Munich Cancer Registry

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ICD-10 C71: Glioblastoma

Incidence and Mortality

Year of diagnosis	1998-2016
Patients	2,978
Diseases	2,978
Creation date	08/21/2018
Export date	08/09/2018
Population	4.81 m

Munich Cancer Registry
Cancer Registry Bavaria - Upper Bavaria Regional Center
at Klinikum Grosshadern/IBE
Marchioninistr. 15
Munich, 81377
Germany

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, August 2018

[#] 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	67	4.5	1.3	94.0	100.0
1999	60	5.5	1.2	98.3	100.0
2000	72	6.5	1.2	91.7	98.6
2001	99	6.7	1.2	97.0	99.0
2002	158	6.8	1.2	94.9	98.7 #
2003	156	7.4	1.2	96.8	98.7
2004	146	7.9	1.2	95.9	98.6
2005	182	8.4	1.2	94.0	98.9
2006	164	9.0	1.3	95.1	98.8
2007	153	9.2	1.3	93.5	94.8 #
2008	199	9.1	1.2	93.5	97.0
2009	257	9.2	1.0	89.1	91.8
2010	225	9.6	1.0	95.1	97.3
2011	225	10.1	1.0	87.6	93.3
2012	215	10.3	1.1	88.8	94.4
2013	227	10.7	1.2	85.5	93.0
2014	230	11.0	1.1	84.3	96.1
2015	96	11.1	1.4	86.5	100.0
2016	47	11.2	4.3	55.3	85.1 ##
1998-2016	2978	11.2	1.3	91.0	96.2

2,978 cases diagnosed 1998-2016 are related to a total of 2,978 patients. Currently, in 383 (12.9 %) of these 2,978 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 326 / 41 / 16 (10.9 % / 1.4 % / 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 2014, a subgroup of 230 cases has been diagnosed, of which 11.0 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 1.1 % 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	41	61.2	7.3	1.6	92.7	100.0
1999	32	53.3	5.5	1.5	96.9	100.0
2000	42	58.3	7.0	1.4	92.9	97.6
2001	52	52.5	6.0	1.4	98.1	100.0
2002	90	57.0	7.4	1.4	92.2	98.9 #
2003	83	53.2	7.1	1.4	97.6	98.8
2004	83	56.8	8.0	1.4	97.6	100.0
2005	105	57.7	9.3	1.3	95.2	99.0
2006	104	63.4	9.8	1.4	94.2	98.1
2007	83	54.2	10.1	1.4	95.2	95.2 #
2008	127	63.8	9.7	1.3	95.3	97.6
2009	160	62.3	9.8	1.0	89.4	92.5
2010	125	55.6	10.3	1.1	96.0	96.8
2011	125	55.6	10.9	1.2	92.8	94.4
2012	118	54.9	10.7	1.3	89.8	94.1
2013	142	62.6	11.5	1.7	85.2	93.7
2014	138	60.0	11.8	1.4	82.6	95.7
2015	58	60.4	11.7	2.4	82.8	100.0
2016	24	51.1	11.8	8.3	50.0	83.3 ##
1998-2016	1732	58.2	11.8	1.6	91.3	96.4

1,732 cases diagnosed 1998-2016 are related to a total of 1,732 patients. Currently, in 232 (13.4 %) of these 1,732 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 194 / 26 / 12 (11.2 % / 1.5 % / 0.7 %) 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 2014, a subgroup of 138 cases has been diagnosed, of which 11.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 1.4 % 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	26	38.8	0.0	0.9	96.2	100.0
1999	28	46.7	5.6	0.9	100.0	100.0
2000	30	41.7	6.0	0.9	90.0	100.0
2001	47	47.5	7.6	0.9	95.7	97.9
2002	68	43.0	6.0	0.9	98.5	98.5 #
2003	73	46.8	7.7	1.0	95.9	98.6
2004	63	43.2	7.8	1.0	93.7	96.8
2005	77	42.3	7.3	1.0	92.2	98.7
2006	60	36.6	7.8	1.1	96.7	100.0
2007	70	45.8	8.1	1.2	91.4	94.3 #
2008	72	36.2	8.1	1.2	90.3	95.8
2009	97	37.7	8.4	1.0	88.7	90.7
2010	100	44.4	8.6	1.0	94.0	98.0
2011	100	44.4	9.1	0.7	81.0	92.0
2012	97	45.1	9.7	0.9	87.6	94.8
2013	85	37.4	9.7	0.4	85.9	91.8
2014	92	40.0	10.0	0.7	87.0	96.7
2015	38	39.6	10.3	0.0	92.1	100.0
2016	23	48.9	10.4	0.0	60.9	87.0 ##
1998-2016	1246	41.8	10.4	0.9	90.4	96.0

1,246 cases diagnosed 1998-2016 are related to a total of 1,246 patients. Currently, in 151 (12.1 %) of these 1,246 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 132 / 15 / 4 (10.6 % / 1.2 % / 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 2014, a subgroup of 92 cases has been diagnosed, of which 10.0 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.7 % 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 4.81 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	41	26	3.7	2.2	2.5	1.3	3.4	1.8	3.7	2.0
1999	32	28	2.9	2.4	2.0	1.3	2.7	1.9	3.0	2.2
2000	42	30	3.7	2.5	2.6	1.5	3.3	2.0	3.9	2.3
2001	52	47	4.5	3.9	2.7	2.1	3.9	2.9	4.6	3.5
2002	90	68	4.8	3.5	3.1	2.1	4.1	2.8	4.7	3.2
2003	83	73	4.4	3.7	2.7	2.1	3.7	2.8	4.4	3.3
2004	83	63	4.4	3.2	2.7	1.9	3.7	2.5	4.3	2.8
2005	105	77	5.5	3.9	3.2	2.0	4.4	2.8	5.3	3.3
2006	104	60	5.4	3.0	3.2	1.6	4.4	2.2	5.0	2.6
2007	83	70	3.7	3.0	2.3	1.6	3.0	2.2	3.5	2.6
2008	127	72	5.7	3.1	3.3	1.7	4.6	2.3	5.5	2.7
2009	160	97	7.2	4.2	4.0	2.3	5.6	3.2	6.8	3.7
2010	125	100	5.5	4.3	3.1	2.1	4.4	3.0	5.3	3.6
2011	125	100	5.6	4.3	3.1	2.1	4.3	3.0	5.3	3.6
2012	118	97	5.2	4.1	2.8	2.0	3.9	2.8	4.7	3.3
2013	142	85	6.2	3.6	3.5	1.8	4.8	2.5	5.6	3.0
2014	138	92	5.9	3.8	3.4	1.8	4.6	2.6	5.3	3.1
2015	58	38	2.4	1.6	1.2	0.7	1.7	1.0	2.2	1.3
2016	24	23	1.0	0.9	0.4	0.4	0.7	0.6	0.9	0.7
1998-2016	1732	1246	4.7	3.2	2.8	1.7	3.8	2.4	4.5	2.8

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	67	59.1	13.2	13.0	79.2	43.0	50.9	59.2	68.2	75.8
1999	60	61.0	13.4	20.0	89.2	44.4	51.7	64.1	70.7	76.3
2000	72	59.0	16.2	8.0	84.2	36.7	52.6	61.0	68.8	76.7
2001	99	63.3	12.5	23.6	85.2	45.6	57.3	64.0	71.9	78.8
2002	158	62.1	13.5	7.1	87.7	44.5	56.2	63.4	70.2	76.6
2003	156	63.3	13.2	13.7	89.8	44.7	57.7	65.3	72.8	77.3
2004	146	62.4	11.9	6.2	86.7	46.8	56.0	63.9	69.4	76.3
2005	182	64.2	12.6	7.8	92.8	46.1	58.5	65.3	71.5	80.4
2006	164	62.8	13.5	22.3	88.7	43.9	55.0	65.2	71.5	79.2
2007	153	63.7	13.4	13.3	88.0	43.9	56.6	65.3	72.9	79.4
2008	199	63.9	13.3	0.1	88.2	47.4	56.9	66.5	72.9	78.3
2009	257	64.4	12.9	6.8	87.8	46.5	58.4	65.9	73.0	80.1
2010	225	65.1	12.8	16.2	90.8	46.5	57.4	67.9	74.2	79.9
2011	225	64.1	14.0	11.1	92.4	46.4	54.7	66.6	74.8	79.9
2012	215	65.6	13.1	21.2	90.4	46.2	56.5	67.1	74.6	80.9
2013	227	64.8	12.7	8.6	93.9	49.1	58.4	67.0	74.1	77.8
2014	230	64.4	14.2	8.5	88.3	45.3	55.1	67.6	74.8	79.0
2015	96	69.9	9.4	26.9	85.4	59.8	65.1	71.6	77.0	79.4
2016	47	71.1	8.9	51.6	84.9	57.9	62.6	72.8	77.9	81.9
1998-2016	2978	64.0	13.2	0.1	93.9	46.3	56.7	66.0	73.4	79.0

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	41	56.6	11.2	32.4	78.2	43.0	49.2	55.2	63.6	69.6
1999	32	58.2	14.1	20.0	79.4	42.2	49.7	59.3	68.6	71.8
2000	42	57.1	16.8	8.0	84.2	30.5	51.7	59.9	66.4	76.7
2001	52	62.3	11.3	33.3	84.2	46.3	57.2	62.0	70.7	75.6
2002	90	61.2	14.0	7.1	87.7	42.1	55.3	63.4	69.3	75.9
2003	83	62.5	13.0	22.7	83.2	44.3	56.7	64.7	71.8	77.3
2004	83	62.6	10.7	35.2	86.7	46.8	55.5	63.5	70.3	76.3
2005	105	63.1	13.4	7.8	92.8	44.1	56.0	65.3	70.7	80.3
2006	104	61.2	12.7	22.3	88.0	43.4	54.3	63.9	69.7	75.7
2007	83	62.7	13.2	13.3	86.4	43.9	58.6	63.9	70.7	77.9
2008	127	63.4	12.5	16.6	82.3	47.3	56.6	66.0	72.3	78.1
2009	160	64.7	13.4	6.8	87.8	45.9	58.8	66.6	73.8	80.6
2010	125	64.4	13.5	16.2	90.8	44.9	56.0	67.0	74.2	80.5
2011	125	62.4	14.2	20.8	86.2	43.1	52.3	64.2	74.4	79.2
2012	118	65.1	13.2	21.2	89.9	45.9	54.7	67.3	74.5	80.5
2013	142	63.9	12.6	11.6	93.9	48.4	56.4	66.5	73.1	76.5
2014	138	62.8	15.1	8.5	88.3	43.5	53.8	65.4	73.8	79.0
2015	58	69.7	9.2	26.9	85.4	59.8	65.0	71.6	75.6	78.6
2016	24	70.6	9.4	51.6	84.9	57.6	62.6	73.0	77.9	81.6
1998-2016	1732	63.1	13.3	6.8	93.9	44.9	55.8	65.3	72.4	78.3

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	26	62.9	15.3	13.0	79.2	43.7	57.2	66.7	74.4	77.2
1999	28	64.2	12.0	43.0	89.2	46.1	55.0	64.9	72.0	79.4
2000	30	61.8	15.2	8.4	81.3	41.1	56.4	66.7	70.8	76.6
2001	47	64.4	13.8	23.6	85.2	44.1	57.6	67.2	73.9	79.8
2002	68	63.3	12.8	22.4	87.5	49.8	56.7	63.7	71.1	76.9
2003	73	64.1	13.5	13.7	89.8	49.6	58.3	65.6	74.1	77.1
2004	63	62.2	13.4	6.2	82.8	46.9	56.5	65.4	69.3	76.2
2005	77	65.6	11.2	37.7	86.5	49.6	59.0	65.8	71.9	81.6
2006	60	65.6	14.6	26.9	88.7	46.4	57.0	66.9	76.6	83.1
2007	70	64.8	13.7	26.1	88.0	45.4	55.1	66.7	75.8	81.2
2008	72	64.8	14.8	0.1	88.2	48.0	60.4	67.8	73.5	78.7
2009	97	64.1	12.1	27.9	87.1	46.5	58.0	65.1	71.3	78.7
2010	100	66.1	11.9	31.6	87.0	47.3	58.5	68.2	74.6	79.0
2011	100	66.2	13.6	11.1	92.4	50.0	57.7	68.9	75.2	81.5
2012	97	66.3	13.0	30.6	90.4	46.8	58.8	66.8	74.6	82.0
2013	85	66.5	12.8	8.6	87.6	51.3	60.3	68.2	76.1	78.6
2014	92	66.7	12.4	30.2	87.4	48.1	57.9	70.4	75.9	79.5
2015	38	70.1	9.7	45.5	83.1	52.7	65.1	71.3	78.2	80.8
2016	23	71.6	8.6	57.9	83.6	59.1	61.2	72.8	79.5	81.9
1998-2016	1246	65.3	13.0	0.1	92.4	48.1	58.4	66.9	74.6	79.8

Table 4

Age distribution by 5-year age group and sex for period 2007-2016

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	1	0.1	0.1			0.0	1	0.1	0.1
5-9	3	0.2	0.2	2	0.2	0.2	1	0.1	0.3
10-14	5	0.3	0.5	4	0.4	0.5	1	0.1	0.4
15-19	3	0.2	0.6	3	0.3	0.8			0.4
20-24	6	0.3	1.0	4	0.4	1.2	2	0.3	0.6
25-29	12	0.6	1.6	8	0.7	1.9	4	0.5	1.2
30-34	21	1.1	2.7	13	1.2	3.1	8	1.0	2.2
35-39	24	1.3	4.0	16	1.5	4.5	8	1.0	3.2
40-44	70	3.7	7.7	45	4.1	8.6	25	3.2	6.5
45-49	101	5.4	13.1	64	5.8	14.5	37	4.8	11.2
50-54	140	7.5	20.6	86	7.8	22.3	54	7.0	18.2
55-59	192	10.2	30.8	118	10.7	33.0	74	9.6	27.8
60-64	225	12.0	42.8	132	12.0	45.0	93	12.0	39.8
65-69	310	16.5	59.4	183	16.6	61.6	127	16.4	56.2
70-74	326	17.4	76.8	187	17.0	78.6	139	18.0	74.2
75-79	268	14.3	91.1	149	13.5	92.2	119	15.4	89.5
80-84	124	6.6	97.7	67	6.1	98.3	57	7.4	96.9
85+	43	2.3	100.0	19	1.7	100.0	24	3.1	100.0
All ages	1874	100.0		1100	100.0		774	100.0	

Table 5

Age-specific incidence and proportion of all cancers
for period 2007-2016

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males Prop.all cancers n=113978 %	Females Prop.all cancers n=112253 %
0- 4		1		0.1		0.7
5- 9	2	1	0.2	0.1	1.9	1.2
10-14	4	1	0.3	0.1	3.5	1.0
15-19	3		0.2		1.2	
20-24	4	2	0.3	0.1	0.9	0.5
25-29	8	4	0.5	0.3	1.2	0.5
30-34	13	8	0.8	0.5	1.4	0.5
35-39	16	8	1.0	0.5	1.2	0.3
40-44	45	25	2.4	1.4	2.1	0.5
45-49	64	37	3.2	1.9	1.6	0.5
50-54	86	54	5.0	3.2	1.4	0.6
55-59	118	74	8.3	5.0	1.3	0.8
60-64	132	93	10.8	7.0	1.0	0.8
65-69	183	127	15.4	9.8	1.0	0.9
70-74	187	139	16.9	11.0	0.9	0.9
75-79	149	119	18.7	11.9	0.9	0.9
80-84	67	57	14.6	8.1	0.6	0.5
85+	19	24	6.2	3.3	0.2	0.2
All ages	1100	774			1.0	0.7
Incidence						
Raw			4.8	3.3		
WS			2.7	1.6		
ES			3.7	2.3		
BRD-S			4.5	2.7		

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).

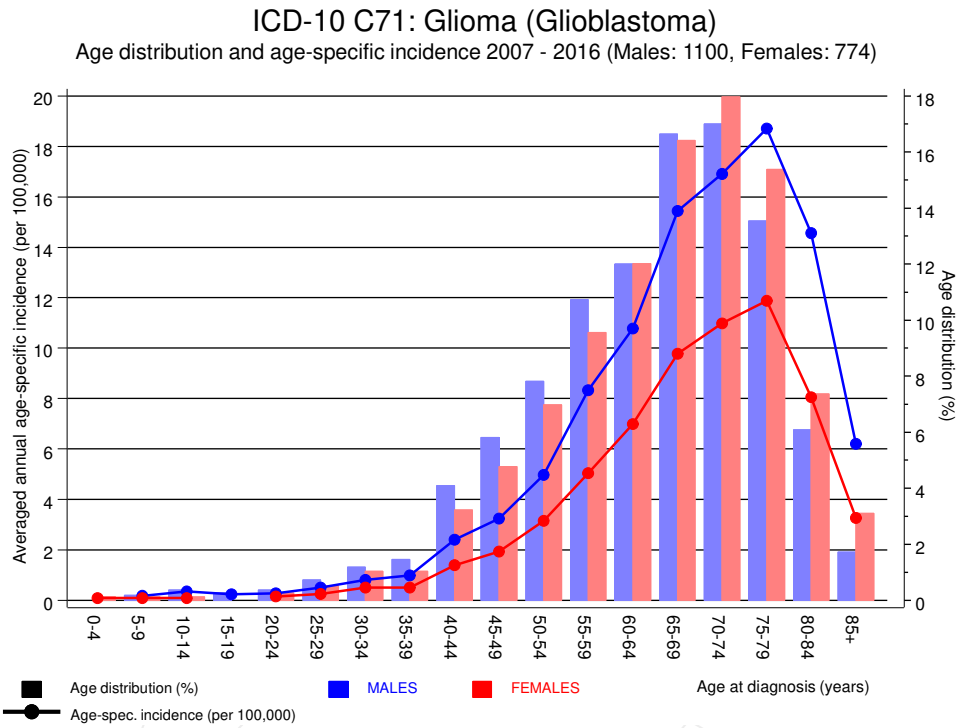


Figure 6. Age distribution (males: mean=64.2 yrs, median=66.8 yrs; females: mean=66.1 yrs, median=68.0 yrs) and age-specific incidence.

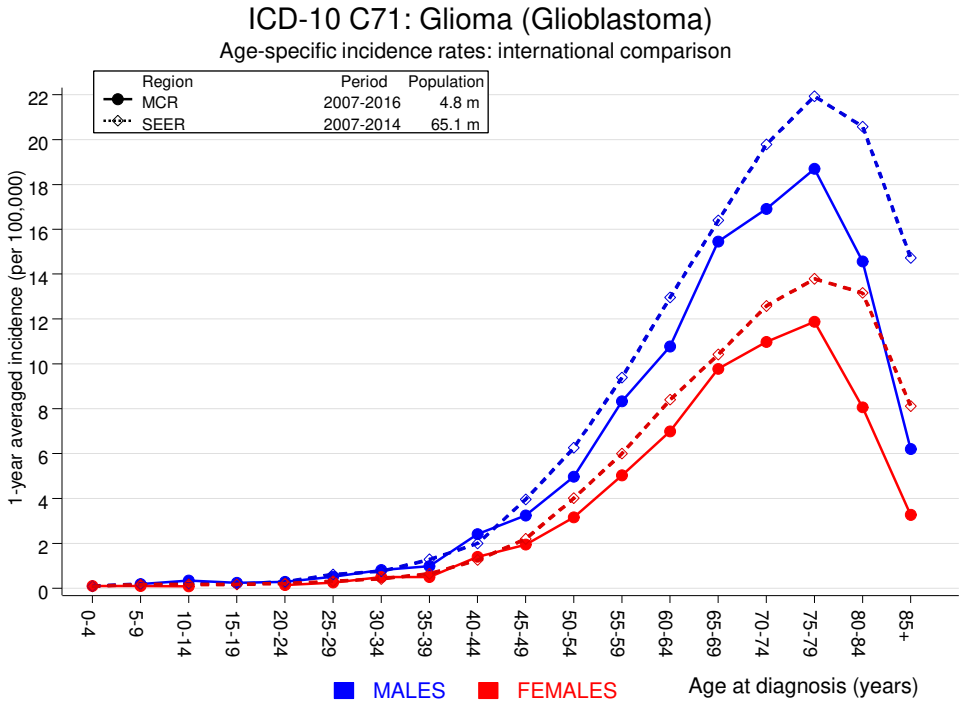


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 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 1998–2016

MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C18	Colon	3	1.9	1.6	0.3	4.7		5.7	
C25	Pancreas	2	0.8	2.7	0.3	9.6		6.3	
C43	Malign. melanoma	3	1.0	2.9	0.6	8.4		9.9	33.3
C61	Prostate	5	6.1	0.8	0.3	1.9		-5.8	40.0
C64	Kidney	5	0.8	6.2	2.0	14.5	#	21.2	20.0
C67	Bladder	3	0.8	3.7	0.8	10.9		11.1	
Others, specified		7	2.8	2.5	1.0	5.1		21.1	57.1
Not observed		0	7.5	0.0	0.0	0.5	#	-37.7	
All further malignancies		28	21.7	1.3	0.9	1.9		31.7	28.6

Patients	1706
Median age at next malignancy (years)	65.9
Person-years	1980
Mean observation time (years)	1.2
Median observation time (years)	0.7

The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category “Others, specified”.

Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998–2016

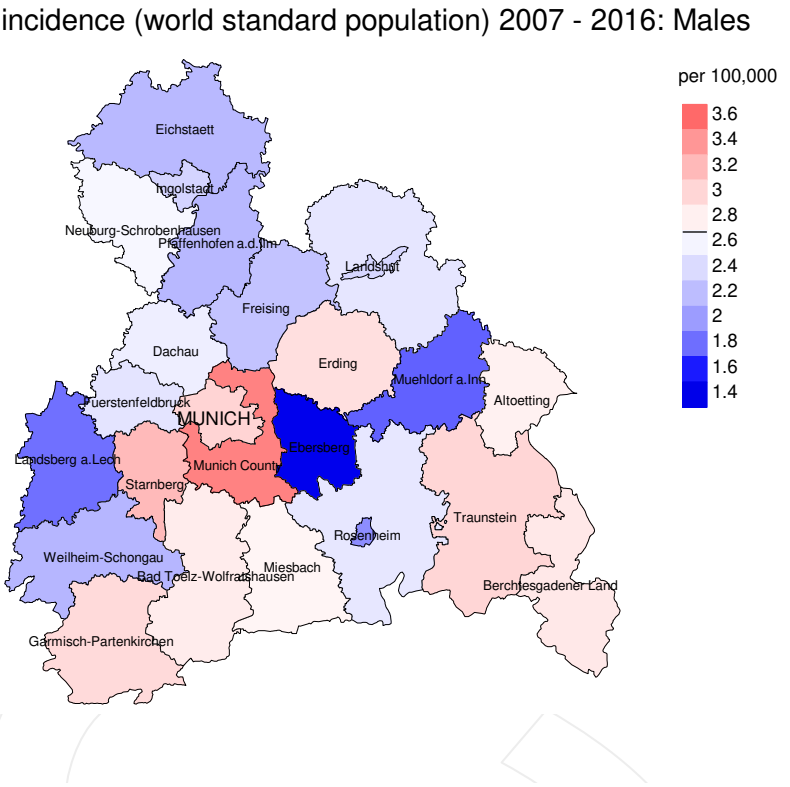
FEMALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C50	Breast	6	4.0	1.5	0.6	3.3		15.6	16.7
C82-C85	NHL	2	0.4	4.9	0.6	17.6		12.2	
Others, specified		3	1.6	1.9	0.4	5.5		10.8	
Not observed		0	5.6	0.0	0.0	0.7	#	-42.8	
All further malignancies		11	11.6	1.0	0.5	1.7		-4.3	9.1

Patients	1220
Median age at next malignancy (years)	66.8
Person-years	1304
Mean observation time (years)	1.1
Median observation time (years)	0.6

The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category “Others, specified”.



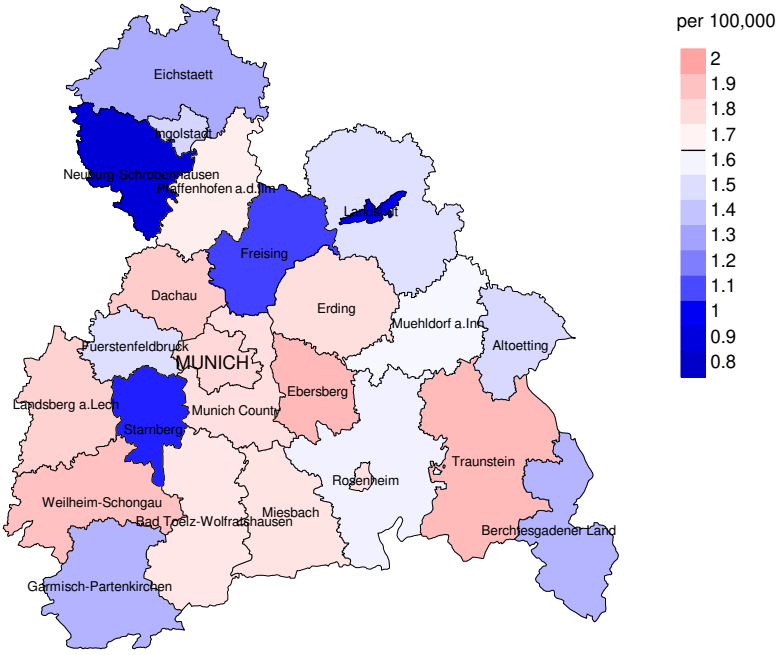
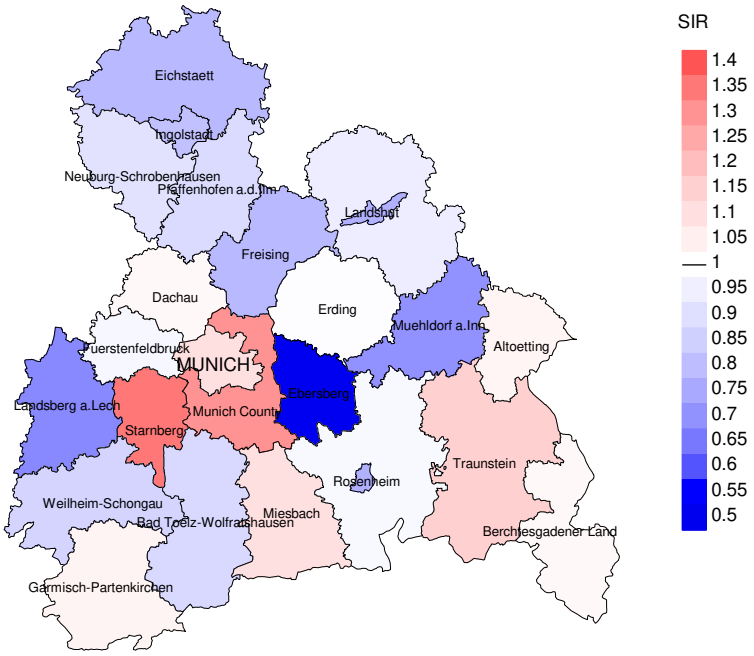


Figure 8a. Map of cancer incidence (world standard population) by county averaged for period 2007 to 2016. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 2.7/100,000 WS N=1,100, females 1.6/100,000 WS N=774).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 27 women were identified with newly diagnosed glioblastoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.0 and 3.4/100,000.

Standardized incidence ratio (SIR) 2007 - 2016: Males



Standardized incidence ratio (SIR) 2007 - 2016: Females

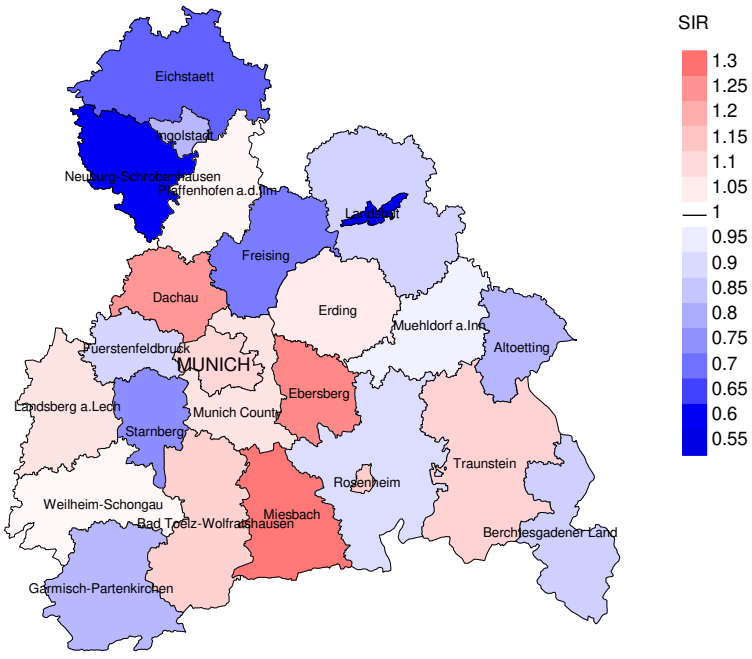


Figure 8b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2016. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,100, females N=774).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 27 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 1.27. Though, the value of this parameter may vary with an underlying probability of 99% between 0.73 and 2.04, 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 4.81 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	67	100.0	63	94.0	95.2
1999	60	100.0	59	98.3	94.9
2000	72	98.6	66	91.7	92.4
2001	99	99.0	96	97.0	87.5
2002	158	98.7	150	94.9	98.0
2003	156	98.7	151	96.8	94.7
2004	146	98.6	140	95.9	96.4
2005	182	98.9	171	94.0	96.5
2006	164	98.8	156	95.1	98.1
2007	153	94.8	143	93.5	98.6
2008	199	97.0	186	93.5	97.8
2009	257	91.8	229	89.1	97.4
2010	225	97.3	214	95.1	98.6
2011	225	93.3	197	87.6	98.5
2012	215	94.4	191	88.8	97.4
2013	227	93.0	194	85.5	96.9
2014	230	96.1	194	84.3	96.4
2015	96	100.0	83	86.5	100.0
2016	47	85.1	26	55.3	92.3
1998-2016	2978	96.2	2709	91.0	96.8

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 4.81 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	67	36	15	22.4
1999	60	67	29	48.3
2000	72	60	20	27.8
2001	99	77	41	41.4
2002	158	131	54	34.2
2003	156	148	58	37.2
2004	146	151	52	35.6
2005	182	135	64	35.2
2006	164	153	59	36.0
2007	153	162	58	37.9
2008	199	143	56	28.1
2009	257	196	80	31.1
2010	225	228	81	36.0
2011	225	195	69	30.7
2012	215	213	80	37.2
2013	227	197	72	31.7
2014	230	223	79	34.3
2015	96	180	65	67.7
2016	47	111	24	51.1
1998–2016	2978	2806	1056	35.5

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 4.81 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	36	80.6	19.4	100.0
1999	67	77.6	22.4	98.4
2000	60	78.3	21.7	100.0
2001	77	83.1	16.9	100.0
2002	131	89.3	10.7	100.0
2003	148	95.9	4.1	99.3
2004	151	94.7	5.3	99.3
2005	135	92.6	7.4	98.5
2006	153	93.5	6.5	99.3
2007	162	97.5	2.5	98.8
2008	143	95.8	4.2	99.3
2009	196	91.8	8.2	99.0
2010	228	96.1	3.9	99.1
2011	195	97.4	2.6	99.5
2012	213	94.4	5.6	98.6
2013	197	93.4	6.6	99.0
2014	223	96.9	3.1	99.5
2015	180	97.8	2.2	100.0
2016	111	97.3	2.7	99.1
1998-2016	2806	93.8	6.2	99.2

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	17	57.6	57.6	61.4	57.6
1999	38	61.4	61.7	60.3	62.1
2000	28	59.0	56.9	66.1	61.6
2001	48	62.3	62.2	69.8	62.5
2002	81	63.6	65.1	59.0	64.3
2003	69	67.0	67.0	65.5	67.1
2004	81	64.9	65.0	56.5	64.9
2005	84	65.5	65.3	69.7	65.4
2006	89	65.4	66.7	63.7	66.7
2007	93	66.4	66.4	74.0	66.4
2008	84	64.2	63.9	73.8	64.2
2009	119	69.4	69.3	70.1	69.1
2010	155	68.7	68.8	64.2	68.9
2011	108	68.2	68.2	67.1	68.0
2012	115	67.4	67.8	61.2	67.4
2013	116	67.4	67.3	74.2	67.4
2014	135	68.6	68.3	72.8	68.7
2015	112	70.2	70.2	65.9	70.2
2016	62	62.6	64.0	49.9	64.0
1998-2016	1634	66.7	66.8	64.2	66.9

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	19	67.1	69.2	56.9	67.1
1999	29	68.2	68.2	71.1	69.0
2000	32	64.3	64.3	64.9	64.3
2001	29	67.4	67.4	68.2	67.4
2002	50	68.0	68.5	67.4	68.5
2003	79	66.7	66.7	69.2	67.1
2004	70	64.4	64.3	65.8	64.3
2005	51	66.3	66.3	67.1	66.3
2006	64	68.0	68.1	67.5	68.5
2007	69	68.0	67.8	69.2	68.0
2008	59	68.0	68.5	56.1	68.6
2009	77	68.2	68.3	64.4	68.3
2010	73	70.3	69.1	73.2	69.9
2011	87	70.7	71.1	67.4	71.6
2012	98	68.3	68.4	66.7	68.7
2013	81	69.8	68.2	74.9	68.2
2014	88	70.1	70.1		70.1
2015	68	68.9	68.9	67.8	69.2
2016	49	70.4	70.5	69.7	70.4
1998-2016	1172	68.2	68.3	67.4	68.4

By 2010, life expectancy at birth was 77.5 years for boys and 82.6 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	11	1.0	0.27	0.6	0.25	0.9	0.26	0.9	0.23
1999	29	2.6	0.91	1.7	0.85	2.4	0.88	2.7	0.90
2000	19	1.7	0.45	1.2	0.45	1.5	0.46	1.5	0.40
2001	39	3.4	0.75	2.0	0.75	2.9	0.76	3.6	0.78
2002	72	3.9	0.80	2.3	0.75	3.2	0.79	3.8	0.81
2003	67	3.6	0.81	2.0	0.76	2.9	0.79	3.6	0.82
2004	76	4.0	0.92	2.4	0.92	3.4	0.90	4.1	0.96
2005	77	4.1	0.73	2.4	0.74	3.3	0.75	3.9	0.74
2006	84	4.4	0.81	2.5	0.76	3.5	0.79	4.2	0.82
2007	92	4.2	1.11	2.3	1.03	3.2	1.07	3.9	1.12
2008	81	3.6	0.64	2.2	0.66	3.0	0.64	3.5	0.63
2009	106	4.7	0.66	2.5	0.63	3.6	0.64	4.6	0.68
2010	149	6.6	1.19	3.5	1.14	5.0	1.14	6.2	1.18
2011	106	4.7	0.85	2.5	0.80	3.6	0.83	4.4	0.85
2012	110	4.8	0.93	2.6	0.93	3.6	0.93	4.4	0.93
2013	110	4.8	0.77	2.6	0.74	3.6	0.74	4.3	0.78
2014	128	5.5	0.93	2.9	0.86	4.2	0.90	4.9	0.92
2015	110	4.6	1.90	2.4	2.02	3.4	1.97	4.1	1.88
2016	61	2.5	2.54	1.4	3.04	1.9	2.84	2.3	2.53
1998-2016	1527	4.1	0.88	2.3	0.85	3.3	0.87	4.0	0.89

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	18	1.5	0.69	0.8	0.57	1.1	0.62	1.4	0.69
1999	23	1.9	0.82	1.2	0.87	1.6	0.84	1.9	0.85
2000	28	2.3	0.93	1.4	0.92	1.9	0.94	2.1	0.94
2001	25	2.1	0.53	1.2	0.59	1.6	0.56	1.9	0.54
2002	45	2.3	0.66	1.2	0.60	1.7	0.61	2.1	0.65
2003	75	3.8	1.03	2.1	0.98	2.9	1.03	3.5	1.05
2004	67	3.4	1.06	2.1	1.10	2.7	1.11	3.1	1.11
2005	48	2.4	0.62	1.3	0.62	1.7	0.61	2.0	0.62
2006	59	2.9	0.98	1.6	1.02	2.1	0.98	2.5	0.95
2007	66	2.9	0.94	1.4	0.89	2.0	0.89	2.4	0.92
2008	56	2.4	0.78	1.3	0.74	1.7	0.77	2.1	0.78
2009	74	3.2	0.76	1.6	0.68	2.2	0.69	2.6	0.72
2010	70	3.0	0.70	1.4	0.66	2.0	0.66	2.5	0.70
2011	84	3.6	0.84	1.6	0.76	2.3	0.79	2.9	0.82
2012	91	3.9	0.94	1.9	0.94	2.6	0.92	3.2	0.96
2013	74	3.1	0.87	1.5	0.80	2.1	0.84	2.5	0.85
2014	88	3.7	0.96	1.8	0.98	2.4	0.94	3.0	0.97
2015	66	2.7	1.74	1.2	1.84	1.8	1.83	2.2	1.74
2016	47	1.9	2.04	0.9	2.32	1.2	2.18	1.6	2.11
1998-2016	1104	2.9	0.89	1.5	0.86	2.0	0.86	2.5	0.88

Table 12

Age distribution of age at death (cancer-related) for period 2007-2016
(**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	0.3
15-19	5	0.3	0.5	4	0.4	0.6	1	0.1	0.4
20-24	5	0.3	0.8	3	0.3	0.9	2	0.3	0.7
25-29	6	0.3	1.1	5	0.5	1.3	1	0.1	0.8
30-34	4	0.2	1.4	2	0.2	1.5	2	0.3	1.1
35-39	20	1.1	2.5	14	1.3	2.8	6	0.8	2.0
40-44	42	2.4	4.9	29	2.8	5.6	13	1.8	3.8
45-49	117	6.6	11.5	73	6.9	12.5	44	6.1	9.9
50-54	112	6.3	17.8	71	6.7	19.3	41	5.7	15.6
55-59	154	8.7	26.5	106	10.1	29.3	48	6.7	22.3
60-64	207	11.7	38.2	125	11.9	41.2	82	11.5	33.8
65-69	302	17.1	55.3	170	16.1	57.4	132	18.4	52.2
70-74	346	19.6	74.8	211	20.0	77.4	135	18.9	71.1
75-79	265	15.0	89.8	145	13.8	91.2	120	16.8	87.8
80-84	134	7.6	97.4	71	6.7	97.9	63	8.8	96.6
85+	46	2.6	100.0	22	2.1	100.0	24	3.4	100.0
All ages	1769	100.0		1053	100.0		716	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**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	0.50	0.1	1.00	4.2	5.6
10-14	1	1	0.1	0.25	0.1	1.00	4.3	4.2
15-19	4	1	0.3	1.33	0.1	1.00	9.1	4.5
20-24	3	2	0.2	0.75	0.1	1.00	5.3	6.1
25-29	5	1	0.3	0.63	0.1	0.25	6.8	1.4
30-34	2	2	0.1	0.15	0.1	0.25	1.9	1.7
35-39	14	6	0.9	0.88	0.4	0.75	7.0	2.1
40-44	29	13	1.6	0.64	0.7	0.52	5.9	1.9
45-49	73	44	3.7	1.14	2.3	1.19	6.4	3.4
50-54	71	41	4.1	0.83	2.4	0.76	3.5	2.1
55-59	106	48	7.5	0.90	3.3	0.65	3.1	1.7
60-64	125	82	10.2	0.95	6.2	0.88	2.5	2.2
65-69	170	132	14.3	0.93	10.2	1.04	2.3	2.5
70-74	211	135	19.1	1.13	10.7	0.97	2.3	2.0
75-79	145	120	18.2	0.97	12.0	1.01	1.6	1.7
80-84	71	63	15.4	1.06	8.9	1.11	0.9	0.9
85+	22	24	7.2	1.16	3.3	1.00	0.3	0.3
All ages	1053	716					2.0	1.5
Mortality								
Raw			4.6	0.96	3.0	0.93		
WS			2.5	0.92	1.5	0.88		
ES			3.5	0.94	2.0	0.89		
BRD-S			4.3	0.96	2.5	0.91		
PYLL-70								
per 100,000			37.6		21.0			
ES			32.9		18.0			
AYLL-70			12.6		11.2			

Table 14a

Further malignancies in deaths in period 1998–2016
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	4	1.9	4	100.0				
C17	Small intestine	3	1.4	1	33.3	1	33.3	1	33.3
C18	Colon	18	8.7	15	83.3	3	16.7		
C19–C20	Rectum	11	5.3	10	90.9			1	9.1
C25	Pancreas	4	1.9	1	25.0	1	25.0	2	50.0
C33–C34	Lung	3	1.4	2	66.7	1	33.3		
C43	Malign. melanoma	10	4.8	8	80.0			2	20.0
C44	Skin others	14	6.7	7	50.0	4	28.6	3	21.4
C61	Prostate	78	37.5	72	92.3	1	1.3	5	6.4
C62	Testis	6	2.9	6	100.0				
C64	Kidney	13	6.3	8	61.5	2	15.4	3	23.1
C67	Bladder	6	2.9	3	50.0	1	16.7	2	33.3
C70–C72	CNS cancer	3	1.4			1	33.3	2	66.7
C73	Thyroid	5	2.4	5	100.0				
C82–C85	NHL	10	4.8	9	90.0	1	10.0		
Others, specified		20	9.6	16	80.0			4	20.0
All further malignancies		208	100.0	167	80.3	16	7.7	25	12.0

Further malignancies with number of cases 1 to 2 are pooled in category “Others, specified”.

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 1998–2016
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	2	1.6	2	100.0				
C18	Colon	6	4.8	6	100.0				
C19–C20	Rectum	2	1.6	1	50.0			1	50.0
C43	Malign. melanoma	8	6.3	7	87.5			1	12.5
C44	Skin others	4	3.2	2	50.0	1	25.0	1	25.0
C46,C49	Soft tissue	2	1.6	2	100.0				
C50	Breast	52	41.3	46	88.5	3	5.8	3	5.8
C53	Cervix uteri	5	4.0	5	100.0				
C54	Corpus uteri	8	6.3	8	100.0				
C56	Ovary	6	4.8	6	100.0				
C64	Kidney	3	2.4	3	100.0				
C70–C72	CNS cancer	3	2.4			1	33.3	2	66.7
C73	Thyroid	6	4.8	6	100.0				
C82–C85	NHL	6	4.8	2	33.3	2	33.3	2	33.3
C91–C96	Leukaemia	4	3.2	3	75.0			1	25.0
Others, specified		9	7.1	9	100.0				
All further malignancies		126	100.0	108	85.7	7	5.6	11	8.7

Further malignancies with number of cases 1 are pooled in category “Others, specified”.

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 2007-2016
(**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	0.50	0.1	1.00	4.3	5.6
10-14	1	1	0.1	0.25	0.1	1.00	4.3	4.8
15-19	4	1	0.3	1.33	0.1	1.00	9.5	5.0
20-24	3	2	0.2	0.75	0.1	1.00	5.9	6.5
25-29	5	1	0.3	0.63	0.1	0.25	7.5	1.5
30-34	2	2	0.1	0.15	0.1	0.25	2.0	1.9
35-39	14	6	0.9	0.88	0.4	0.86	7.4	2.3
40-44	27	11	1.4	0.64	0.6	0.50	5.9	1.8
45-49	72	43	3.6	1.14	2.3	1.23	6.9	3.8
50-54	67	39	3.9	0.82	2.3	0.76	3.7	2.3
55-59	102	43	7.2	0.92	2.9	0.64	3.5	1.8
60-64	111	76	9.1	0.98	5.7	0.89	2.7	2.5
65-69	152	109	12.8	0.95	8.4	1.05	2.6	2.6
70-74	174	111	15.7	1.13	8.8	0.98	2.4	2.1
75-79	114	100	14.3	1.03	10.0	0.99	1.7	1.8
80-84	56	54	12.2	1.06	7.6	1.10	1.0	1.0
85+	12	22	3.9	1.09	3.0	1.05	0.3	0.3
All ages	917	622					2.2	1.7
Mortality								
Raw			4.0	0.97	2.6	0.93		
WS			2.2	0.93	1.3	0.88		
ES			3.1	0.94	1.8	0.89		
BRD-S			3.7	0.96	2.2	0.91		
PYLL-70								
per 100,000			35.9		19.6			
ES			31.5		16.9			
AYLL-70			12.9		11.7			

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**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	0.50	0.1	1.00	4.3	5.6
10-14	1	1	0.1	0.25	0.1	1.00	4.3	4.8
15-19	4	1	0.3	1.33	0.1	1.00	9.5	5.3
20-24	3	2	0.2	0.75	0.1	1.00	5.9	6.5
25-29	5	1	0.3	0.63	0.1	0.25	7.5	1.5
30-34	2	2	0.1	0.18	0.1	0.25	2.0	1.9
35-39	12	6	0.7	0.75	0.4	0.86	6.4	2.4
40-44	27	11	1.4	0.64	0.6	0.50	5.9	1.9
45-49	72	43	3.6	1.14	2.3	1.30	6.9	3.8
50-54	67	38	3.9	0.82	2.2	0.75	3.8	2.3
55-59	100	42	7.1	0.92	2.9	0.64	3.4	1.8
60-64	110	75	9.0	0.99	5.6	0.89	2.7	2.5
65-69	149	109	12.6	0.94	8.4	1.06	2.6	2.6
70-74	170	109	15.4	1.11	8.6	0.98	2.4	2.1
75-79	113	99	14.2	1.03	9.9	0.98	1.8	1.9
80-84	55	53	12.0	1.04	7.5	1.10	1.1	1.0
85+	12	22	3.9	1.09	3.0	1.05	0.3	0.3
All ages	903	615					2.3	1.7
Mortality								
Raw			4.0	0.96	2.6	0.93		
WS			2.2	0.93	1.3	0.88		
ES			3.0	0.94	1.8	0.89		
BRD-S			3.6	0.96	2.2	0.92		
PYLL-70								
per 100,000			35.3		19.4			
ES			31.0		16.7			
AYLL-70			12.9		11.7			

* See corresponding tables with multiple malignancies.

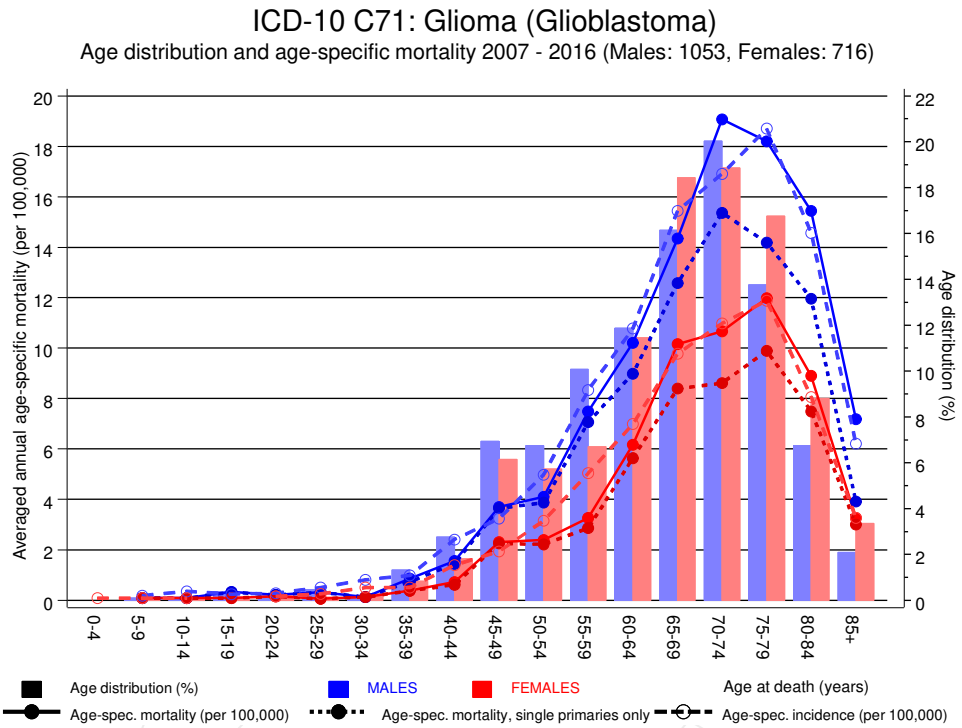


Figure 17. Distribution of age at death (bars; males: mean=64.2 yrs, median=66.6 yrs; females: mean=66.4 yrs, median=68.3 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

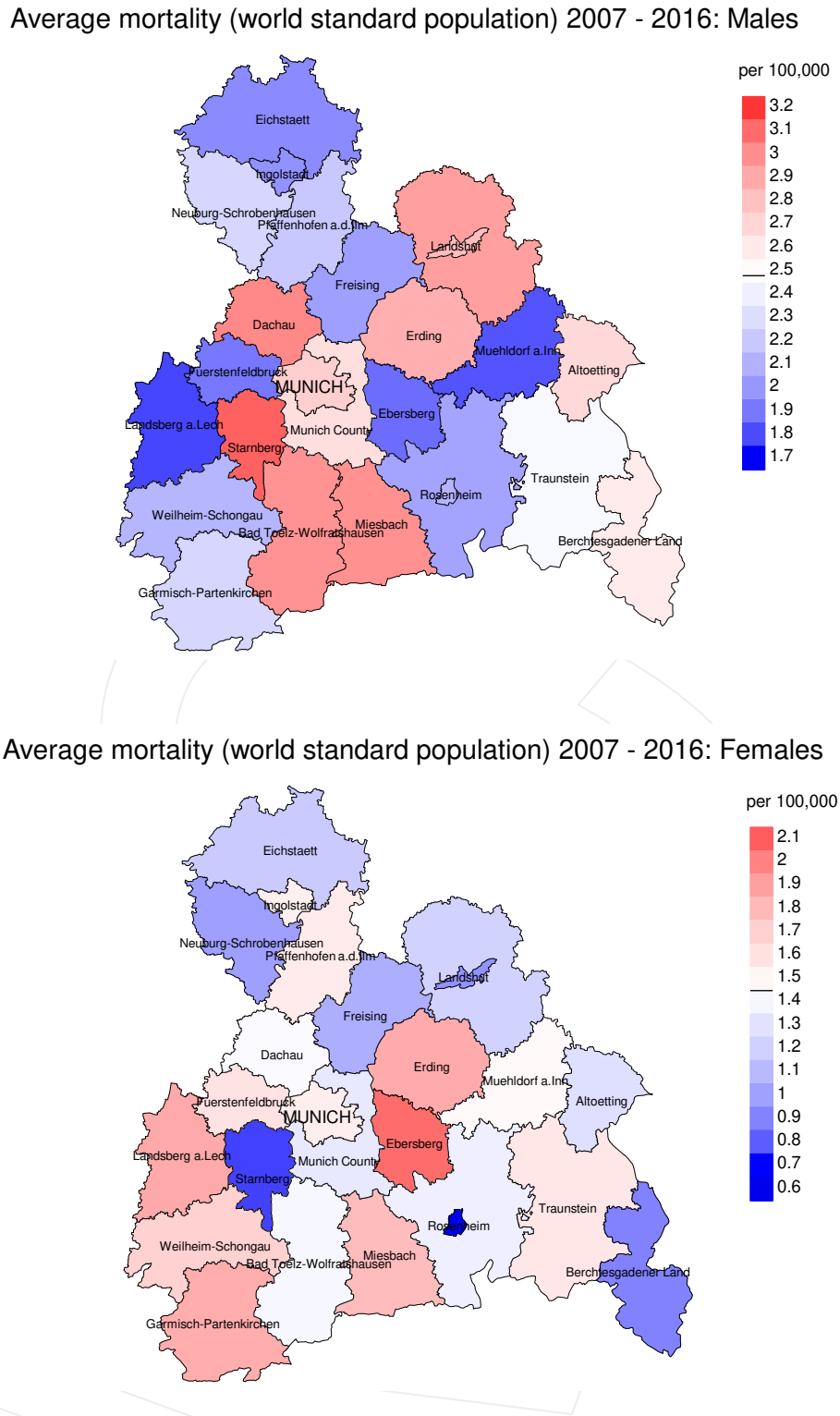
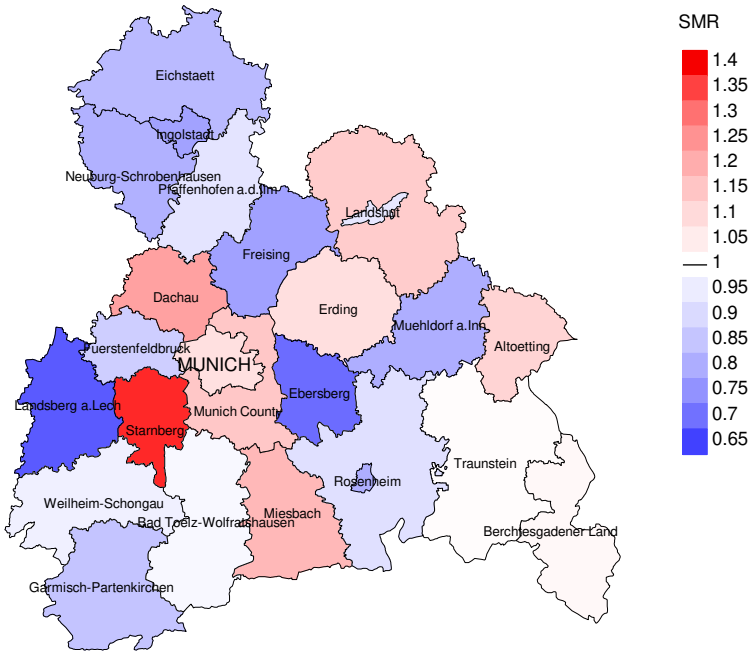


Figure 18a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2016. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 2.5/100,000 WS N=1,053, females 1.5/100,000 WS N=716).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 28 women died from glioblastoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.1 and 3.6/100,000.

Standardized mortality ratio (SMR) 2007 - 2016: Males



Standardized mortality ratio (SMR) 2007 - 2016: Females

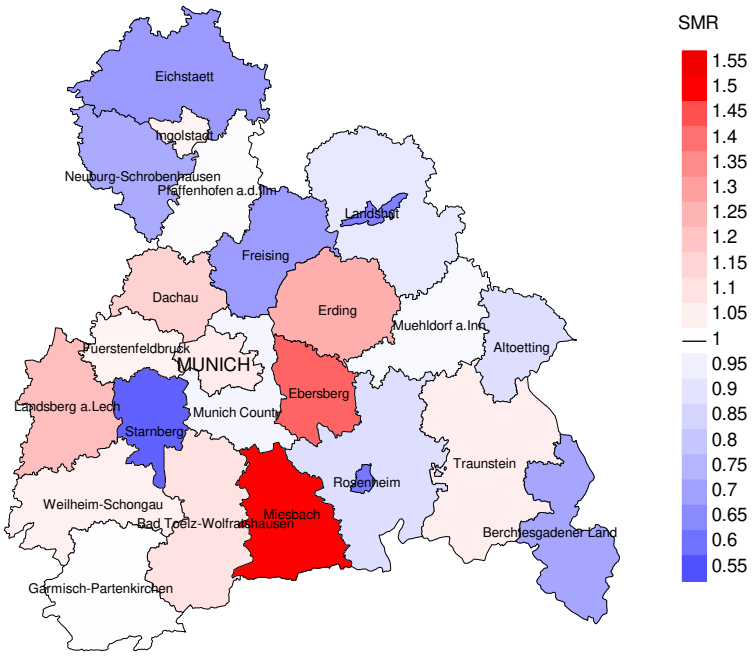


Figure 18b. Map of standardized mortality ratio (SMR) by county averaged for period 2007 to 2016. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,053, females N=716).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 28 women died from glioblastoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.42. Though, the value of this parameter may vary with an underlying probability of 99% between 0.82 and 2.27, 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 index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic 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 MI- index. 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 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 between mortality and incidence
FRG	Federal Republic of Germany

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