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Potential reduction in mortality associated with the shifts of population educational structures in the Czech Republic

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Outline

- **Long term mortality trends in the Czech Republic 1920-2012.**

- **Mortality differentials according to education level in selected countries in 2010.**

- **Three model scenarios in the Czech Republic 2009-2012 based on $_{50}e_{30}$ will show the impact of shifts in education (in structure or rates) on temporary life expectancy between ages 30 and 80.**

    Population structure and death rates by gender, age and education from 2009-2012

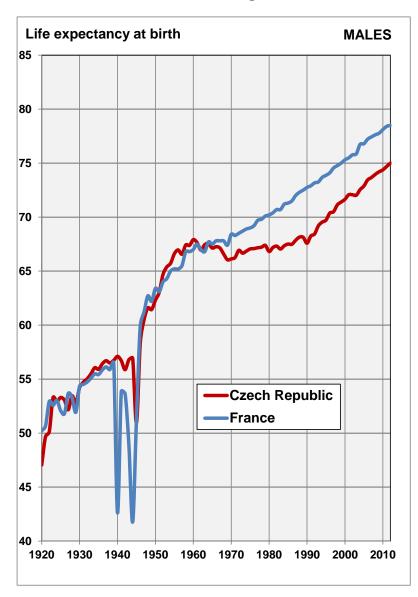   Change in population structure according to education level

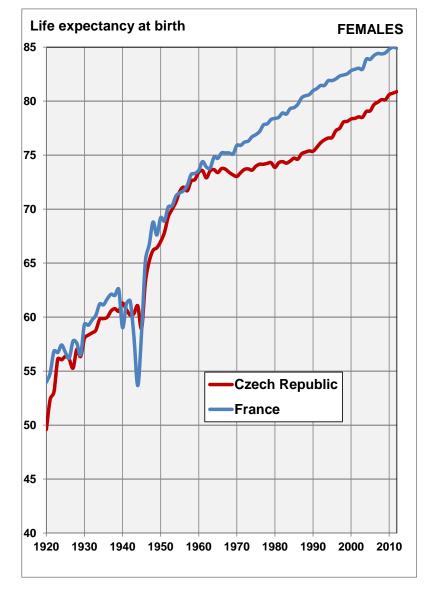   Change in death rates according to education level

- **Summary**

Long term trends of life expectancy at birth in the Czech Republic and France 1920-2012

e_0 (males; females) 2012 : CR 75.0; 80.9;   FR 78.5; 84.9
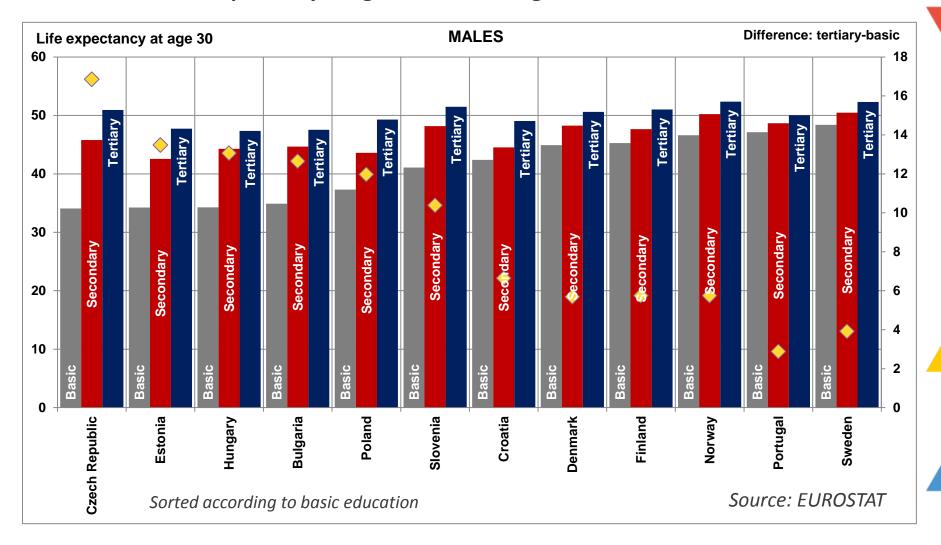
Factors behind long term mortality trends

- 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 France.

- 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 France began to widen due to 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 France did not diminish and life expectancy at birth followed an almost parallel trend in both 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)

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MALES

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

Life expectancy at age 30   MALES   Difference: tertiary-basic

Sorted according to basic education

Source: EUROSTAT

FEMALES

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)

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Life expectancy at age 30

FEMALES

Difference: tertiary-basic

Sorted according to basic education

Source: EUROSTAT

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

Therefore, it would be interesting to see how different scenarios impact total life expectancy based on shifting age structure or death rates towards higher educational levels.
Our study will address the age group 30-79 (age last birthday) using temporary life expectancy between exact ages 30 and 80.

Temporary Life Expectancy

Eduardo. E. Arriaga: Measuring and Explaining the Change in Life Expectancies, Demography, 21,1984,1, p.83-96

$$_{i}e_{x} = \frac{T_{x} - T_{x+i}}{l_{x}}$$

The temporary life expectancy from age *x* to *x+i* is the average number of years that a group of persons alive at exact age *x* will live from age *x* to *x+i* years.

Life Table of the Czech Republic for Males in 2012:

T_{30} = 4 519 070; T_{80} = 297 187; l_{30} = 98 580;

$$_{50}e_{30} = \frac{4\ 519\ 070 - 297\ 187}{98\ 580} = 42.83$$

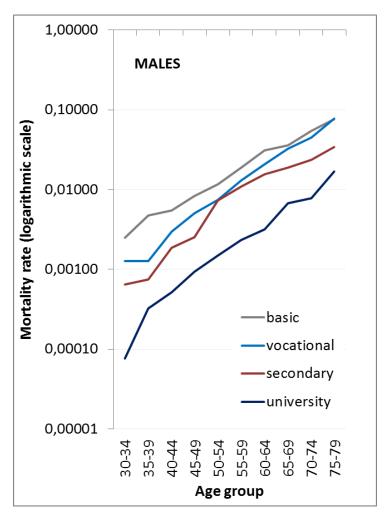**Czech Republic 2012: $_{50}e_{30}$: males 42.83;   females 46.25**

Data

- **Age-specific mortality rates according to education attainment calculated as an average from the years 2009–2012**

- **Population structure by gender, age and education (census 2011)**
    - **5 year age-groups from 30–34 to 75–79 years**

    - **Levels of education used in the analysis are based on ISCED codes**

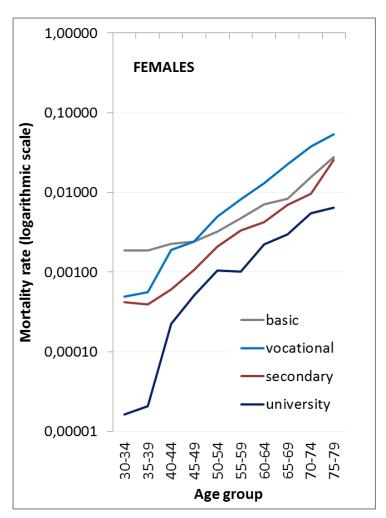| Level of education	Educational attainment (ISCED 97)	Educational attainment (ISCED 2011)
Basic	ISCED 2	ISCED 2 and lower
Vocational	ISCED 3C	ISCED 35
Secondary	ISCED 3A	ISCED 34
University	ISCED 5A and higher	ISCED 64 and higher

Age-specific mortality rates

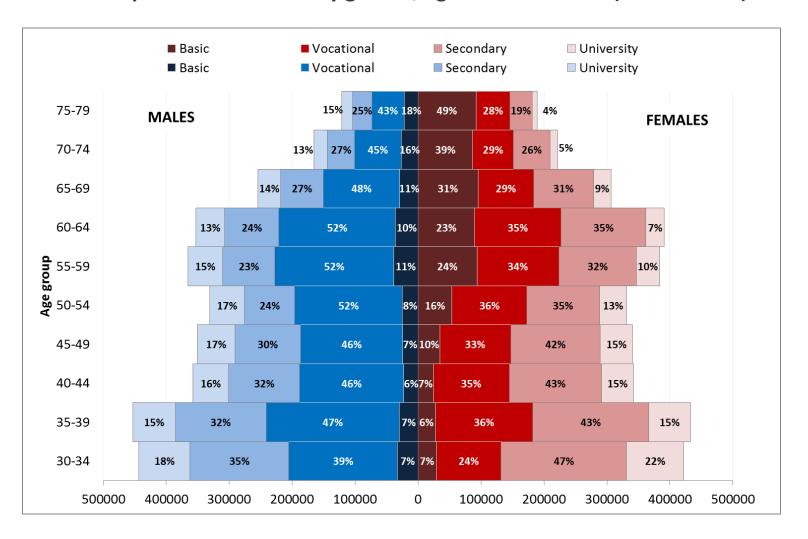## Mortality rates as an average calculated from years 2009–2012

Significantly lower mortality of university graduated men

Crossover of mortality of women with basic and vocational education

Population structure of the Czech Republic

Population structure by gender, age and education (census 2011)
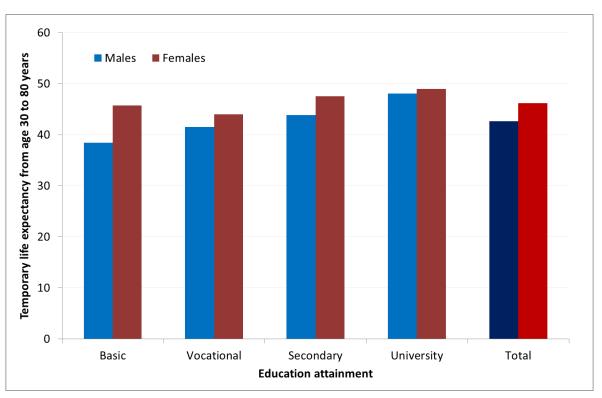
Description of three model scenarios to be elaborated

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1. **Population structure by gender, age and education will remain the same as from the census 2011 as well as mortality rates will not change** (reference output) **.**

2. **Changing population structure according to education level:**
   60 % of males with basic education will move into a higher category (vocational) and 60 % of women with basic and vocational education will move into the secondary education

3. **Changing intensity of mortality according to education level:**
   gender age education-specific mortality rates will be shifted upwards by one level (basic=vocational, vocational=secondary, secondary=university, new_university=0.80*university)

   The proposed scenarios will show the impact of shifts in education (in structure or rates) on temporary life expectancy between ages 30 and 80.

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Scenario 1: Results

Temporary life expectancy from age 30 to 80
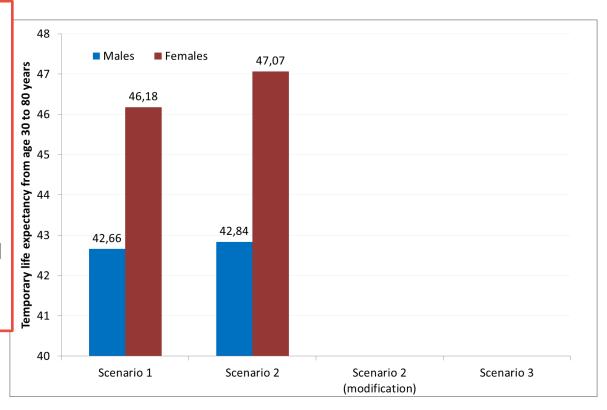
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Scenario 2: Results

Temporary life expectancy from age 30 to 80

60 % of males with basic education were moved into a higher category (vocational) and

60 % of women with basic and vocational education were moved into the secondary education

Scenario 2: Results

- Reduction of a small proportion of population with the lowest level of education has only a small impact on the increase of the temporary life expectancy (42.66 → 42.84 for males)

- The impact is more significant for females, where the two less educated groups were combined and reduced (46.18 → 47.07)

Scenario 2 - modification

- Suppose the Scenario 2 is modified for males: **60 % of males with vocational education will move towards secondary education**

- It corresponds with general trends in education attainment in the Czech Republic (general tendency towards secondary and university education)

- Moreover, vocational education is the most common nowadays in the Czech Republic
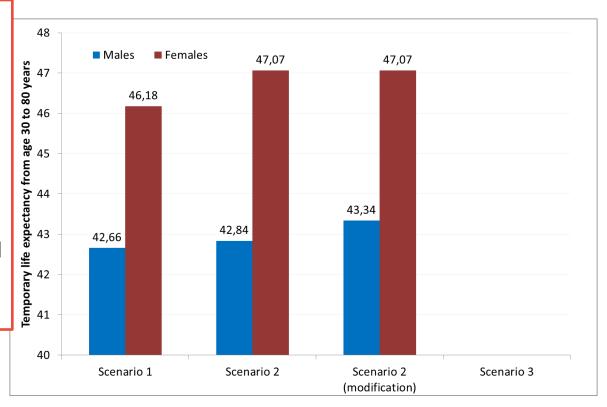
Scenario 2 – modification: Results

Temporary life expectancy from age 30 to 80

60 % of males with vocational education were moved into the secondary education and

60 % of women with basic and vocational education were moved into the secondary education

Scenario 2: Changing population structure according to education level

Scenario 2 – modification: Results

- Reduction of high proportion of population with vocational education has a more significant impact on the increase of the temporary life expectancy (42.66 → 43.34 for males)

- **In the Czech Republic, it is possible to expect a growth in life expectancy caused by the ongoing change in education structure**
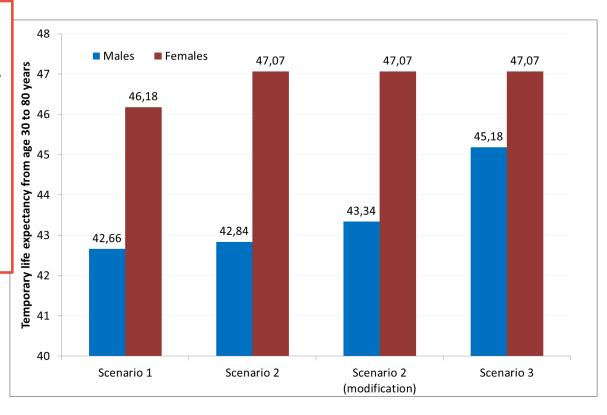
Scenario 3

- **Changing mortality rates according to education level**

- Gender age education-specific mortality rates will be shifted upwards by one level (basic=vocational, vocational=secondary, secondary=university, new_university=0.80*university)

- This corresponds with the overall trend of mortality decrease in the Czech Republic

Scenario 3: Results

Temporary life expectancy from age 30 to 80

gender age education-specific mortality rates are shifted upwards by one level (basic=vocational, vocational=secondary, secondary=university, new_university=0.80* university)

Scenario 3: Results

- The significant increase of temporary life expectancy for males is caused above all by shifting mortality rates towards lower levels, primarily those of males with secondary education

- For females the effect of the shift of mortality rates is the same as the effect of the shift in population structure according to education

Summary

- In recent years, the population of the Czech Republic experienced two phenomena: **increase in the share of higher educated people and a significant decline in mortality; therefore we can expect further increase of the temporary life expectancy of the Czech population**

- It was shown that a decrease of the proportion of population with the lowest education would lead to only a small increase in temporary life expectancy. This is due to the impact of the small weight of this education group in the total population.

- However, it is clear, that even a small sub-group of the population matters and is worth considering when looking at the overall mortality level.

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Thank you for your attention

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