Munich Cancer Registry

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ICD-10 C71: Brain cancer

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	6,128
Diseases	6,132
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

Munich Cancer Registry
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https://www.tumorregister-muenchen.de/en

https://www.tumorregister-muenchen.de/en/facts/base/bC71__E-ICD-10-C71-Brain-cancer-incidence-and-mortality.pdf

Index of figures and tables

Global Statements about the statistics on the Internet −
Baseline Statistics (grey button), **Survival** (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.69 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, December 2021

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.65 million to 4.10 in 2002, and to 4.69 million in 2007).

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate.

ICD-10 codes (ICD-10 2015) used for specifying cancer site

Code	Description
C71.-	Malignant neoplasm of brain
C71.0	Cerebrum, except lobes and ventricles
C71.1	Frontal lobe
C71.2	Temporal lobe
C71.3	Parietal lobe
C71.4	Occipital lobe
C71.5	Cerebral ventricle
C71.6	Cerebellum
C71.7	Brain stem
C71.8	Overlapping lesion of brain
C71.9	Brain, unspecified

INCIDENCE

Table 1

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (ALL PATIENTS) (incl. DCO)

Year of diagnosis	All cases n	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	149	49	32.9	8.1	2.0	88.6	97.3
1999	147	58	39.5	9.8	2.0	94.6	98.0
2000	171	54	31.6	9.4	2.0	87.1	98.2
2001	195	59	30.3	9.1	2.0	89.2	96.9
2002	278	64	23.0	8.7	2.0	88.1	98.9 #
2003	323	73	22.6	8.7	2.0	87.6	98.8
2004	295	73	24.7	8.9	2.0	88.1	98.3
2005	330	65	19.7	9.4	1.9	85.5	97.9
2006	263	40	15.2	9.5	1.8	90.1	98.5
2007	304	50	16.4	9.6	1.8	82.9	95.1 #
2008	356	56	15.7	9.7	1.7	82.9	98.9
2009	410	55	13.4	9.9	1.4	83.9	98.0
2010	352	54	15.3	10.0	1.4	84.7	98.6
2011	362	46	12.7	10.4	1.3	79.0	98.9
2012	361	41	11.4	10.5	1.2	81.4	99.2
2013	341	40	11.7	10.7	1.3	84.5	99.1
2014	327	32	9.8	11.0	1.1	84.1	98.2
2015	316	38	12.0	11.0	0.7	81.3	98.7
2016	281	36	12.8	10.9	0.8	79.4	99.6
2017	231	38	16.5	11.2	0.7	70.6	100.0
2018	167	25	15.0	11.4	0.6	63.5	100.0
2019	95	2	2.1	11.5	0.6	67.4	100.0
2020	78			11.6	0.0	52.6	100.0 ##
1998-2020	6132	1048	17.1	11.6	2.0	83.0	98.5

6,132 cases diagnosed 1998-2020 are related to a total of 6,128 patients. Currently, in 855 (14.0 %) of these 6,128 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 731 / 104 / 20 (11.9 % / 1.7 % / 0.3 %) patients exist having 2 / 3 / 4+ malignancies.

The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be retreived from the respective headings.

How to interpret:
In 2018, a subgroup of 167 cases has been diagnosed, of which 11.4 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.6 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (MALES) (incl. DCO)

Year of diagnosis	Males n	Males %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	76	51.0	24	31.6	7.9	1.9	89.5	97.4
1999	74	50.3	28	37.8	9.3	1.8	95.9	98.6
2000	89	52.0	23	25.8	9.2	1.8	85.4	97.8
2001	91	46.7	26	28.6	8.2	1.9	90.1	97.8
2002	134	48.2	24	17.9	8.2	1.9	86.6	98.5 #
2003	169	52.3	32	18.9	7.9	1.9	89.3	99.4
2004	146	49.5	28	19.2	8.5	1.9	93.2	99.3
2005	176	53.3	30	17.0	9.1	1.7	90.3	97.7
2006	153	58.2	17	11.1	9.4	1.8	90.2	98.7
2007	167	54.9	23	13.8	9.4	1.8	80.8	95.2 #
2008	199	55.9	25	12.6	9.7	1.7	85.9	99.0
2009	246	60.0	25	10.2	10.1	1.3	81.3	98.0
2010	193	54.8	25	13.0	10.2	1.3	84.5	98.4
2011	195	53.9	19	9.7	10.8	1.3	81.5	99.0
2012	188	52.1	19	10.1	10.8	1.1	82.4	99.5
2013	198	58.1	18	9.1	11.2	1.2	87.9	100.0
2014	188	57.5	12	6.4	11.4	1.2	83.5	98.9
2015	172	54.4	18	10.5	11.5	0.6	86.0	98.8
2016	151	53.7	15	9.9	11.3	0.8	78.1	99.3
2017	141	61.0	19	13.5	11.6	0.3	72.3	100.0
2018	105	62.9	14	13.3	11.9	0.0	62.9	100.0
2019	61	64.2	1	1.6	12.0	0.0	67.2	100.0
2020	47	60.3			12.2	0.0	55.3	100.0 ##
1998-2020	3359	54.8	465	13.8	12.2	1.9	83.7	98.7

3,359 cases diagnosed 1998-2020 are related to a total of 3,356 patients. Currently, in 473 (14.1 %) of these 3,356 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 400 / 60 / 13 (11.9 % / 1.8 % / 0.4 %) patients exist having 2 / 3 / 4+ malignancies.

The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be retreived from the respective headings.

How to interpret:
In 2018, a subgroup of 105 cases has been diagnosed, of which 11.9 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.0 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1b

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (FEMALES)
(incl. DCO)

Year of diagnosis	Females n	Females %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %	
1998	73	49.0	25	34.2	8.2	2.3	87.7	97.3	
1999	73	49.7	30	41.1	10.3	2.2	93.2	97.3	
2000	82	48.0	31	37.8	9.6	2.2	89.0	98.8	
2001	104	53.3	33	31.7	9.9	2.2	88.5	96.2	
2002	144	51.8	40	27.8	9.2	2.2	89.6	99.3	#
2003	154	47.7	41	26.6	9.5	2.2	85.7	98.1	
2004	149	50.5	45	30.2	9.2	2.1	83.2	97.3	
2005	154	46.7	35	22.7	9.6	2.1	79.9	98.1	
2006	110	41.8	23	20.9	9.6	1.9	90.0	98.2	
2007	137	45.1	27	19.7	9.7	1.9	85.4	94.9	#
2008	157	44.1	31	19.7	9.6	1.8	79.0	98.7	
2009	164	40.0	30	18.3	9.7	1.5	87.8	98.2	
2010	159	45.2	29	18.2	9.8	1.4	84.9	98.7	
2011	167	46.1	27	16.2	9.9	1.3	76.0	98.8	
2012	173	47.9	22	12.7	10.1	1.4	80.3	98.8	
2013	143	41.9	22	15.4	10.1	1.3	79.7	97.9	
2014	139	42.5	20	14.4	10.5	1.1	84.9	97.1	
2015	144	45.6	20	13.9	10.4	0.8	75.7	98.6	
2016	130	46.3	21	16.2	10.4	0.9	80.8	100.0	
2017	90	39.0	19	21.1	10.7	1.4	67.8	100.0	
2018	62	37.1	11	17.7	10.8	1.6	64.5	100.0	
2019	34	35.8	1	2.9	10.9	1.5	67.6	100.0	
2020	31	39.7			11.0	0.0	48.4	100.0	##
1998-2020	2773	45.2	583	21.0	11.0	2.3	82.0	98.2	

2,773 cases diagnosed 1998-2020 are related to a total of 2,772 patients. Currently, in 382 (13.8 %) of these 2,772 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 331 / 44 / 7 (11.9 % / 1.6 % / 0.3 %) patients exist having 2 / 3 / 4+ malignancies.

\# The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be retreived from the respective headings.

How to interpret:
In 2018, a subgroup of 62 cases has been diagnosed, of which 10.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 1.6 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 2

Incidence measures by year of diagnosis including DCO cases
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	76	73	6.9	6.2	4.8	4.1	6.2	5.0	7.1	5.7
1999	74	73	6.6	6.2	4.3	3.6	6.0	4.7	7.3	5.5
2000	89	82	7.8	6.8	5.5	4.0	7.1	5.2	8.5	5.9
2001	91	104	7.9	8.5	5.2	5.0	7.1	6.5	8.5	7.6
2002	134	144	7.2	7.4	5.2	4.1	6.4	5.5	7.2	6.6
2003	169	154	9.0	7.8	6.1	4.7	7.9	6.0	9.2	7.0
2004	146	149	7.8	7.5	5.0	4.8	6.7	5.8	7.9	6.5
2005	176	154	9.3	7.7	6.3	4.7	7.9	5.8	9.1	6.7
2006	153	110	8.0	5.5	5.3	3.1	6.7	4.0	7.7	4.6
2007	167	137	7.5	5.9	5.1	3.4	6.5	4.4	7.3	5.3
2008	199	157	8.9	6.8	5.7	4.4	7.5	5.2	8.9	5.8
2009	246	164	11.0	7.1	7.3	4.0	9.3	5.3	10.7	6.1
2010	193	159	8.6	6.8	5.4	4.0	7.0	5.0	8.2	5.7
2011	195	167	8.7	7.1	5.4	3.9	7.1	5.1	8.2	6.1
2012	188	173	8.3	7.3	5.4	4.5	6.7	5.5	7.7	6.2
2013	198	143	8.6	6.0	5.5	3.6	6.9	4.5	7.9	5.1
2014	188	139	8.1	5.8	5.1	3.1	6.5	4.1	7.4	4.7
2015	172	144	7.2	5.9	4.5	3.4	5.8	4.3	6.7	5.1
2016	151	130	6.3	5.3	3.8	2.8	5.0	3.7	5.8	4.3
2017	141	90	5.8	3.7	3.5	1.9	4.6	2.5	5.3	2.9
2018	105	62	4.3	2.5	2.5	1.4	3.4	1.8	4.0	2.0
2019	61	34	2.5	1.4	1.4	0.6	1.9	0.9	2.3	1.1
2020	47	31	1.9	1.2	1.2	0.6	1.6	0.8	1.8	1.0
1998-2020	3359	2773	7.2	5.7	4.6	3.3	6.0	4.2	6.9	4.9

The computation of the incidence measures includes all cancers, irrespective of first or subsequent malignancy.

Table 3

Age distribution parameters by year of diagnosis (ALL PATIENTS)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	149	58.0	18.6	1.8	90.2	32.4	47.5	60.1	72.4	79.7
1999	147	62.7	17.4	4.7	93.4	42.2	53.5	65.8	75.8	82.2
2000	171	60.3	17.9	2.9	93.8	36.2	48.7	63.8	72.5	80.3
2001	195	60.9	17.9	2.3	92.0	37.0	50.8	62.6	73.9	80.5
2002	278	60.4	19.0	0.8	91.2	31.6	51.6	63.5	74.2	81.1
2003	323	59.5	18.2	0.6	95.4	33.3	47.6	63.1	74.0	80.2
2004	295	60.3	19.2	0.0	92.8	34.1	51.6	63.2	74.3	82.3
2005	330	59.5	19.8	0.8	94.3	33.4	47.5	64.0	73.6	81.8
2006	263	60.7	18.6	3.0	97.0	35.0	48.3	64.2	73.5	81.6
2007	304	59.7	19.0	2.2	93.5	32.5	47.6	63.4	73.7	81.2
2008	356	60.1	19.6	0.1	94.1	31.6	48.7	64.8	73.8	81.0
2009	410	61.2	18.6	0.2	94.2	35.0	52.1	64.8	74.2	82.4
2010	352	61.1	19.3	0.6	91.6	35.8	49.7	66.7	75.1	81.7
2011	362	61.1	18.2	6.2	94.0	36.6	49.6	64.1	75.7	82.0
2012	361	60.2	20.3	0.0	96.0	32.8	48.0	65.0	74.1	83.0
2013	341	61.1	18.5	0.1	93.9	37.3	52.1	65.0	74.5	80.7
2014	327	62.0	18.4	2.6	93.6	36.1	51.6	65.6	75.0	82.7
2015	316	61.7	17.8	0.5	95.8	34.4	52.3	64.6	74.9	80.8
2016	281	62.6	17.7	0.4	94.5	38.2	51.5	65.7	76.4	82.3
2017	231	63.3	18.9	1.5	94.3	36.8	55.5	67.7	76.7	83.2
2018	167	63.6	18.2	1.9	98.3	42.0	52.0	66.8	76.9	84.1
2019	95	65.1	14.3	23.3	94.9	46.2	55.3	66.8	76.8	81.8
2020	78	61.1	17.1	17.8	86.0	33.3	50.4	63.5	75.8	80.7
1998-2020	6132	61.0	18.7	0.0	98.3	35.0	50.5	64.5	74.7	81.7

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	76	55.5	15.3	14.5	80.9	32.6	47.1	57.3	67.2	74.8
1999	74	62.6	14.3	10.4	89.2	43.9	54.4	63.4	72.6	78.8
2000	89	57.8	17.2	4.1	84.2	31.1	48.2	60.0	68.9	78.5
2001	91	59.7	16.3	10.0	91.2	37.7	50.8	60.9	72.4	77.4
2002	134	56.5	18.5	0.8	87.7	30.9	46.7	62.0	68.8	76.2
2003	169	57.8	18.3	6.2	89.4	30.8	45.5	61.5	71.9	77.6
2004	146	59.8	16.5	0.1	90.1	37.4	48.8	61.0	70.4	81.9
2005	176	58.4	19.9	0.8	94.3	33.1	47.0	62.7	71.8	80.4
2006	153	58.5	17.4	3.0	90.4	34.7	47.1	63.0	69.7	77.5
2007	167	57.9	18.4	2.2	92.6	32.5	47.5	60.7	70.7	79.2
2008	199	59.6	17.5	1.2	94.1	33.1	48.7	64.1	72.9	78.7
2009	246	59.6	19.5	0.9	90.3	33.2	49.8	63.7	73.4	81.9
2010	193	60.1	18.6	2.7	90.8	34.4	49.3	63.5	74.2	80.8
2011	195	59.1	17.8	6.2	91.9	36.6	45.3	60.1	73.7	80.5
2012	188	59.7	20.8	0.3	96.0	30.5	47.3	65.3	74.0	81.3
2013	198	60.4	18.3	0.1	93.9	38.6	51.9	63.5	73.7	78.8
2014	188	59.9	18.8	2.6	93.6	33.2	49.8	62.6	73.8	81.7
2015	172	61.9	17.0	0.5	95.1	38.5	55.2	64.5	73.4	79.3
2016	151	60.8	18.1	0.4	93.0	35.2	48.9	63.5	75.7	81.5
2017	141	62.4	18.2	1.5	90.4	41.4	55.6	66.1	75.9	79.8
2018	105	63.1	17.0	1.9	98.3	42.2	50.9	64.3	76.2	82.7
2019	61	63.4	14.0	23.3	86.3	47.0	55.3	64.0	73.2	81.7
2020	47	58.3	17.6	17.8	84.1	28.1	50.5	59.9	70.4	79.2
1998–2020	3359	59.6	18.1	0.1	98.3	34.6	49.6	62.6	73.0	79.8

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	73	60.5	21.3	1.8	90.2	30.9	49.6	64.7	77.9	83.4
1999	73	62.8	20.1	4.7	93.4	33.4	51.8	68.3	77.6	85.1
2000	82	63.0	18.2	2.9	93.8	36.8	55.5	66.7	75.3	81.7
2001	104	62.0	19.2	2.3	92.0	35.3	50.9	65.5	76.0	81.8
2002	144	64.0	18.8	2.6	91.2	34.5	54.2	69.0	78.6	83.2
2003	154	61.5	18.0	0.6	95.4	36.6	51.9	64.6	75.2	80.8
2004	149	60.7	21.5	0.0	92.8	29.6	51.9	65.7	77.3	82.6
2005	154	60.8	19.7	2.7	91.7	34.5	47.7	65.1	75.8	83.4
2006	110	63.7	19.9	7.3	97.0	36.8	54.1	67.3	78.9	85.9
2007	137	61.9	19.6	4.0	93.5	32.3	47.6	67.4	77.8	82.7
2008	157	60.7	21.9	0.1	92.9	28.1	48.7	66.5	77.1	86.1
2009	164	63.5	16.9	0.2	94.2	44.1	54.4	65.2	75.8	83.6
2010	159	62.5	20.2	0.6	91.6	37.3	51.0	68.1	75.9	83.5
2011	167	63.5	18.4	11.1	94.0	36.3	50.3	68.8	78.3	83.1
2012	173	60.8	19.8	0.0	90.4	34.9	49.3	64.6	74.3	83.7
2013	143	62.1	18.8	0.7	92.8	34.7	52.6	65.8	76.1	84.4
2014	139	64.7	17.5	3.2	92.7	42.6	53.9	69.7	77.1	84.2
2015	144	61.4	18.8	5.9	95.8	32.9	49.0	65.1	77.0	82.8
2016	130	64.7	17.1	7.1	94.5	41.5	54.1	68.0	77.3	83.7
2017	90	64.8	20.1	8.2	94.3	33.4	52.1	71.5	79.2	85.9
2018	62	64.6	20.3	5.8	97.4	38.9	54.6	69.4	77.2	86.3
2019	34	68.0	14.6	35.3	94.9	44.0	57.0	71.7	78.3	81.8
2020	31	65.2	15.7	33.3	86.0	45.0	50.0	67.9	79.5	81.7
1998-2020	2773	62.6	19.2	0.0	97.4	35.3	51.8	66.6	77.0	83.5

Table 4

Age distribution by 5-year age group and sex for period 2007-2020
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	44	1.1	1.1	26	1.2	1.2	18	1.0	1.0
5-9	36	0.9	2.0	21	0.9	2.1	15	0.9	1.9
10-14	27	0.7	2.7	18	0.8	2.9	9	0.5	2.4
15-19	29	0.7	3.4	15	0.7	3.6	14	0.8	3.2
20-24	54	1.4	4.8	36	1.6	5.2	18	1.0	4.3
25-29	84	2.1	6.9	48	2.1	7.3	36	2.1	6.4
30-34	116	2.9	9.8	63	2.8	10.1	53	3.1	9.4
35-39	129	3.2	13.0	66	2.9	13.0	63	3.6	13.1
40-44	195	4.9	17.9	121	5.4	18.4	74	4.3	17.3
45-49	239	6.0	23.9	148	6.6	25.0	91	5.3	22.6
50-54	302	7.6	31.5	180	8.0	33.0	122	7.1	29.7
55-59	356	8.9	40.5	231	10.3	43.2	125	7.2	36.9
60-64	361	9.1	49.5	220	9.8	53.0	141	8.2	45.0
65-69	469	11.8	61.3	268	11.9	64.9	201	11.6	56.6
70-74	532	13.4	74.7	290	12.9	77.8	242	14.0	70.6
75-79	472	11.9	86.5	264	11.7	89.5	208	12.0	82.7
80-84	303	7.6	94.1	145	6.4	96.0	158	9.1	91.8
85+	233	5.9	100.0	91	4.0	100.0	142	8.2	100.0
All ages	3981	100.0		2251	100.0		1730	100.0	

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 2007–2020

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=233 %	Females DCO rate n=280 %	Males Prop.all cancers n=153686 %	Females Prop.all cancers n=155051 %
0- 4	26	18	1.6	1.2			11.8	10.5
5- 9	21	15	1.3	1.0	4.8		17.9	15.0
10-14	18	9	1.1	0.6			13.1	7.0
15-19	15	14	0.9	0.9	6.7		4.7	5.3
20-24	36	18	1.8	0.9	2.8		5.7	3.5
25-29	48	36	2.1	1.6	4.2		5.0	3.0
30-34	63	53	2.7	2.3		7.5	4.9	2.5
35-39	66	63	2.9	2.8	4.5		3.6	1.8
40-44	121	74	4.8	3.1	1.7	1.4	4.3	1.2
45-49	148	91	5.5	3.5	2.7	3.3	2.9	1.0
50-54	180	122	7.1	4.9	2.8	7.4	2.1	1.0
55-59	231	125	10.9	5.7	4.3	4.8	1.8	0.9
60-64	220	141	12.4	7.4	5.0	5.0	1.3	0.9
65-69	267	201	16.4	11.1	5.6	5.5	1.1	1.1
70-74	290	241	19.3	14.0	9.7	12.0	1.1	1.2
75-79	264	208	21.8	13.9	17.8	18.3	1.1	1.1
80-84	145	158	20.0	14.8	30.3	41.1	0.9	1.0
85+	91	142	19.5	13.6	64.8	75.4	0.9	0.9
All ages	2250	1729			10.4	16.2	1.5	1.1
Incidence								
Raw			6.9	5.1				
WS			4.4	2.9				
ES			5.6	3.7				
BRD-S			6.4	4.3				

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

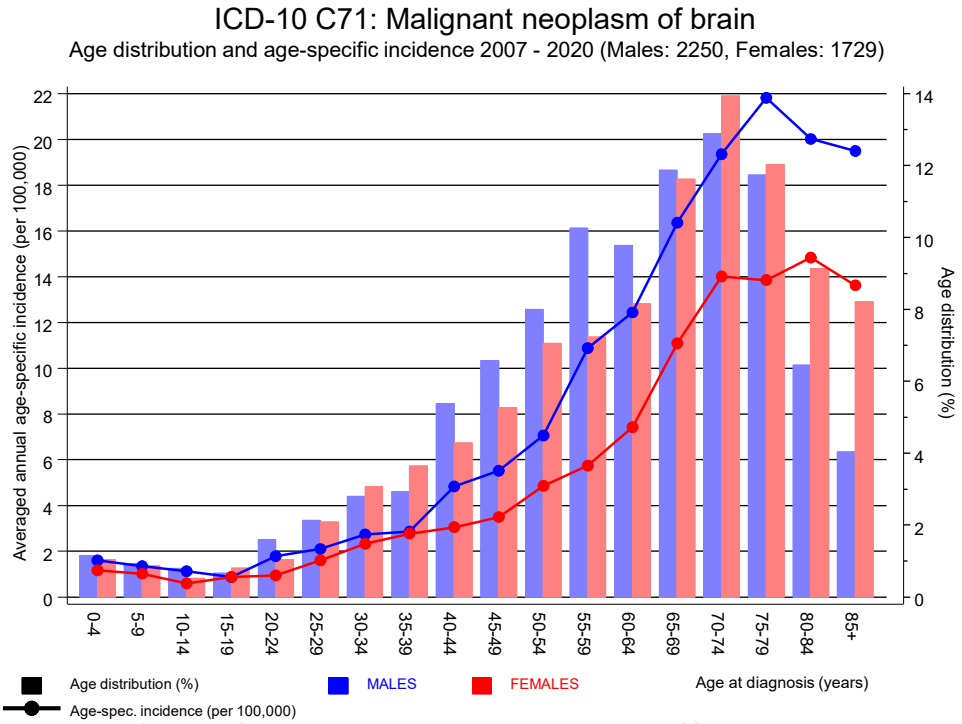


Figure 6. Age distribution (males: mean=60.2 yrs, median=63.4 yrs; females: mean=62.9 yrs, median=66.7 yrs) and age-specific incidence.

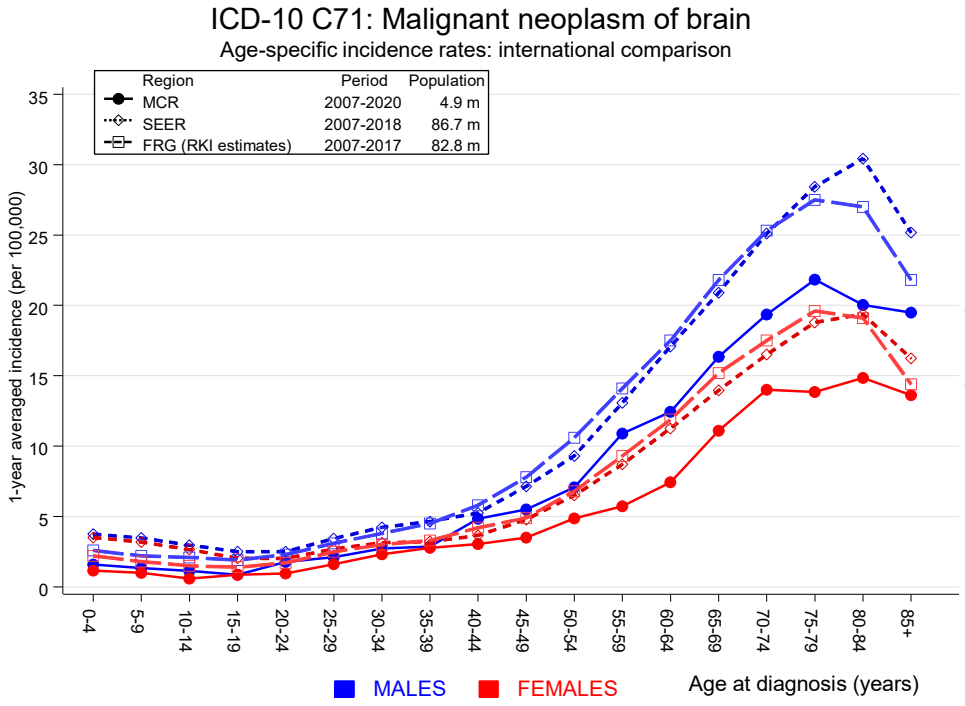


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, RKI estimates) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Estimated age-specific patient population of Germany, latest update: 16 March 2021. German Centre for Cancer Registry Data, Robert Koch Institute (RKI), based on data of the population based cancer registries. http://www.krebsdaten.de. Last access: 08/17/2021
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 21 Regs Research Data, released April 2021, based on the November 2020 submission. http://www.seer.cancer.gov.

Table 7a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998–2020

MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C07–C08	Salivary gland	1	0.1	9.7	0.2	54.0		1.4	
C17	Small intestine	1	0.3	3.3	0.1	18.1		1.1	100.0
C18	Colon	6	4.0	1.5	0.6	3.3		3.1	
C19–C20	Rectum	2	2.6	0.8	0.1	2.8		−1.0	50.0
C23–C24	Bile	1	0.4	2.3	0.1	12.9		0.9	100.0
C25	Pancreas	5	1.7	3.0	1.0	7.0		5.1	20.0
C30–C31	Sinuses	1	0.1	9.6	0.2	53.2		1.4	
C33–C34	Lung	6	5.5	1.1	0.4	2.4		0.7	
C40–C41	Bone	1	0.1	16.4	0.4	91.1		1.4	
C43	Malign. melanoma	3	2.5	1.2	0.3	3.5		0.8	33.3
C46,C49	Soft tissue	3	0.3	10.1	2.1	29.5	#	4.1	
C61	Prostate	13	12.5	1.0	0.6	1.8		0.7	
C64	Kidney	6	1.8	3.4	1.2	7.3	#	6.4	16.7
C67	Bladder	4	1.7	2.3	0.6	5.9		3.4	
C69	Eye melanoma	1	0.1	17.2	0.4	95.9		1.4	
C70–C72	CNS cancer	4	0.8	5.2	1.4	13.4	#	4.9	
C76–C79	CUP	1	0.7	1.4	0.0	7.7		0.4	
C81	Hodgkin lymphoma	1	0.2	5.0	0.1	27.8		1.2	
C82–C85	NHL	2	2.0	1.0	0.1	3.7		0.1	
C91–C96	Leukaemia	1	0.7	1.5	0.0	8.4		0.5	100.0
Not observed		0	9.4	0.0	0.0	0.4	#	−14.4	
All further malignancies		63	47.5	1.3	1.0	1.7	#	23.7	11.1

Patients	3053
Median age at next malignancy (years)	65.3
Person-years	6553
Mean observation time (years)	2.1
Median observation time (years)	0.9

The occurrence of further specified malignancy is statistically significant.

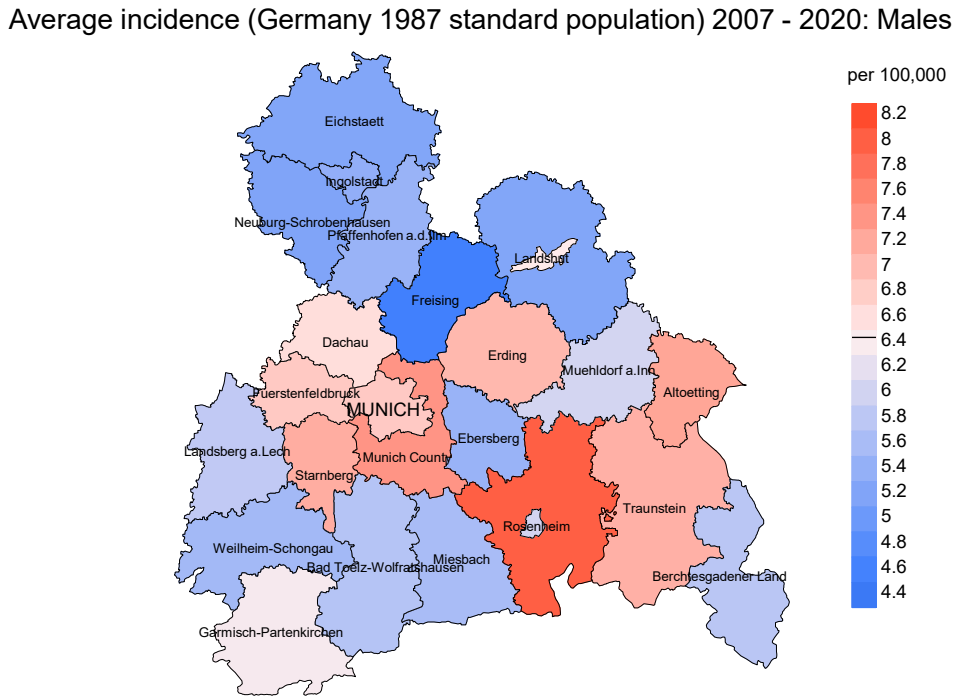
Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998–2020
FEMALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C18	Colon	3	2.6	1.1	0.2	3.3		0.7	
C19–C20	Rectum	3	1.2	2.5	0.5	7.3		3.2	33.3
C23–C24	Bile	1	0.4	2.7	0.1	15.1		1.1	100.0
C25	Pancreas	1	1.2	0.8	0.0	4.5		−0.4	
C30–C31	Sinuses	1	0.0	20.8	0.5	115.8		1.7	
C33–C34	Lung	1	2.6	0.4	0.0	2.1		−2.9	
C40–C41	Bone	1	0.0	24.7	0.6	137.5		1.7	
C43	Malign. melanoma	4	1.6	2.4	0.7	6.2		4.2	
C46,C49	Soft tissue	2	0.2	10.0	1.2	36.3	#	3.2	
C50	Breast	20	12.3	1.6	1.0	2.5		13.8	15.0
C51	Vulva	1	0.3	3.2	0.1	18.0		1.2	
C53	Cervix uteri	1	0.7	1.3	0.0	7.5		0.5	
C54	Corpus uteri	4	1.9	2.1	0.6	5.3		3.7	
C56	Ovary	2	1.4	1.4	0.2	5.2		1.1	
C64	Kidney	1	0.7	1.4	0.0	7.8		0.5	
C70–C72	CNS cancer	1	0.5	2.1	0.1	11.6		0.9	
C73	Thyroid	2	1.0	2.1	0.2	7.4		1.8	
C82–C85	NHL	3	1.2	2.5	0.5	7.3		3.2	
C91–C96	Leukaemia	4	0.5	8.7	2.4	22.2	#	6.4	
Not observed		0	4.6	0.0	0.0	0.8	#	−8.2	
All further malignancies		56	35.1	1.6	1.2	2.1	#	37.6	8.9

Patients	2399
Median age at next malignancy (years)	66.9
Person-years	5561
Mean observation time (years)	2.3
Median observation time (years)	0.9

The occurrence of further specified malignancy is statistically significant.



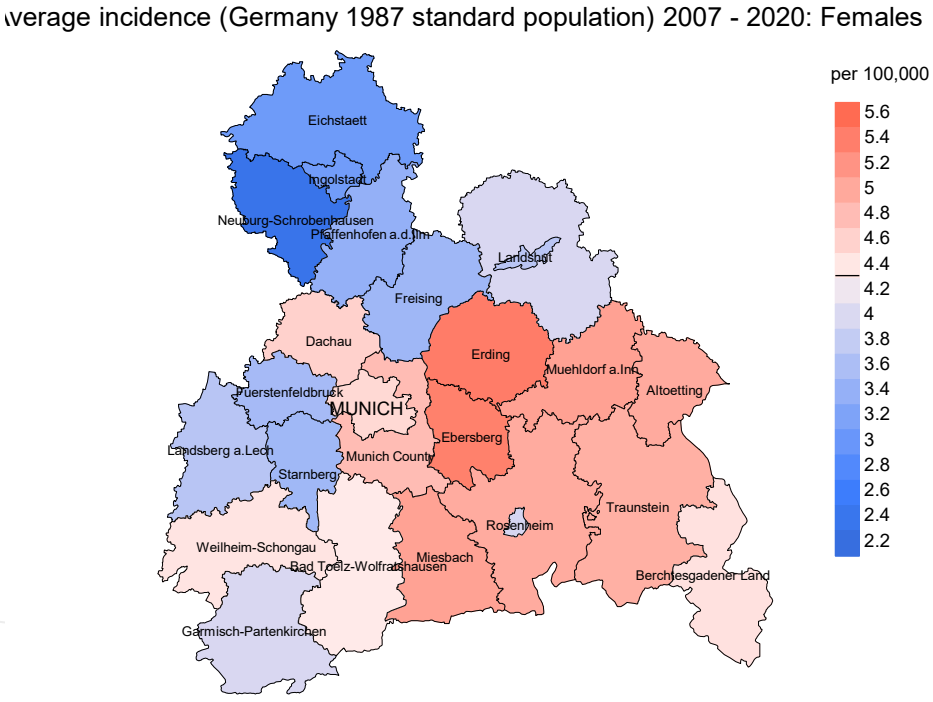
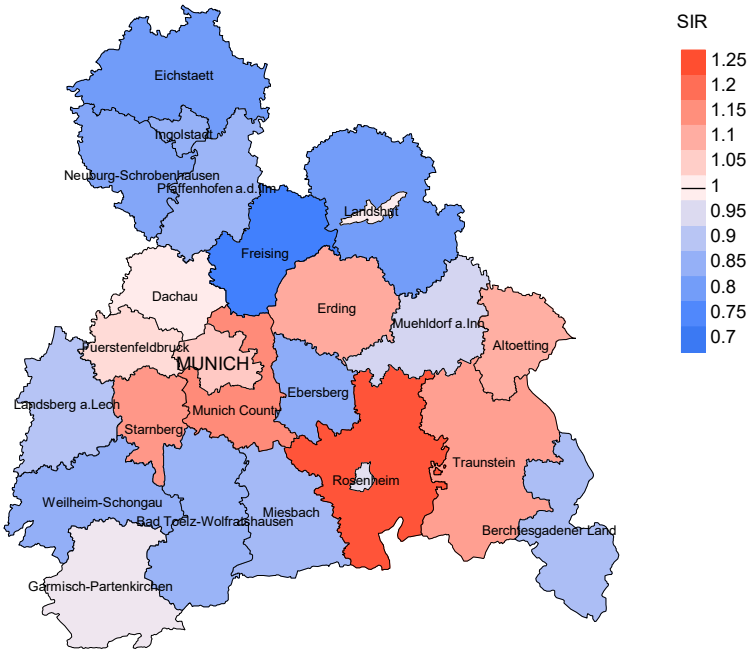


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 6.4/100,000 WS N=2,250, females 4.3/100,000 WS N=1,729).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,727 female residents (averaged) in the period from 2007 to 2020 a total of 56 women were identified with newly diagnosed brain cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 5.4/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.7 and 7.6/100,000.

Standardized incidence ratio (SIR) 2007 - 2020: Males



Standardized incidence ratio (SIR) 2007 - 2020: Females

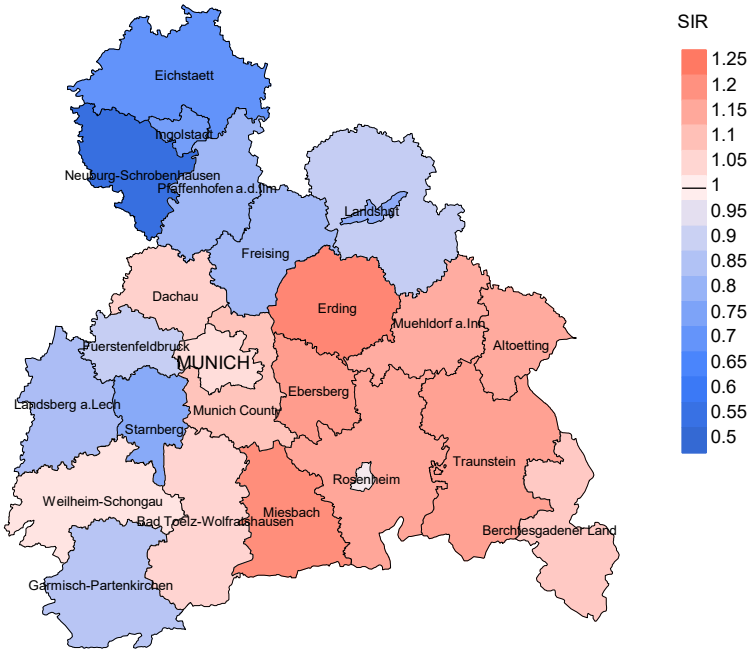


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=2,250, females N=1,729).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2020 a total of 56 women were identified with newly diagnosed brain cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.18. Though, the value of this parameter may vary with an underlying probability of 99% between 0.81 and 1.64, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	149	97.3	32.9	132	88.6	98.5
1999	147	98.0	39.5	139	94.6	95.7
2000	171	98.2	31.6	149	87.1	95.3
2001	195	96.9	30.3	174	89.2	93.1
2002	278	98.9	23.0	245	88.1	98.4
2003	323	98.8	22.6	283	87.6	94.3
2004	295	98.3	24.7	260	88.1	97.3
2005	330	97.9	19.7	282	85.5	96.8
2006	263	98.5	15.2	237	90.1	97.0
2007	304	95.1	16.4	252	82.9	95.6
2008	356	98.9	15.7	295	82.9	95.9
2009	410	98.0	13.4	344	83.9	96.2
2010	352	98.6	15.3	298	84.7	98.3
2011	362	98.9	12.7	286	79.0	96.9
2012	361	99.2	11.4	294	81.4	95.2
2013	341	99.1	11.7	288	84.5	94.4
2014	327	98.2	9.8	275	84.1	95.6
2015	316	98.7	12.0	257	81.3	96.1
2016	281	99.6	12.8	223	79.4	95.5
2017	231	100.0	16.5	163	70.6	84.0
2018	167	100.0	15.0	106	63.5	68.9
2019	95	100.0	2.1	64	67.4	82.8
2020	78	100.0		41	52.6	97.6
1998-2020	6132	98.5	17.1	5087	83.0	95.0

Table 9b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased within the same year of being diagnosed with cancer (incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	149	106	99.1	63	42.3
1999	147	141	97.2	85	57.8
2000	171	131	94.7	77	45.0
2001	195	150	93.3	93	47.7
2002	278	195	96.9	107	38.5
2003	323	216	97.7	117	36.2
2004	295	236	97.0	114	38.6
2005	330	218	97.2	127	38.5
2006	263	238	95.8	103	39.2
2007	304	224	97.3	109	35.9
2008	356	230	97.0	112	31.5
2009	410	277	97.8	129	31.5
2010	352	318	98.1	129	36.6
2011	362	280	98.6	113	31.2
2012	361	284	96.8	119	33.0
2013	341	268	96.6	102	29.9
2014	327	292	98.3	106	32.4
2015	316	280	97.9	109	34.5
2016	281	306	99.3	113	40.2
2017	231	258	95.3	89	38.5
2018	167	164	70.7	49	29.3
2019	95	123	46.3	21	22.1
2020	78	120	90.8	23	29.5
1998–2020	6132	5055	95.0	2209	36.0

Table 9c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	106	75.5	24.5	100.0
1999	141	75.9	24.1	97.8
2000	131	79.4	20.6	98.4
2001	150	84.0	16.0	99.3
2002	195	91.8	8.2	99.5
2003	216	94.4	5.6	98.6
2004	236	93.6	6.4	99.1
2005	218	89.9	10.1	97.6
2006	238	91.2	8.8	97.8
2007	224	95.5	4.5	98.6
2008	230	94.3	5.7	98.7
2009	277	91.0	9.0	97.4
2010	318	93.7	6.3	98.1
2011	280	94.6	5.4	98.2
2012	284	93.0	7.0	98.9
2013	268	92.9	7.1	98.1
2014	292	97.3	2.7	99.3
2015	280	94.6	5.4	98.2
2016	306	95.8	4.2	99.3
2017	258	94.6	5.4	98.4
2018	164	72.6	27.4	95.7
2019	123	48.8	51.2	98.2
2020	120	74.2	25.8	96.3
1998-2020	5055	90.0	10.0	98.4

Table 10a

Medians of age at death according to the grouping in Table 9
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	48	60.9	57.8	68.8	60.9
1999	76	64.1	66.5	63.5	64.1
2000	60	64.7	63.4	71.4	66.0
2001	80	65.5	64.9	69.8	65.5
2002	107	62.7	62.9	59.0	63.1
2003	99	67.1	67.0	72.0	67.1
2004	121	65.4	65.2	68.3	65.2
2005	128	64.4	63.0	73.3	63.5
2006	126	63.9	64.0	63.7	64.0
2007	127	66.0	66.1	57.8	66.2
2008	124	64.3	64.2	73.8	64.3
2009	166	68.6	67.7	70.0	66.6
2010	199	68.7	68.7	68.6	68.7
2011	152	67.4	67.4	65.1	67.4
2012	157	68.2	67.4	68.6	67.8
2013	149	66.9	67.0	61.7	67.0
2014	173	66.1	66.1	75.6	66.9
2015	166	67.3	67.3	61.6	68.5
2016	165	64.9	64.6	73.2	65.0
2017	148	64.8	64.8	68.4	64.8
2018	106	69.0	69.7	65.6	69.0
2019	78	65.4	62.1	67.5	63.9
2020	77	63.7	64.8	59.4	65.3
1998–2020	2832	66.0	65.9	67.9	66.1

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 10b

Medians of age at death according to the grouping in Table 9
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	58	72.4	72.8	71.5	72.7
1999	65	71.4	68.2	78.6	72.5
2000	71	70.2	68.1	74.6	70.2
2001	70	70.6	69.2	75.0	71.0
2002	88	70.1	69.9	70.4	70.1
2003	117	67.6	66.7	75.4	67.6
2004	115	67.0	67.0	67.6	67.2
2005	90	69.0	69.0	74.2	68.9
2006	112	68.4	68.4	68.3	69.2
2007	97	68.4	67.8	77.9	68.4
2008	106	68.5	68.5	71.8	68.6
2009	111	69.2	68.9	77.4	69.2
2010	119	68.9	68.6	73.2	69.1
2011	128	70.4	70.0	74.2	70.6
2012	127	68.4	68.4	70.6	69.1
2013	119	66.8	66.6	74.9	66.6
2014	119	68.8	68.8	56.6	68.5
2015	114	70.7	70.3	75.8	71.0
2016	141	68.7	68.7	70.4	68.7
2017	110	70.3	69.3	78.0	70.6
2018	58	72.9	72.9	71.9	72.9
2019	45	70.0	68.6	71.0	69.9
2020	43	68.8	65.6	77.0	67.2
1998–2020	2223	69.2	68.6	74.7	69.3

By 2018, Bavarians' life expectancy at birth is estimated at 79.3 years for boys and 83.8 years for girls.

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 11a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	36	3.2	0.47	2.3	0.48	3.0	0.49	3.3	0.47
1999	60	5.4	0.81	3.5	0.82	4.9	0.81	6.1	0.83
2000	46	4.0	0.52	2.6	0.48	3.6	0.51	4.2	0.49
2001	67	5.8	0.74	3.4	0.65	5.1	0.72	6.5	0.76
2002	98	5.3	0.73	3.4	0.65	4.5	0.71	5.2	0.73
2003	95	5.1	0.56	2.9	0.47	4.2	0.53	5.3	0.57
2004	114	6.1	0.78	3.7	0.74	5.1	0.76	6.2	0.78
2005	114	6.0	0.65	3.7	0.59	5.0	0.64	5.9	0.65
2006	117	6.1	0.76	4.1	0.78	5.2	0.77	5.9	0.77
2007	122	5.5	0.73	3.1	0.61	4.4	0.68	5.3	0.73
2008	117	5.3	0.59	3.3	0.57	4.3	0.58	5.0	0.56
2009	146	6.5	0.59	3.6	0.50	5.1	0.55	6.4	0.59
2010	190	8.4	0.98	4.7	0.88	6.5	0.93	8.0	0.97
2011	145	6.5	0.74	3.6	0.66	5.1	0.71	6.1	0.74
2012	149	6.6	0.79	3.8	0.70	5.0	0.75	6.1	0.79
2013	137	6.0	0.69	3.4	0.62	4.5	0.65	5.4	0.69
2014	167	7.2	0.89	4.2	0.83	5.6	0.86	6.5	0.88
2015	160	6.7	0.93	3.9	0.87	5.2	0.89	6.1	0.91
2016	153	6.4	1.01	3.5	0.92	4.9	0.98	5.8	0.99
2017	143	5.9	1.01	3.3	0.95	4.6	1.00	5.4	1.02
2018	74	3.0	0.70	1.6	0.64	2.3	0.68	2.8	0.70
2019	38	1.6	0.63	1.0	0.71	1.3	0.67	1.5	0.66
2020	58	2.4	1.23	1.4	1.12	1.8	1.18	2.2	1.23
1998-2020	2546	5.5	0.76	3.2	0.69	4.4	0.73	5.2	0.75

Table 11b

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
FEMALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	44	3.7	0.60	1.8	0.45	2.6	0.53	3.4	0.59
1999	47	4.0	0.64	2.3	0.63	3.0	0.64	3.5	0.63
2000	58	4.8	0.71	2.7	0.69	3.6	0.71	4.2	0.71
2001	59	4.9	0.57	2.8	0.55	3.6	0.55	4.3	0.56
2002	81	4.1	0.56	2.1	0.52	2.9	0.53	3.6	0.54
2003	109	5.5	0.71	3.1	0.67	4.2	0.70	4.9	0.70
2004	107	5.4	0.72	3.2	0.66	4.0	0.70	4.8	0.73
2005	82	4.1	0.53	2.2	0.48	2.9	0.50	3.5	0.53
2006	100	5.0	0.91	2.6	0.83	3.5	0.87	4.2	0.90
2007	92	4.0	0.67	2.0	0.58	2.8	0.63	3.4	0.64
2008	100	4.3	0.64	2.5	0.58	3.2	0.61	3.6	0.63
2009	106	4.6	0.65	2.1	0.53	3.0	0.57	3.6	0.60
2010	108	4.6	0.68	2.4	0.60	3.2	0.65	3.9	0.68
2011	120	5.1	0.72	2.7	0.70	3.5	0.70	4.2	0.69
2012	115	4.9	0.67	2.5	0.56	3.4	0.61	4.0	0.65
2013	112	4.7	0.78	2.6	0.73	3.4	0.76	3.9	0.75
2014	117	4.9	0.84	2.5	0.83	3.4	0.83	4.0	0.85
2015	105	4.3	0.73	2.0	0.57	2.8	0.65	3.5	0.68
2016	140	5.7	1.08	2.9	1.05	3.9	1.06	4.7	1.09
2017	101	4.1	1.12	2.0	1.03	2.7	1.09	3.3	1.10
2018	45	1.8	0.73	0.8	0.55	1.1	0.62	1.4	0.68
2019	22	0.9	0.65	0.5	0.78	0.6	0.71	0.7	0.65
2020	31	1.2	1.00	0.6	1.00	0.9	1.03	1.0	0.97
1998-2020	2001	4.1	0.72	2.2	0.65	2.9	0.69	3.5	0.71

Table 12

Age distribution of age at death (cancer-related) for period 2007-2020
(**incl. multiple malignancies**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	11	0.4	0.4	7	0.4	0.4	4	0.3	0.3
5-9	20	0.6	1.0	7	0.4	0.8	13	1.0	1.3
10-14	13	0.4	1.4	8	0.4	1.2	5	0.4	1.7
15-19	15	0.5	1.9	10	0.6	1.8	5	0.4	2.1
20-24	11	0.4	2.2	7	0.4	2.2	4	0.3	2.4
25-29	30	1.0	3.2	21	1.2	3.3	9	0.7	3.0
30-34	30	1.0	4.2	19	1.1	4.4	11	0.8	3.9
35-39	55	1.8	5.9	40	2.2	6.6	15	1.1	5.0
40-44	124	4.0	9.9	78	4.3	11.0	46	3.5	8.5
45-49	201	6.5	16.4	126	7.0	18.0	75	5.7	14.2
50-54	212	6.8	23.2	130	7.2	25.2	82	6.2	20.5
55-59	279	9.0	32.2	174	9.7	34.9	105	8.0	28.5
60-64	340	10.9	43.1	207	11.5	46.4	133	10.1	38.6
65-69	422	13.6	56.6	229	12.7	59.1	193	14.7	53.3
70-74	490	15.7	72.4	289	16.1	75.2	201	15.3	68.6
75-79	421	13.5	85.9	234	13.0	88.2	187	14.2	82.8
80-84	257	8.3	94.2	136	7.6	95.7	121	9.2	92.0
85+	182	5.8	100.0	77	4.3	100.0	105	8.0	100.0
All ages	3113	100.0		1799	100.0		1314	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**incl. multiple malignancies**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	7	4	0.4	0.27	0.3	0.22	36.8	25.0
5- 9	7	13	0.4	0.33	0.9	0.87	25.0	52.0
10-14	8	5	0.5	0.44	0.3	0.56	28.6	21.7
15-19	10	5	0.6	0.67	0.3	0.36	20.8	20.0
20-24	7	4	0.3	0.19	0.2	0.22	9.6	9.3
25-29	21	9	0.9	0.44	0.4	0.25	22.6	9.1
30-34	19	11	0.8	0.30	0.5	0.21	13.3	6.1
35-39	40	15	1.7	0.61	0.7	0.24	15.0	3.7
40-44	78	46	3.1	0.64	1.9	0.62	12.9	5.4
45-49	126	75	4.7	0.85	2.9	0.82	8.9	4.5
50-54	130	82	5.1	0.72	3.3	0.67	4.9	3.1
55-59	174	105	8.2	0.75	4.8	0.84	3.9	2.8
60-64	207	133	11.7	0.94	7.0	0.94	3.2	2.7
65-69	229	193	14.0	0.86	10.6	0.96	2.5	2.8
70-74	289	201	19.3	1.00	11.7	0.83	2.4	2.3
75-79	234	187	19.3	0.89	12.5	0.90	1.9	1.9
80-84	136	121	18.8	0.94	11.4	0.77	1.3	1.3
85+	77	105	16.5	0.85	10.1	0.74	0.8	0.9
All ages	1799	1314					2.6	2.1
Mortality								
Raw			5.5	0.80	3.9	0.76		
WS			3.1	0.72	2.0	0.68		
ES			4.3	0.76	2.7	0.72		
BRD-S			5.1	0.79	3.2	0.74		
PYLL-70								
per 100,000			58.2		36.4			
ES			53.8		34.3			
AYLL-70			15.7		14.7			

Table 14a

Further malignancies in deaths in period 1998–2020
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06	Oral cavity	1	0.3	1	100.0				
C07–C08	Salivary gland	2	0.5	2	100.0				
C09–C10	Oropharynx	3	0.8	3	100.0				
C11	Nasopharynx	1	0.3	1	100.0				
C15	Oesophagus	1	0.3					1	100.0
C16	Stomach	7	1.8	7	100.0				
C17	Small intestine	4	1.0	1	25.0	1	25.0	2	50.0
C18	Colon	30	7.7	26	86.7	3	10.0	1	3.3
C19–C20	Rectum	17	4.3	16	94.1			1	5.9
C21	Anus/canal	1	0.3	1	100.0				
C22	Liver	2	0.5	1	50.0			1	50.0
C23–C24	Bile	2	0.5					2	100.0
C25	Pancreas	7	1.8	1	14.3	2	28.6	4	57.1
C32	Larynx	2	0.5	1	50.0			1	50.0
C33–C34	Lung	15	3.8	7	46.7	3	20.0	5	33.3
C38,C45	Mesothelioma	1	0.3	1	100.0				
C40–C41	Bone	5	1.3	2	40.0	1	20.0	2	40.0
C43	Malign. melanoma	24	6.1	22	91.7			2	8.3
C44	Skin others	25	6.4	14	56.0	5	20.0	6	24.0
C46,C49	Soft tissue	4	1.0	2	50.0			2	50.0
C60	Penis	2	0.5	2	100.0				
C61	Prostate	129	32.9	117	90.7	7	5.4	5	3.9
C62	Testis	8	2.0	6	75.0	1	12.5	1	12.5
C64	Kidney	21	5.4	15	71.4	2	9.5	4	19.0
C66	Ureter	1	0.3	1	100.0				
C67	Bladder	15	3.8	11	73.3	2	13.3	2	13.3
C68	Urinary org.	1	0.3	1	100.0				
C69	Eye melanoma	1	0.3					1	100.0
C70–C72	CNS cancer	25	6.4			5	20.0	20	80.0
C73	Thyroid	5	1.3	5	100.0				
C76–C79	CUP	5	1.3	3	60.0			2	40.0
C81	Hodgkin lymphoma	1	0.3	1	100.0				
C82–C85	NHL	15	3.8	14	93.3	1	6.7		
C90	Mult. myeloma	3	0.8	2	66.7	1	33.3		
C91–C96	Leukaemia	5	1.3	2	40.0	1	20.0	2	40.0
C96	Systemic	1	0.3			1	100.0		
All further malignancies		392	100.0	289	73.7	36	9.2	67	17.1

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a further malignancy.

Table 14b

Further malignancies in deaths in period 1998–2020
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06	Oral cavity	1	0.4	1	100.0				
C09–C10	Oropharynx	1	0.4	1	100.0				
C16	Stomach	2	0.7	2	100.0				
C18	Colon	20	7.1	16	80.0	1	5.0	3	15.0
C19–C20	Rectum	7	2.5	3	42.9	2	28.6	2	28.6
C21	Anus/canal	1	0.4	1	100.0				
C22	Liver	1	0.4	1	100.0				
C23–C24	Bile	1	0.4					1	100.0
C25	Pancreas	1	0.4					1	100.0
C26	GI cancer	1	0.4			1	100.0		
C30–C31	Sinuses	1	0.4	1	100.0				
C32	Larynx	1	0.4	1	100.0				
C33–C34	Lung	3	1.1	2	66.7			1	33.3
C38,C45	Mesothelioma	1	0.4					1	100.0
C40–C41	Bone	1	0.4					1	100.0
C43	Malign. melanoma	22	7.8	18	81.8			4	18.2
C44	Skin others	15	5.3	9	60.0	2	13.3	4	26.7
C46,C49	Soft tissue	4	1.4	2	50.0	1	25.0	1	25.0
C50	Breast	97	34.4	81	83.5	5	5.2	11	11.3
C52	Vagina	1	0.4	1	100.0				
C53	Cervix uteri	9	3.2	9	100.0				
C54	Corpus uteri	22	7.8	16	72.7			6	27.3
C55,C57	Fem. genitals un	1	0.4	1	100.0				
C56	Ovary	11	3.9	8	72.7	2	18.2	1	9.1
C64	Kidney	7	2.5	7	100.0				
C65	Renal pelvis	1	0.4	1	100.0				
C67	Bladder	3	1.1	1	33.3			2	66.7
C69	Eye melanoma	3	1.1	3	100.0				
C70–C72	CNS cancer	15	5.3			1	6.7	14	93.3
C73	Thyroid	9	3.2	9	100.0				
C76–C79	CUP	1	0.4	1	100.0				
C81	Hodgkin lymphoma	1	0.4	1	100.0				
C82–C85	NHL	10	3.5	6	60.0	2	20.0	2	20.0
C90	Mult. myeloma	1	0.4	1	100.0				
C91–C96	Leukaemia	6	2.1	2	33.3			4	66.7
All further malignancies		282	100.0	206	73.0	17	6.0	59	20.9

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a further malignancy.

Table 15

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**First primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	7	4	0.4	0.28	0.3	0.22	36.8	26.7
5- 9	6	13	0.4	0.29	0.9	0.87	22.2	52.0
10-14	8	5	0.5	0.44	0.3	0.56	28.6	26.3
15-19	9	5	0.5	0.60	0.3	0.36	19.6	21.7
20-24	7	4	0.3	0.19	0.2	0.22	10.6	9.8
25-29	20	9	0.9	0.43	0.4	0.26	23.5	9.9
30-34	19	10	0.8	0.30	0.4	0.19	13.8	6.3
35-39	40	15	1.7	0.61	0.7	0.25	16.1	4.1
40-44	75	43	3.0	0.64	1.8	0.66	13.4	5.7
45-49	122	72	4.5	0.88	2.8	0.84	9.4	5.0
50-54	122	76	4.8	0.72	3.0	0.67	5.2	3.4
55-59	168	93	7.9	0.78	4.3	0.84	4.4	2.9
60-64	186	119	10.5	0.98	6.3	0.94	3.5	2.9
65-69	202	170	12.4	0.90	9.4	0.99	2.8	3.1
70-74	229	165	15.3	1.02	9.6	0.88	2.5	2.4
75-79	176	147	14.5	0.94	9.8	0.88	1.9	2.0
80-84	106	106	14.6	0.94	10.0	0.80	1.4	1.5
85+	49	90	10.5	0.77	8.6	0.74	0.8	1.0
All ages	1551	1146					2.9	2.3
Mortality								
Raw			4.8	0.80	3.4	0.76		
WS			2.8	0.72	1.8	0.68		
ES			3.8	0.76	2.4	0.72		
BRD-S			4.4	0.79	2.8	0.74		
PYLL-70								
per 100,000			55.5		34.3			
ES			51.3		32.5			
AYLL-70			16.1		15.2			

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	7	4	0.4	0.28	0.3	0.24	36.8	26.7
5- 9	6	13	0.4	0.29	0.9	0.87	22.2	52.0
10-14	8	5	0.5	0.44	0.3	0.56	28.6	26.3
15-19	9	5	0.5	0.60	0.3	0.36	19.6	22.7
20-24	7	4	0.3	0.19	0.2	0.22	10.6	10.0
25-29	18	8	0.8	0.38	0.4	0.24	21.2	9.1
30-34	19	10	0.8	0.31	0.4	0.20	13.9	6.4
35-39	37	15	1.6	0.58	0.7	0.26	14.9	4.1
40-44	72	43	2.9	0.63	1.8	0.67	12.9	5.8
45-49	121	70	4.5	0.88	2.7	0.83	9.5	4.9
50-54	120	72	4.7	0.71	2.9	0.65	5.2	3.3
55-59	166	90	7.8	0.79	4.1	0.82	4.4	2.9
60-64	183	117	10.4	1.00	6.2	0.93	3.5	2.9
65-69	194	168	11.9	0.89	9.3	0.99	2.7	3.1
70-74	222	160	14.8	1.01	9.3	0.88	2.5	2.4
75-79	171	141	14.1	0.92	9.4	0.85	2.0	1.9
80-84	104	103	14.4	0.92	9.7	0.79	1.5	1.5
85+	49	90	10.5	0.77	8.6	0.74	0.8	1.0
All ages	1513	1118					2.9	2.4
Mortality								
Raw			4.6	0.80	3.3	0.76		
WS			2.7	0.71	1.8	0.67		
ES			3.7	0.76	2.3	0.71		
BRD-S			4.3	0.79	2.7	0.73		
PYLL-70								
per 100,000			54.2		33.5			
ES			50.1		31.9			
AYLL-70			16.1		15.2			

* See corresponding tables with multiple malignancies.

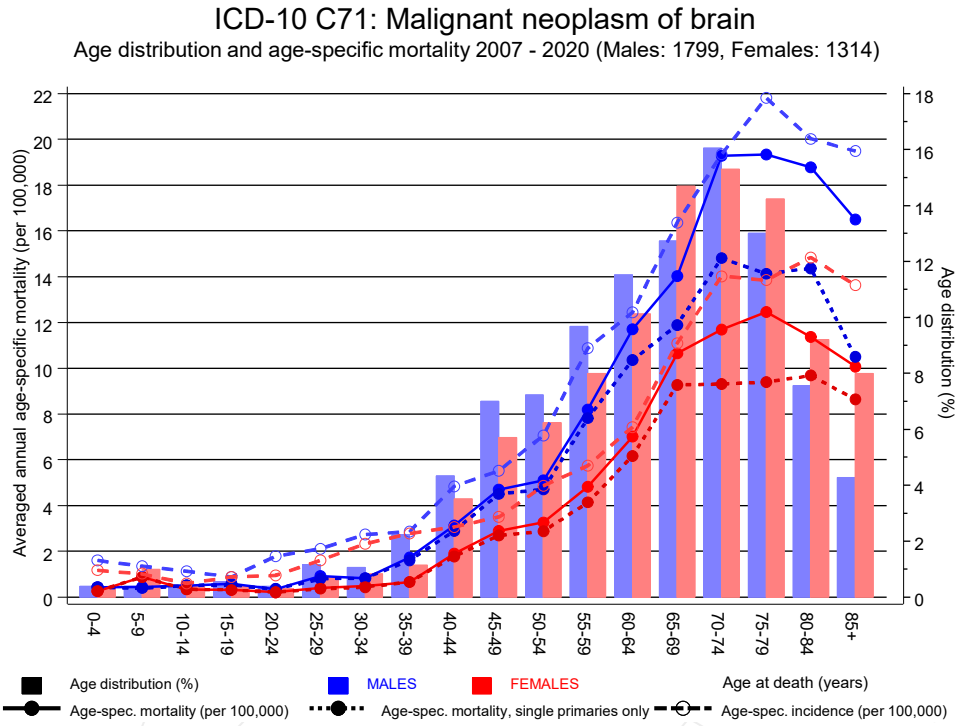
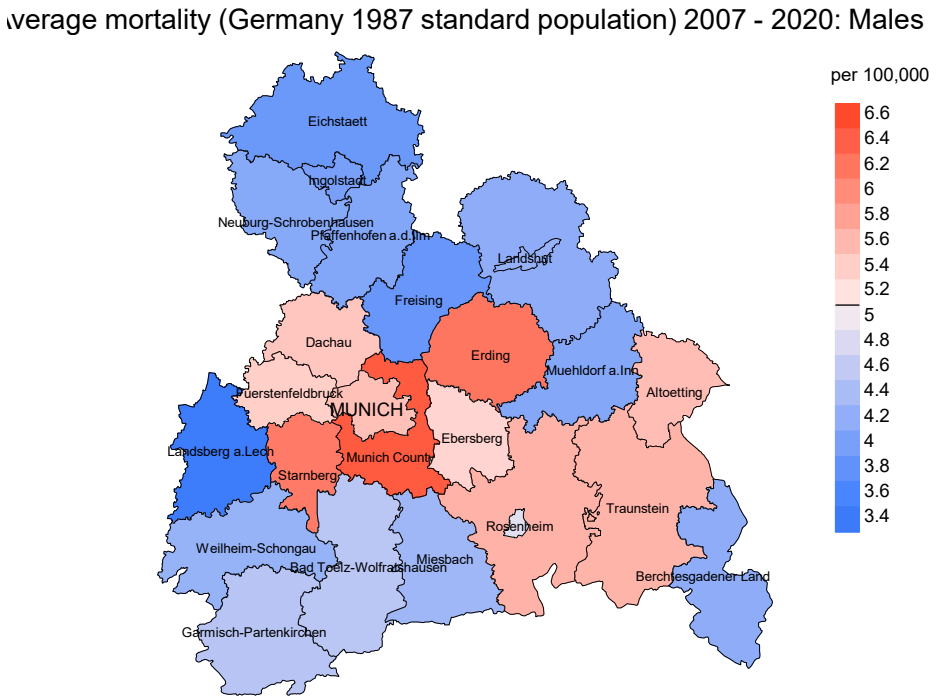


Figure 17. Distribution of age at death (bars; males: mean=61.6 yrs, median=64.8 yrs; females: mean=64.0 yrs, median=67.1 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at brain cancer-related death (see Table 10) should be considered.



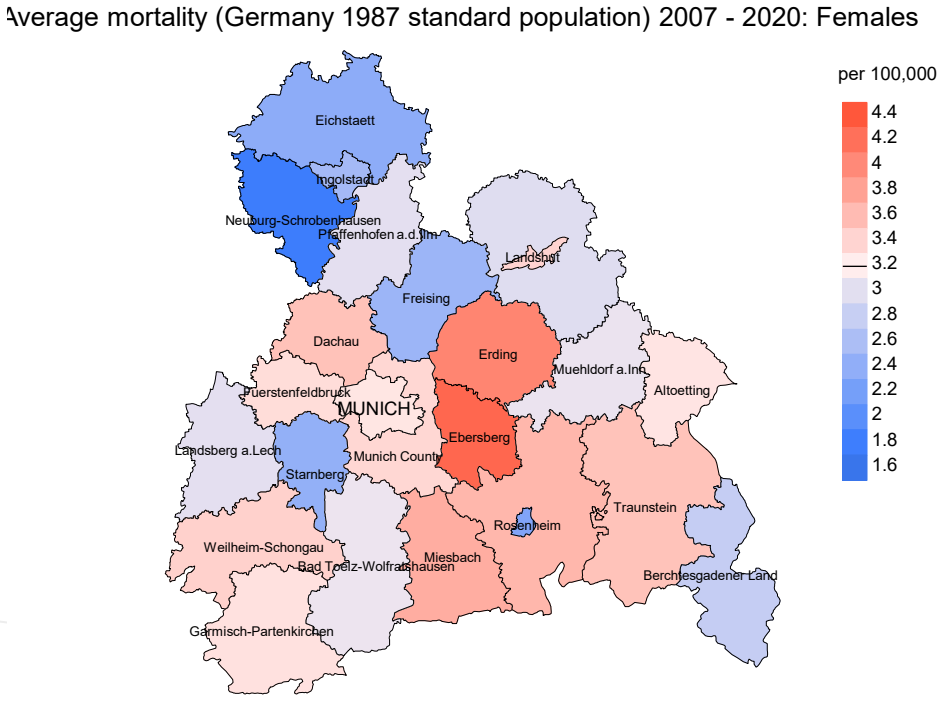
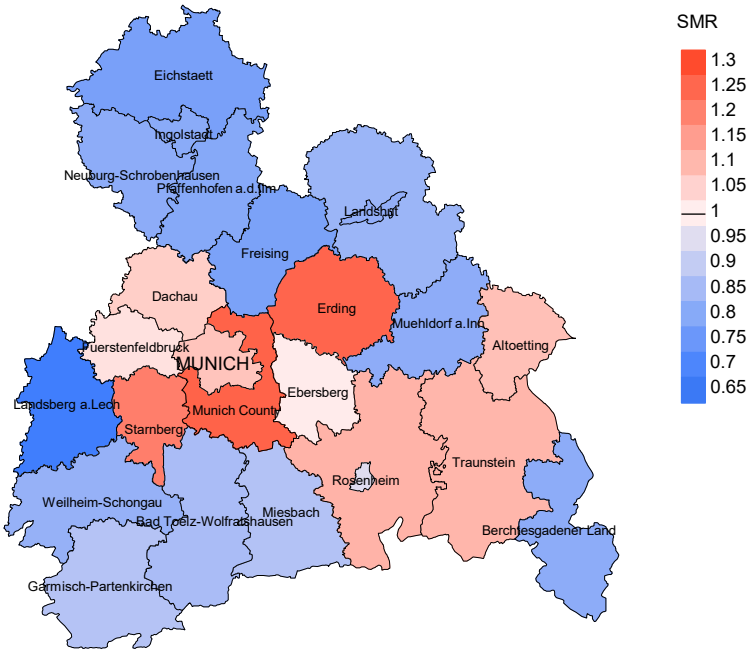


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 5.1/100,000 WS N=1,799, females 3.2/100,000 WS N=1,314).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,727 female residents (averaged) in the period from 2007 to 2020 a total of 48 women died from brain cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 4.3/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 2.8 and 6.2/100,000.

Standardized mortality ratio (SMR) 2007 - 2020: Males



Standardized mortality ratio (SMR) 2007 - 2020: Females

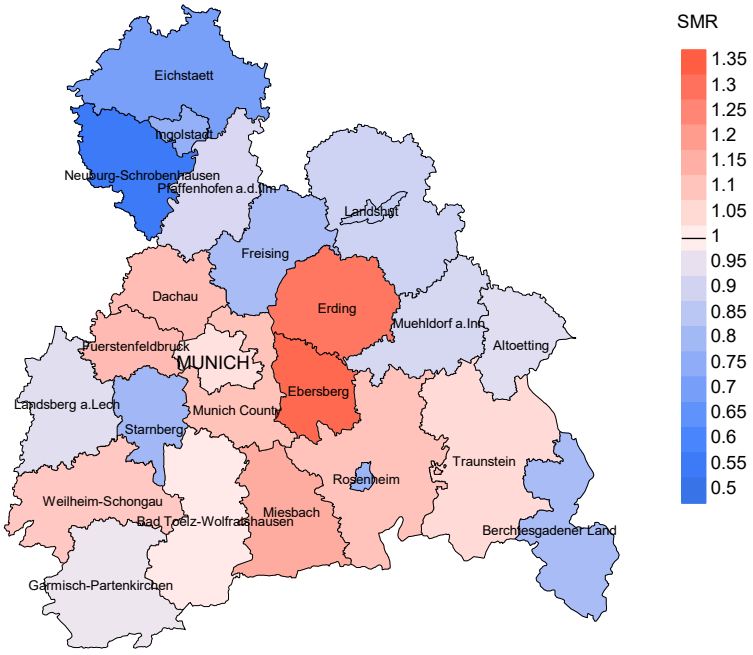


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,799, females N=1,314).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2020 a total of 48 women died from brain cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.32. Though, the value of this parameter may vary with an underlying probability of 99% between 0.88 and 1.90, and is therefore not statistically striking.

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases, where applicable. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head&neck and lung).

The ratio of mortality and incidence (mortality-to-incidence ratio, **MIR**, **MI-Index**) is a statistical index that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MIR. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

MCR	Munich Cancer Registry (Tumorregister München)
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
SEER	Surveillance, Epidemiology, and End Results (USA)
DCO	Death certificate only
BRD-S	German (FRG) standard population
ES	European standard population (old)
WS	World standard population
SIR	Standardized incidence ratio
CI	Confidence interval
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
SMR	Standardized mortality ratio
MI-index	Ratio of mortality to incidence, MIR
FRG	Federal Republic of Germany

Recommended Citation

Munich Cancer Registry. ICD-10 C71: Brain cancer - Incidence and Mortality [Internet]. 2021 [updated 2021 Dec 21; cited 2022 Feb 1]. Available from: https://www.tumorregister-muenchen.de/en/facts/base/bC71__E-ICD-10-C71-Brain-cancer-incidence-and-mortality.pdf

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