Munich Cancer Registry

- Survival
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ICD-10 C71: Glioblastoma

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	3,319
Diseases	3,319
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

Munich Cancer Registry
Cancer Registry Bavaria - Upper Bavaria Regional Center
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Marchioninistr. 15
Munich, 81377
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https://www.tumorregister-muenchen.de/en

https://www.tumorregister-muenchen.de/en/facts/base/bC71G_E-ICD-10-C71-Glioblastoma-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

... if additionally existing any of ...

Morphology codes (ICD-O-3 2011) used for specifying cancer site

Code	Description
9440/3	Glioblastoma – IV
9441/3	Giant cell glioblastoma – IV
9442/3	Gliosarcoma – IV

INCIDENCE

Table 1

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

Year of diagnosis	All cases n	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	47	4.3	1.2	95.7	100.0
1999	47	5.3	1.2	100.0	100.0
2000	65	5.7	1.1	90.8	98.5
2001	81	6.3	1.1	97.5	98.8
2002	130	5.9	1.1	95.4	98.5 #
2003	141	6.5	1.2	96.5	98.6
2004	130	7.0	1.2	96.9	98.5
2005	163	7.7	1.1	94.5	99.4
2006	150	8.5	1.2	96.7	99.3
2007	143	8.8	1.2	93.0	95.1 #
2008	184	8.7	1.2	94.6	99.5
2009	247	9.0	1.0	90.3	98.8
2010	202	9.4	1.1	96.0	98.5
2011	214	10.0	1.1	90.7	99.5
2012	208	10.2	1.2	93.3	100.0
2013	206	10.6	1.2	93.2	99.5
2014	221	10.9	1.2	93.7	99.1
2015	203	10.9	0.7	93.6	99.5
2016	172	10.8	0.8	93.6	100.0
2017	138	11.2	0.6	81.2	100.0
2018	100	11.5	0.0	69.0	100.0
2019	71	11.7	0.0	76.1	100.0
2020	56	11.9	0.0	64.3	100.0 ##
1998-2020	3319	11.9	1.2	91.8	99.1

3,319 cases diagnosed 1998-2020 are related to a total of 3,319 patients. Currently, in 451 (13.6 %) of these 3,319 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 387 / 49 / 15 (11.7 % / 1.5 % / 0.5 %) 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 100 cases has been diagnosed, of which 11.5 % 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 1a

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

Year of diagnosis	Males n	Males %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	28	59.6	7.1	1.3	92.9	100.0
1999	27	57.4	3.6	1.3	100.0	100.0
2000	38	58.5	5.4	1.2	92.1	97.4
2001	42	51.9	5.2	1.2	100.0	100.0
2002	71	54.6	6.3	1.3	93.0	98.6 #
2003	77	54.6	6.0	1.3	97.4	98.7
2004	74	56.9	7.3	1.3	100.0	100.0
2005	95	58.3	8.6	1.2	96.8	100.0
2006	95	63.3	9.3	1.3	95.8	98.9
2007	79	55.2	9.6	1.3	94.9	96.2 #
2008	116	63.0	9.4	1.3	95.7	100.0
2009	154	62.3	9.6	1.1	90.9	98.7
2010	114	56.4	10.1	1.1	96.5	98.2
2011	121	56.5	10.8	1.2	95.0	99.2
2012	113	54.3	10.7	1.2	92.9	100.0
2013	131	63.6	11.5	1.4	93.1	100.0
2014	134	60.6	11.6	1.2	94.0	99.3
2015	120	59.1	11.4	0.7	95.0	100.0
2016	96	55.8	11.2	0.9	92.7	100.0
2017	90	65.2	11.7	0.4	80.0	100.0
2018	65	65.0	12.1	0.0	67.7	100.0
2019	46	64.8	12.3	0.0	71.7	100.0
2020	33	58.9	12.5	0.0	69.7	100.0 ##
1998-2020	1959	59.0	12.5	1.3	92.2	99.3

1,959 cases diagnosed 1998-2020 are related to a total of 1,959 patients. Currently, in 273 (13.9 %) of these 1,959 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 227 / 35 / 11 (11.6 % / 1.8 % / 0.6 %) 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 65 cases has been diagnosed, of which 12.1 % 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 further malignancies, deaths, and active follow-up (FEMALES)

Year of diagnosis	Females n	Females %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	19	40.4	0.0	1.0	100.0	100.0
1999	20	42.6	7.7	1.0	100.0	100.0
2000	27	41.5	6.1	1.0	88.9	100.0
2001	39	48.1	7.6	0.9	94.9	97.4
2002	59	45.4	5.5	1.0	98.3	98.3 #
2003	64	45.4	7.0	1.0	95.3	98.4
2004	56	43.1	6.7	1.1	92.9	96.4
2005	68	41.7	6.5	1.0	91.2	98.5
2006	55	36.7	7.4	1.1	98.2	100.0
2007	64	44.8	7.6	1.2	90.6	93.8 #
2008	68	37.0	7.8	1.1	92.6	98.5
2009	93	37.7	8.2	1.0	89.2	98.9
2010	88	43.6	8.3	1.0	95.5	98.9
2011	93	43.5	8.9	1.0	84.9	100.0
2012	95	45.7	9.5	1.1	93.7	100.0
2013	75	36.4	9.4	0.9	93.3	98.7
2014	87	39.4	9.8	1.1	93.1	98.9
2015	83	40.9	10.1	0.7	91.6	98.8
2016	76	44.2	10.3	0.5	94.7	100.0
2017	48	34.8	10.6	0.8	83.3	100.0
2018	35	35.0	10.7	0.0	71.4	100.0
2019	25	35.2	10.9	0.0	84.0	100.0
2020	23	41.1	11.0	0.0	56.5	100.0 ##
1998-2020	1360	41.0	11.0	1.0	91.3	98.8

1,360 cases diagnosed 1998-2020 are related to a total of 1,360 patients. Currently, in 178 (13.1 %) of these 1,360 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 160 / 14 / 4 (11.8 % / 1.0 % / 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 35 cases has been diagnosed, of which 10.7 % 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 2

Incidence measures by year of diagnosis
(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	28	19	2.5	1.6	1.8	0.8	2.4	1.2	2.6	1.4
1999	27	20	2.4	1.7	1.7	0.9	2.3	1.3	2.6	1.6
2000	38	27	3.3	2.2	2.3	1.4	3.0	1.9	3.4	2.0
2001	42	39	3.6	3.2	2.2	1.8	3.1	2.4	3.8	2.9
2002	71	59	3.8	3.0	2.5	1.8	3.3	2.4	3.6	2.8
2003	77	64	4.1	3.2	2.5	1.8	3.4	2.5	4.0	2.9
2004	74	56	3.9	2.8	2.4	1.7	3.4	2.2	3.8	2.5
2005	95	68	5.0	3.4	2.9	1.8	4.0	2.5	4.8	2.9
2006	95	55	5.0	2.7	3.0	1.4	4.0	2.0	4.6	2.4
2007	79	64	3.6	2.8	2.2	1.5	2.9	2.1	3.3	2.4
2008	116	68	5.2	2.9	3.0	1.6	4.2	2.1	5.0	2.5
2009	154	93	6.9	4.0	3.9	2.2	5.4	3.1	6.5	3.5
2010	114	88	5.1	3.8	2.8	1.9	4.0	2.7	4.8	3.2
2011	121	93	5.4	4.0	3.0	2.0	4.2	2.8	5.1	3.3
2012	113	95	5.0	4.0	2.6	2.0	3.7	2.8	4.5	3.3
2013	131	75	5.7	3.1	3.2	1.7	4.4	2.3	5.2	2.7
2014	134	87	5.7	3.6	3.3	1.8	4.5	2.5	5.1	2.9
2015	120	83	5.0	3.4	2.9	1.8	4.0	2.4	4.6	2.9
2016	96	76	4.0	3.1	2.1	1.4	3.0	2.1	3.6	2.5
2017	90	48	3.7	1.9	1.9	0.8	2.7	1.2	3.3	1.5
2018	65	35	2.7	1.4	1.5	0.7	2.1	0.9	2.4	1.2
2019	46	25	1.9	1.0	1.0	0.4	1.4	0.6	1.7	0.8
2020	33	23	1.4	0.9	0.7	0.4	1.0	0.6	1.2	0.7
1998–2020	1959	1360	4.2	2.8	2.4	1.5	3.4	2.0	4.0	2.4

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)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	47	61.4	11.6	30.9	79.2	46.8	53.5	62.9	69.6	75.8
1999	47	61.9	13.5	20.0	89.2	45.8	51.6	65.1	71.3	77.8
2000	65	58.5	16.0	8.0	84.2	36.7	52.6	60.0	67.8	77.2
2001	81	62.5	13.0	23.6	85.2	44.1	57.0	62.3	71.7	76.2
2002	130	61.6	13.4	7.1	87.7	44.0	55.3	63.2	70.0	76.1
2003	141	63.7	12.3	17.7	89.8	48.6	58.3	65.2	72.1	77.1
2004	130	61.9	12.3	6.2	86.7	46.0	55.5	63.6	69.0	77.3
2005	163	64.0	12.6	7.8	92.8	46.1	58.0	65.3	71.5	80.3
2006	150	62.8	13.4	22.3	88.0	44.2	54.8	65.2	70.7	79.0
2007	143	63.1	13.3	13.3	88.0	43.9	56.2	64.4	72.2	78.4
2008	184	64.3	12.7	0.1	88.2	47.8	58.4	66.5	72.5	78.1
2009	247	64.2	13.0	6.8	87.8	45.9	58.0	65.8	72.8	80.0
2010	202	64.8	13.2	16.2	90.8	45.5	56.6	67.8	74.5	79.4
2011	214	63.8	14.2	11.1	92.4	46.0	54.2	66.1	74.6	80.2
2012	208	65.5	13.1	21.2	90.4	46.0	56.4	67.1	74.5	80.9
2013	206	64.4	13.0	8.6	93.9	48.8	57.5	66.6	74.1	77.2
2014	221	64.2	14.4	8.5	90.8	45.3	54.9	67.5	74.8	79.0
2015	203	64.2	13.3	20.2	85.4	45.5	57.9	66.3	74.6	78.6
2016	172	66.4	12.0	32.2	85.0	50.0	57.8	69.1	76.3	80.6
2017	138	68.0	12.1	7.4	94.3	53.9	60.2	70.3	76.4	80.5
2018	100	65.8	12.9	33.3	86.8	45.9	56.1	67.5	76.3	82.5
2019	71	68.2	10.9	42.8	86.3	53.9	59.6	70.0	77.3	81.7
2020	56	67.6	11.2	47.2	86.0	50.5	58.8	68.8	77.2	81.5
1998-2020	3319	64.2	13.1	0.1	94.3	46.6	56.5	66.0	73.8	79.2

Table 3a

Age distribution parameters by year of diagnosis (MALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	28	57.8	10.6	40.0	78.2	46.7	49.2	55.7	67.2	74.8
1999	27	58.6	13.5	20.0	79.4	42.2	49.3	59.6	68.7	71.8
2000	38	56.9	16.2	8.0	84.2	30.5	51.7	59.9	65.8	77.2
2001	42	61.8	12.1	33.3	84.2	45.6	57.0	62.0	71.3	75.6
2002	71	60.2	14.5	7.1	87.7	41.7	54.2	63.0	69.2	74.7
2003	77	62.8	12.1	22.7	81.4	44.3	57.6	64.7	69.7	76.8
2004	74	62.0	10.8	35.2	86.7	46.2	55.0	62.4	68.3	77.3
2005	95	63.0	13.6	7.8	92.8	44.1	55.8	65.1	70.7	80.3
2006	95	61.2	12.8	22.3	88.0	43.4	54.2	64.1	69.7	75.6
2007	79	62.4	12.9	13.3	84.5	43.9	58.6	63.9	70.7	76.4
2008	116	64.0	11.2	24.0	82.3	47.8	56.8	66.0	72.2	78.1
2009	154	64.4	13.5	6.8	87.8	44.1	58.4	66.3	73.4	80.5
2010	114	64.3	14.0	16.2	90.8	44.6	55.2	67.0	75.1	80.5
2011	121	62.2	14.2	20.8	86.2	43.1	52.3	63.8	73.7	79.2
2012	113	65.1	13.3	21.2	89.9	45.9	55.0	67.5	74.5	80.5
2013	131	63.5	12.9	11.6	93.9	47.6	55.7	65.8	73.1	76.5
2014	134	62.9	15.4	8.5	90.8	45.0	53.8	65.4	73.9	79.0
2015	120	64.2	11.7	20.2	85.4	50.7	58.6	65.7	73.3	77.9
2016	96	65.2	12.9	32.2	85.0	45.7	55.0	67.7	76.0	81.5
2017	90	66.6	12.3	7.4	86.3	54.0	58.7	67.6	76.1	78.8
2018	65	64.6	13.2	33.3	86.8	45.6	55.3	65.4	75.8	82.3
2019	46	66.5	10.4	47.8	86.3	53.9	57.9	66.4	73.4	81.7
2020	33	65.2	10.8	47.2	84.1	51.2	55.8	67.1	73.9	79.6
1998–2020	1959	63.3	13.2	6.8	93.9	45.6	55.8	65.1	72.9	78.7

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	19	66.8	11.2	30.9	79.2	54.4	62.9	67.9	75.0	78.1
1999	20	66.4	12.3	45.8	89.2	48.5	55.2	69.7	75.3	81.2
2000	27	60.7	15.6	8.4	81.3	37.4	55.9	65.0	70.0	77.5
2001	39	63.1	14.1	23.6	85.2	42.4	56.3	64.5	72.2	79.3
2002	59	63.4	11.8	22.9	87.1	49.8	56.2	64.3	71.7	76.8
2003	64	64.8	12.5	17.7	89.8	50.1	58.8	65.6	74.4	77.8
2004	56	61.7	14.1	6.2	82.8	45.8	56.0	64.9	69.4	77.2
2005	68	65.4	10.9	37.7	85.9	49.6	58.9	65.7	71.8	81.3
2006	55	65.4	14.0	26.9	86.5	46.5	56.8	66.8	76.1	81.3
2007	64	63.8	13.8	26.1	88.0	43.5	54.6	65.5	73.3	81.5
2008	68	64.7	15.1	0.1	88.2	47.8	61.6	67.8	73.3	79.4
2009	93	63.9	12.3	27.9	87.1	46.5	57.6	65.0	71.3	78.7
2010	88	65.4	12.1	31.6	86.7	46.5	57.5	68.1	73.8	77.7
2011	93	65.9	13.9	11.1	92.4	49.9	55.9	68.9	74.9	81.5
2012	95	66.1	13.0	30.6	90.4	46.8	58.5	66.4	74.6	82.0
2013	75	65.8	13.0	8.6	87.6	51.3	60.2	67.5	75.5	78.1
2014	87	66.3	12.5	30.2	87.4	45.3	57.8	69.7	75.5	79.5
2015	83	64.1	15.3	22.0	83.4	43.2	54.8	66.6	76.6	78.9
2016	76	68.0	10.6	35.6	84.0	54.0	59.5	69.4	76.7	80.6
2017	48	70.7	11.4	42.0	94.3	53.2	64.7	72.7	78.1	85.3
2018	35	67.9	12.3	38.9	86.5	47.8	59.9	70.5	77.0	84.0
2019	25	71.4	11.2	42.8	85.6	50.7	66.7	75.0	78.6	81.8
2020	23	71.1	11.1	48.2	86.0	50.4	66.2	73.3	81.1	83.0
1998–2020	1360	65.5	13.0	0.1	94.3	48.0	58.3	67.1	75.0	80.1

Table 4

Age distribution by 5-year age group and sex for period 2007-2020

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	1	0.0	0.0			0.0	1	0.1	0.1
5-9	4	0.2	0.2	3	0.2	0.2	1	0.1	0.2
10-14	5	0.2	0.4	4	0.3	0.5	1	0.1	0.3
15-19	2	0.1	0.5	2	0.1	0.6			0.3
20-24	9	0.4	0.9	6	0.4	1.1	3	0.3	0.6
25-29	15	0.6	1.5	8	0.6	1.6	7	0.7	1.4
30-34	25	1.1	2.6	15	1.1	2.7	10	1.0	2.4
35-39	28	1.2	3.8	16	1.1	3.8	12	1.3	3.7
40-44	92	3.9	7.7	60	4.2	8.1	32	3.4	7.0
45-49	126	5.3	13.0	83	5.9	14.0	43	4.5	11.5
50-54	189	8.0	21.0	117	8.3	22.2	72	7.6	19.1
55-59	263	11.1	32.1	173	12.3	34.5	90	9.4	28.5
60-64	279	11.8	43.9	174	12.3	46.8	105	11.0	39.6
65-69	366	15.5	59.4	216	15.3	62.1	150	15.7	55.3
70-74	395	16.7	76.1	223	15.8	77.9	172	18.0	73.3
75-79	349	14.8	90.8	201	14.2	92.1	148	15.5	88.9
80-84	161	6.8	97.6	86	6.1	98.2	75	7.9	96.7
85+	56	2.4	100.0	25	1.8	100.0	31	3.3	100.0
All ages	2365	100.0		1412	100.0		953	100.0	

Table 5

Age-specific incidence 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 Prop.all cancers n=153686 %	Females Prop.all cancers n=155051 %
0- 4		1		0.1		0.6
5- 9	3	1	0.2	0.1	2.6	1.0
10-14	4	1	0.3	0.1	2.9	0.8
15-19	2		0.1		0.6	
20-24	6	3	0.3	0.2	1.0	0.6
25-29	8	7	0.4	0.3	0.8	0.6
30-34	15	10	0.6	0.4	1.2	0.5
35-39	16	12	0.7	0.5	0.9	0.3
40-44	60	32	2.4	1.3	2.1	0.5
45-49	83	43	3.1	1.7	1.6	0.5
50-54	117	72	4.6	2.9	1.4	0.6
55-59	173	90	8.1	4.1	1.4	0.7
60-64	174	105	9.8	5.5	1.0	0.7
65-69	216	150	13.2	8.3	0.9	0.8
70-74	223	172	14.9	10.0	0.8	0.9
75-79	201	148	16.6	9.9	0.8	0.8
80-84	86	75	11.9	7.0	0.6	0.5
85+	25	31	5.4	3.0	0.2	0.2
All ages	1412	953			0.9	0.6
Incidence						
Raw			4.3	2.8		
WS			2.4	1.4		
ES			3.3	2.0		
BRD-S			4.0	2.4		

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).

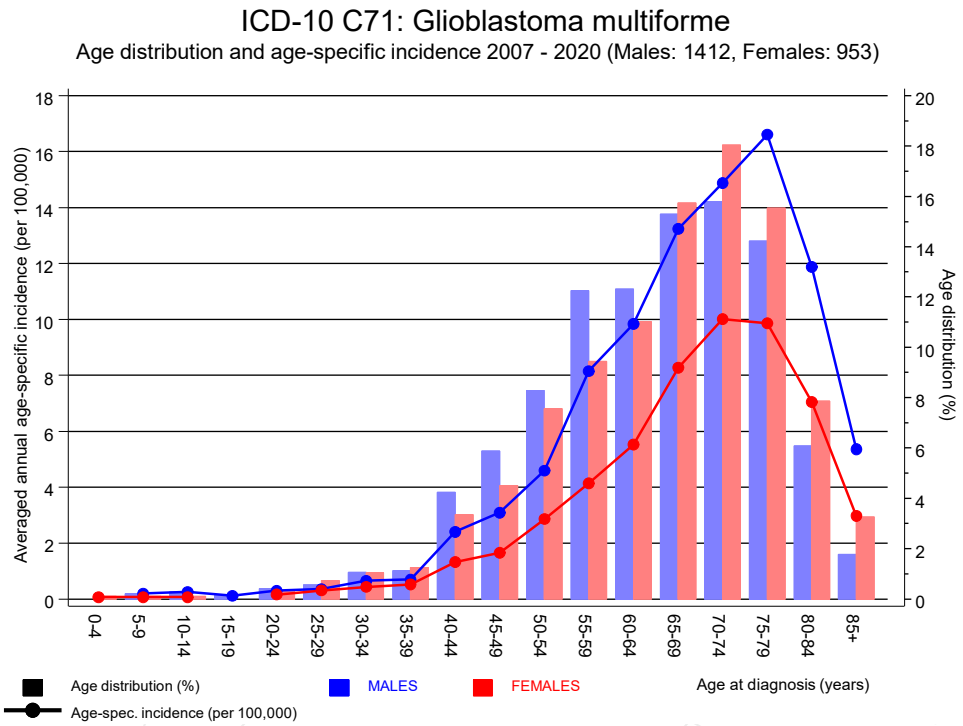


Figure 6. Age distribution (males: mean=64.2 yrs, median=66.2 yrs; females: mean=66.1 yrs, median=68.1 yrs) and age-specific incidence.

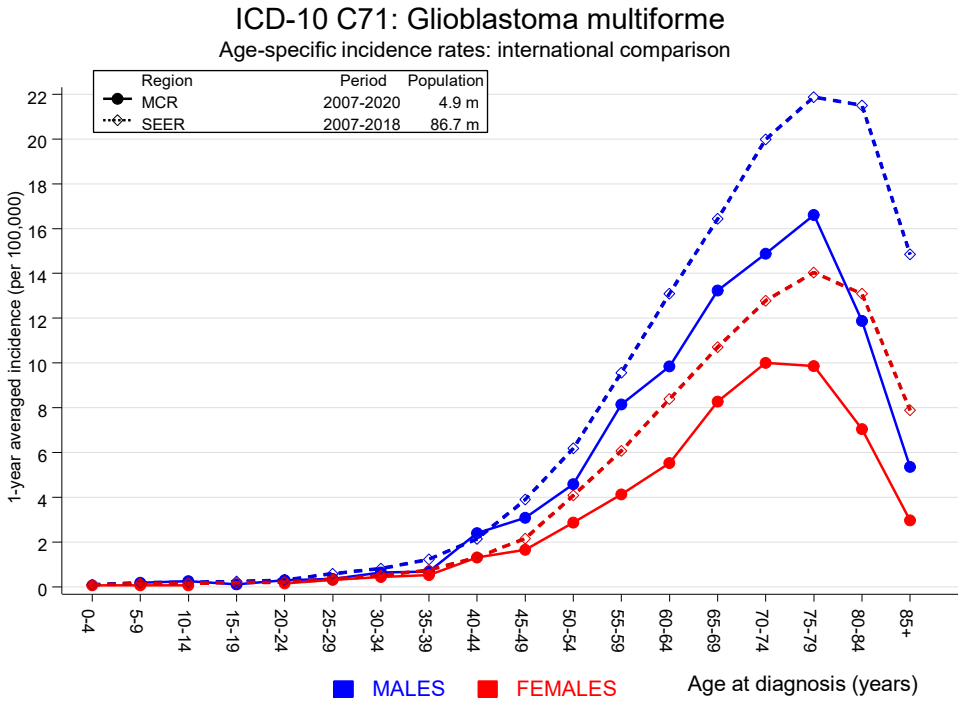


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:
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	18.7	0.5	104.3		3.9	
C17	Small intestine	1	0.2	6.4	0.2	35.5		3.5	100.0
C18	Colon	2	2.2	0.9	0.1	3.3		−0.7	
C19–C20	Rectum	1	1.4	0.7	0.0	4.0		−1.6	100.0
C23–C24	Bile	1	0.2	4.2	0.1	23.3		3.1	100.0
C25	Pancreas	3	0.9	3.3	0.7	9.7		8.6	33.3
C40–C41	Bone	1	0.0	38.6	1.0	215.0		4.0	
C43	Malign. melanoma	3	1.2	2.4	0.5	7.1		7.3	33.3
C46,C49	Soft tissue	1	0.1	6.9	0.2	38.7		3.5	
C61	Prostate	5	7.0	0.7	0.2	1.7		−8.2	
C64	Kidney	4	0.9	4.3	1.2	11.1	#	12.7	25.0
C67	Bladder	3	1.0	3.1	0.6	9.1		8.4	
C82–C85	NHL	1	1.0	1.0	0.0	5.5		−0.0	
C91–C96	Leukaemia	1	0.3	2.9	0.1	16.3		2.7	100.0
Not observed		0	8.6	0.0	0.0	0.4	#	−35.7	
All further malignancies		28	25.2	1.1	0.7	1.6		11.7	25.0

Patients	1949
Median age at next malignancy (years)	64.3
Person-years	2421
Mean observation time (years)	1.2
Median observation time (years)	0.8

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 %
C19–C20 Rectum	1	0.5	2.0	0.1	11.4		3.1	
C30–C31 Sinuses	1	0.0	51.7	1.3	288.0	#	6.0	
C43 Malign. melanoma	2	0.6	3.3	0.4	11.9		8.6	
C50 Breast	6	4.9	1.2	0.4	2.7		6.8	16.7
C54 Corpus uteri	1	0.8	1.2	0.0	6.6		1.0	
C82–C85 NHL	2	0.5	4.0	0.5	14.6		9.3	
Not observed	0	6.8	0.0	0.0	0.5	#	-41.7	
All further malignancies	13	14.1	0.9	0.5	1.6		-7.0	7.7

Patients	1352
Median age at next malignancy (years)	70.1
Person-years	1625
Mean observation time (years)	1.2
Median observation time (years)	0.7

The occurrence of further specified malignancy is statistically significant.

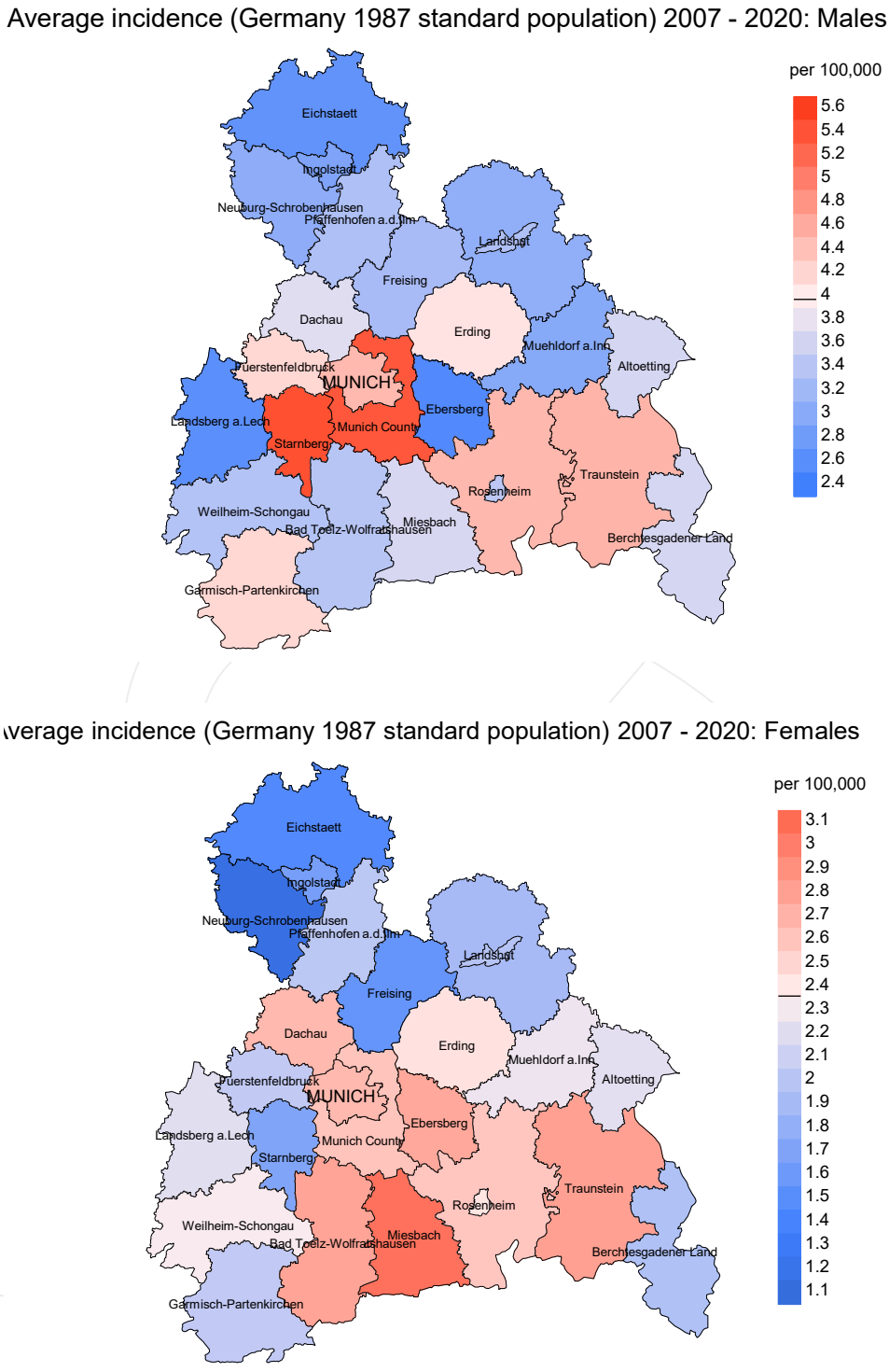


Figure 8a. Map of cancer incidence (german standard population) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 4.0/100,000 WS N=1,412, females 2.4/100,000 WS N=953).

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 31 women were identified with newly diagnosed glioblastoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 2.8/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.6 and 4.3/100,000.

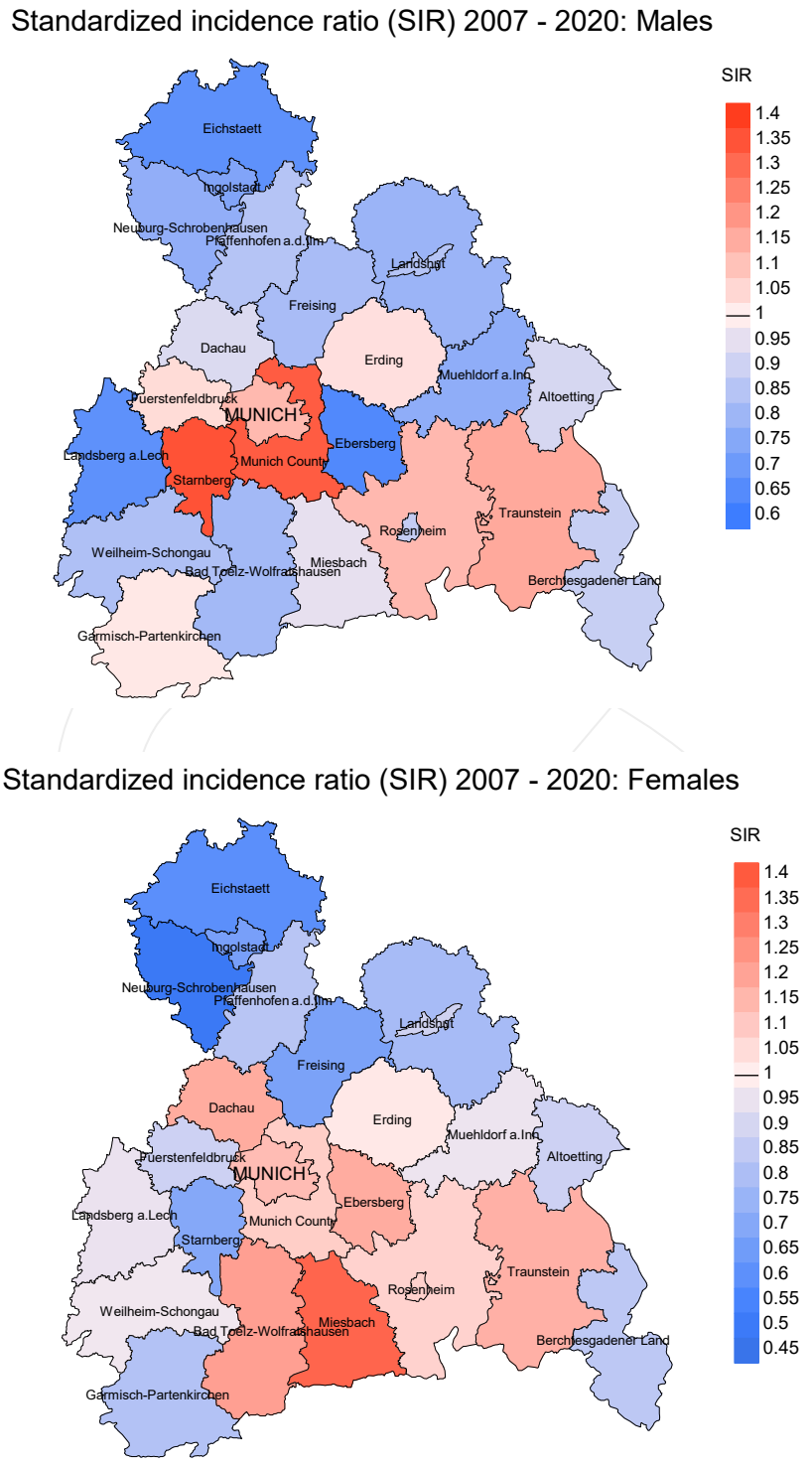


Figure 8b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,412, females N=953).

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 31 women were identified with newly diagnosed glioblastoma. 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 0.70 and 1.84, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status,
and deaths among the annual cohorts

(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 %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	47	100.0	45	95.7	97.8
1999	47	100.0	47	100.0	93.6
2000	65	98.5	59	90.8	93.2
2001	81	98.8	79	97.5	87.3
2002	130	98.5	124	95.4	98.4
2003	141	98.6	136	96.5	94.1
2004	130	98.5	126	96.9	96.0
2005	163	99.4	154	94.5	96.1
2006	150	99.3	145	96.7	97.9
2007	143	95.1	133	93.0	97.7
2008	184	99.5	174	94.6	97.1
2009	247	98.8	223	90.3	96.9
2010	202	98.5	194	96.0	98.5
2011	214	99.5	194	90.7	97.4
2012	208	100.0	194	93.3	96.4
2013	206	99.5	192	93.2	94.8
2014	221	99.1	207	93.7	96.1
2015	203	99.5	190	93.6	95.3
2016	172	100.0	161	93.6	94.4
2017	138	100.0	112	81.2	80.4
2018	100	100.0	69	69.0	58.0
2019	71	100.0	54	76.1	81.5
2020	56	100.0	36	64.3	100.0
1998–2020	3319	99.1	3048	91.8	94.5

Table 9b

Annual cohorts of incident cancers and deaths,
and cases deceased within the same year of being diagnosed with cancer

(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	Deaths in same year n	Prop. deaths in same year %
1998	47	27	12	25.5
1999	47	52	24	51.1
2000	65	48	19	29.2
2001	81	60	32	39.5
2002	130	107	41	31.5
2003	141	131	52	36.9
2004	130	137	46	35.4
2005	163	119	58	35.6
2006	150	139	54	36.0
2007	143	148	50	35.0
2008	184	127	47	25.5
2009	247	186	74	30.0
2010	202	208	68	33.7
2011	214	180	63	29.4
2012	208	208	75	36.1
2013	206	179	59	28.6
2014	221	207	71	32.1
2015	203	177	66	32.5
2016	172	219	76	44.2
2017	138	180	48	34.8
2018	100	102	23	23.0
2019	71	83	16	22.5
2020	56	83	21	37.5
1998–2020	3319	3107	1095	33.0

Table 9c

Annual cohorts of deaths, and proportion of cancer-related and non-cancer-related deaths

(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	27	88.9	11.1	100.0
1999	52	73.1	26.9	98.0
2000	48	77.1	22.9	100.0
2001	60	85.0	15.0	100.0
2002	107	90.7	9.3	100.0
2003	131	95.4	4.6	99.2
2004	137	94.2	5.8	99.2
2005	119	92.4	7.6	98.3
2006	139	92.8	7.2	99.3
2007	148	98.0	2.0	98.6
2008	127	95.3	4.7	99.2
2009	186	91.4	8.6	98.9
2010	208	95.7	4.3	99.0
2011	180	97.2	2.8	99.4
2012	208	93.8	6.3	98.5
2013	179	93.9	6.1	98.8
2014	207	97.6	2.4	99.5
2015	177	97.7	2.3	99.4
2016	219	96.8	3.2	99.5
2017	180	94.4	5.6	98.8
2018	102	73.5	26.5	95.8
2019	83	49.4	50.6	100.0
2020	83	79.5	20.5	98.6
1998-2020	3107	91.8	8.2	99.0

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	10	57.8	57.8	62.6	57.8
1999	30	64.1	66.5	58.1	65.3
2000	24	59.0	59.0	59.2	61.6
2001	36	62.0	61.6	70.1	61.8
2002	66	63.3	63.7	61.0	63.6
2003	61	66.8	66.8	65.5	66.9
2004	74	64.0	64.2	56.5	64.0
2005	75	65.3	64.1	69.7	64.2
2006	82	65.1	65.1	63.7	65.1
2007	89	66.4	66.3	74.0	66.4
2008	75	64.3	64.0	73.8	64.2
2009	113	69.5	69.4	70.1	69.3
2010	141	68.8	68.9	64.2	69.1
2011	103	68.0	68.0	67.1	67.9
2012	113	68.4	68.4	66.5	68.3
2013	105	67.2	67.1	73.4	67.2
2014	128	67.4	67.1	75.5	67.8
2015	109	70.2	70.2	65.9	70.2
2016	124	66.8	66.1	71.7	67.3
2017	108	66.1	65.7	70.0	65.7
2018	67	70.8	71.1	69.3	71.0
2019	52	65.4	63.9	66.4	63.9
2020	51	67.2	67.9	63.6	68.4
1998–2020	1836	66.9	66.9	67.1	67.0

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	17	67.1	70.5	56.9	67.1
1999	22	68.6	68.6	71.1	69.5
2000	24	67.1	66.4	72.2	67.1
2001	24	66.7	66.7	66.6	66.7
2002	41	67.1	67.1	65.3	67.1
2003	70	67.6	67.6	69.2	67.7
2004	63	64.9	64.7	65.8	64.7
2005	44	65.6	65.6	71.7	65.6
2006	57	68.1	68.3	67.5	68.6
2007	59	66.3	65.9	77.7	65.9
2008	52	68.2	68.6	56.1	68.8
2009	73	68.5	68.6	64.4	68.6
2010	67	69.2	68.8	73.2	69.1
2011	77	70.7	71.1	67.4	71.6
2012	95	68.2	68.3	66.7	68.4
2013	74	67.5	66.9	75.3	66.9
2014	79	68.8	68.8		68.8
2015	68	69.8	69.8	67.8	70.5
2016	95	69.4	69.1	70.4	69.4
2017	72	73.1	70.8	79.9	73.3
2018	35	71.2	71.4	63.4	71.3
2019	31	71.0	69.5	75.0	69.5
2020	32	71.6	68.0	74.9	70.2
1998–2020	1271	68.5	68.4	70.4	68.6

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	8	0.7	0.29	0.5	0.25	0.6	0.27	0.6	0.24
1999	22	2.0	0.81	1.3	0.78	1.8	0.81	2.2	0.86
2000	16	1.4	0.42	1.0	0.41	1.3	0.42	1.3	0.37
2001	30	2.6	0.71	1.6	0.71	2.3	0.72	2.8	0.73
2002	58	3.1	0.82	1.9	0.76	2.6	0.80	3.0	0.82
2003	59	3.1	0.77	1.8	0.73	2.6	0.75	3.2	0.79
2004	69	3.7	0.93	2.2	0.92	3.0	0.90	3.6	0.96
2005	68	3.6	0.72	2.1	0.72	2.9	0.73	3.4	0.72
2006	77	4.0	0.81	2.3	0.77	3.2	0.80	3.8	0.83
2007	88	4.0	1.11	2.2	1.03	3.1	1.07	3.8	1.13
2008	72	3.2	0.62	1.9	0.65	2.6	0.63	3.0	0.61
2009	100	4.5	0.65	2.3	0.61	3.4	0.63	4.3	0.67
2010	135	6.0	1.18	3.2	1.14	4.5	1.13	5.7	1.17
2011	101	4.5	0.83	2.4	0.78	3.4	0.82	4.2	0.83
2012	107	4.7	0.95	2.5	0.94	3.5	0.94	4.3	0.95
2013	100	4.3	0.76	2.4	0.73	3.3	0.73	3.9	0.76
2014	123	5.3	0.92	2.9	0.87	4.0	0.90	4.7	0.92
2015	107	4.5	0.89	2.3	0.81	3.3	0.83	4.0	0.87
2016	118	4.9	1.23	2.6	1.22	3.6	1.23	4.5	1.23
2017	105	4.4	1.17	2.3	1.22	3.3	1.21	3.9	1.18
2018	48	2.0	0.74	0.9	0.63	1.4	0.67	1.8	0.73
2019	26	1.1	0.57	0.7	0.70	0.9	0.62	1.0	0.61
2020	42	1.7	1.27	0.9	1.31	1.3	1.27	1.6	1.31
1998-2020	1679	3.6	0.86	2.0	0.82	2.8	0.84	3.4	0.86

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	16	1.4	0.84	0.7	0.80	1.0	0.82	1.2	0.86
1999	16	1.3	0.80	0.8	0.89	1.1	0.84	1.3	0.82
2000	21	1.7	0.78	0.9	0.66	1.4	0.73	1.6	0.79
2001	21	1.7	0.54	1.0	0.58	1.4	0.56	1.6	0.55
2002	39	2.0	0.66	1.1	0.62	1.5	0.62	1.8	0.64
2003	66	3.4	1.03	1.8	0.99	2.5	1.03	3.0	1.04
2004	60	3.0	1.07	1.8	1.07	2.4	1.09	2.7	1.10
2005	42	2.1	0.62	1.1	0.63	1.5	0.61	1.8	0.62
2006	52	2.6	0.95	1.4	0.97	1.8	0.92	2.2	0.91
2007	57	2.5	0.89	1.3	0.85	1.8	0.85	2.1	0.87
2008	49	2.1	0.72	1.1	0.69	1.5	0.72	1.8	0.73
2009	70	3.0	0.75	1.5	0.66	2.1	0.67	2.5	0.71
2010	64	2.7	0.73	1.3	0.68	1.8	0.69	2.3	0.73
2011	74	3.2	0.80	1.5	0.73	2.1	0.76	2.6	0.78
2012	88	3.7	0.93	1.8	0.92	2.5	0.91	3.1	0.94
2013	68	2.9	0.91	1.4	0.85	2.0	0.89	2.4	0.89
2014	79	3.3	0.91	1.6	0.94	2.2	0.90	2.7	0.92
2015	66	2.7	0.80	1.2	0.70	1.8	0.74	2.2	0.76
2016	94	3.8	1.24	1.9	1.31	2.6	1.25	3.2	1.26
2017	65	2.6	1.35	1.1	1.43	1.7	1.39	2.1	1.42
2018	27	1.1	0.77	0.4	0.66	0.6	0.68	0.8	0.72
2019	15	0.6	0.60	0.3	0.68	0.4	0.66	0.5	0.59
2020	24	1.0	1.04	0.4	1.14	0.6	1.15	0.8	1.03
1998-2020	1173	2.4	0.86	1.2	0.84	1.7	0.84	2.1	0.86

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									
5-9	2	0.1	0.1	1	0.1	0.1	1	0.1	0.1
10-14	2	0.1	0.2	1	0.1	0.2	1	0.1	0.2
15-19	6	0.3	0.5	5	0.4	0.6	1	0.1	0.4
20-24	5	0.2	0.7	3	0.2	0.8	2	0.2	0.6
25-29	10	0.5	1.2	6	0.5	1.3	4	0.5	1.1
30-34	7	0.3	1.5	4	0.3	1.6	3	0.4	1.4
35-39	22	1.0	2.6	14	1.1	2.7	8	1.0	2.4
40-44	53	2.5	5.1	38	3.0	5.7	15	1.8	4.2
45-49	131	6.2	11.3	85	6.7	12.3	46	5.5	9.6
50-54	141	6.7	17.9	89	7.0	19.3	52	6.2	15.8
55-59	196	9.3	27.2	131	10.3	29.6	65	7.7	23.6
60-64	257	12.2	39.4	159	12.5	42.1	98	11.7	35.2
65-69	338	16.0	55.4	189	14.9	57.0	149	17.7	53.0
70-74	388	18.4	73.8	238	18.7	75.7	150	17.9	70.8
75-79	327	15.5	89.3	189	14.9	90.6	138	16.4	87.3
80-84	168	8.0	97.2	91	7.2	97.7	77	9.2	96.4
85+	59	2.8	100.0	29	2.3	100.0	30	3.6	100.0
All ages	2112	100.0		1272	100.0		840	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								
5- 9	1	1	0.1	0.33	0.1	1.00	3.6	4.0
10-14	1	1	0.1	0.25	0.1	1.00	3.6	4.3
15-19	5	1	0.3	2.50	0.1	1.00	10.4	4.0
20-24	3	2	0.1	0.50	0.1	0.67	4.1	4.7
25-29	6	4	0.3	0.75	0.2	0.57	6.5	4.0
30-34	4	3	0.2	0.27	0.1	0.30	2.8	1.7
35-39	14	8	0.6	0.88	0.4	0.67	5.2	2.0
40-44	38	15	1.5	0.63	0.6	0.47	6.3	1.8
45-49	85	46	3.2	1.02	1.8	1.07	6.0	2.8
50-54	89	52	3.5	0.76	2.1	0.72	3.3	2.0
55-59	131	65	6.2	0.76	3.0	0.72	3.0	1.7
60-64	159	98	9.0	0.91	5.2	0.93	2.5	2.0
65-69	189	149	11.6	0.88	8.2	0.99	2.1	2.1
70-74	238	150	15.9	1.07	8.7	0.87	2.0	1.7
75-79	189	138	15.6	0.94	9.2	0.93	1.5	1.4
80-84	91	77	12.6	1.06	7.2	1.03	0.9	0.8
85+	29	30	6.2	1.16	2.9	0.97	0.3	0.3
All ages	1272	840					1.8	1.4
Mortality								
Raw			3.9	0.90	2.5	0.88		
WS			2.1	0.87	1.2	0.85		
ES			2.9	0.88	1.7	0.86		
BRD-S			3.6	0.90	2.1	0.88		
PYLL-70								
per 100,000			32.1		18.0			
ES			28.0		15.4			
AYLL-70			12.7		11.4			

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 ←%
C09–C10	Oropharynx	3	1.2	3	100.0				
C11	Nasopharynx	1	0.4	1	100.0				
C16	Stomach	5	2.0	5	100.0				
C17	Small intestine	3	1.2	1	33.3	1	33.3	1	33.3
C18	Colon	21	8.6	18	85.7	3	14.3		
C19–C20	Rectum	12	4.9	11	91.7			1	8.3
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	4	1.6	1	25.0	1	25.0	2	50.0
C32	Larynx	1	0.4	1	100.0				
C33–C34	Lung	3	1.2	2	66.7	1	33.3		
C38,C45	Mesothelioma	1	0.4	1	100.0				
C40–C41	Bone	3	1.2	2	66.7			1	33.3
C43	Malign. melanoma	14	5.7	13	92.9			1	7.1
C44	Skin others	20	8.2	12	60.0	4	20.0	4	20.0
C46,C49	Soft tissue	1	0.4					1	100.0
C60	Penis	2	0.8	2	100.0				
C61	Prostate	90	36.7	83	92.2	2	2.2	5	5.6
C62	Testis	5	2.0	5	100.0				
C64	Kidney	13	5.3	9	69.2	2	15.4	2	15.4
C67	Bladder	6	2.4	3	50.0	1	16.7	2	33.3
C68	Urinary org.	1	0.4	1	100.0				
C70–C72	CNS cancer	12	4.9			3	25.0	9	75.0
C73	Thyroid	5	2.0	5	100.0				
C76–C79	CUP	1	0.4	1	100.0				
C82–C85	NHL	11	4.5	10	90.9	1	9.1		
C90	Mult. myeloma	2	0.8	2	100.0				
C91–C96	Leukaemia	2	0.8	1	50.0			1	50.0
All further malignancies		245	100.0	195	79.6	19	7.8	31	12.7

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	0.7	1	100.0				
C16	Stomach	2	1.3	2	100.0				
C18	Colon	10	6.7	10	100.0				
C19–C20	Rectum	2	1.3	1	50.0			1	50.0
C32	Larynx	1	0.7	1	100.0				
C33–C34	Lung	1	0.7	1	100.0				
C43	Malign. melanoma	13	8.7	11	84.6			2	15.4
C44	Skin others	8	5.3	5	62.5	2	25.0	1	12.5
C46,C49	Soft tissue	2	1.3	2	100.0				
C50	Breast	57	38.0	49	86.0	3	5.3	5	8.8
C52	Vagina	1	0.7	1	100.0				
C53	Cervix uteri	6	4.0	6	100.0				
C54	Corpus uteri	11	7.3	10	90.9			1	9.1
C56	Ovary	6	4.0	6	100.0				
C64	Kidney	2	1.3	2	100.0				
C65	Renal pelvis	1	0.7	1	100.0				
C67	Bladder	1	0.7	1	100.0				
C69	Eye melanoma	1	0.7	1	100.0				
C70–C72	CNS cancer	8	5.3					8	100.0
C73	Thyroid	6	4.0	6	100.0				
C76–C79	CUP	1	0.7	1	100.0				
C81	Hodgkin lymphoma	1	0.7	1	100.0				
C82–C85	NHL	6	4.0	3	50.0	2	33.3	1	16.7
C91–C96	Leukaemia	2	1.3	1	50.0			1	50.0
All further malignancies		150	100.0	123	82.0	7	4.7	20	13.3

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								
5- 9	1	1	0.1	0.33	0.1	1.00	3.7	4.0
10-14	1	1	0.1	0.25	0.1	1.00	3.6	5.3
15-19	5	1	0.3	2.50	0.1	1.00	10.9	4.3
20-24	3	2	0.1	0.50	0.1	0.67	4.5	4.9
25-29	6	4	0.3	0.75	0.2	0.57	7.1	4.4
30-34	4	3	0.2	0.27	0.1	0.30	2.9	1.9
35-39	14	8	0.6	0.88	0.4	0.73	5.6	2.2
40-44	36	13	1.4	0.62	0.5	0.46	6.4	1.7
45-49	85	45	3.2	1.05	1.7	1.10	6.6	3.1
50-54	83	48	3.3	0.75	1.9	0.71	3.5	2.1
55-59	127	58	6.0	0.78	2.7	0.73	3.3	1.8
60-64	142	86	8.0	0.94	4.5	0.91	2.6	2.1
65-69	169	128	10.4	0.89	7.1	1.02	2.3	2.3
70-74	188	123	12.5	1.08	7.2	0.89	2.1	1.8
75-79	145	109	12.0	0.99	7.3	0.91	1.6	1.5
80-84	70	66	9.7	1.04	6.2	1.03	0.9	0.9
85+	17	27	3.6	1.06	2.6	1.04	0.3	0.3
All ages	1096	723					2.0	1.5
Mortality								
Raw			3.4	0.91	2.2	0.88		
WS			1.9	0.87	1.1	0.85		
ES			2.6	0.89	1.5	0.86		
BRD-S			3.1	0.91	1.8	0.87		
PYLL-70								
per 100,000			30.8		16.7			
ES			26.9		14.3			
AYLL-70			13.0		11.8			

* 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								
5- 9	1	1	0.1	0.33	0.1	1.00	3.7	4.0
10-14	1	1	0.1	0.25	0.1	1.00	3.6	5.3
15-19	5	1	0.3	2.50	0.1	1.00	10.9	4.5
20-24	3	2	0.1	0.50	0.1	0.67	4.5	5.0
25-29	6	4	0.3	0.75	0.2	0.57	7.1	4.5
30-34	4	3	0.2	0.31	0.1	0.30	2.9	1.9
35-39	12	8	0.5	0.75	0.4	0.73	4.8	2.2
40-44	36	13	1.4	0.63	0.5	0.46	6.5	1.7
45-49	85	45	3.2	1.05	1.7	1.15	6.7	3.2
50-54	83	46	3.3	0.75	1.8	0.68	3.6	2.1
55-59	126	57	5.9	0.79	2.6	0.72	3.3	1.8
60-64	140	85	7.9	0.94	4.5	0.90	2.7	2.1
65-69	166	128	10.2	0.89	7.1	1.03	2.3	2.4
70-74	184	120	12.3	1.07	7.0	0.89	2.1	1.8
75-79	144	107	11.9	0.99	7.1	0.90	1.7	1.5
80-84	69	64	9.5	1.03	6.0	1.02	1.0	0.9
85+	17	27	3.6	1.06	2.6	1.04	0.3	0.3
All ages	1082	712					2.1	1.5
Mortality								
Raw			3.3	0.90	2.1	0.88		
WS			1.8	0.87	1.0	0.85		
ES			2.6	0.88	1.5	0.85		
BRD-S			3.1	0.91	1.8	0.87		
PYLL-70								
per 100,000			30.4		16.5			
ES			26.6		14.2			
AYLL-70			13.0		11.8			

* See corresponding tables with multiple malignancies.

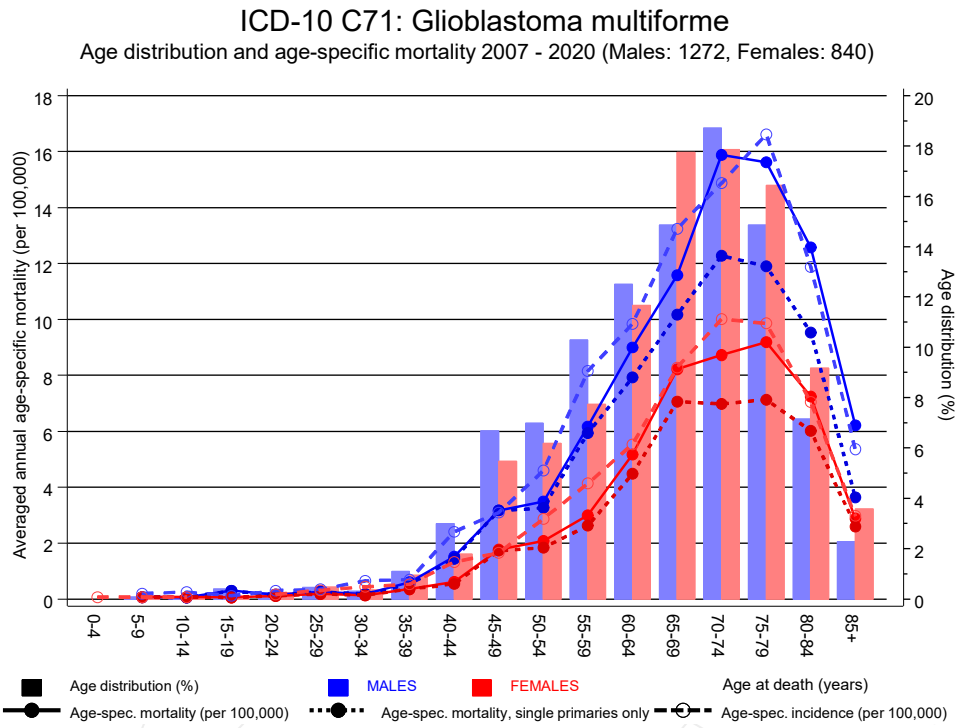
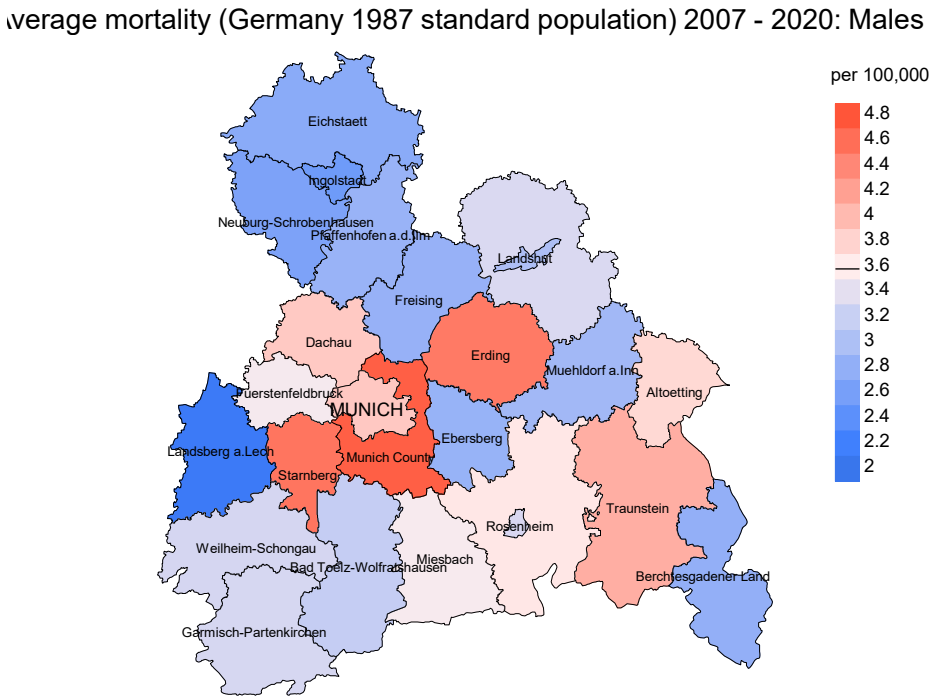


Figure 17. Distribution of age at death (bars; males: mean=64.3 yrs, median=66.4 yrs; females: mean=66.1 yrs, median=68.0 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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



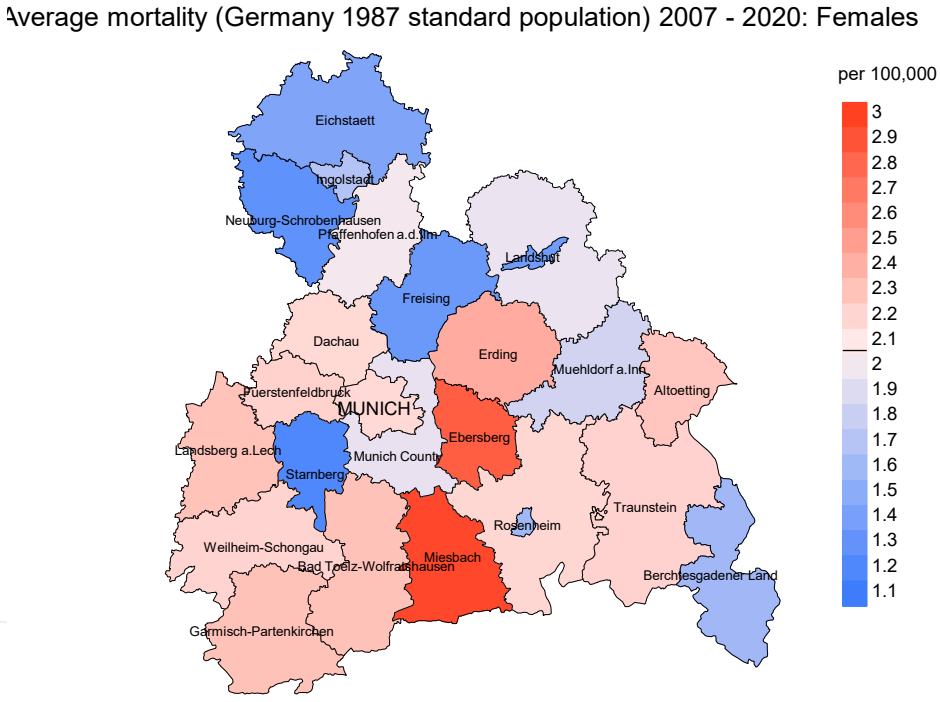
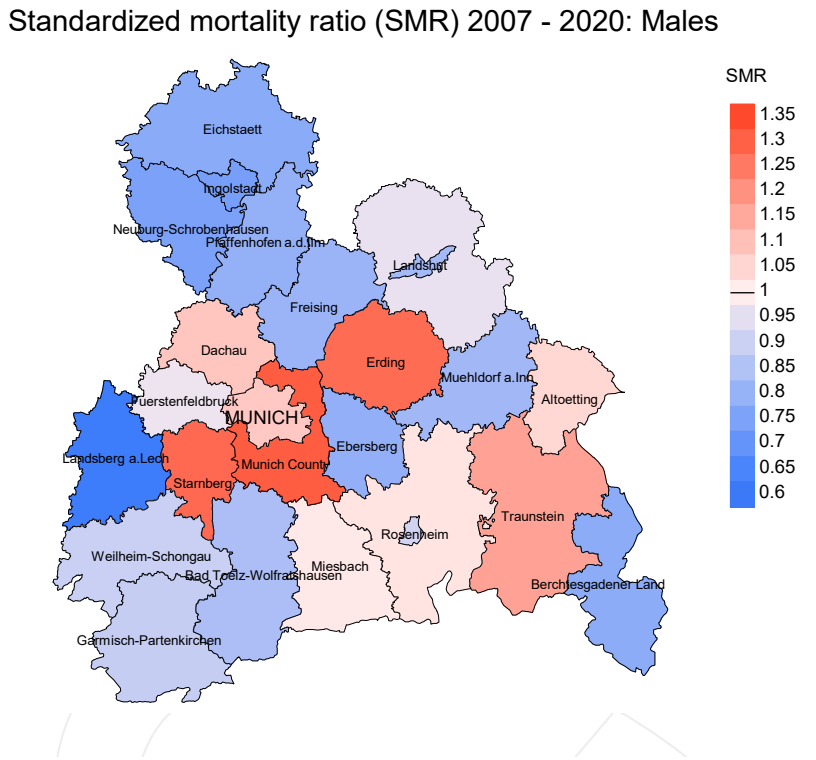


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 3.6/100,000 WS N=1,272, females 2.1/100,000 WS N=840).

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 32 women died from glioblastoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.8/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.7 and 4.5/100,000.



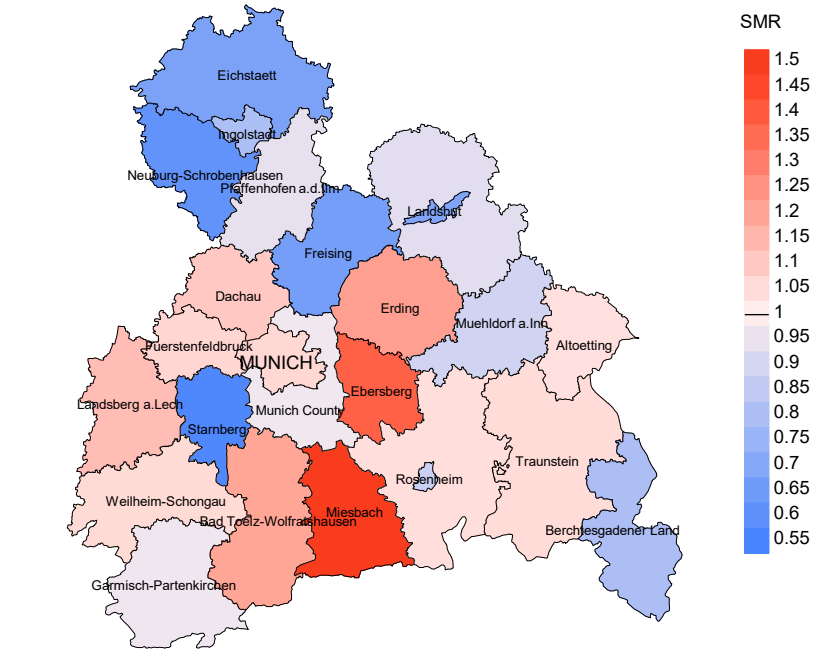


Figure 18b. Map of standardized mortality ratio (SMR) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,272, females N=840).

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 32 women died from glioblastoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.38. Though, the value of this parameter may vary with an underlying probability of 99% between 0.83 and 2.14, 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

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