



Faculty of Science
CHARLES UNIVERSITY IN PRAGUE



Mortality Risk by Education Level and Medical Cause in the Czech Republic 2001–2005

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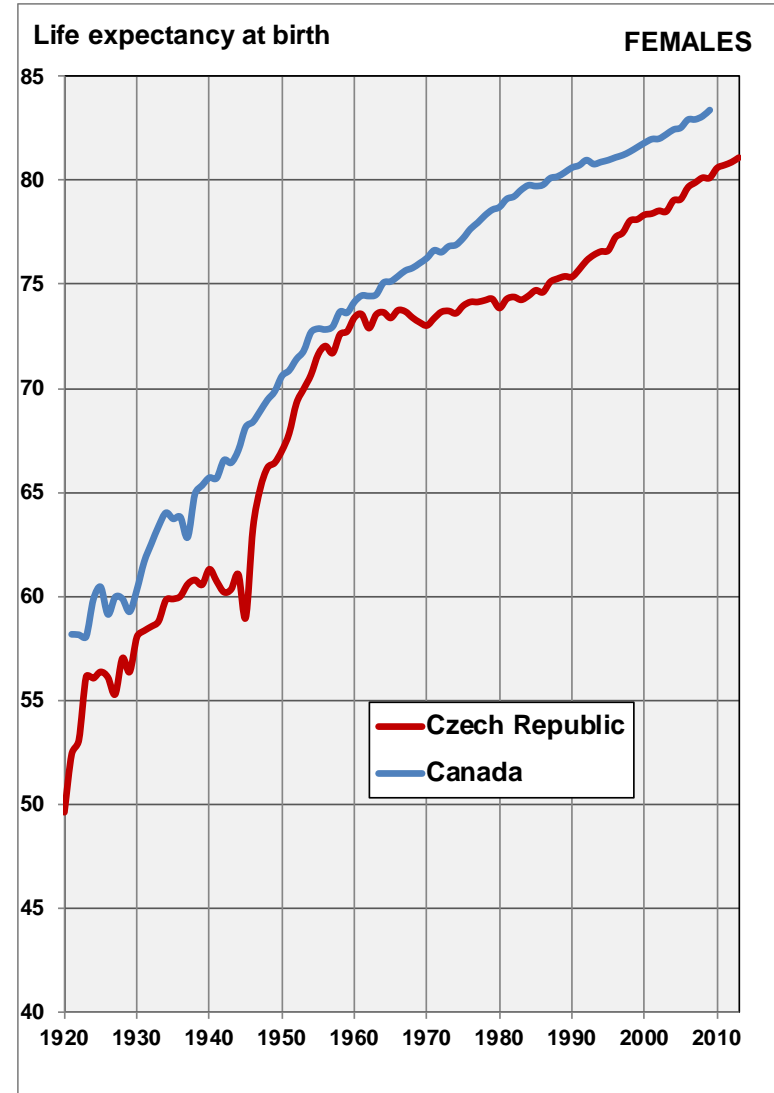
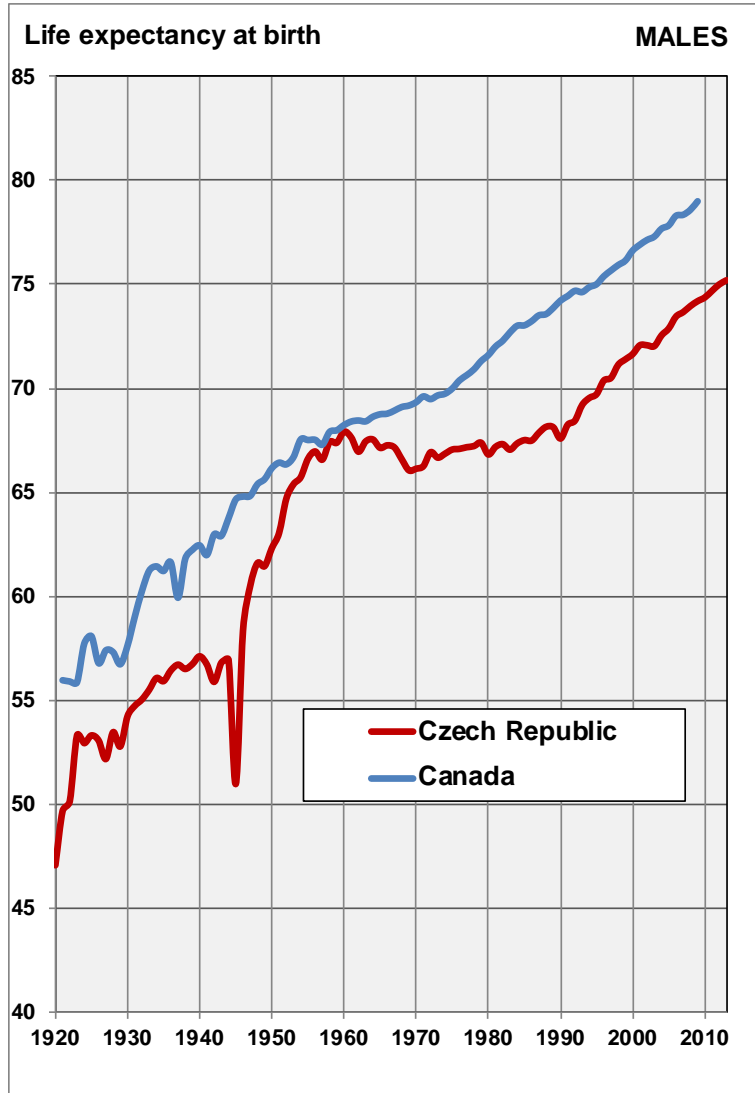


Outline

- **Long term trends in mortality and current European survival by education**
- **Productive (30-64) and post-productive (65+) age of mortality differentiation in the Czech Republic 2001-2005**
 - **Do mortality inequalities remain larger at younger age?**
 - **How do mortality risks by education differ between males and females?**
 - **What causes of death impact mortality differentials the most ?**
- **Data and Methods**
- **Gender – education – cause connections**
- **Health perspective**
- **Conclusions**

Long term trends of life expectancy at birth in the Czech Republic (1920-2013) and Canada (1921-2009)

e_0 (males; females) 2013 : Czech Republic 75.2; 81.1;





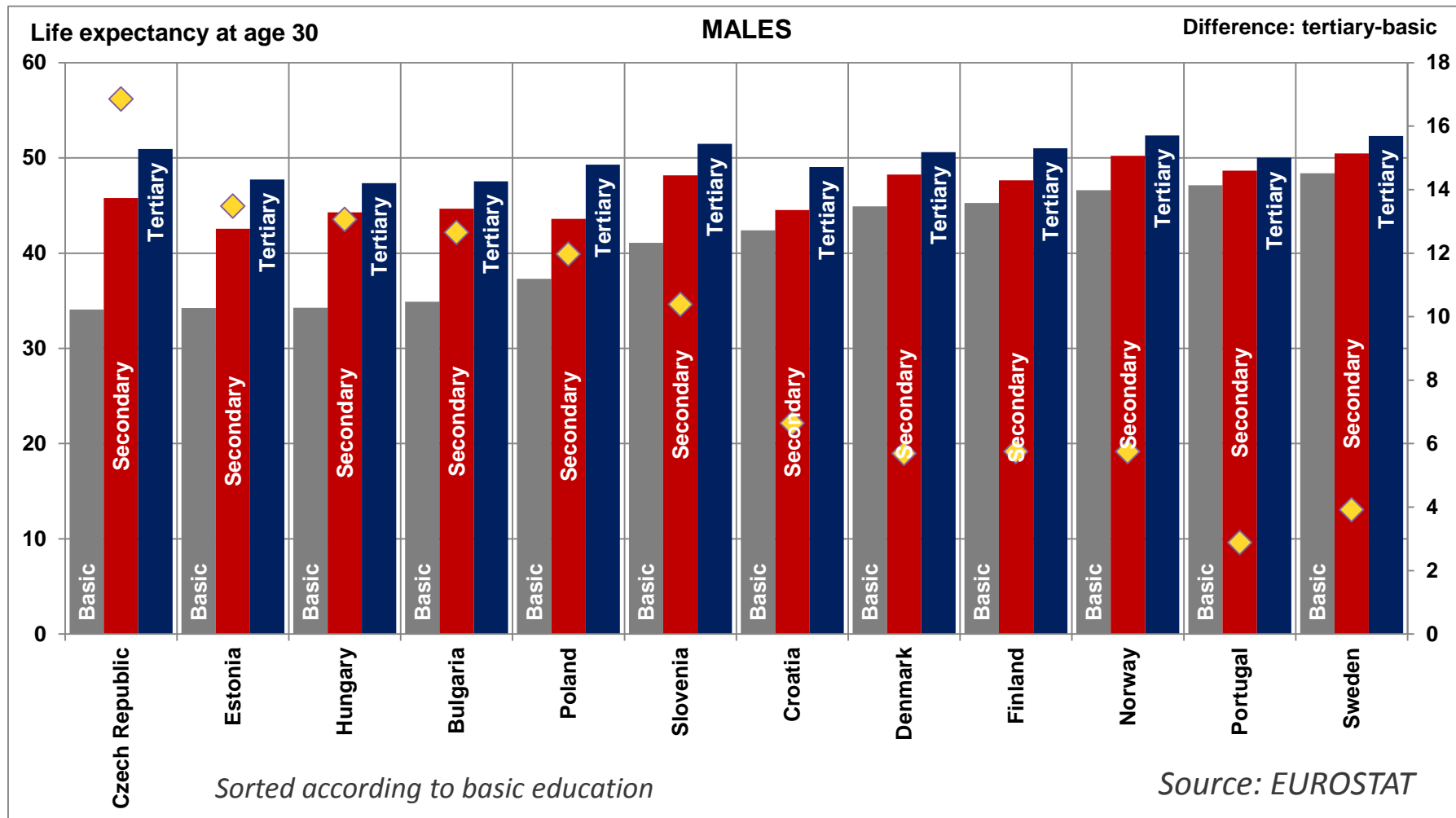
Factors behind long term mortality trends

- From the beginning of the 20th century into the interwar period, the mean length of life increased and male and female survival in the Czech Republic was close to the levels observed in the Western Europe.
- During the post-war period (the 1950s), life expectancy at birth increased rapidly in the Czech Republic. This significant decline in Czech mortality was due to a quick development of a health care system that covered the entire population with basic but comprehensive health services.
- From the mid-1960s to the mid-1980s, the gap in life expectancy between the Czech Republic and „western“ developed countries began to widen due to an “epidemic” of heart diseases.
- Health conditions slightly improved in the Czech Republic in the end of the 1980s. However, the delay of the Czech Republic in the reduction of mortality rate compared to the „West“ did not diminish. Life expectancy at birth followed almost a parallel trend with the „Western“ countries.

Basic=Pre-primary, primary and lower secondary education (levels 0-2)
 Secondary=Upper secondary and post-secondary non-tertiary education (levels 3 and 4)
 Tertiary=First and second stage of tertiary education (levels 5 and 6)

MALES

Life expectancy at age of 30 according to education level in 2010





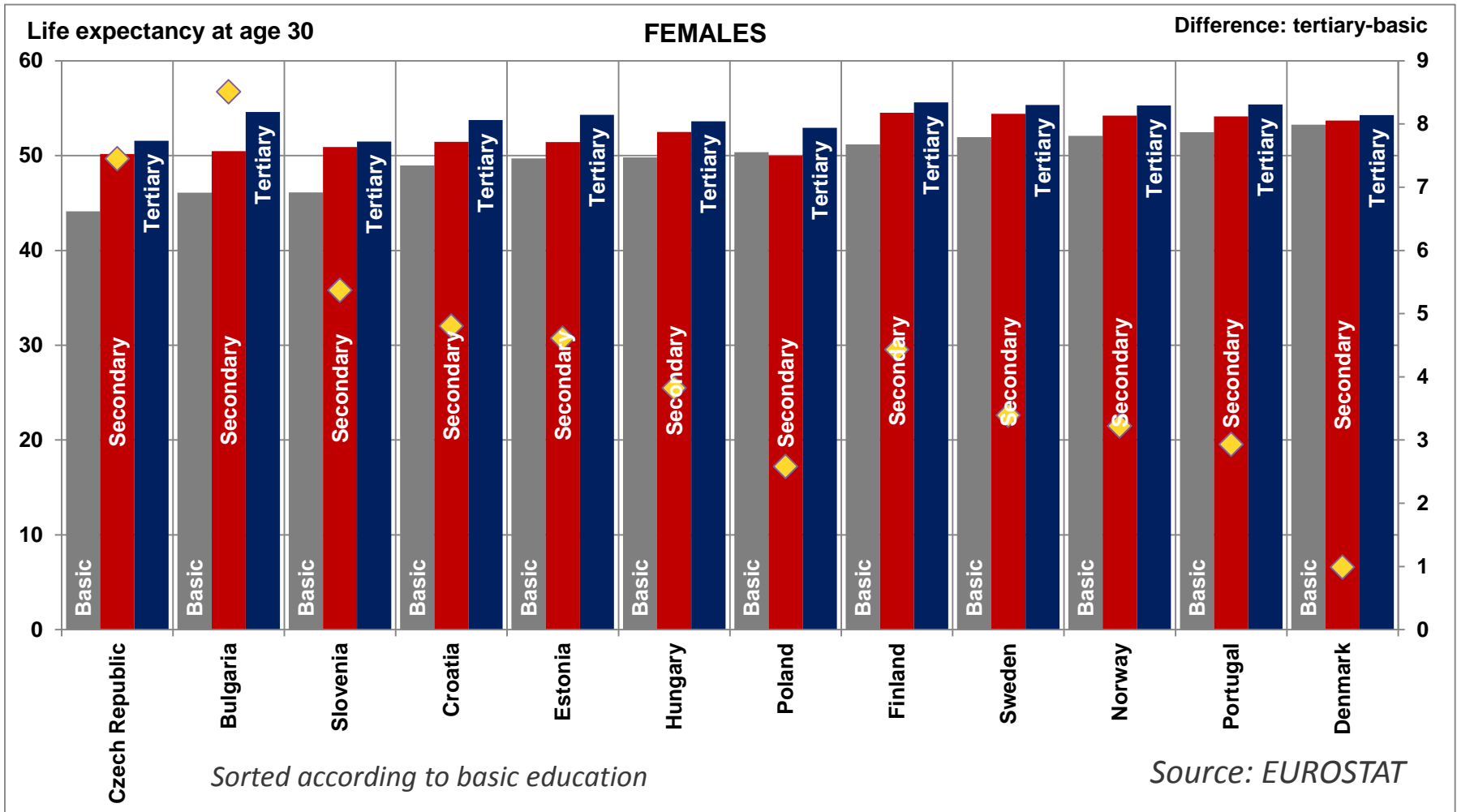
Basic=Pre-primary, primary and lower secondary education (levels 0-2)

Secondary=Upper secondary and post-secondary non-tertiary education (levels 3 and 4)

Tertiary=First and second stage of tertiary education (levels 5 and 6)

FEMALES

Life expectancy at age 30 according to education level in 2010



Mortality differentials by education

The Czech Republic shows a rather short life expectancy at age 30 for males and females with the lowest education even when compared with countries of higher mortality (Estonia, Hungary, Bulgaria).

The difference between life expectancy at 30 of people with the highest and the lowest educational attainment reaches 16.9 years among Czech men compared to 2.9 years in Portugal or 3.9 in Sweden.

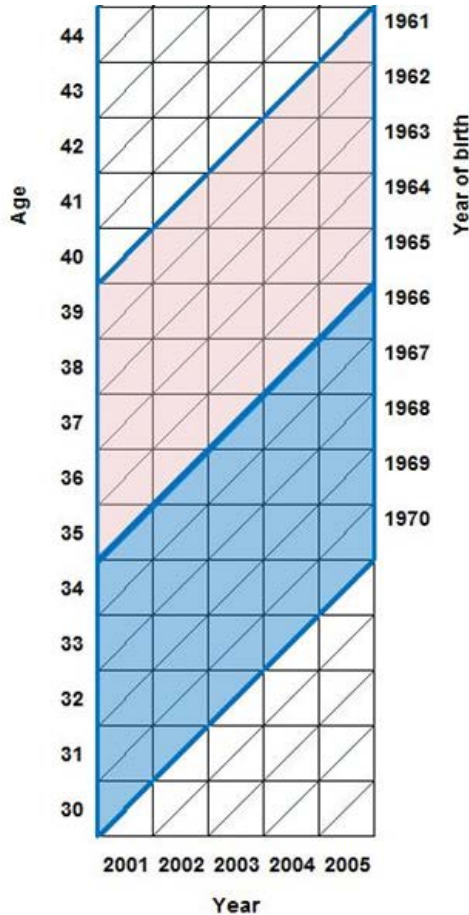
Czech men and women with just a basic education, experience a less favorable survival time. The gap in female mortality between the highest and the lowest education level is the second high (7.5), after Bulgarian one (8.5).

Our study will address two age groups 30-64 and 65-84 years (age last birthday) using education-cause analysis.

DATA

Two unlinked datasets of deaths (449 968) and census population (6 065 610)

*Lexis diagram:
data structure*



Men and women aged 30–84 years January 1, 2001 and followed over the period 2001–2005 by five year birth cohorts.
Four education levels and eighteen causes of deaths

| Level of education | Educational attainment (ISCED 97) | Educational attainment (ISCED 2011) |
|--------------------|-----------------------------------|-------------------------------------|
| Basic | ISCED 2 | ISCED 2 and lower |
| Vocational | ISCED 3C | ISCED 35 |
| Secondary | ISCED 3A | ISCED 34 |
| University | ISCED 5A and higher | ISCED 64 and higher |

| Causes of death | Variable name | ICD 10 codes |
|---|---------------|---|
| Ischaemic heart disease | ISCHAE | I20-I25 |
| Cerebrovascular disease | CERVAS | I60-I69 |
| Other circulatory diseases | OTHCV | Rest (I00-I99) |
| Cancer of trachea, bronchus and lung | CALUNG | C33-C34 |
| Cancer of colon-rectum | CACORE | C18-C21 |
| Cancer of stomach | CASTOM | C16 |
| Sex-specific neoplasms: Cancer of breast, uterus, corpus and cervix uteri (females). Cancer of prostate and testis (males) | CASEXD | C50, C53-C55, C61-C62 |
| Cancer of bladder, kidney, and other urinary organs | CABKOT | C64-C68 |
| Other neoplasms | OTHCAN | Rest (C00-D48) |
| Diabetes mellitus | DIABET | E10-E14 |
| Pneumonia and Influenza | PNEUMO | J10-J18 |
| Road and other traffic accidents | ROTHAC | V01-V99, Y85 |
| Suicide | SUICID | X60-X84 |
| Accidental fall | ACCFAL | W00-W19 |
| Other external | OTHEXT | Rest (V01-Y98) |
| Alcohol related | ALCREL | C00-C15, C22, C32, F10, I42.6, K70, X45 |
| Chronic lower respiratory diseases | CHRORE | J40-J44, J47 |
| All other | ALLOTH | Rest (A00-Y98) |

*Adapted from Eikemo T. A.
Mackenbach J.P. (eds) (2012)
EURO GBD*

METHODS

Standardized death rates (direct standardization, using new European 2013 standard) were computed by sex, education (4 categories), and cause (18 groups) for two broad age groups 30–64 and 65–84 years .

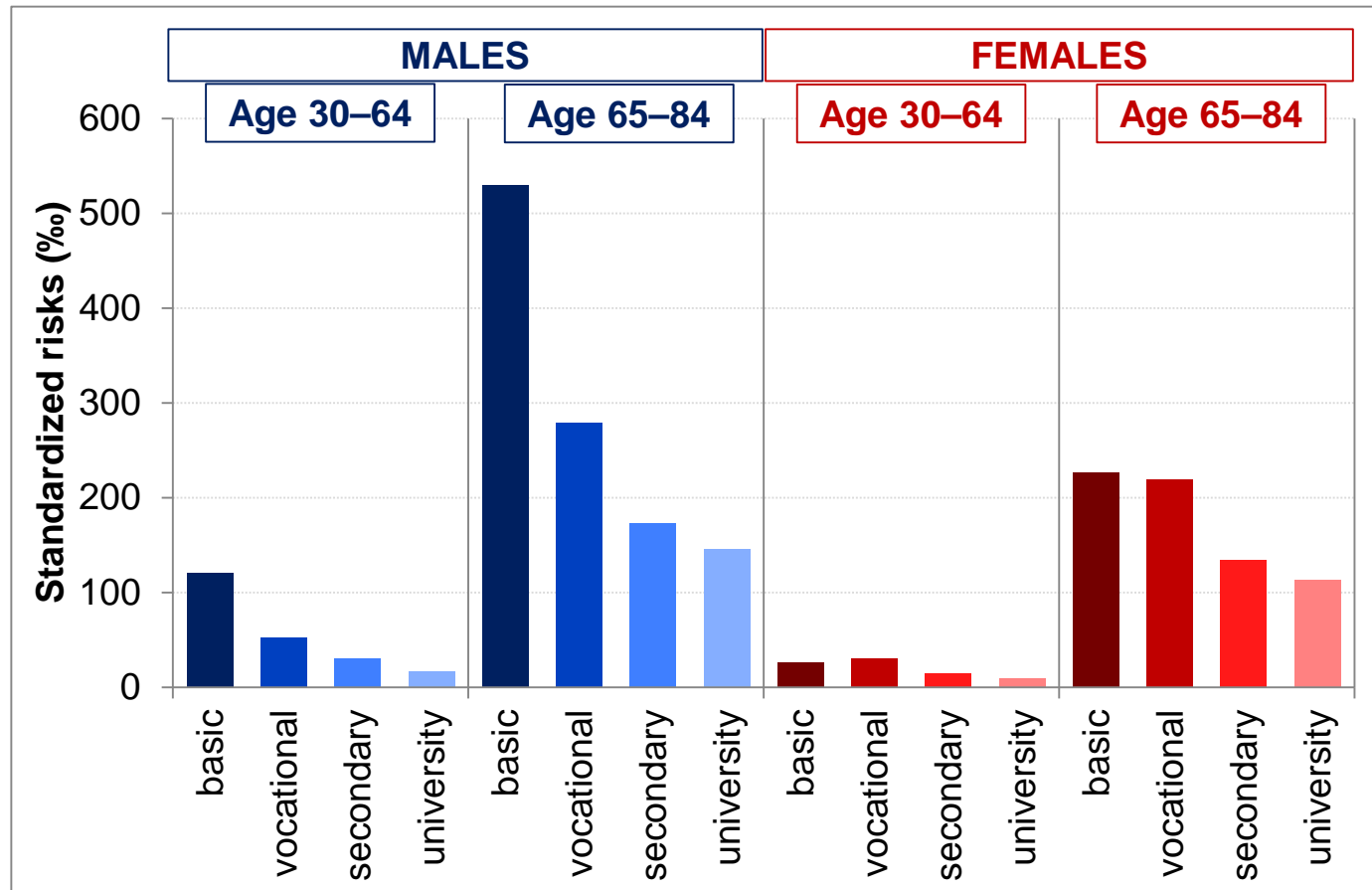
Method of simple **correspondence analysis** (using SAS 9.4 software, CORRESP Procedure). The associations between 18 groups of causes of deaths (rows) and 4 education levels (columns) were estimated for four datasets (two age groups x two sexes) and plotted.

Correspondence analysis locates all the categories in a Euclidean space. The method enables one to find a low-dimensional graphical representation of the rows and columns of a crosstabulation or contingency table.

The first two dimensions of the space were plotted to examine the associations among the causes and education. Each row and column is represented by a point in a plot determined from the cell frequencies. The results provide information which is similar in nature to those produced by Factor Analysis techniques, and they allow one to explore the structure of categorical variables included in the table.



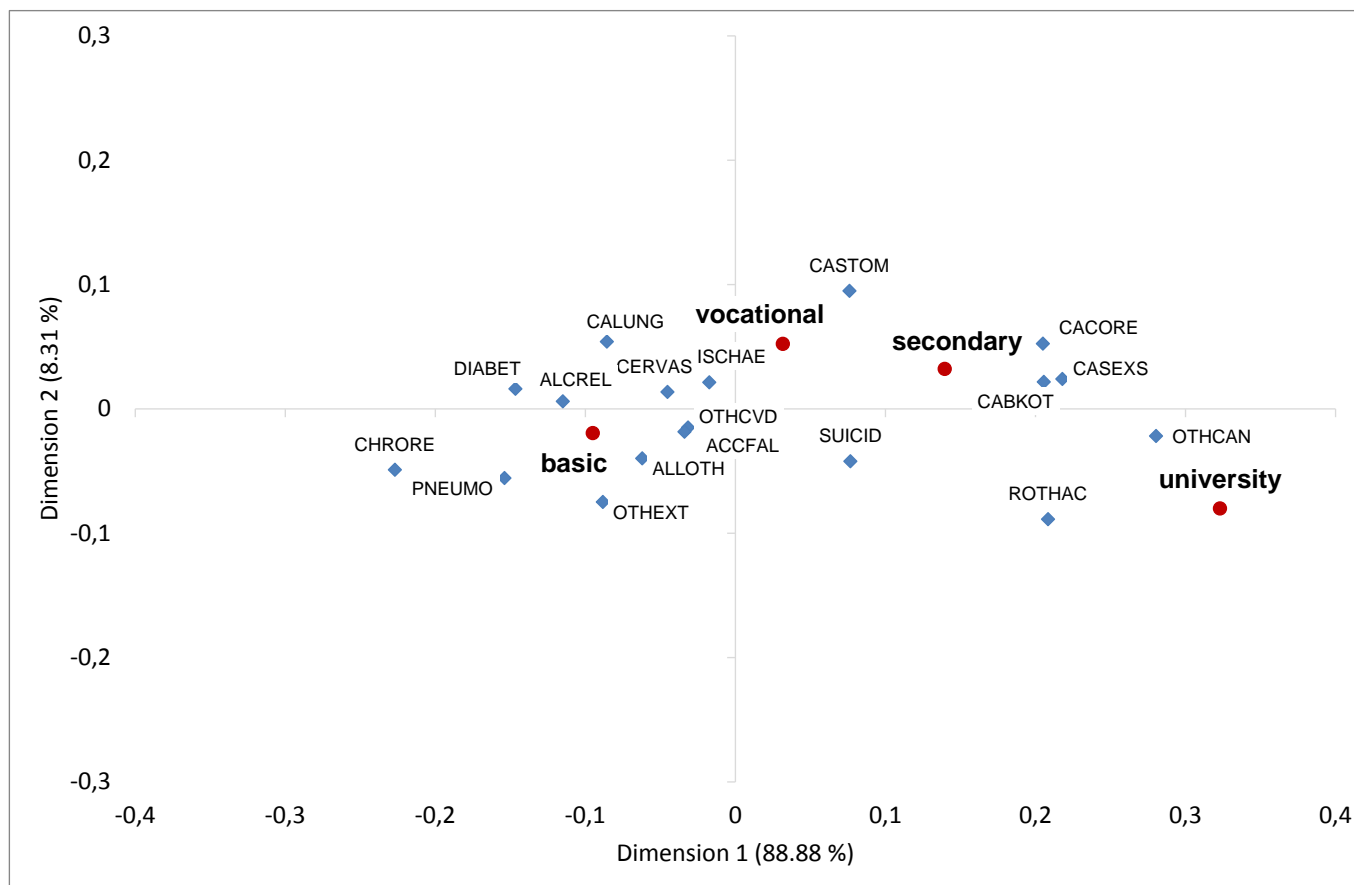
Significant differences in mortality risk are seen among men at older age group.



Excess mortality of low educated men exists in spite of low social differentiation in former socialist societies and universal access to free health services. It might be due to the less favorable working conditions in factories with obsolete equipment in the past. These men have been dying very early after retiring.

MEN 30-64

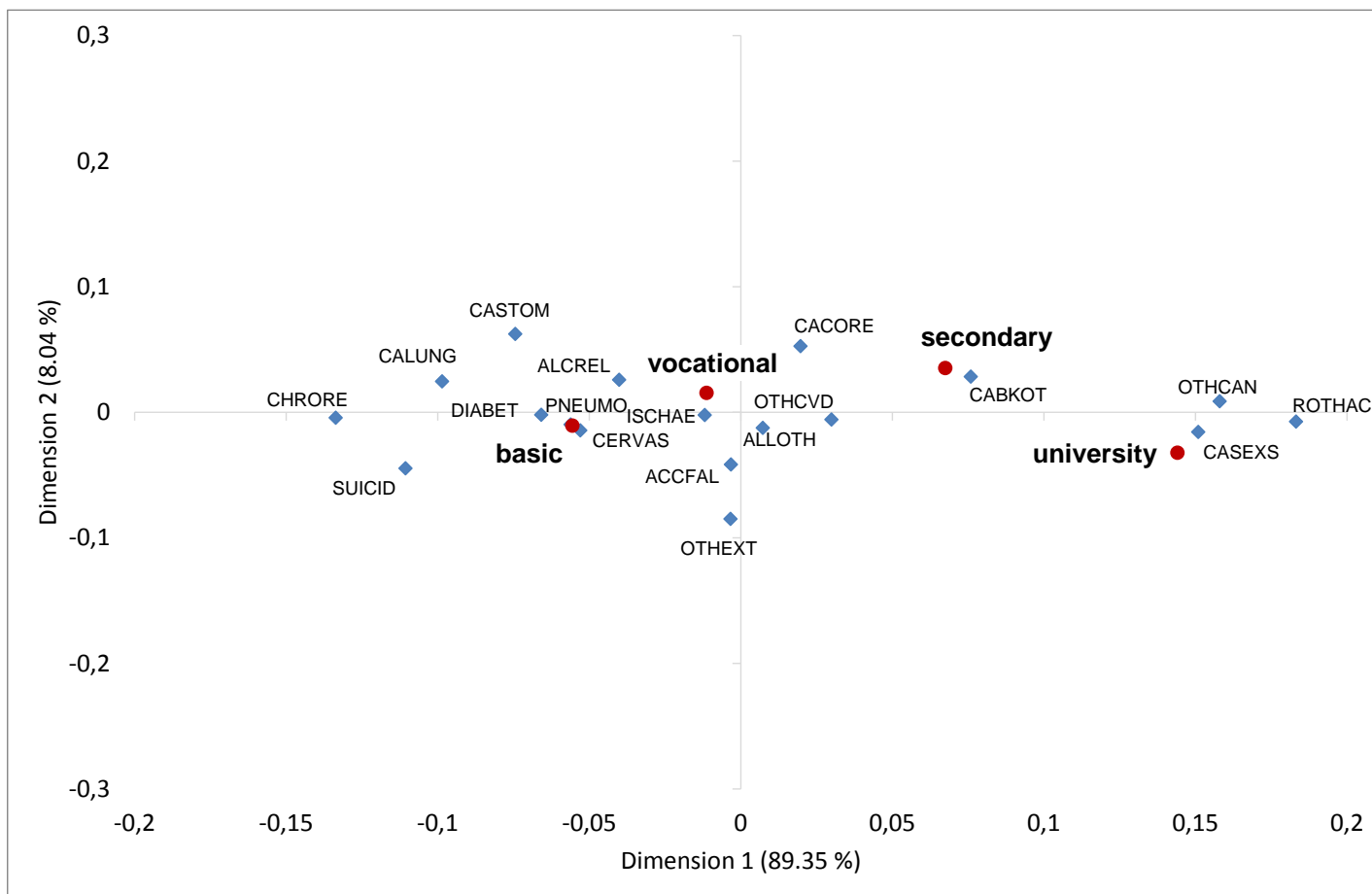
Almost 90 % of the total chi-square and inertia is explained by the first dimension, indicating that the association between the row and column categories is essentially one-dimensional.



The plot shows that educational levels are in the correct order, from high to low mortality levels. Mortality of younger men with the lowest education is mostly associated with lifestyle causes (alcohol related, pneumonia, diabetes, and chronic lower respiratory diseases). The highest educated men show excess mortality from cancer and traffic accidents.

MEN 65-84

Also here, almost 90 % of the total chi-square and inertia is explained by the first dimension, consequently the association between the row and column categories is essentially one-dimensional as it is for younger men.

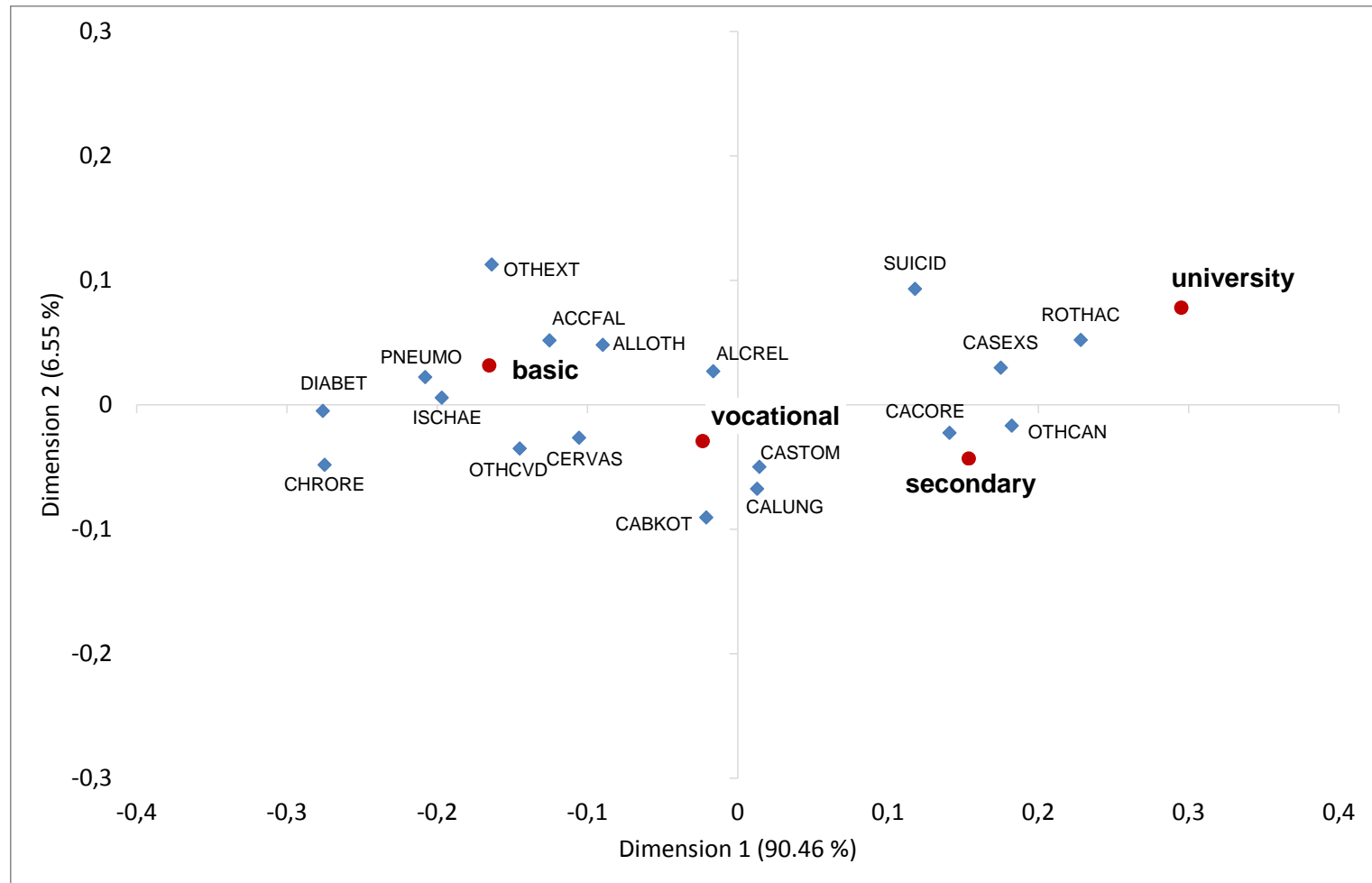


Older male age group shows a similar education-cause pattern as younger age group, only inequalities in mortality are relatively reduced (see scaling).

In addition, suicide is more frequent among older men with basic education.

WOMEN 30-64

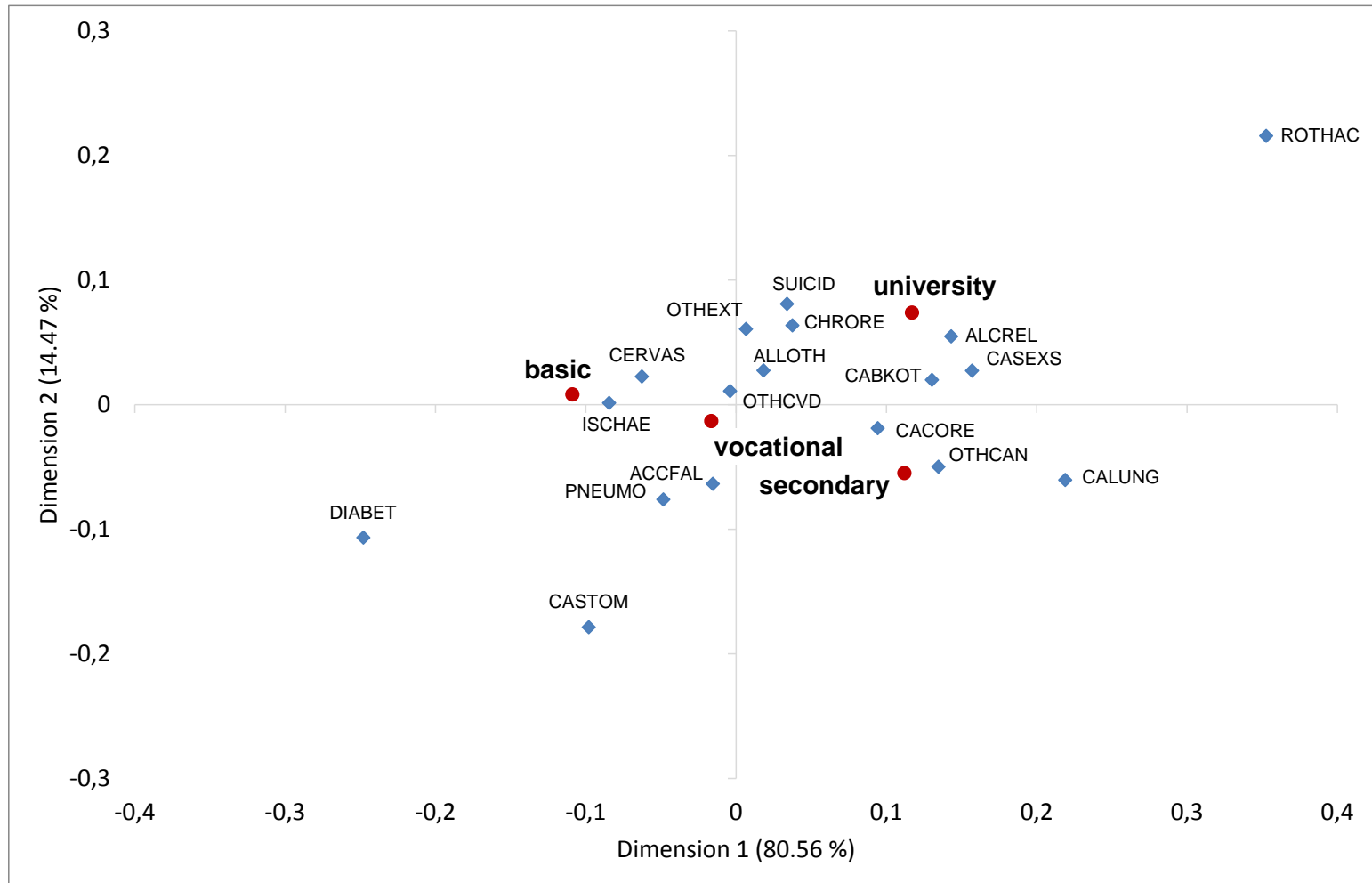
The association between the rows and columns is almost entirely one-dimensional (first dimension= for 90 %).



Mortality of younger women, just like younger men, with the lowest education is associated with lifestyle causes (pneumonia, diabetes, and chronic lower respiratory diseases).

WOMEN 65-84

The first dimension is slightly less important among older women compared to previous configurations.



Women with secondary education in the first dimension share the same position as university graduates.

Mortality of women with basic education is relatively often associated with diabetes mellitus.

Self Perceived Health: How is your health in general?

good=very good+good; bad=very bad+bad; fair=reference category

Generations and Gender Survey, Czech Republic 2005, 7 400 respondents (3 461 men + 3 939 women)

Multinomial logistic regression for the reference category of fair health; model of the main effects: age, education, living alone (OR).

Two regression models were calculated, for men and for women

| Age | MALES | | FEMALES | |
|-------|-------------|------|-------------|-------------|
| | good | bad | good | bad |
| 30-34 | 2,63 | 1,14 | 2,75 | 0,70 |
| 35-39 | 2,36 | 1,12 | 1,72 | 0,53 |
| 40-44 | 1 | 1 | 1 | 1 |
| 45-49 | 0,79 | 1,47 | 0,63 | 0,52 |
| 50-54 | 0,51 | 1,41 | 0,49 | 0,95 |
| 55-59 | 0,26 | 1,44 | 0,37 | 0,93 |
| 60-64 | 0,19 | 0,92 | 0,24 | 0,66 |
| 65-69 | 0,16 | 1,12 | 0,18 | 0,49 |
| 70-74 | 0,12 | 1,39 | 0,13 | 1,04 |
| 75-79 | 0,09 | 2,24 | 0,11 | 1,00 |

OR in bold are statistically significant at 5% level

The self-perception of health as good statistically significantly decreases with age.

If people perceive their health as bad the odds ratios are very similar and often statistically insignificant.

An interesting anomaly along the gradient of changes in the declared subjective perception of health by age is the age group of 60-64 year old men and 60-69 year old women.

It could be hypothesized that men and women just entered retirement and are not threatened by unemployment.

Multinomial logistic regression for the reference category of fair health; model of the main effects: age, education, living alone (OR)
model continues

The self-perception of health changes not just in relation to age but also in relation to a number of other lifestyle factors. It can depend on whether a person has a partner or not, and even the level of a person's education can indirectly say something about a person's lifestyle.

| Living arrangement | MALES | | FEMALES | |
|--------------------|-------|------|---------|------|
| | good | bad | good | bad |
| alone | 0,83 | 1,73 | 0,95 | 1,17 |
| not alone | 1 | 1 | 1 | 1 |

Partnership is particularly important for men with bad health. Living with a partner in a shared household tends to give men the perception of better health.

| Education | MALES | | FEMALES | |
|------------|-------|------|---------|------|
| | good | bad | good | bad |
| basic | 0,87 | 1,55 | 0,80 | 1,38 |
| vocational | 1 | 1 | 1 | 1 |
| secondary | 1,44 | 0,74 | 1,29 | 0,64 |
| university | 2,01 | 0,65 | 1,64 | 0,42 |

With increasing education levels, men evaluate their health more positively. Good health is cited statistically significantly twice as often (2.1) among men with university education compared to men with basic education. Women essentially perceive their health similarly to men in relation to education.

Conclusions

In spite of the recent increase in survival, the Czech Republic still lags behind „western“ developed countries in mortality figures.

Male-female differential in life expectancy at birth was 5,9 years in 2013. However, the mortality divide between people with the highest and the lowest educational attainment is very pronounced compared to the male-female difference in life expectancy.

Significant differences in mortality risk by education are seen especially among men.

Mortality of men and women with the lowest education is mostly associated with lifestyle causes (alcohol related, pneumonia, diabetes, and chronic lower respiratory diseases).

The sense of good health correlates negatively with age and positively with education. Partnership is particularly important among people with bad health.



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Thank you for your attention

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