

# Multimorbid death process and mortality disparities: case of Czechia

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SCOR meeting, 21.–22.04.2026



Interdisciplinary  
Centre on Population Dynamics



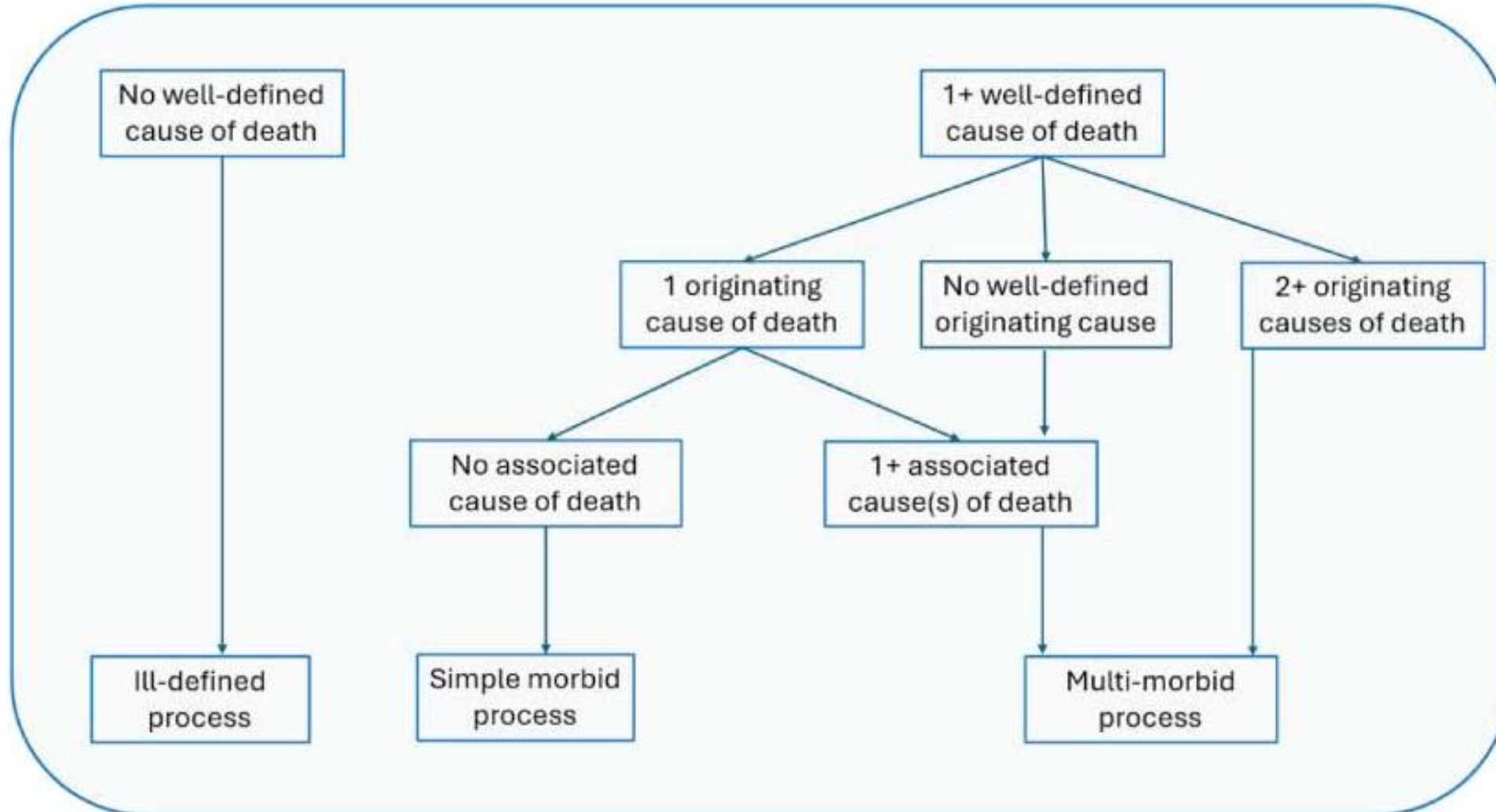
<b>27. PART I.</b> Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line.		Approximate Interval Between Onset and Death
<b>IMMEDIATE CAUSE</b> (final disease or condition resulting in death)	a. <b>I23</b> <i>Rupture of myocardium</i>	<i>Mins.</i>
Sequentially list conditions, if any, leading to immediate cause. Enter <b>UNDERLYING CAUSE</b> (Disease or injury that initiated events resulting in death) <b>LAST</b>	b. <b>I21</b> <i>Acute myocardial infraction</i> Due to (or as a consequence of):	<i>6 days</i>
	c. <b>I25</b> <i>Chronic ischemic heart disease</i> Due to (or as a consequence of):	<i>5 years</i>
	d. Due to (or as a consequence of):	
<b>PART II.</b> <u>Other significant conditions</u> contributing to death but not resulting in the underlying cause given in Part I.		<b>28a.</b> AUTOPSY?
<i>Diabetes, Chronic obstructive pulmonary disease, smoking</i> <b>E11, J44, F17</b>		<i>(Yes or no)</i>

Iris Software →

Reads the data, uses ACME tables to determine relations between diseases, selects the „statistical cause of death“ (Underlying cause of death, UCD)

**How about the other diseases?**

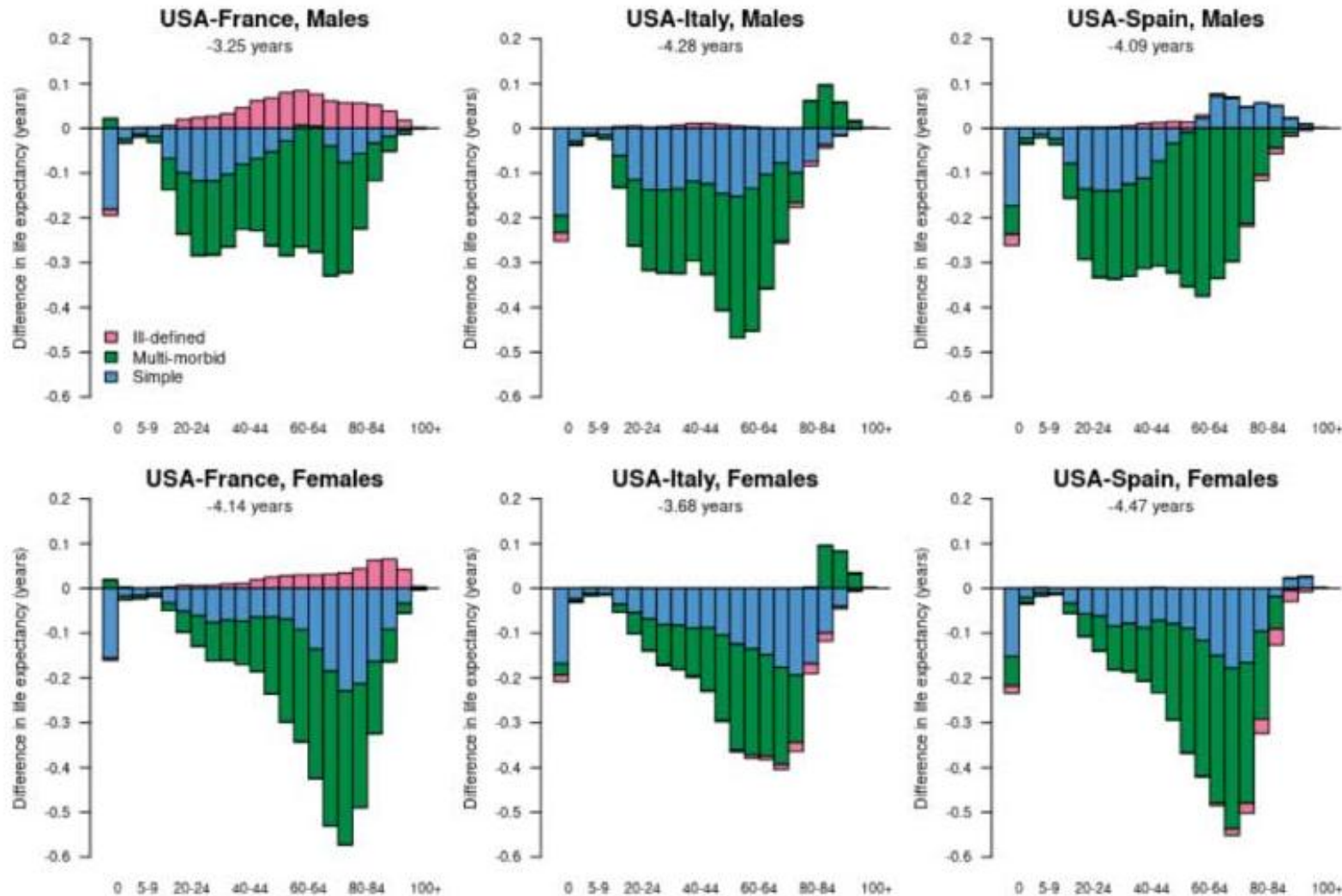
How about the other diseases? They can be used to study deaths by type, including multimorbidity at death.



Source: Barbieri, M., Désesquelles, A., Egidi, V., Frova, L., Grippo, F., Meslé, F., ... & Trias-Llimós, S. (2025). Multi-Morbidity at Death and the US Disadvantage in Mortality: M. Barbieri et al. *European Journal of Population*, 41(1), 28.

RiCoDa extends the Iris beyond selection of UCD. It produces new data dimensions useful for mortality analysis: (i) by death process type and (ii) by role of a disease in the death process.

Figure 2. Contribution (in years) of the three morbid processes to the difference in life expectancy at birth between the US and peer countries in 2017, each sex

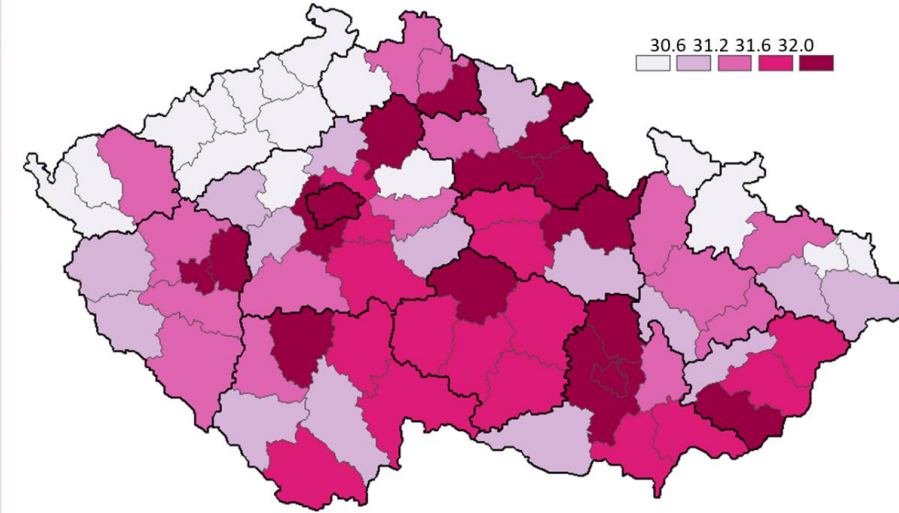
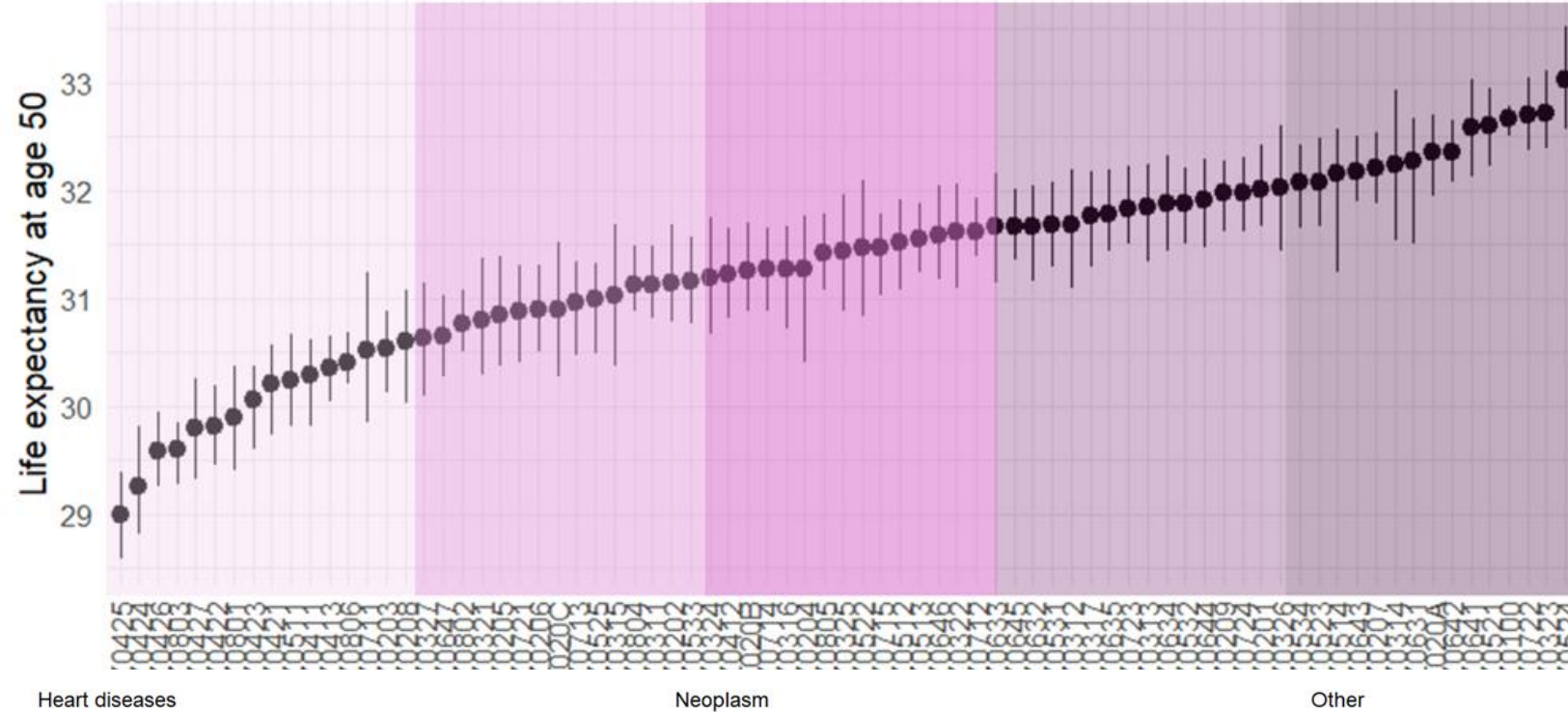


RiCoDa has been applied to analyze US mortality disadvantage. The gap in life expectancy between USA and several European countries is due to higher burden of multimorbid death process.

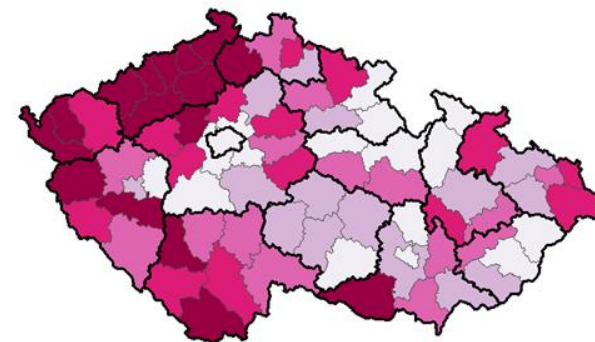
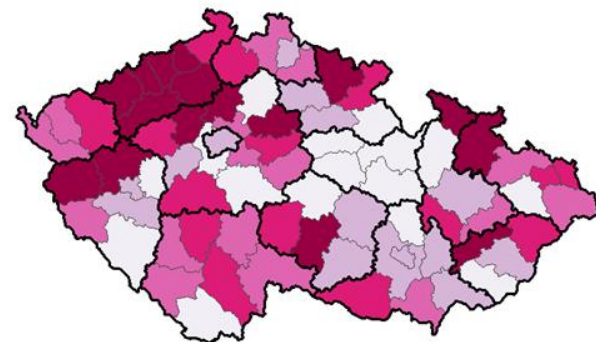
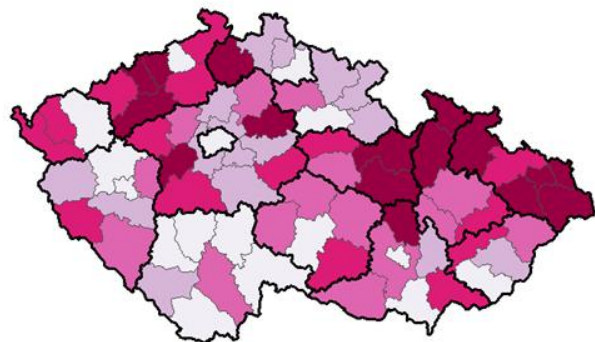
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Czechia has large inter-district differences in life expectancy (at age 50), up to 4 years in 2023.

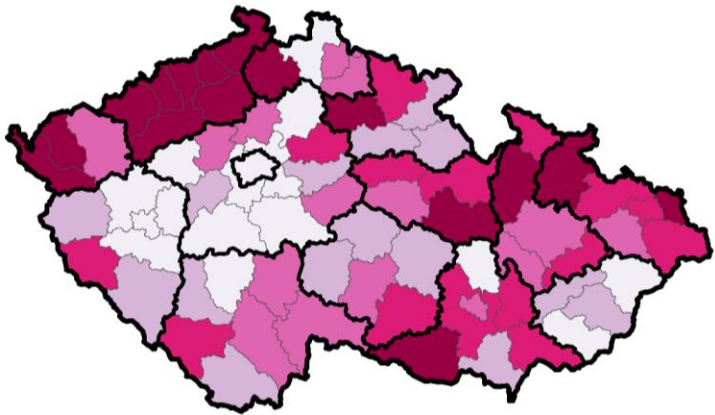
How well can regional disparities be explained with disproportionate burden of multimorbid death process?



Age-adjusted mortality index by cause of death using UCD



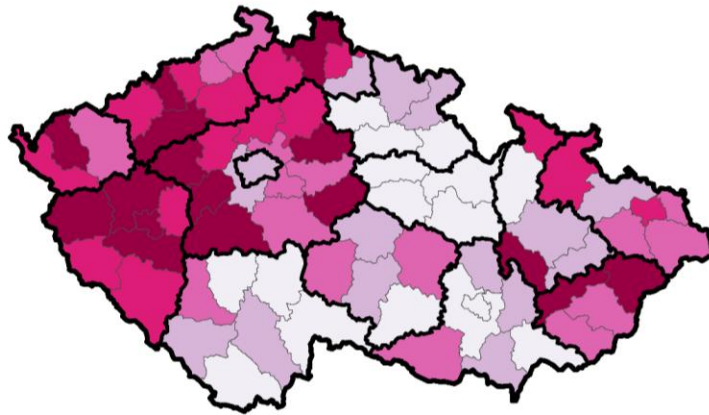
Single process



Mortality ratio



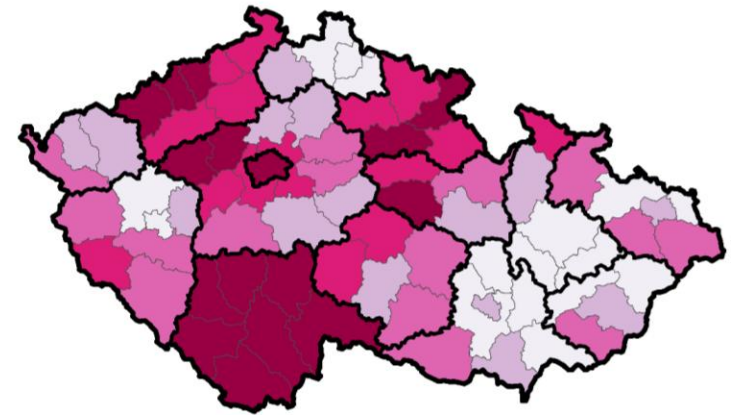
Multimorbid process



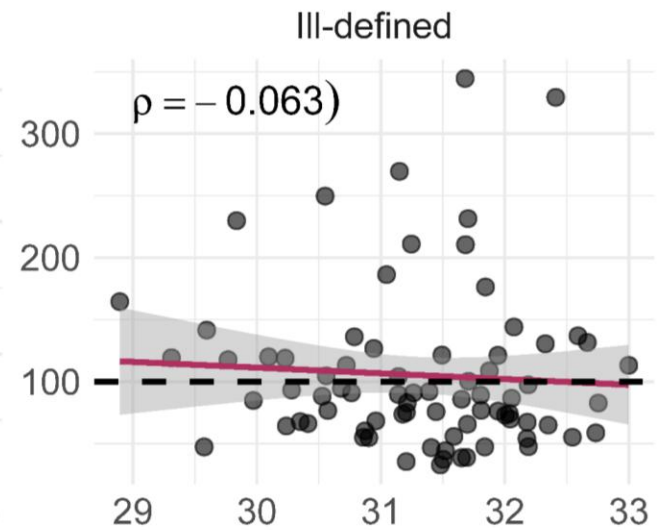
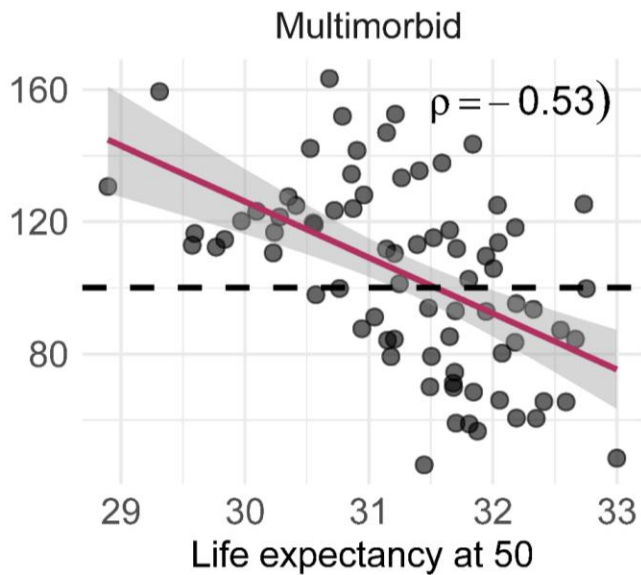
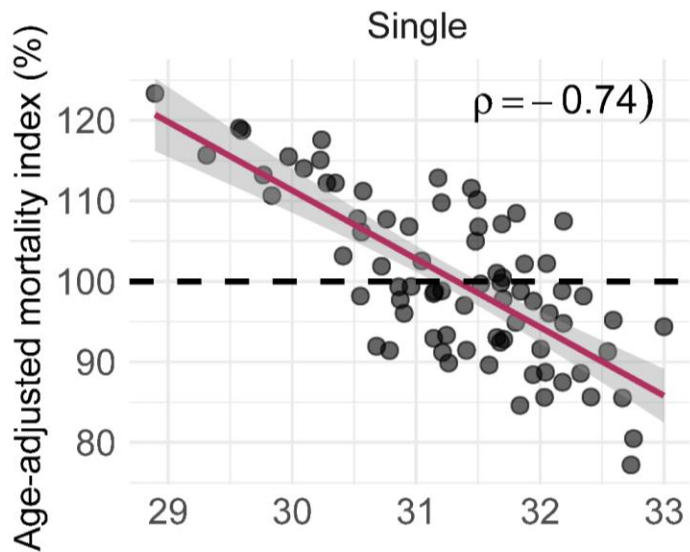
Mortality ratio

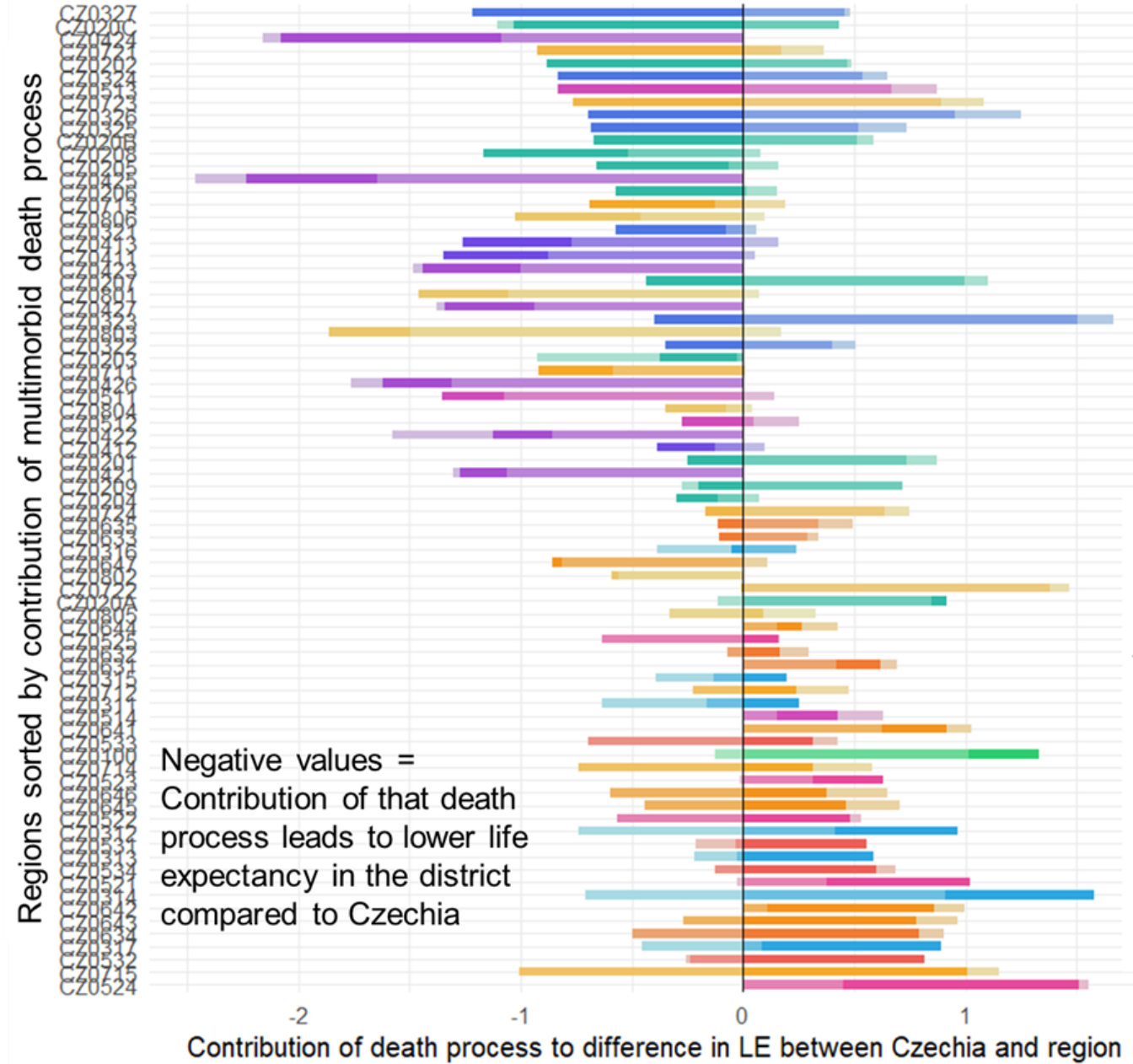


Ill-defined process



Mortality ratio





Type of death process (transparency)

- Multimorbid (darkest)
- Single
- Ill. Defined (lightest)

Region (shade)



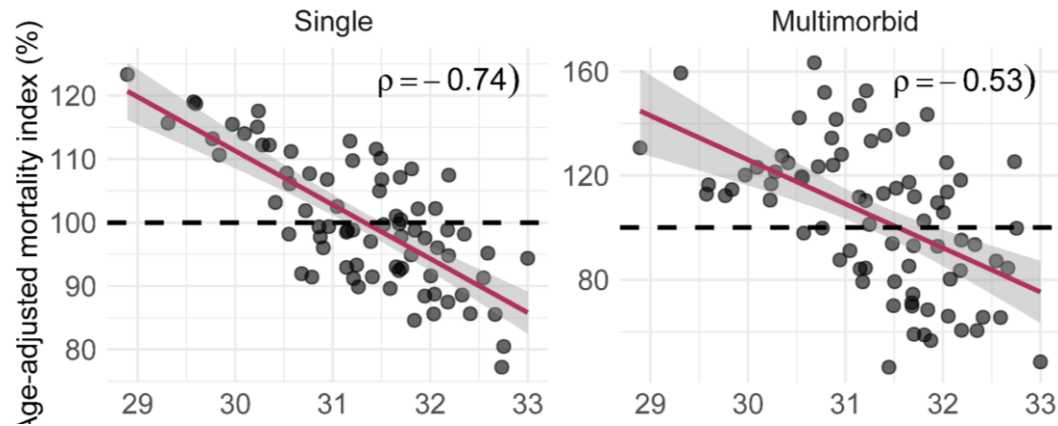
Correlation of positive mu-mo. contributions and LE: 0.39

Correlation of negative mu-mo. contributions and LE: 0.19

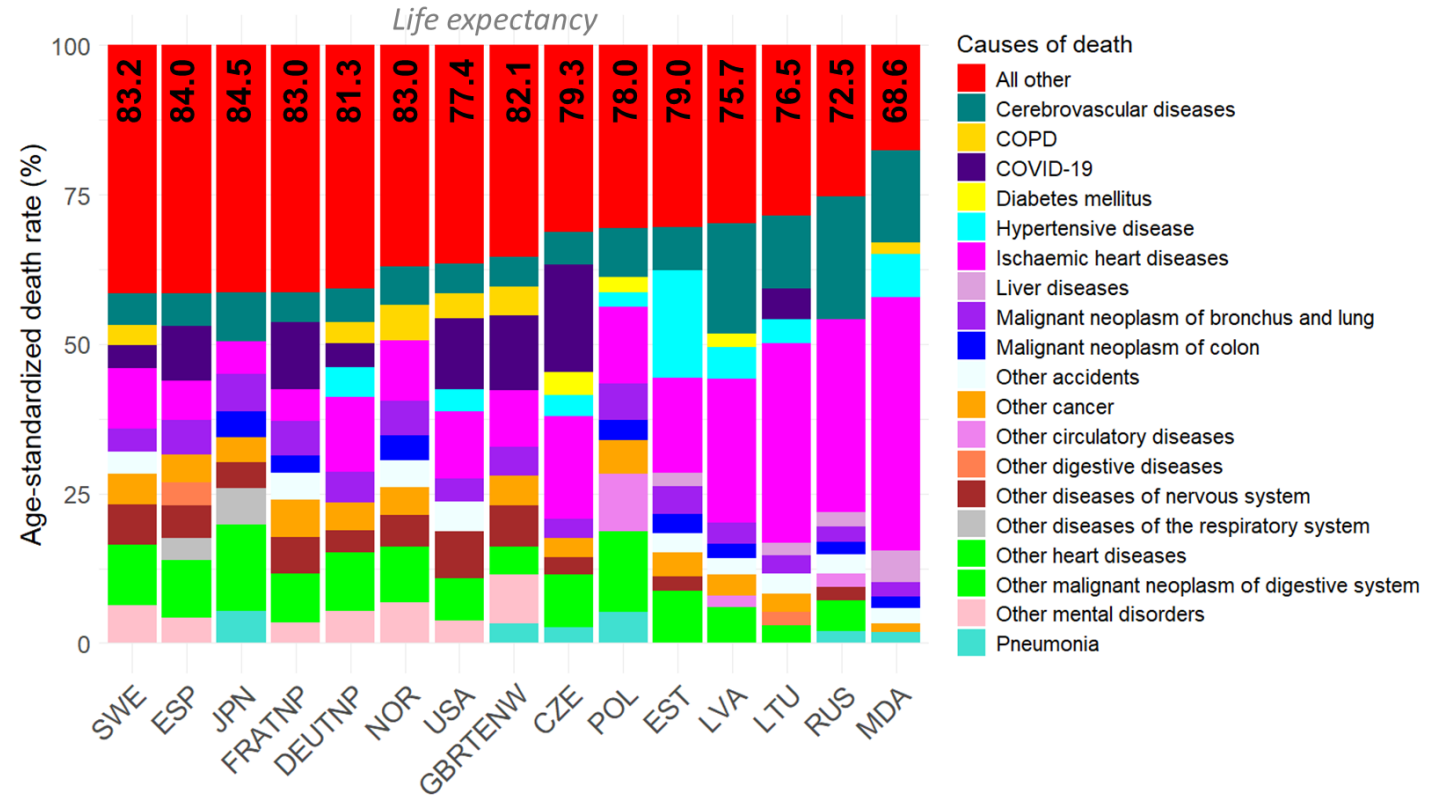
- Mortality by mu-mo death process is a weaker predictor of LE than mortality by single death process.
- In regions with above average LE, multimorbidity is more closely related to heterogeneity in LE.

Why?

Certification?



Relativized age-standardized death rate from leading disease groups, selected countries, latest year



Or health disparities?

Or theory?

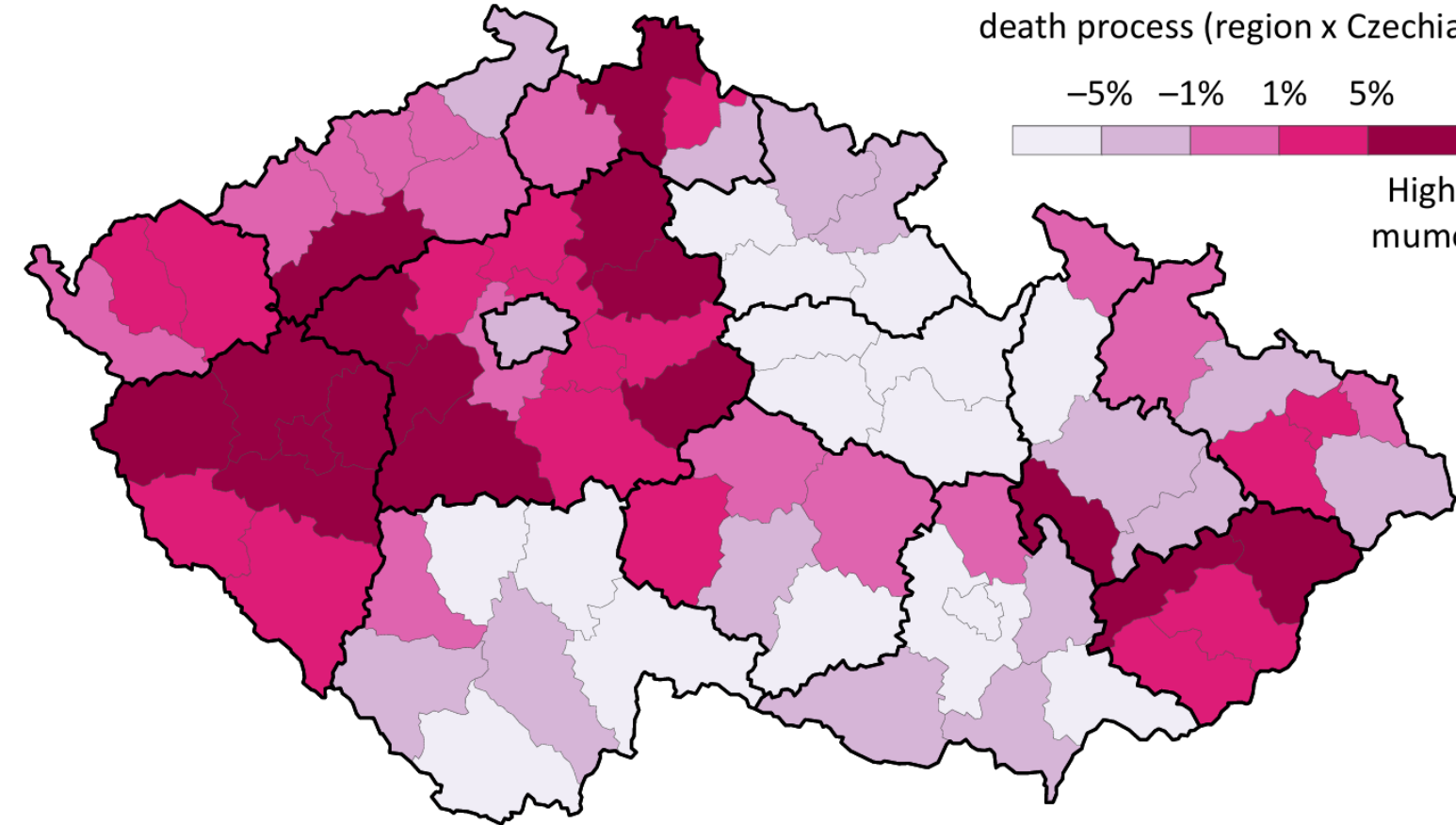
## Rate decomposition by age and UCD-structure

Difference in prevalence of mumo death process (region x Czechia)

-5% -1% 1% 5%

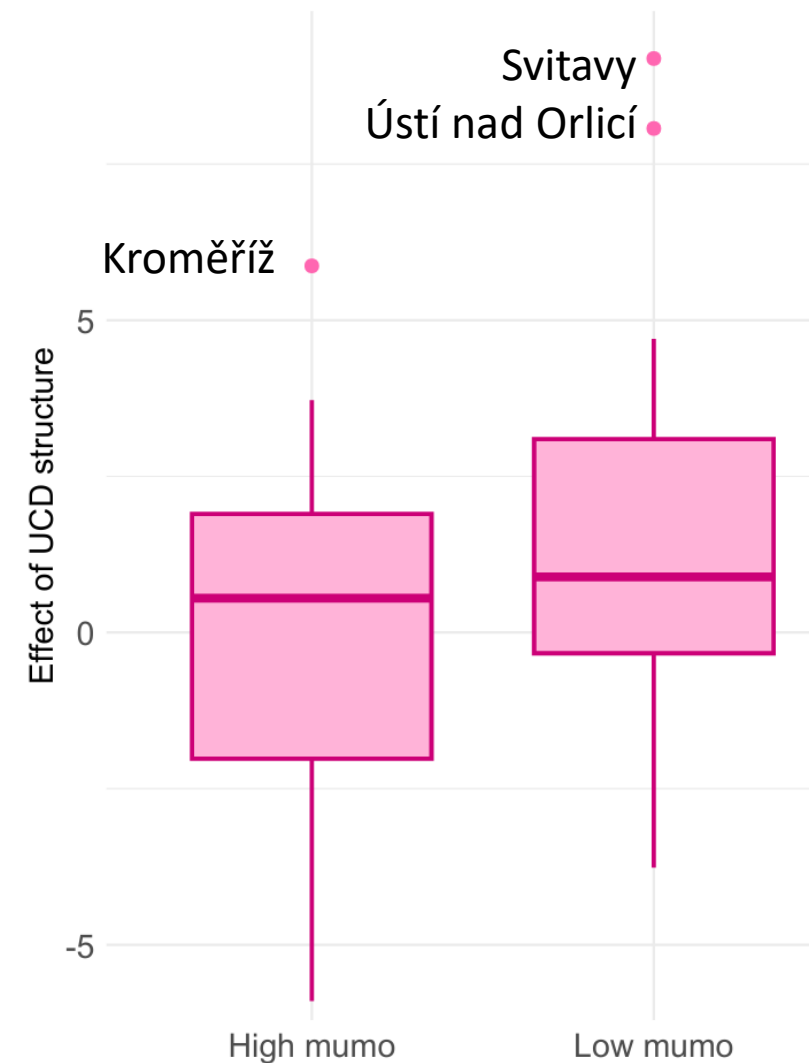


High mumo



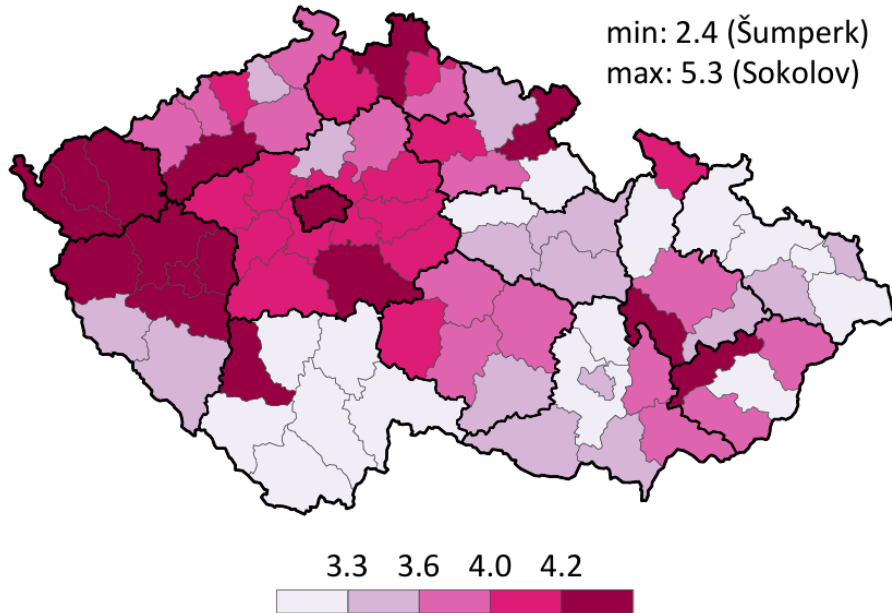
Czechia: 21% of death from mumo death process

Contribution of UCD structure to the difference in prevalence of mumo death process

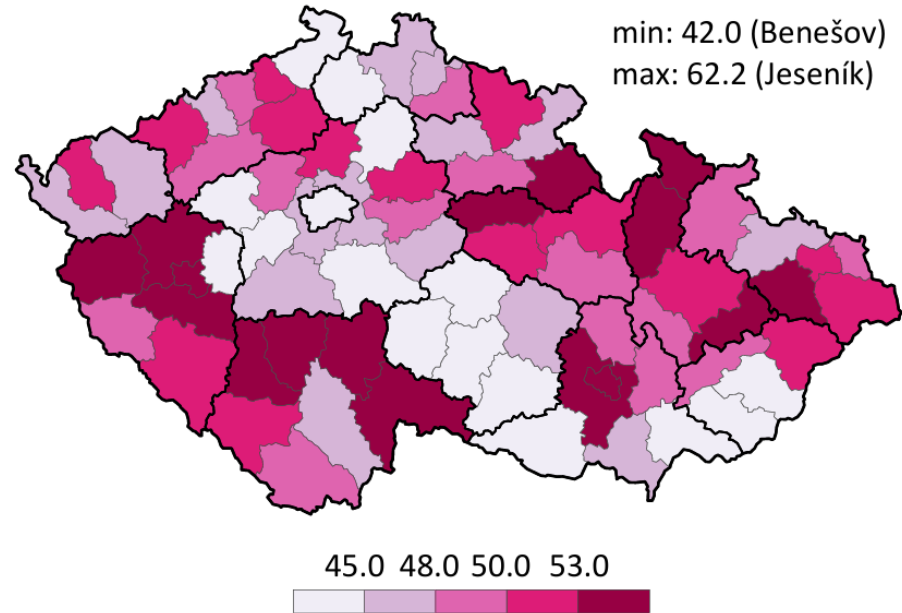


UCD structure is not an important contributor to the difference in prevalence of mumo death process.

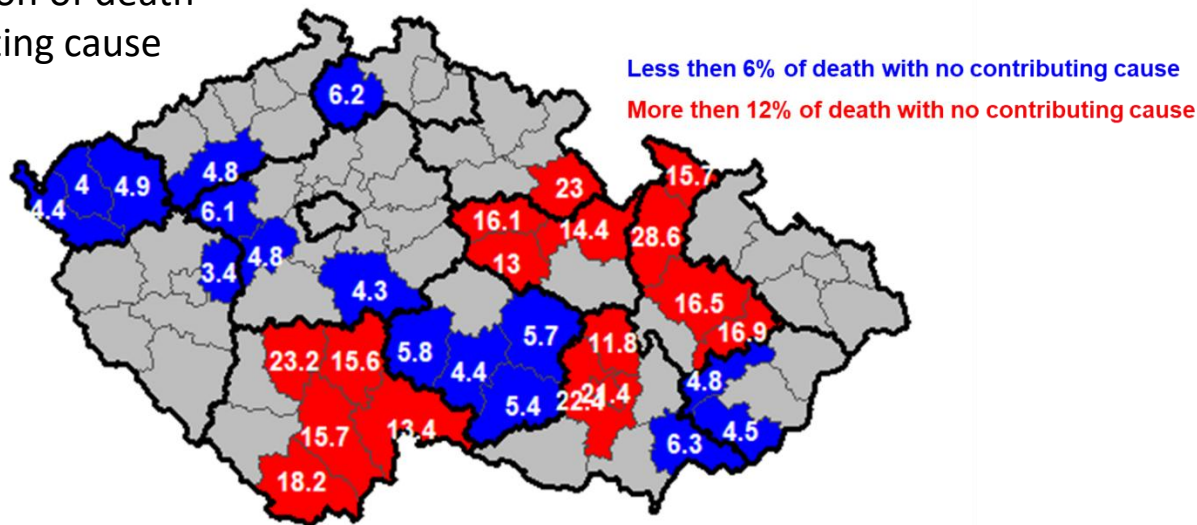
Panel A: Average number of causes



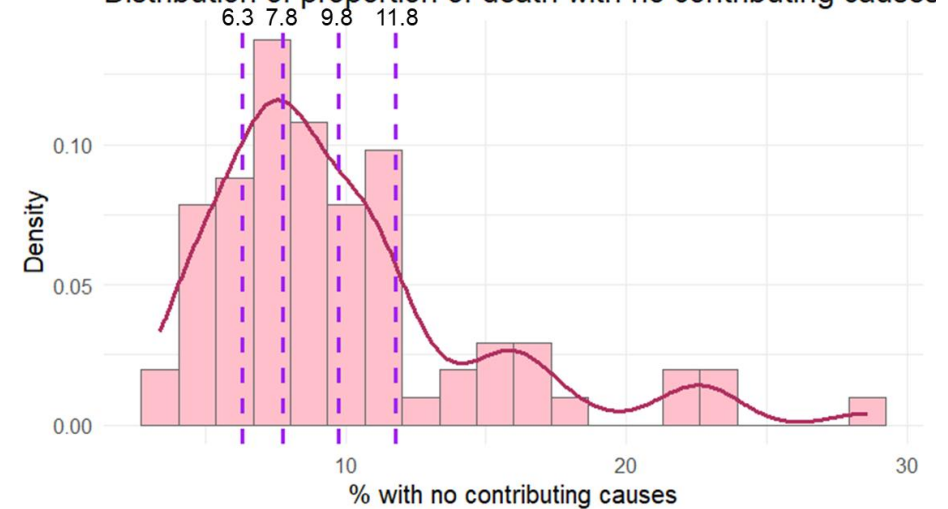
Panel B: Coefficient of variation of the average (%)



Panel C: Proportion of death with no contributing cause



Distribution of proportion of death with no contributing causes



MCD data have the potential to provide annual, population-wide data on multimorbidity at death, not burdened by the non attendance in health care. But in some countries there is a long way before they can be used to measure mumo at death, even with RiCoDa.

Further considerations: new form of death certificate?

Thank you.