

Bridging Morbidity and Mortality

Analysis of (mortality by) disability using Czech administrative data

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Outline

How long does a person on average live without chronic diseases?

What diseases can be associated with longest period between illness and death?

What are the differences in mortality between groups by chronic diseases?

Length of life without a chronic disease

Length of life with a chronic disease

Data

- Czech health registry data: outpatient visits, hospitalizations, medical prescriptions, treatment, sick leaves etc.
 - Indication of treatment, diagnosis, medication does not necessarily imply presence of health condition
 - Data-cleaning to validate diagnoses

Table: Validated diagnoses and their overall prevalence (%), Czechia, 2023

Chronic pulmonary disease	13,0
Diabetes without complications	8,6
Any malignancy	5,3
Cerebrovascular disease	5,0
Mild liver disease	4,4
Peripheral varcular disease	4,3
Diabetes with complications	3,9
Congestive heart failure	3,3
Rheumatic disease	2,2
Dementia	1,5
Myocardial infarction	1,4
Peptic ulcer disease	1,2
Hemiplegia or paraplegia	0,6
Metastatic solid tumor	0,6
Moderate or severe liver disease	0,2

Methods and Indicators

- Disease-free life expectancy
 - Sullivan's method
 - Weights derived from (i) prevalences of diseases and (ii) values of DCCI index (= Dey modification of Charlson comorbidity index)
- Life expectancy by causes of death
 - Multiple-decrement life tables
- Age-specific mortality rates
 - Unconditional rates (D_x^{dg}/P_x)
 - Conditional rates (D_x^{dg}/P_x^{dg})

Results

Table: Healthy life expectancies by level of disability, Czechia, 2023, males & females

	DCCI=0 (66,2%)	DCCI=1 (17,2%)	DCCI=2 (7,5%)	DCCI=3 (3,8%)	DCCI=4 (2,1%)	DCCI=5 (3,1%)
Males	0 51,8 (67,4)	64,1 (83,4)	71,5 (92,9)	74,1 (96,3)	75,3 (97,9)	74,5 (96,8)
	30 26,4 (55,5)	38,4 (80,6)	42,5 (89,3)	44,8 (94,2)	46 (96,6)	45,2 (94,9)
	50 11,6 (40,1)	22,6 (78,2)	24,5 (84,8)	26,3 (90,9)	27,3 (94,5)	26,5 (91,6)
	65 4,2 (25,4)	13,3 (79,4)	13,6 (81,5)	14,5 (87,0)	15,3 (91,4)	14,4 (86,0)
	85 0,8 (14,4)	4,5 (84,4)	4,4 (82,3)	4,5 (84,3)	4,7 (87,4)	4 (75,9)
Females	DCCI=0 (64,2%)	DCCI=1 (18,0%)	DCCI=2 (8,6%)	DCCI=3 (4,2%)	DCCI=4 (2,2%)	DCCI=5 (2,9%)
	0 54,5 (65,8)	68,5 (82,8)	76,2 (92,0)	79,5 (96,0)	81,1 (97,9)	80,4 (97,2)
	30 28,5 (53,6)	42,1 (79,0)	47 (88,2)	50 (93,9)	51,5 (96,8)	50,9 (95,6)
	50 13,8 (40,7)	26,1 (76,9)	28,6 (84,3)	30,9 (91,1)	32,2 (95,1)	31,6 (93,2)
	65 5,9 (28,9)	15,8 (77,1)	16,7 (81,5)	18 (88,0)	18,9 (92,7)	18,3 (89,6)
	85 1 (16,3)	5,2 (81,0)	5,2 (80,7)	5,4 (84,4)	5,7 (88,7)	5,2 (81,5)

Note: In () is relative healthy life expectancy expressed as percentage of overall life expectancy

Results

Figure: Relative disease free life expectancy at age 0 and 65, leading chronic diseases, Czechia, 2023

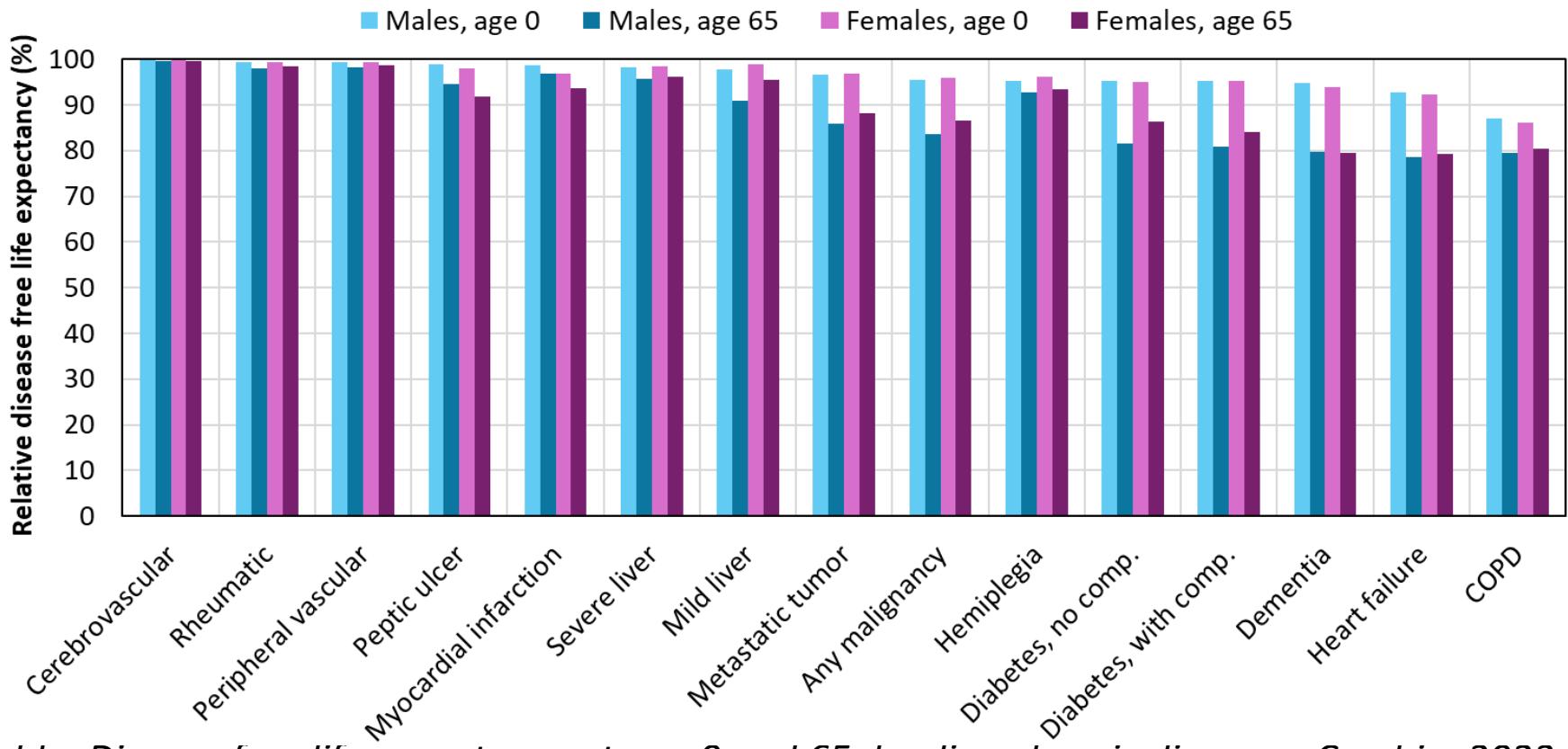


Table: Disease free life expectancy at age 0 and 65, leading chronic diseases, Czechia, 2023

		Cerebro- vascular	Rheuma- tic	Peripheral vascular	Peptic ulcer	Myocardial infarction	Severe liver	Mild liver	Metastatic tumor	Any malignancy	Hemi- plegia	Diabetes, no comp.	Diabetes, with comp.	Dementia	Heart failure	COPD
Males	0	73,0	75,9	73,2	75,6	75,1	76,7	73,2	76,5	73,2	76,4	71,3	73,5	76,0	74,2	67,0
	65	13,3	16,2	13,5	16,0	15,2	16,6	15,5	16,3	13,6	16,4	13,1	14,0	15,8	14,4	13,3
Females	0	77,8	80,3	78,9	81,5	81,8	82,6	79,6	82,3	78,6	82,3	76,4	79,4	81,2	80,1	71,3
	65	16,3	19,1	17,2	19,7	19,5	20,4	19,1	20,1	17,6	20,2	16,2	17,7	18,8	18,0	16,4

Results

Table: Disease free life expectancy at age 0 and 65, leading causes of death, Czechia, 2023

	Age	Cerebro-vascular	COPD	Heart failure	Dementia	Diabetes	Myocardial infarction
Males	0	73,0	67,0	74,2	76,0	73,5	75,1
	65	13,3	13,3	14,4	15,8	14,0	15,2
Females	0	77,8	71,3	80,1	81,2	79,4	81,8
	65	16,3	16,4	18,0	18,8	17,7	19,5

Table: Life expectancy of people dying with leading causes of death, age 0 and 65, Czechia, 2023

	Age	Cerebro-vascular	COPD	Heart failure	Dementia	Diabetes	Myocardial infarction
Males	0	80,1	78,0	80,4	85,0	80,0	74,4
	65	17,6	14,8	18,4	20,5	17,2	14,6
Females	0	85,4	80,1	86,5	88,3	84,9	82,4
	65	21,6	16,4	22,5	23,4	20,9	18,9

Table: Difference between disease free life expectancy and life expectancy of people dying from leading causes of death, Czechia, 2023

	Age	Cerebro-vascular	COPD	Heart failure	Dementia	Diabetes	Myocardial infarction
Males	0	7,1	11,0	6,1	9,0	6,5	-0,7
	65	4,3	1,5	4,0	4,7	3,2	-0,6
Females	0	7,6	8,8	6,4	7,2	5,5	0,6
	65	5,3	0,0	4,5	4,7	3,2	-0,7

Results

= 1,4 % people with malignancy die from liver disease

Table: Distribution of deaths by causes and leading chronic diseases, males, Czechia, 2023

	Any malignancy	Cerebrovascular	COPD	Heart failure	Dementia	Diabetes	Hemiplegia, paraplegia	Liver disease	Myocardial infarction	Peptic ulcer	Peripheral vascular	Rheumatic	Other
Any malignancy	41,2	3,5	3,1	4,3	1,9	3,0	0,0	1,4	1,6	0,2	1,3	0,1	38,4
Metastatic tumor	78,0	0,6	1,0	1,1	0,2	0,7	0,0	0,5	0,3	0,1	0,3	0,0	17,2
Cerebrovascular	16,7	13,9	2,8	5,5	3,4	5,0	0,0	1,4	2,1	0,3	1,7	0,1	47,0
COPD	23,2	3,8	11,2	6,0	1,6	3,7	0,0	2,0	2,1	0,4	1,5	0,2	44,3
Heart failure	13,9	3,7	4,9	10,5	1,6	4,9	0,0	2,2	3,2	0,4	1,4	0,3	53,1
Dementia	9,0	7,6	2,6	7,3	11,5	5,6	0,0	0,9	1,2	0,2	2,2	0,1	51,9
Diabetes, with comp.	18,6	5,1	3,2	6,5	1,9	12,7	0,0	2,0	3,2	0,3	1,4	0,3	44,8
Diabetes, no comp.	25,5	4,7	3,4	5,8	2,4	5,4	0,0	2,7	2,9	0,4	1,5	0,1	45,0
Hemiplegia, paraplegia	21,0	19,7	1,7	5,5	2,0	4,0	0,4	1,1	1,2	0,3	1,7	0,3	41,2
Mild liver disease	26,2	3,9	3,2	5,3	1,4	3,4	0,1	7,3	1,7	0,8	1,2	0,2	45,3
Severe liver disease	18,5	1,4	1,4	3,0	0,2	2,0	0,0	44,8	0,8	0,3	1,0	0,1	26,5
Myocardial infarction	13,9	3,9	3,1	5,5	1,5	5,1	0,0	0,9	16,9	0,3	1,4	0,1	47,4
Peptic ulcer	24,8	4,3	3,6	5,9	1,8	4,0	0,0	5,9	1,8	4,6	1,6	0,2	41,5
Peripheral vascular	16,9	5,6	3,8	6,5	2,5	6,3	0,0	1,5	3,3	0,3	4,0	0,3	49,1
Rheumatic disease	21,0	4,8	4,0	5,8	1,7	4,9	0,0	1,4	3,0	0,3	1,7	1,4	50,1

Results

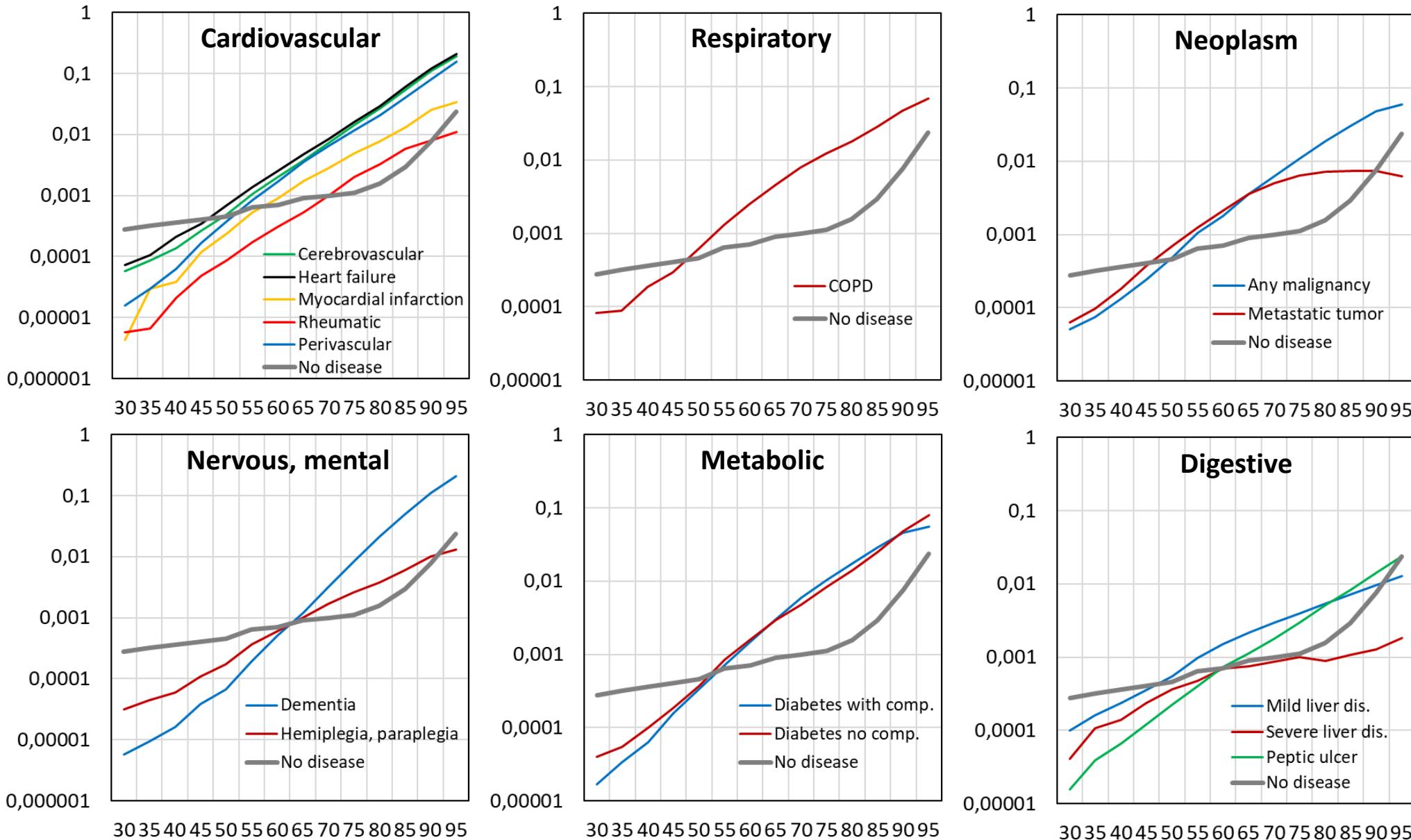
= 0,9 % people with malignancy die from liver disease

Table: Distribution of deaths by causes and leading chronic diseases, females, Czechia, 2023

	Any malignancy	Cerebrovascular	COPD	Heart failure	Dementia	Diabetes	Hemiplegia, paraplegia	Liver disease	Myocardial infarction	Peptic ulcer	Peripheral vascular	Rheumatic	Other
Any malignancy	40,5	4,1	2,4	4,7	2,3	3,1	0,0	0,9	1,0	0,3	1,1	0,2	39,3
Metastatic tumor	12,1	15,5	2,5	7,5	5,8	5,4	0,0	0,6	1,4	0,3	1,9	0,2	46,9
Cerebrovascular	19,8	4,9	11,2	6,6	2,9	3,9	0,0	1,3	1,3	0,3	1,6	0,4	45,8
COPD	10,1	4,9	4,4	12,5	3,1	5,2	0,0	0,9	2,0	0,3	1,3	0,3	55,0
Heart failure	6,4	7,6	1,9	8,6	13,8	6,2	0,0	0,4	1,2	0,2	2,2	0,1	51,4
Dementia	14,7	6,1	2,7	7,8	3,3	14,6	0,0	1,1	2,1	0,3	1,4	0,3	45,8
Diabetes, with comp.	20,6	6,0	3,4	6,9	4,7	6,7	0,0	1,4	1,6	0,4	1,8	0,2	46,2
Diabetes, no comp.	16,0	25,7	1,6	4,8	2,9	4,1	0,1	0,6	1,4	0,4	1,1	0,3	41,2
Hemiplegia, paraplegia	78,5	0,8	0,8	1,1	0,2	1,0	0,0	0,4	0,2	0,0	0,2	0,1	16,8
Mild liver disease	27,1	5,0	2,9	5,9	2,4	4,4	0,0	5,7	1,1	0,4	1,3	0,3	43,6
Severe liver disease	19,1	1,0	1,6	4,0	0,6	2,3	0,0	39,5	0,4	0,6	1,0	0,2	29,6
Myocardial infarction	9,3	5,3	2,7	7,3	2,3	5,2	0,0	0,6	15,4	0,2	1,2	0,3	50,3
Peptic ulcer	18,9	4,9	3,3	7,1	3,2	4,6	0,0	4,1	1,1	4,4	1,6	0,2	46,6
Peripheral vascular	11,6	7,1	2,9	8,0	5,0	6,5	0,0	0,6	2,1	0,3	4,0	0,3	51,4
Rheumatic disease	18,0	6,2	3,3	7,2	3,2	4,4	0,0	1,3	1,8	0,4	2,2	2,5	49,5

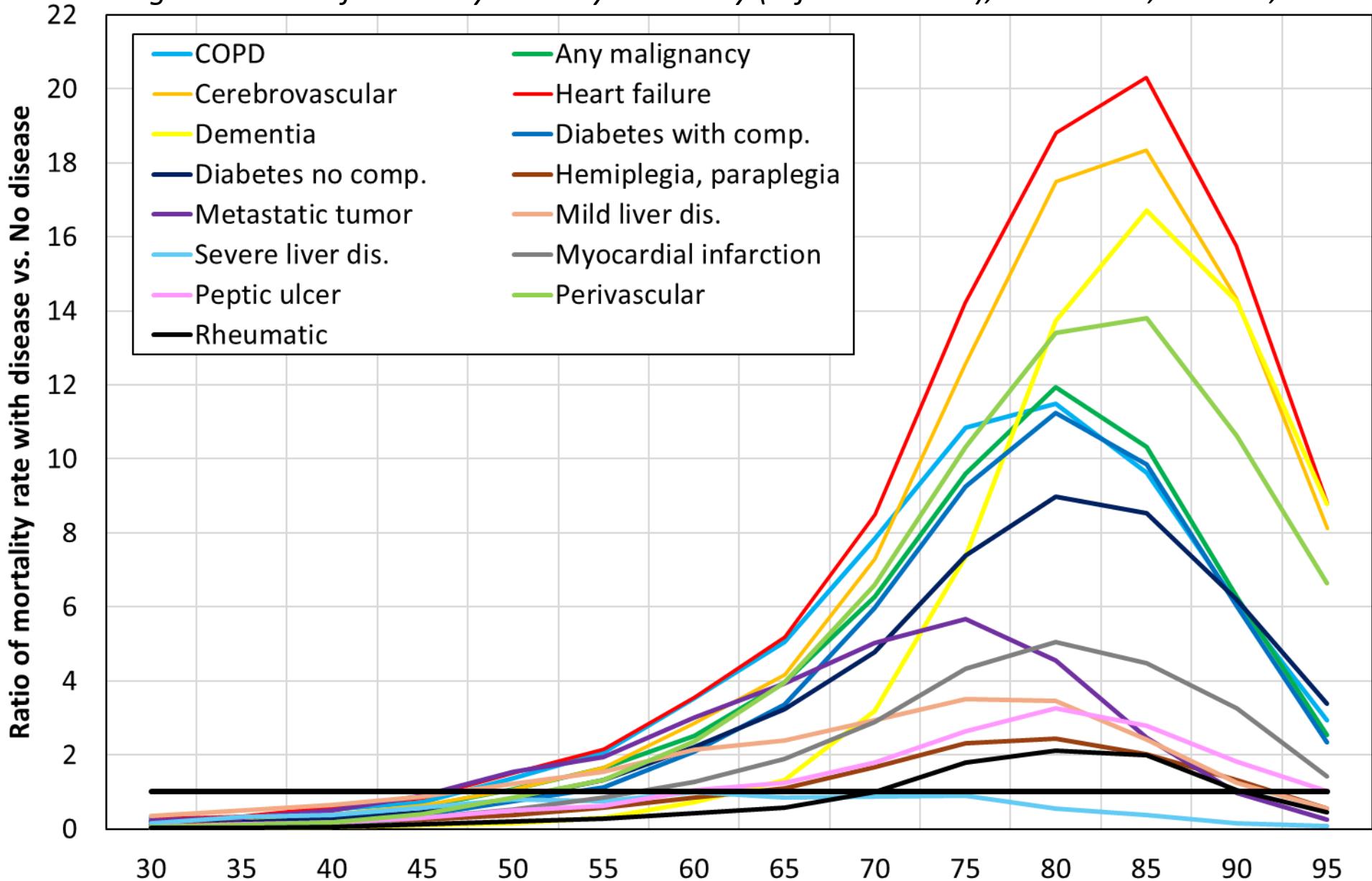
Results

Figure: Unconditional age-specific mortality rates by leading chronic diagnoses, both sexes, Czechia, 2023



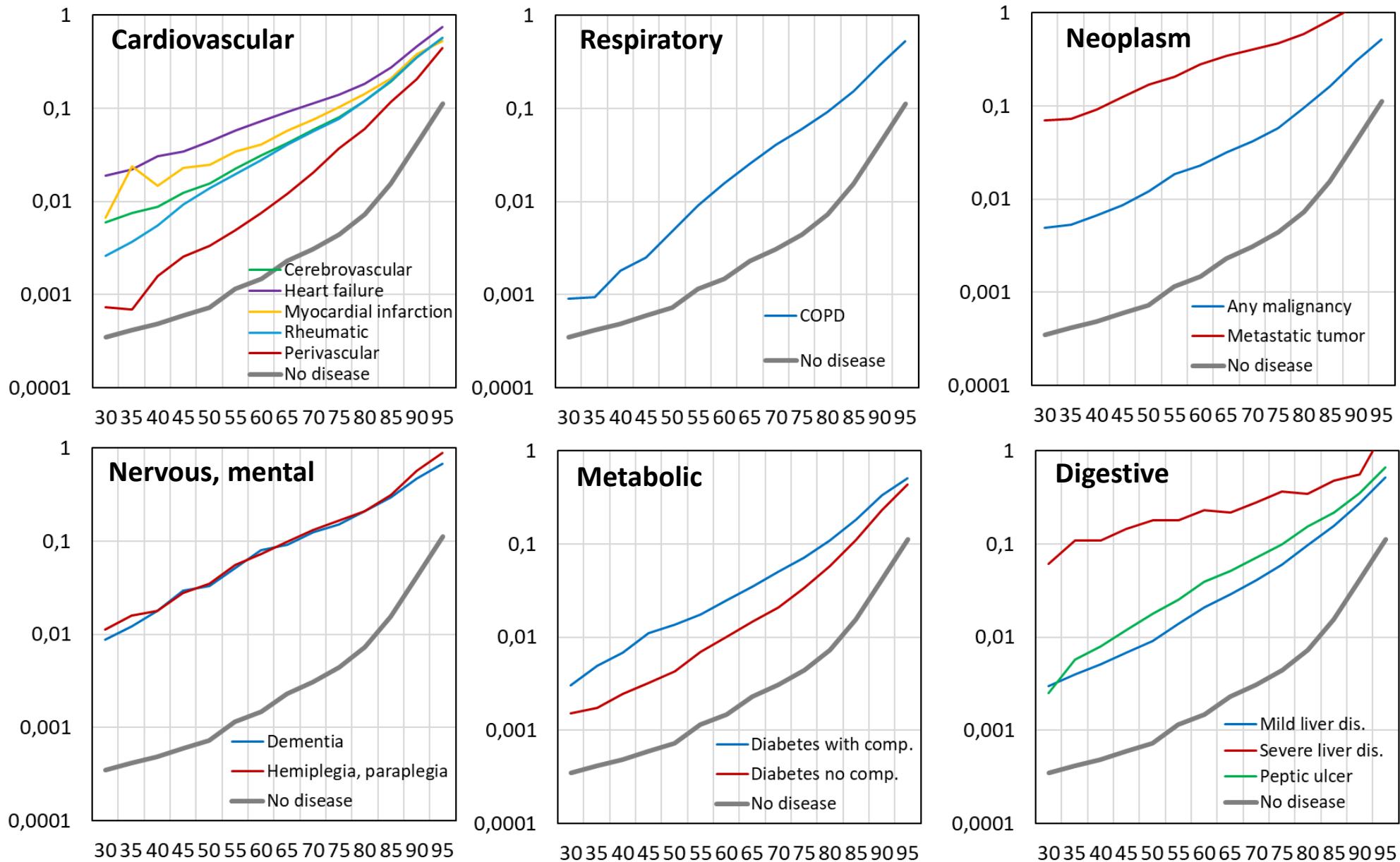
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Figure: Ratios of mortality rates by morbidity (ref=No disease), both sexes, Czechia, 2023



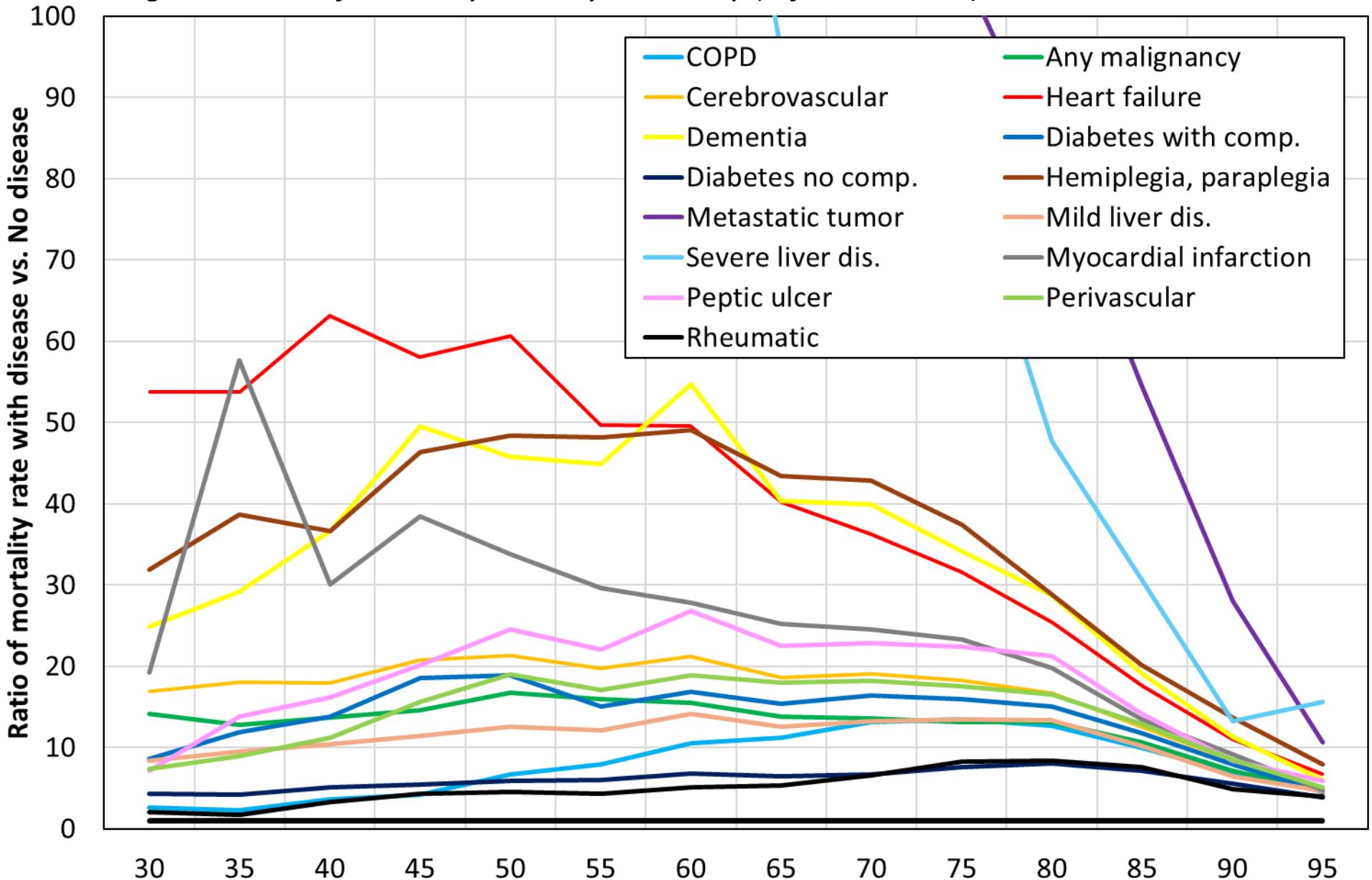
Results

Figure: Conditional age-specific mortality rates by leading chronic diagnoses, both sexes, Czechia, 2023



Results

Figure: Ratios of mortality rates by morbidity (ref=No disease), both sexes, Czechia, 2023



Summary of findings

How long does a person on average live without chronic diseases?

Czechs live on average **53 years** disease-free (51,8 in Males, 54,5 in Females), which is nearly **65% of average lifetime**. Conditions causing the earliest onset of disability include COPD, diabetes, malignancy and peripheral vascular diseases.

What diseases can be associated with longest period between illness and death?

The longest durations of life with disability can be attributed to **dementia, COPD and cerebrovascular diseases**. However, only a minority (app. 10%) of Czechs die from diseases, which they are treated for. Of course, this does not apply for severe diseases.

What are the differences in mortality between groups by chronic diseases?

The highest risk of death is in populations with **metastatic tumors, severe liver diseases, heart failure, myocardial infarction and dementia with hemiplegia**. The mortality disparity between subpopulations by diagnosis is most pronounced at ages 40-60.

Thank you.

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