problems (32). Alcohol-related health inequalities are thus at least partially related to differences in the drinking habits of people with different educational attainments, as it has been observed that in Slovenia uneducated people stand out among the adult alcohol dependant population (33). The excessive consumption of alcohol and high-risk binge drinking are additionally influenced by the poor socioeconomic status of the area of residence (34) and probably also the regionally conditioned ease of access of alcohol due to home production (31).

Risk behaviours related to the poor socioeconomic status of an individual, including excessive alcohol consumption, result in a greater risk in less educated women of premature death in motor vehicle accidents. The Slovenian adult population with low educational attainment uses seat belts in cars less often and drives less well equipped, i.e. less safe cars (26, 35). But in the last decades, falls have become a more significant cause of fatal injuries in Slovenia (36) and the risk of death is higher among women with a low educational attainment and from poorer areas (24). The socioeconomic differences in mortality from falls are related to the poor safety of the living space and inadequate property maintenance in poorer areas (37) and also to individual lifestyle factors that affect physical fitness and bone mineral density (26, 38). Another disparity relates to the accessibility of adequate health care (39, 40), as individuals in the least developed Slovenian region have a lower rehabilitation rate after hip fractures compared to the most developed region (41).

The established higher risk of death from suicide among women with a low educational attainment could be related to the higher incidence of mental health problems among people with a lower socioeconomic status (42-45). Among adults, the prevalence of two strong risk factors for suicide, depression and anxiety (46), is much higher in women (47). In Slovenian study the highest level of depression was recorded among women with the lower education. This could be explained by favourable psychologic effect of higher education on self-image and self-respect (45). However in linking socioeconomic status and mental problems, it is difficult to identify the cause and consequence (48, 49).

Socioeconomic differences in mortality are just one of the factors that affect the life expectancy of an individual (50). They are nevertheless important, as they arise from inequalities in the distribution of socioeconomic resources and on the other hand are at least partly

avoidable (51). The rapid decline in mortality from certain chronic diseases in people with a higher socioeconomic status is predominantly related to changes in lifestyle and better treatment (52), which means that there is a considerable potential to reduce mortality. It should be noted that the social patterning of behaviour is probably conditioned by material deprivation, poor psychosocial conditions and the lack of a supportive environment, which requires new approaches that combine support for an individual's behaviour change with interventions to ensure the social conditions for a healthy lifestyle (53, 54). The findings of our study represent the first step towards determining the priority areas for reducing health inequalities in Slovenia. However, additional research is needed to clarify the specific reasons for the significant differences in mortality from specific causes of death.

4.1 Methodological limitations

In our study a methodology with the most accurate available sources of data has been used, therefore our calculations have shown a larger gap in the life expectancy of Slovenian women and men by educational attainment than presented in the Eurostat study (9). The results nevertheless show a similar pattern of inequalities by education between women and men. Data on the educational attainment of deceased persons was obtained from administrative sources and population censuses, as the database of deceased persons includes causes of death and the educational attainment of the deceased, though the latter are poorly filled in. The sources used also have some deficiencies, as the level of attained education can be underestimated since they are unable to follow the rapid changes in the education of the younger population. In our study, this has resulted in a bias due to the misclassification of children and youth up to the age of 20 according to exposure (education) and consequently leads to a decrease in mortality differences by education. However, it has not affected the study results substantially, as the number of deceased persons under the age of 20 is relatively small.

Another methodological issue was how to determine the correct category for the same level of educational attainment, which might have a different socioeconomic meaning in the older generations compared to the younger generations and may be seen in the results as a higher mortality rate among people with a lower educational attainment and a lower mortality rate among people with a higher educational attainment. This methodological issue is often exposed in studies of inequalities in mortality by education. However, very

few solutions for using generation-adapted categories of education are published. One example is the use of higher category limits for completed years of schooling with closer in time cohorts of deceased persons (54). Due to the lack of an appropriate basis for a more equivalent categorisation of education in different generations in Slovenia, this adaptation of the data was not applied.

5 CONCLUSIONS

This study on the educational inequalities in women's mortality is the first of its kind in Slovenia. A comparison of results provided by our and some international studies confirms that in order to realistically show socioeconomic differences in health in a country, high quality data sources need to be used for the entire population including data on personal socioeconomic factors.

Our study has shown that women in Slovenia, whose socioeconomic equality was ranked among the highest in Europe in previous studies, experience substantial differences in life expectancy and mortality. The analysis has shown a different relative inequality in women's mortality from specific groups of causes of death. In terms of causes directly attributable to alcohol, cardiovascular diseases, diabetes, some types of cancer and falls, women with a low educational attainment are exposed to at least twice the risk of death as highly educated women. These differences cannot be reduced by social policies alone but require additional measures and programmes aimed at changing and improving lifestyle, especially among people with a low socioeconomic status.

The established large socioeconomic differences in women's mortality in Slovenia obligate us to a more systematic monitoring of health inequalities in the future. Further research on certain causes of death is required in order to obtain a more complex insight into specific reasons for the disproportionately high mortality in population groups with a low socioeconomic status.

References

1. Urad RS za makroekonomske analize in razvoj. Development report 2011. Available March 27, 2012 from: http://www.umar.gov.si/fileadmin/user_upload/publikacije/pr/2011/A_POR_2011.pdf.
2. Malnar B, Kurdija S. Trends in subjective health assessment between 1981 and 2011 as an indicator of persistent social inequalities. *Zdrav Var* 2012; 51: 11-20.
3. Kogevinas M, Pearce N, Susser M, Boffetta P, editors. Social inequalities and cancer. Lyon: International Agency for Research on Cancer, 1997.
4. Šelb-Šemerl J, Kravanja M. Umrlijvost. *Zdrav Var* 2001; 40: 79-86.

5. Buzeti T, Gobec M. Neenakosti v zdravju v Sloveniji. *Zdrav Var* 2012; 51: 75-79.
6. Artnik B, Vidmar G, Javornik J, Laaser U. Premature mortality in Slovenia in relation to selected biological, socioeconomic, and geographical determinants. *Croat Med J* 2006; 47: 103-113.
7. Doyal L. What makes women sick. London: MacMillan Press, 1995.
8. Mustard CA, Etches J. Gender differences in socioeconomic inequality in mortality. *J Epidemiol Community Health* 2003; 57: 974-980.
9. Corsini V. Highly educated men and women likely to live longer: life expectancy by educational attainment. In: *Eurostat Statistics in focus* 24. Brussels: Statistical Office of the European Communities, 2010.
10. Huisman M, Kunst A, Bopp M, Borgan JK, Borrell C, Costa G, et al. Educational inequalities in cause-specific mortality in middle-aged and older men and women in eight western European populations. *Lancet* 2005; 365: 493-500.
11. Schwarz F. Causes of death contributing to educational disparities in Austria. *Wien Klin Woch* 2007; 119: 309-317.
12. Leyland AH, Dundas R, McLoone P, Boddy FA. Cause-specific inequalities in mortality in Scotland: two decades of change: a population based study. *BMC Public Health* 2007; 7: 172.
13. WHO Regional Office for Europe. European health for all database (HFA-DB) (online database). Copenhagen, 2012. Available March 23, 2012 from: <http://www.euro.who.int/en/what-we-do/data-and-evidence/databases/european-health-for-all-database-hfa-db2>.
14. Mackenbach JP, Kunst AE. Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc Sci Med* 1997; 44: 757-771.
15. Scottish Public Health Observatory. Measuring socioeconomic inequalities in health: a practical guide. *Scotpho* 2007. Available September 13, 2012 from: http://www.scotpho.org.uk/downloads/scotphoreports/scotpho071009_measuringinequalities_rep.pdf.
16. Spinakis A, Anastasiou G, Panousis V, Spiliopoulos K, Palaiologou S, Yfantopoulos J. Expert review and proposals for measurement of health inequalities in the European Union. European Commission, 2011.
17. Efron B, Tibshirani R. Bootstrap methods for standard errors, confidence intervals, and other measures of statistical accuracy. *Stat Sci* 1986; 1: 54-75.
18. Cleveland WS, Devlin SJ. Locally-weighted regression: an approach to regression analysis by local fitting. *J Am Stat Assoc* 1988; 83: 596-610.
19. Muntaner C, Borrell C, Benach J, Pasarin I, Fernandez E. The associations of social class and social stratification with patterns of general and mental health in a Spanish population. *Int J Epidemiol* 2003; 32: 950-958.
20. Kamin T, Tivadar B. Kapitali in zdravje. *Teor Praksa* 2011; 48: 1028-1047.
21. Zadnik V. Geografska analiza vpliva socialno-ekonomskih dejavnikov na incidenco raka v Sloveniji v obdobju 1995-2002: doktorska disertacija. Ljubljana: Univerza v Ljubljani, 2005.
22. Primic-Žakelj M, Repše-Fokter A. Cervical cancer screening: a Slovenian experience. *Coll Antropol* 2007; 31 (Suppl 2): 23-26.
23. Bernik I, Klavs I. Spolno življenje v Sloveniji. Maribor: Aristej, 2011.
24. Buzeti T, Djomba JK, Gabrijelčič Blenkuš M, Ivanuša M, Jeriček Klanšček H, Kelsin N et al. Health inequalities in Slovenia. Ljubljana: National Institute of Public Health, 2011.
25. Berkman LF, Melchior M. The shape of things to come: how social policy impacts social integration and family structure to produce population health. In: Siegrist J, Marmot M. *Social inequalities in health: new evidence and policy implications*. Oxford: University Press, 2006; 55-72.
26. Zaletel-Kragelj L, Fras Z, Maučec-Zakotnik J, editors. *Tvegana vedenja povezana z zdravjem in nekatera zdravstvena stanja pri odraslih prebivalcih Slovenije: II. Tvegana vedenja*. Ljubljana: CINDI Slovenija, 2004.
27. Clark AM, DesMeules M, Luo W, Duncan AS, Wielgosz A. Socioeconomic status and cardiovascular disease: risks and implications for care. *Nat Rev Cardiol* 2009; 6: 712-722.
28. Power C, Kuh D. Life course development of unequal health. In: Siegrist J, Marmot M. *Social inequalities in health: new evidence and policy implications*. Oxford: University Press, 2006: 27-53.
29. Fiscella K, Tancredi D. Socioeconomic status and coronary heart disease risk prediction. *JAMA* 2008; 22: 2666-2668.
30. UKPDS Group. UK Prospective Diabetes Study 17: a nine-year update of a randomized, controlled trial on the effect of improved metabolic control on complications in non-insulin-dependent diabetes mellitus. *Ann Intern Med* 1996; 124: 136-145.
31. Kovše K, Tomšič S, Mihevc-Ponikvar B, Nadrag P. Posledice tvegane in škodljivega uživanja alkohola v Sloveniji. *Zdrav Vest* 2012; 81: 119-127.
32. Kalediene R, Starkuviene S, Petrauskienė J. Social dimension of mortality from external cause in Lithuania: do education and place of residence matter? *Soz Praventiv Med* 2006; 51: 232-239.
33. Hovnik-Keršmanc M, Čebašek-Travnik Z, Trdič J. Pivsko vedenje odraslih prebivalcev Slovenije leta 1999: rezultati raziskave. Ljubljana: Inštitut za varovanje zdravja, 2000.
34. Kovše K, Truden Dobrin P. Epidemiološke raziskave o pivskem vedenju v Sloveniji. Ljubljana: Inštitut za varovanje zdravja RS. Available March 23, 2012 from: <http://www.ivz.si>.
35. Bilban M, Zaletel-Kragelj L. Seat-belt use and non-use in adults in Slovenia. *Int J Public Health* 2007; 52: 317-325.
36. Rok Simon M. Poškodbe doma in v prostem času. In: Hočevar Grom A, editor. *Zdravje v Sloveniji*. Ljubljana: Inštitut za varovanje zdravja Republike Slovenije, 2010.
37. WHO Regional Office for Europe. Comparative assessment of policies on housing safety in 18 countries of the European Union, European Environment and Health Information System (EHIS). Copenhagen: WHO, Regional Office for Europe, 2007.
38. Zingmond DS, Soohoo NF, Silverman SL. The role of socioeconomic status on hip fracture. *Osteoporos Int* 2006; 17: 1562-1568.
39. Icks A, Haastert B, Wildner M, Becker C, Rapp K, Dragano N, et al. Hip fractures and area level socioeconomic conditions: a population-based study. *BMC Public Health* 2009; 9: 114.
40. Bentler SE, Liu L, Obrizan M, Cook EA, Wright KB, Geweke JF, et al. The aftermath of hip fracture: discharge placement, functional status change, and mortality. *Am J Epidemiol* 2009; 170: 1290-1299.
41. Rok-Simon M. Epidemiologija zloma kolka v Sloveniji. In: Komadina R, editor. *Zlom kolka v Sloveniji 2000-2010*. Celje: Splošna bolnišnica, 2011.
42. Holzer CE, Shea BM, Swanson JW, Leaf PJ, Myers JK, George L, et al. The increased risk for specific psychiatric disorders among persons of low socio-economic status. *Am J Soc Psych* 1986; 6: 259-271.
43. Bijil RV, Van Zessen G, Racelli A. Prevalence of psychiatric disorders in the general population: results of the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Soc Psychiatry Psychiatr Epidemiol* 1998; 33: 587-595.
44. Davey Smith G, Hart C, Hole D, MacKinnon P, Gillis C, Watt G, et al. Educational and occupational social class: which is the more

- important indicator of mortality risk? *J Epidemiol Community Health* 1998; 52: 153-160.
45. Kamin T, Berzelak N, Ule M. The influence of education on differences in depressive symptoms between men and women in Slovenia. *Zdrav Var* 2012; 51: 33-42.
 46. Tanney B. Mental disorders, psychiatric patients, and suicide. In: Maris RW, Berman AL, Maltzberger JT, Yufit RI. Assessment and prediction of suicide. New York: The Guilford Press, 1992: 277-320.
 47. World Health Organization. Gender and mental health. Available September 30, 2012 from: http://www.who.int/gender/other_health/en/genderMH.pdf.
 48. Muntaner C, Eaton WW, Diala C, Kessler RC, Sorlie PD. Social class, assets, organizational control and the prevalence of common groups of psychiatric disorders. *Soc Sci Med* 1998; 47: 2043-2053.
 49. Miech RA, Caspi A, Moffitt TE, Wright BE, Silva PA. Low socioeconomic status and mental disorders: a longitudinal study of selection and causation during young adulthood. *Am J Sociol* 1999; 104: 1096-1131.
 50. Van Raalte A, Kunst AE, Lundberg O, Leinsalu M, Martikainen P, Artnik B, et al. The contribution of educational inequalities to lifespan variation. *Popul Health Metr* 2012; 10: 1-10.
 51. Whitehead M, Dahlgren G. Concepts and principles for tackling social inequalities in health: levelling up: part 1. Copenhagen: World Health Organization, Regional Office for Europe, 2006.
 52. Vartiainen E, Pekkanen J, Koskinen S, Jousilahti P, Salomaa V, and Puska P. Do changes in cardiovascular risk factors explain the increasing socioeconomic difference in mortality from ischaemic heart disease in Finland? *J Epidemiol Community Health* 1998; 52: 416-419.
 53. Mackenbach JP, Bos V, Andersen O, Cardano M, Costa G, Harding S, et al. Widening socioeconomic inequalities in mortality in six Western European countries. *Int J Epidemiol* 2003; 32: 830-837.
 54. Strand BH, Grøholt EK, Steingrimsdottir OA, Blakely T, Graff-Iversen S, Næss O. Educational inequalities in mortality over four decades in Norway: prospective study of middle aged men and women followed for cause specific mortality, 1960-2000. *BMJ* 2010; 340: c654.