Munich Cancer Registry

- Survival
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- Homepage

Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

http://www.tumorregister-muenchen.de/en

Cancer statistics: Baseline statistics

C69: Eye cancer

Year of diagnosis	1998-2012
Patients	463
Diseases	465
Creation date	03/20/2014
Export date	02/12/2014
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C69__E.pdf

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 4.5 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. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

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, March 2014

[#] 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 2.51 million to 3.96 in 2002, and to 4.52 million in 2007). Death certificates from 2013 are incorporated into these analyses.

[##] 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. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	22			13.6	59.1	90.9	
1999	23			21.7	43.5	95.7	
2000	27			48.1	74.1	96.3	
2001	13			46.2	69.2	100.0	
2002	35			28.6	48.6	85.7	#
2003	38			31.6	42.1	81.6	#
2004	50			32.0	58.0	78.0	#
2005	53	1	1.9	20.8	50.9	90.6	#
2006	42			28.6	40.5	73.8	#
2007	46			23.9	60.9	73.9	# ##
2008	41			24.4	34.1	65.9	
2009	32			31.3	31.3	65.6	
2010	22			27.3	45.5	77.3	
2011	17			41.2	41.2	94.1	
2012	4			25.0	25.0	100.0	###
1998-2012	465	1	0.2	28.6	49.0	81.5	

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

Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	22	9	13	40.9
1999	23	11	12	47.8
2000	27	15	12	55.6
2001	13	6	7	46.2
2002	35	24	11	68.6
2003	38	14	24	36.8
2004	50	23	27	46.0
2005	53	21	32	39.6
2006	42	18	24	42.9
2007	46	25	21	54.3
2008	41	24	17	58.5
2009	32	14	18	43.8
2010	22	11	11	50.0
2011	17	9	8	52.9
2012	4	3	1	75.0
1998-2012	465	227	238	48.8

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 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	9	13	0.8	1.1	0.6	0.7	0.8	0.8	1.1	0.9
1999	11	12	1.0	1.0	0.7	0.5	0.9	0.8	0.9	0.9
2000	15	12	1.3	1.0	0.7	0.6	1.1	0.8	1.6	0.9
2001	6	7	0.5	0.6	0.3	0.3	0.5	0.4	0.5	0.5
2002	24	11	1.3	0.6	1.0	0.4	1.2	0.5	1.3	0.5
2003	14	24	0.7	1.2	0.6	1.0	0.7	1.1	0.7	1.1
2004	23	27	1.2	1.4	0.8	1.0	1.0	1.2	1.2	1.2
2005	21	32	1.1	1.6	0.8	0.7	1.0	1.0	1.2	1.3
2006	18	24	0.9	1.2	0.6	0.7	0.8	0.8	0.9	0.9
2007	25	21	1.1	0.9	0.7	0.4	0.9	0.6	1.2	0.8
2008	24	17	1.1	0.7	0.6	0.3	0.9	0.4	1.1	0.6
2009	14	18	0.6	0.8	0.4	0.5	0.5	0.6	0.6	0.7
2010	11	11	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
2011	9	8	0.4	0.3	0.2	0.4	0.3	0.3	0.4	0.3
2012	3	1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0
1998-2012	227	238	0.8	0.8	0.5	0.5	0.7	0.6	0.8	0.7

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

Table 3

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	22	58.5	24.8	0.5	89.9	31.1	41.2	63.7	77.0	82.2
1999	23	60.6	10.9	31.8	81.1	50.4	54.7	60.5	66.9	75.1
2000	27	65.8	15.3	27.5	88.6	40.9	55.8	70.3	76.2	84.2
2001	13	66.3	11.7	39.8	83.3	53.7	59.9	69.8	71.9	80.8
2002	35	56.6	21.8	0.2	90.9	16.7	47.8	62.0	71.9	75.0
2003	38	54.7	21.9	0.2	81.2	8.2	47.5	60.7	69.1	77.3
2004	50	60.5	19.8	1.5	86.8	40.6	57.6	64.1	72.5	80.0
2005	53	65.5	19.7	0.3	91.9	39.3	58.9	70.9	80.6	83.8
2006	42	64.8	16.6	7.3	94.2	48.2	55.1	65.9	74.3	85.2
2007	46	66.2	17.2	0.2	96.8	44.6	54.1	69.8	78.7	83.7
2008	41	67.8	15.1	28.8	89.6	44.0	60.4	69.9	79.3	83.4
2009	32	59.0	21.0	1.0	86.4	38.6	48.1	62.1	74.7	82.2
2010	22	56.2	24.8	0.2	86.4	28.4	43.6	63.2	74.5	82.9
2011	17	61.3	26.1	0.4	97.2	1.1	55.3	66.7	75.4	84.0
2012	4	42.3	46.7	1.1	82.9	1.1	1.9	42.6	82.8	82.9
1998-2012	465	61.8	19.9	0.2	97.2	38.6	53.7	65.4	75.1	82.3

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	9	60.5	25.8	0.5	82.2	0.5	54.9	70.5	75.3	82.2
1999	11	60.0	7.5	46.5	68.4	50.4	51.6	61.0	66.9	67.1
2000	15	67.6	13.9	39.0	88.6	40.9	61.1	71.8	76.2	80.4
2001	6	60.8	12.4	39.8	71.7	39.8	53.7	64.9	69.9	71.7
2002	24	56.3	21.8	0.2	81.6	16.7	53.0	62.0	69.8	74.0
2003	14	55.8	18.3	0.6	76.6	44.1	53.0	59.5	65.4	71.4
2004	23	64.0	20.1	2.0	81.8	58.8	61.0	66.9	78.0	80.6
2005	21	62.1	23.7	0.3	89.7	34.3	56.5	70.6	74.8	82.3
2006	18	62.8	10.5	40.8	81.8	49.6	55.1	64.4	68.2	79.2
2007	25	64.5	19.2	0.2	86.7	42.0	54.3	70.2	78.5	81.3
2008	24	65.2	17.1	28.8	89.6	35.7	55.7	69.3	77.5	84.7
2009	14	63.2	21.0	1.1	82.2	38.6	61.2	68.0	74.7	80.3
2010	11	56.8	26.2	0.4	86.4	28.4	37.8	68.1	72.4	82.9
2011	9	71.2	9.8	56.2	84.0	56.2	63.7	70.5	78.5	84.0
2012	3	55.5	47.2	1.1	82.9	1.1	1.1	82.6	82.9	82.9
1998-2012	227	62.2	19.2	0.2	89.7	39.8	55.9	66.1	74.5	81.3

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	13	57.1	25.1	5.4	89.9	31.1	38.1	60.5	77.0	85.4
1999	12	61.1	13.5	31.8	81.1	52.1	55.0	59.4	70.5	80.2
2000	12	63.7	17.2	27.5	86.8	49.0	52.8	63.2	77.7	84.2
2001	7	70.9	9.5	57.5	83.3	57.5	63.3	71.9	80.8	83.3
2002	11	57.2	23.0	9.2	90.9	31.0	44.1	62.0	72.4	75.0
2003	24	54.1	24.0	0.2	81.2	8.2	43.4	62.2	72.1	78.0
2004	27	57.5	19.4	1.5	86.8	35.3	52.8	60.8	67.3	77.2
2005	32	67.7	16.5	30.7	91.9	40.2	60.3	71.2	81.9	83.8
2006	24	66.3	20.1	7.3	94.2	40.9	55.5	67.7	80.7	91.5
2007	21	68.1	14.7	43.1	96.8	52.0	54.1	66.6	79.5	84.4
2008	17	71.6	11.0	44.0	84.2	54.8	65.3	73.9	82.4	83.4
2009	18	55.7	21.0	1.0	86.4	36.8	46.3	51.5	74.7	85.8
2010	11	55.5	24.5	0.2	85.8	32.2	43.6	58.5	74.7	75.7
2011	8	50.1	34.4	0.4	97.2	0.4	22.8	55.3	73.6	97.2
2012	1	2.6		2.6	2.6	2.6	2.6	2.6	2.6	2.6
1998-2012	238	61.5	20.6	0.2	97.2	36.6	52.0	64.7	75.8	83.8

Table 4

Age distribution by 5-year age group and gender for period 1998-2012 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	19	4.1	4.1	10	4.4	4.4	9	3.8	3.8
5-9	6	1.3	5.4	2	0.9	5.3	4	1.7	5.5
10-14	0	0.0	5.4			5.3			5.5
15-19	1	0.2	5.6	1	0.4	5.7			5.5
20-24	0	0.0	5.6			5.7			5.5
25-29	3	0.6	6.2	2	0.9	6.6	1	0.4	5.9
30-34	9	1.9	8.2	2	0.9	7.5	7	2.9	8.8
35-39	14	3.0	11.2	7	3.1	10.6	7	2.9	11.8
40-44	21	4.5	15.7	8	3.5	14.1	13	5.5	17.2
45-49	22	4.7	20.4	7	3.1	17.2	15	6.3	23.5
50-54	34	7.3	27.7	15	6.6	23.8	19	8.0	31.5
55-59	36	7.7	35.5	16	7.0	30.8	20	8.4	39.9
60-64	63	13.5	49.0	37	16.3	47.1	26	10.9	50.8
65-69	57	12.3	61.3	32	14.1	61.2	25	10.5	61.3
70-74	62	13.3	74.6	36	15.9	77.1	26	10.9	72.3
75-79	43	9.2	83.9	22	9.7	86.8	21	8.8	81.1
80-84	51	11.0	94.8	23	10.1	96.9	28	11.8	92.9
85+	24	5.2	100.0	7	3.1	100.0	17	7.1	100.0
All ages	465	100.0		227	100.0		238	100.0	

Included in the statistics are 40.5% multiple primaries in males and 33.1% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2012

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=1 %	Females DCO rate n=0 %	Males Prop.all cancers n=146755 %	Females Prop.all cancers n=142297 %
0- 4	10	9	0.7	0.7			3.3	4.0
5- 9	2	4	0.1	0.3			1.2	3.5
10-14			0.0	0.0				
15-19	1		0.1	0.0			0.3	
20-24			0.0	0.0				
25-29	2	1	0.1	0.1			0.2	0.1
30-34	2	7	0.1	0.3			0.1	0.4
35-39	7	7	0.3	0.3			0.3	0.2
40-44	8	13	0.3	0.6			0.3	0.2
45-49	7	15	0.3	0.7			0.1	0.2
50-54	15	19	0.8	1.0			0.2	0.2
55-59	16	20	0.9	1.1			0.1	0.2
60-64	37	25	2.2	1.4			0.2	0.2
65-69	32	25	2.2	1.6			0.1	0.1
70-74	36	26	3.1	1.9			0.1	0.2
75-79	22	21	2.9	1.9			0.1	0.1
80-84	23	28	5.1	3.2	4.3		0.2	0.2
85+	7	17	2.3	2.1			0.1	0.1
All ages	227	237			0.4	0.0	0.2	0.2
Incidence								
Raw			0.8	0.8				
WS			0.5	0.5				
ES			0.7	0.6				
BRD-S			0.8	0.7				

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).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2012
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C18 Colon	2	1.3	1.5	0.2	5.4		8.5	
C19-C20 Rectum	2	0.7	2.7	0.3	9.8		16.4	
C33-C34 Lung	8	1.6	5.2	2.2	10.2	#	83.6	25.0
C43 Malign. melanoma	3	0.5	6.1	1.3	17.9	#	32.6	
C61 Prostate	11	4.0	2.8	1.4	5.0	#	91.3	9.1
C67 Bladder	2	0.6	3.3	0.4	12.0		18.1	
Other primaries	6	1.2	5.0	1.8	10.9	#	62.3	
Not observed	0	3.5	0.0	0.0	1.1		-45.4	
All mult. primaries	34	13.4	2.5	1.8	3.5	#	267.3	8.8

Patients	171
Mean age at second malignancy (years)	73.3
Person-years	771
Mean observation time (years)	4.5
Median observation time (years)	3.7

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2012
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16 Stomach	2	0.4	5.5	0.7	20.0		19.6	50.0
C50 Breast	7	2.7	2.6	1.0	5.4	#	51.7	14.3
C54 Corpus uteri	2	0.5	4.2	0.5	15.2		18.3	
C70-C72 CNS cancer	2	0.1	16.1	1.9	58.1	#	22.5	
C76-C79 CUP	2	0.2	11.5	1.4	41.5	#	21.9	
C82-C85 NHL	2	0.3	5.7	0.7	20.7		19.8	
Other primaries	13	2.8	4.7	2.5	8.0	#	122.7	
Not observed	0	2.2	0.0	0.0	1.7		-26.0	
All mult. primaries	30	9.1	3.3	2.2	4.7	#	250.4	6.7

Patients	178
Mean age at second malignancy (years)	67.6
Person-years	834
Mean observation time (years)	4.7
Median observation time (years)	4.5

The occurrence of second malignancy is statistically significant.

Observed second malignancies with count 1 are pooled in category "Other primaries".

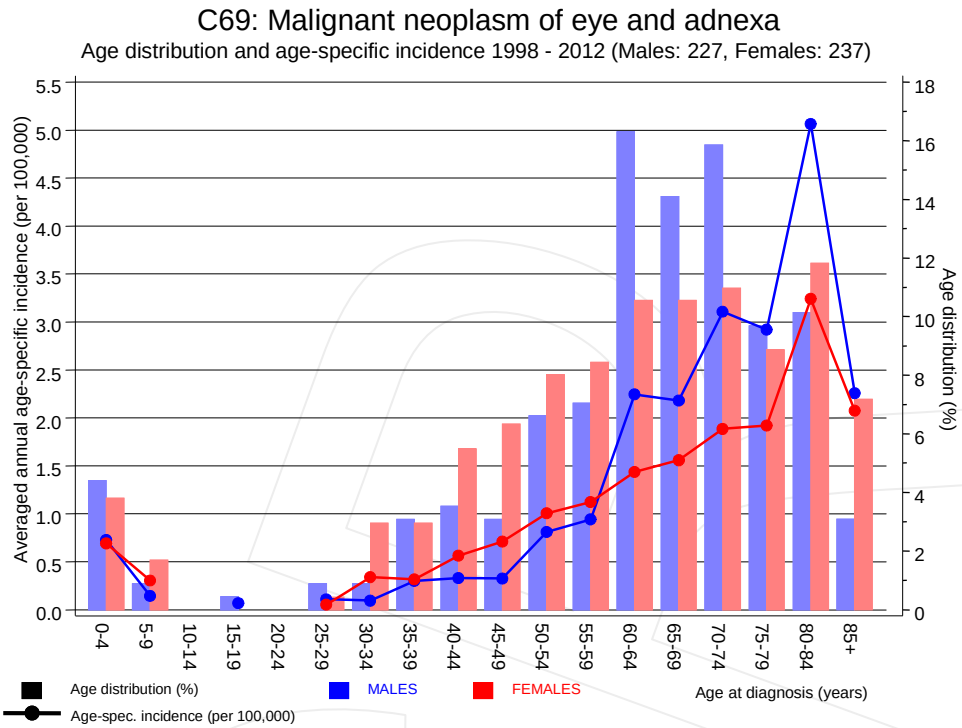


Figure 7. Age distribution and age-specific incidence

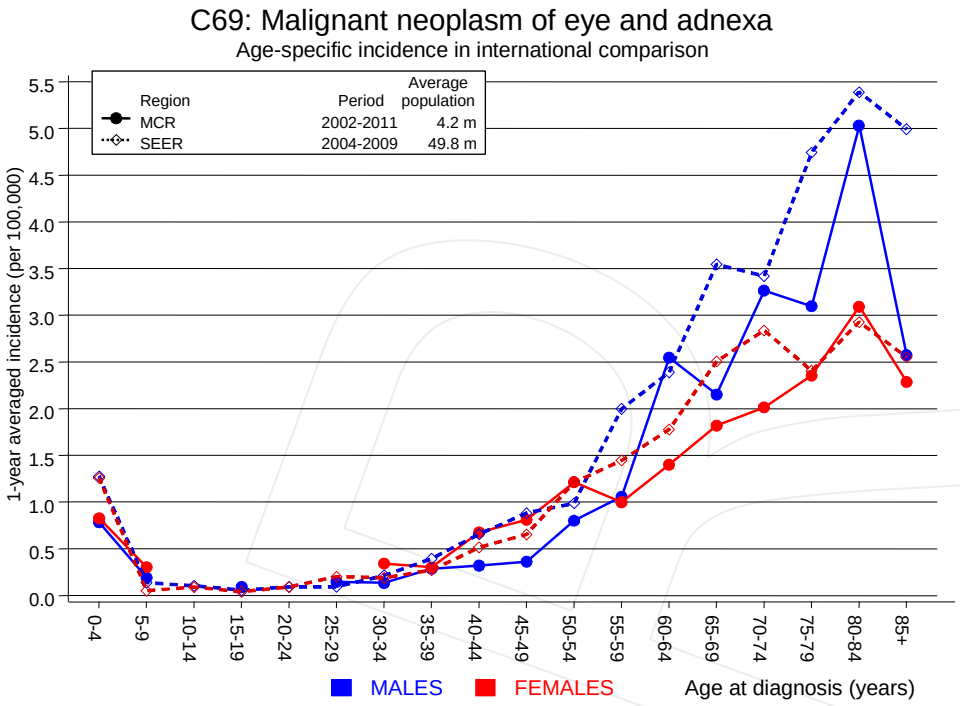


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2012, based on the November 2011 submission. http://www.seer.cancer.gov.

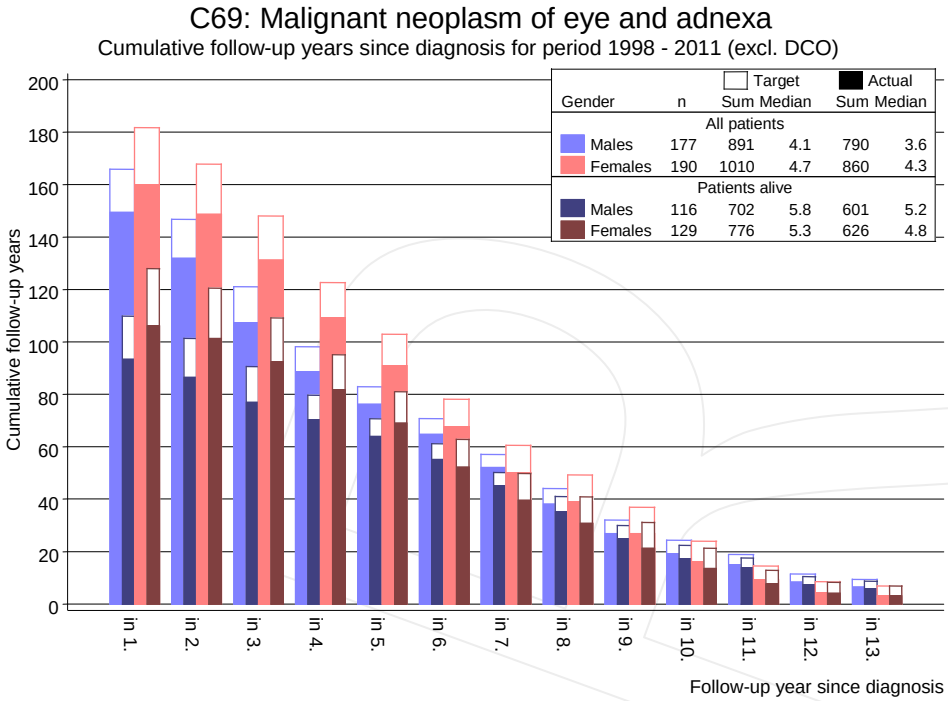
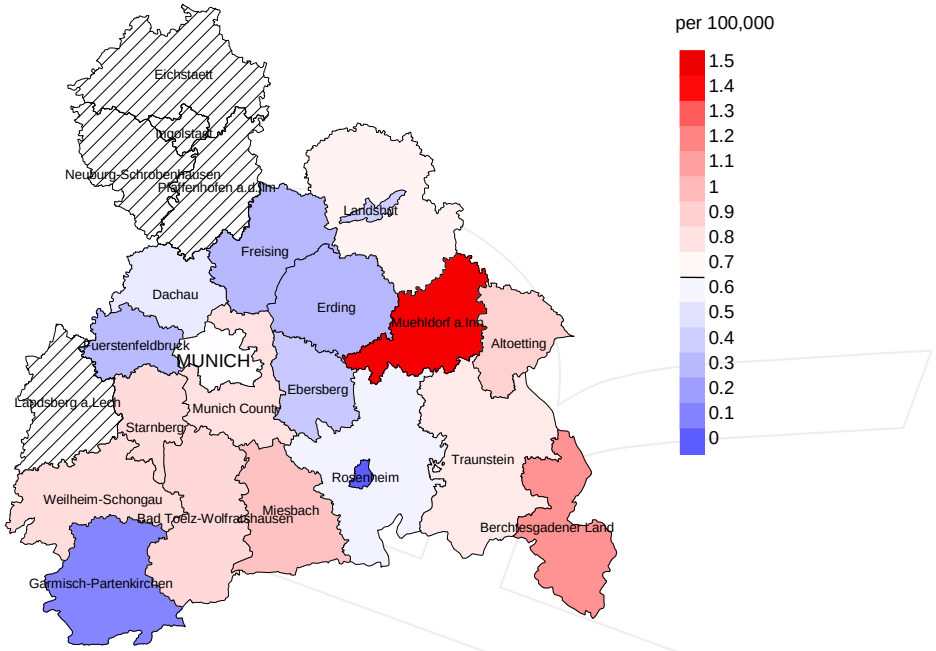


Figure 8. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Average incidence (world standard population) 2003 - 2008: Males



Average incidence (world standard population) 2003 - 2008: Females

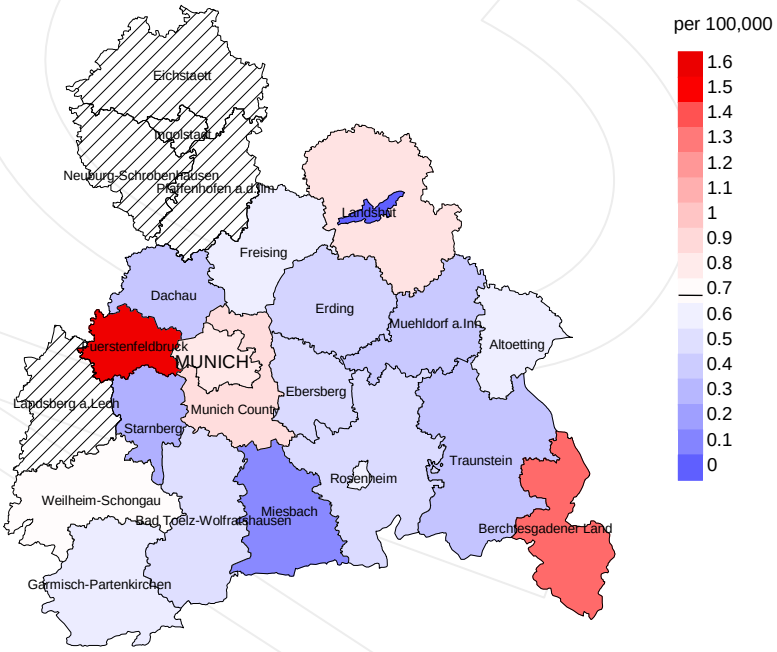
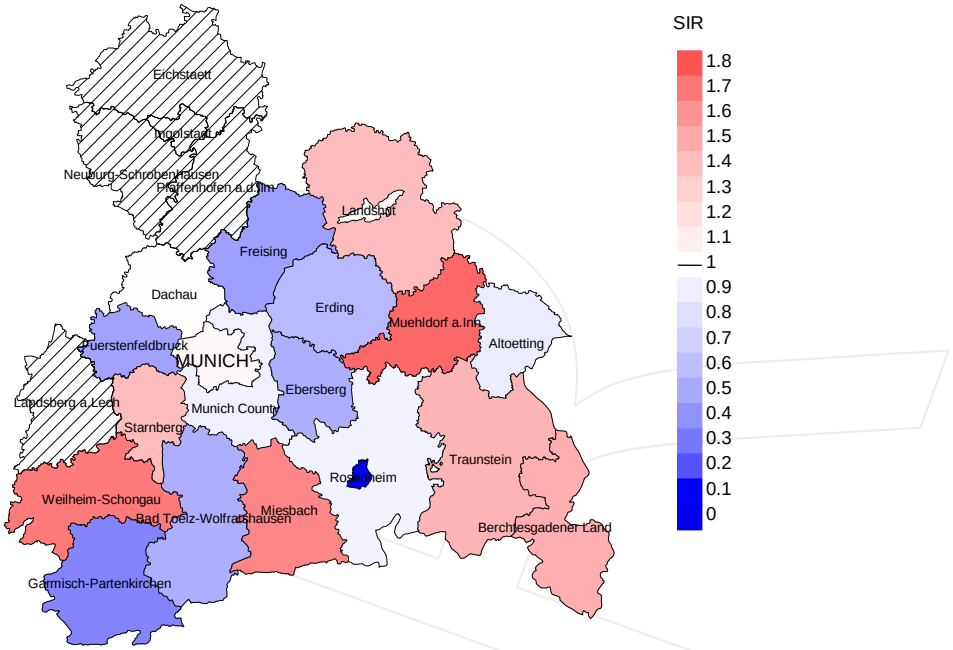


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.7/100,000 WS N=118, females 0.7/100,000 WS N=141). Since cancer data are not available in some counties until 2007, the local incidence rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 3 women were identified with newly diagnosed eye cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.9/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

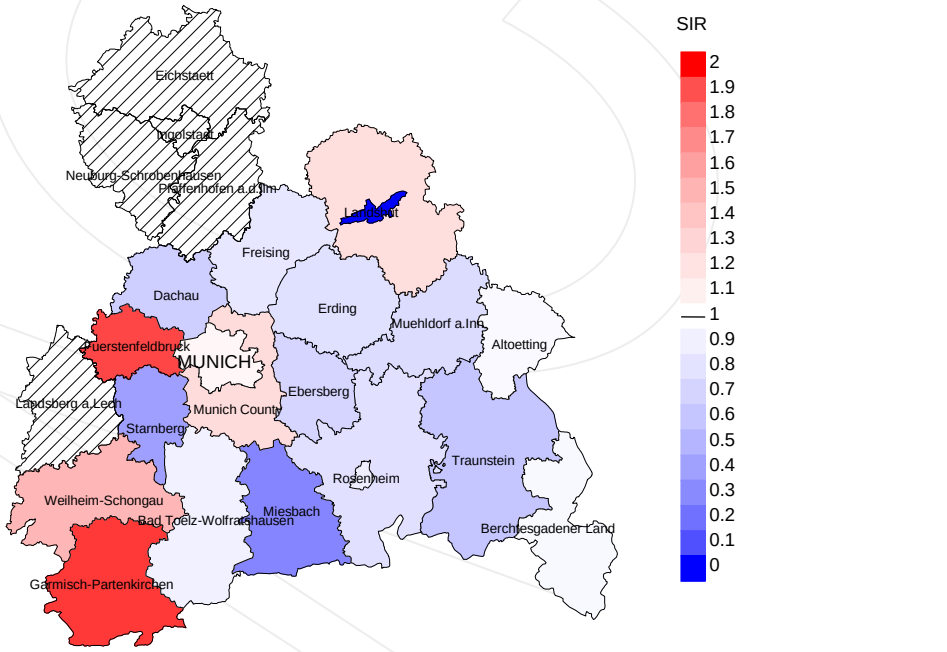


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=118, females N=141). Since cancer data are not available in some counties until 2007, the local SIR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 3 women were identified with newly diagnosed eye cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.71. Though, the value of this parameter may vary with an underlying probability of 99% between 0.08 and 2.59, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts, and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 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	22	90.9		13	59.1	92.3
1999	23	95.7		10	43.5	100.0
2000	27	96.3		20	74.1	95.0
2001	13	100.0		9	69.2	100.0
2002	35	85.7		17	48.6	94.1
2003	38	81.6		16	42.1	93.8
2004	50	78.0		29	58.0	89.7
2005	53	90.6	1.9	27	50.9	92.6
2006	42	73.8		17	40.5	100.0
2007	46	73.9		28	60.9	89.3
2008	41	65.9		14	34.1	71.4
2009	32	65.6		10	31.3	100.0
2010	22	77.3		10	45.5	100.0
2011	17	94.1		7	41.2	85.7
2012	4	100.0		1	25.0	100.0
1998-2012	465	81.5	0.2	228	49.0	92.5

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 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	22	17	94.1		
1999	23	14	85.7	1	4.3
2000	27	19	94.7	1	3.7
2001	13	11	90.9		
2002	35	28	92.9		
2003	38	31	90.3	2	5.3
2004	50	32	100.0	2	4.0
2005	53	37	94.6	8	15.1
2006	42	30	96.7	2	4.8
2007	46	34	100.0	3	6.5
2008	41	36	91.7	1	2.4
2009	32	42	97.6	4	12.5
2010	22	38	97.4	1	4.5
2011	17	43	97.7	1	5.9
2012	4	22	100.0		
1998-2012	465	434	95.6	26	5.6

Table 10c

Annual cohorts of deaths, proportion of cancer-related and not cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. not cancer-related %	Prop. cancer recorded on death certificate %
1998	17	70.6	29.4	68.8
1999	14	64.3	35.7	75.0
2000	19	68.4	31.6	77.8
2001	11	63.6	36.4	70.0
2002	28	71.4	28.6	76.9
2003	31	74.2	25.8	85.7
2004	32	75.0	25.0	81.3
2005	37	73.0	27.0	82.9
2006	30	66.7	33.3	72.4
2007	34	73.5	26.5	76.5
2008	36	72.2	27.8	84.8
2009	42	76.2	23.8	78.0
2010	38	63.2	36.8	73.0
2011	43	67.4	32.6	73.8
2012	22	54.5	45.5	54.5
1998-2012	434	69.8	30.2	76.4

Table 11a

Means of age at death according to the grouping in Table 10
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	5	72.0	72.6	71.0	67.4
1999	5	81.2	86.2	79.9	83.3
2000	6	76.6	75.9	78.2	76.5
2001	3	81.9	79.3	87.2	79.3
2002	15	69.6	69.2	71.3	69.2
2003	15	64.9	65.5	61.0	65.3
2004	15	71.4	68.1	80.4	67.9
2005	20	72.7	69.5	82.0	70.1
2006	15	77.0	73.0	88.0	71.8
2007	11	72.1	66.4	78.9	68.5
2008	17	70.5	67.3	85.3	67.9
2009	20	75.3	71.2	83.0	71.2
2010	17	77.1	75.1	82.0	76.3
2011	23	74.8	75.0	74.5	74.5
2012	12	74.2	66.2	85.4	66.2
1998-2012	199	73.3	70.5	79.9	70.7

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 11b

Means of age at death according to the grouping in Table 10
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	12	77.6	74.5	86.9	72.6
1999	9	62.3	66.7	27.6	69.9
2000	13	72.3	69.2	79.4	69.2
2001	8	77.3	73.7	83.3	78.2
2002	13	77.0	72.2	84.6	72.2
2003	16	71.7	65.4	82.2	65.4
2004	17	73.8	70.3	85.3	70.0
2005	17	79.7	77.1	85.7	77.8
2006	15	72.2	64.3	84.1	67.1
2007	23	74.3	71.2	89.3	71.2
2008	19	76.4	69.2	88.9	73.3
2009	22	72.0	69.7	86.7	69.7
2010	21	77.6	68.2	90.2	69.5
2011	20	79.9	77.4	84.5	75.7
2012	10	76.3	67.4	85.2	67.8
1998-2012	235	75.0	70.6	84.9	71.3

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

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 12a

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	3	0.3	0.33	0.1	0.23	0.3	0.32	0.3	0.32
1999	1	0.1	0.09	0.0	0.06	0.1	0.10	0.1	0.12
2000	4	0.4	0.27	0.2	0.25	0.3	0.27	0.4	0.27
2001	2	0.2	0.33	0.1	0.22	0.1	0.32	0.3	0.61
2002	12	0.6	0.50	0.4	0.35	0.5	0.45	0.7	0.52
2003	13	0.7	0.93	0.4	0.72	0.6	0.87	0.7	1.02
2004	11	0.6	0.48	0.3	0.40	0.5	0.49	0.6	0.52
2005	15	0.8	0.71	0.4	0.55	0.7	0.68	0.9	0.73
2006	11	0.6	0.61	0.3	0.48	0.4	0.58	0.6	0.71
2007	6	0.3	0.24	0.2	0.23	0.2	0.25	0.3	0.25
2008	14	0.6	0.58	0.3	0.54	0.5	0.56	0.6	0.56
2009	13	0.6	0.93	0.3	0.69	0.4	0.85	0.6	0.95
2010	12	0.5	1.09	0.2	0.64	0.4	0.94	0.5	1.23
2011	16	0.7	1.78	0.3	1.44	0.4	1.56	0.7	1.66
2012	7	0.3	2.33	0.2	1.36	0.3	2.24	0.3	2.17
1998-2012	140	0.5	0.62	0.3	0.48	0.4	0.58	0.5	0.65

Table 12b

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	9	0.8	0.69	0.3	0.46	0.5	0.61	0.6	0.65
1999	8	0.7	0.67	0.3	0.63	0.5	0.61	0.6	0.72
2000	9	0.7	0.75	0.3	0.58	0.5	0.65	0.6	0.63
2001	5	0.4	0.71	0.2	0.70	0.3	0.74	0.3	0.70
2002	8	0.4	0.73	0.2	0.38	0.2	0.49	0.3	0.64
2003	10	0.5	0.42	0.3	0.28	0.4	0.35	0.4	0.39
2004	13	0.7	0.50	0.3	0.32	0.5	0.39	0.6	0.48
2005	12	0.6	0.38	0.2	0.28	0.3	0.32	0.4	0.34
2006	9	0.4	0.38	0.2	0.35	0.3	0.38	0.4	0.40
2007	19	0.8	0.90	0.4	0.79	0.5	0.79	0.6	0.81
2008	12	0.5	0.71	0.2	0.75	0.3	0.75	0.4	0.69
2009	19	0.8	1.06	0.4	0.67	0.5	0.85	0.6	0.94
2010	12	0.5	1.09	0.3	0.74	0.4	0.90	0.4	1.07
2011	13	0.6	1.63	0.2	0.55	0.3	0.90	0.4	1.24
2012	5	0.2	5.00	0.1	0.94	0.2	2.03	0.2	3.54
1998-2012	163	0.6	0.69	0.3	0.49	0.4	0.58	0.5	0.64

Table 13

Age distribution of age at death (cancer-related) for period 1998-2012
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
30-34	3	1.0	1.0	1	0.7	0.7	2	1.2	1.2
35-39	3	1.0	2.0	1	0.7	1.4	2	1.2	2.4
40-44	6	2.0	3.9	3	2.1	3.6	3	1.8	4.3
45-49	6	2.0	5.9	2	1.4	5.0	4	2.4	6.7
50-54	19	6.3	12.2	7	5.0	10.0	12	7.3	14.0
55-59	26	8.6	20.7	14	10.0	20.0	12	7.3	21.3
60-64	32	10.5	31.3	17	12.1	32.1	15	9.1	30.5
65-69	44	14.5	45.7	15	10.7	42.9	29	17.7	48.2
70-74	47	15.5	61.2	25	17.9	60.7	22	13.4	61.6
75-79	43	14.1	75.3	23	16.4	77.1	20	12.2	73.8
80-84	34	11.2	86.5	17	12.1	89.3	17	10.4	84.1
85+	41	13.5	100.0	15	10.7	100.0	26	15.9	100.0
All ages	304	100.0		140	100.0		164	100.0	

Included in the statistics are 40.5% multiple primaries in males and 33.1% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**incl. multiple primaries**)

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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34	1	2	0.0	0.50	0.1	0.29	0.6	0.9
35-39	1	2	0.0	0.14	0.1	0.29	0.3	0.4
40-44	3	3	0.1	0.38	0.1	0.23	0.4	0.3
45-49	2	4	0.1	0.29	0.2	0.27	0.1	0.2
50-54	7	12	0.4	0.47	0.6	0.63	0.2	0.4
55-59	14	12	0.8	0.88	0.7	0.60	0.3	0.3
60-64	17	15	1.0	0.46	0.9	0.58	0.2	0.2
65-69	15	29	1.0	0.47	1.8	1.16	0.1	0.4
70-74	25	22	2.2	0.69	1.6	0.85	0.2	0.2
75-79	23	20	3.1	1.05	1.8	0.95	0.2	0.2
80-84	17	17	3.7	0.74	2.0	0.61	0.2	0.2
85+	15	26	4.8	2.14	3.2	1.53	0.2	0.2
All ages	140	164					0.2	0.2
Mortality								
Raw			0.5	0.62	0.6	0.69		
WS			0.3	0.48	0.3	0.49		
ES			0.4	0.58	0.4	0.58		
BRD-S			0.5	0.65	0.5	0.64		
PYLL-70								
per 100,000			2.7		3.5			
ES			2.3		3.0			
AYLL-70			11.0		10.9			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1998-2012
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10 Oropharynx	1	1.4					1	100.0
C11 Nasopharynx	1	1.4					1	100.0
C18 Colon	6	8.1			1	16.7	5	83.3
C19-C20 Rectum	2	2.7	1	50.0	1	50.0		
C22 Liver	3	4.1					3	100.0
C23-C24 Bile	2	2.7	1	50.0			1	50.0
C25 Pancreas	1	1.4					1	100.0
C33-C34 Lung	12	16.2					12	100.0
C43 Malign. melanoma	6	8.1	2	33.3	2	33.3	2	33.3
C44 Skin others	2	2.7	1	50.0			1	50.0
C61 Prostate	13	17.6	4	30.8	1	7.7	8	61.5
C64 Kidney	5	6.8	2	40.0			3	60.0
C67 Bladder	3	4.1			1	33.3	2	66.7
C68 Urethra	1	1.4			1	100.0		
C69 Eye carcinoma	1	1.4					1	100.0
C70-C72 CNS cancer	3	4.1	2	66.7			1	33.3
C73 Thyroid	1	1.4					1	100.0
C76-C79 CUP	2	2.7					2	100.0
C82-C85 NHL	3	4.1	1	33.3			2	66.7
C90 Mult. myeloma	2	2.7	2	100.0				
C91-C96 Leukaemia	4	5.4					4	100.0
All mult. primaries	74	100.0	16	21.6	7	9.5	51	68.9

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 multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2012
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C07-C08 Salivary gland	1	1.3					1	100.0
C16 Stomach	2	2.6					2	100.0
C18 Colon	2	2.6	1	50.0			1	50.0
C19-C20 Rectum	2	2.6	1	50.0			1	50.0
C22 Liver	3	3.9					3	100.0
C23-C24 Bile	1	1.3					1	100.0
C25 Pancreas	3	3.9					3	100.0
C33-C34 Lung	7	9.2	1	14.3	1	14.3	5	71.4
C43 Malign. melanoma	12	15.8	3	25.0			9	75.0
C46,C49 Soft tissue	1	1.3	1	100.0				
C50 Breast	21	27.6	11	52.4	1	4.8	9	42.9
C53 Cervix uteri	1	1.3					1	100.0
C54 Corpus uteri	6	7.9	2	33.3			4	66.7
C56 Ovary	2	2.6					2	100.0
C64 Kidney	1	1.3					1	100.0
C67 Bladder	1	1.3			1	100.0		
C69 Eye melanoma	1	1.3			1	100.0		
C70-C72 CNS cancer	3	3.9					3	100.0
C73 Thyroid	1	1.3	1	100.0				
C76-C79 CUP	1	1.3			1	100.0		
C90 Mult. myeloma	2	2.6					2	100.0
C91-C96 Leukaemia	2	2.6					2	100.0
All mult. primaries	76	100.0	21	27.6	5	6.6	50	65.8

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 multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**Singular 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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34	1	2	0.0	0.50	0.1	0.29	0.6	1.1
35-39	1	2	0.0	0.14	0.1	0.29	0.3	0.4
40-44	3	2	0.1	0.38	0.1	0.18	0.4	0.2
45-49	2	4	0.1	0.29	0.2	0.29	0.1	0.2
50-54	7	12	0.4	0.50	0.6	0.63	0.3	0.5
55-59	12	11	0.7	1.09	0.6	0.69	0.3	0.3
60-64	15	12	0.9	0.54	0.7	0.63	0.2	0.2
65-69	13	26	0.9	0.46	1.6	1.53	0.1	0.4
70-74	22	16	1.9	0.76	1.2	0.70	0.2	0.2
75-79	20	18	2.7	1.25	1.6	1.06	0.2	0.2
80-84	15	15	3.3	0.79	1.7	0.63	0.2	0.2
85+	13	23	4.2	6.50	2.8	1.53	0.2	0.2
All ages	124	143					0.2	0.3
Mortality								
Raw			0.5	0.67	0.5	0.70		
WS			0.2	0.51	0.2	0.49		
ES			0.4	0.63	0.3	0.59		
BRD-S			0.5	0.71	0.4	0.65		
PYLL-70								
per 100,000			2.5		3.2			
ES			2.2		2.8			
AYLL-70			11.4		11.1			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34	1	2	0.0	0.50	0.1	0.33	0.6	1.2
35-39	1	2	0.0	0.14	0.1	0.29	0.3	0.5
40-44	2	2	0.1	0.25	0.1	0.20	0.3	0.2
45-49	2	2	0.1	0.29	0.1	0.15	0.1	0.1
50-54	6	9	0.3	0.43	0.5	0.64	0.2	0.4
55-59	11	9	0.6	1.22	0.5	0.69	0.3	0.3
60-64	10	12	0.6	0.48	0.7	0.75	0.2	0.3
65-69	13	21	0.9	0.57	1.3	1.50	0.2	0.4
70-74	15	9	1.3	0.60	0.7	0.47	0.2	0.1
75-79	11	11	1.5	0.92	1.0	0.85	0.1	0.2
80-84	6	9	1.3	0.38	1.0	0.45	0.1	0.1
85+	8	15	2.6	4.00	1.8	1.15	0.2	0.2
All ages	86	103					0.2	0.2
Mortality								
Raw			0.3	0.54	0.4	0.60		
WS			0.2	0.41	0.2	0.42		
ES			0.3	0.51	0.2	0.51		
BRD-S			0.3	0.55	0.3	0.56		
PYLL-70								
per 100,000			2.1		2.7			
ES			1.9		2.3			
AYLL-70			11.3		11.1			

* See corresponding tables with multiple primaries.

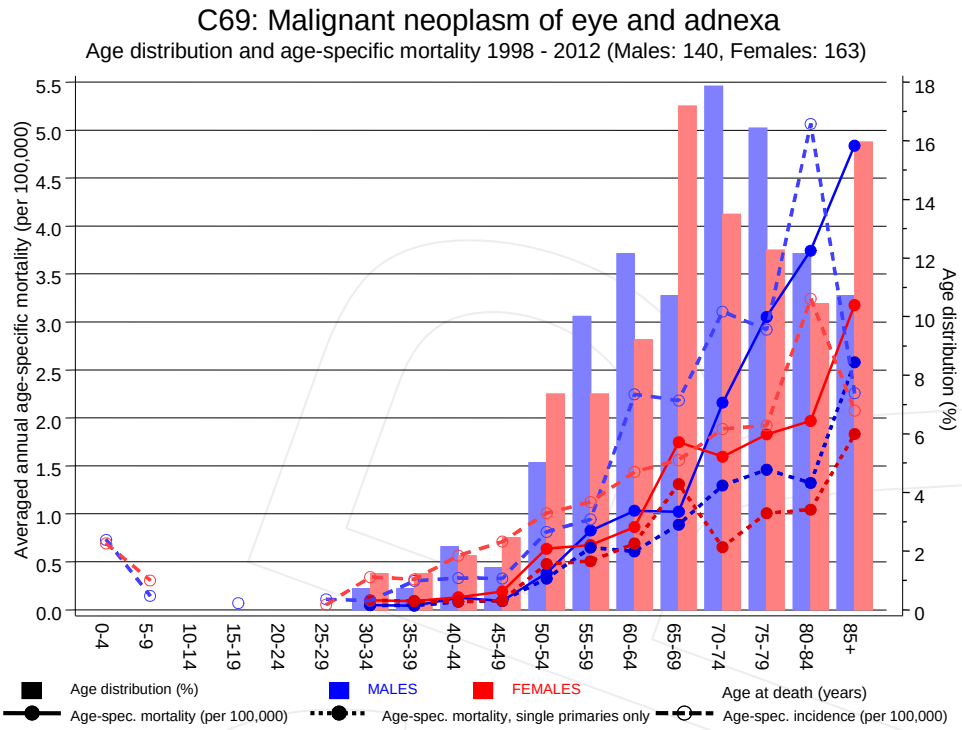
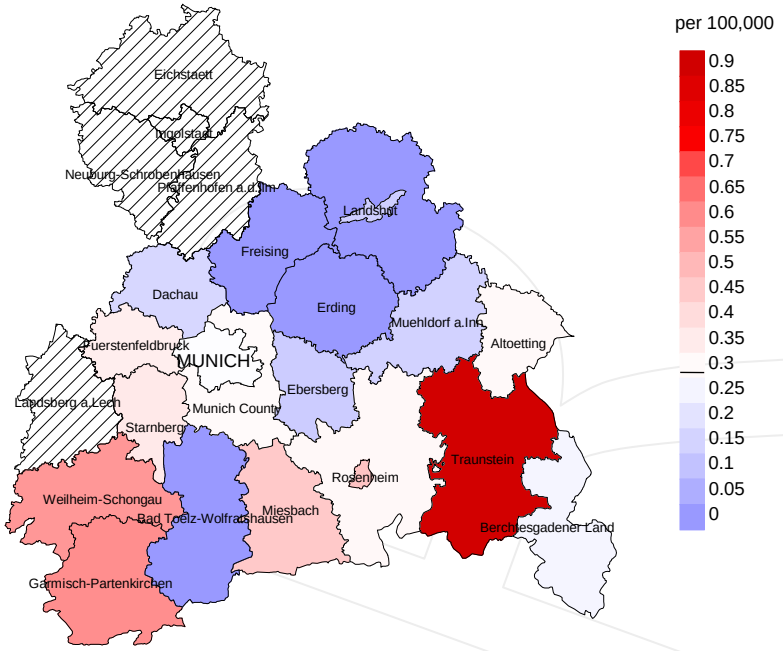


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2003 - 2008: Males



Average mortality (world standard population) 2003 - 2008: Females

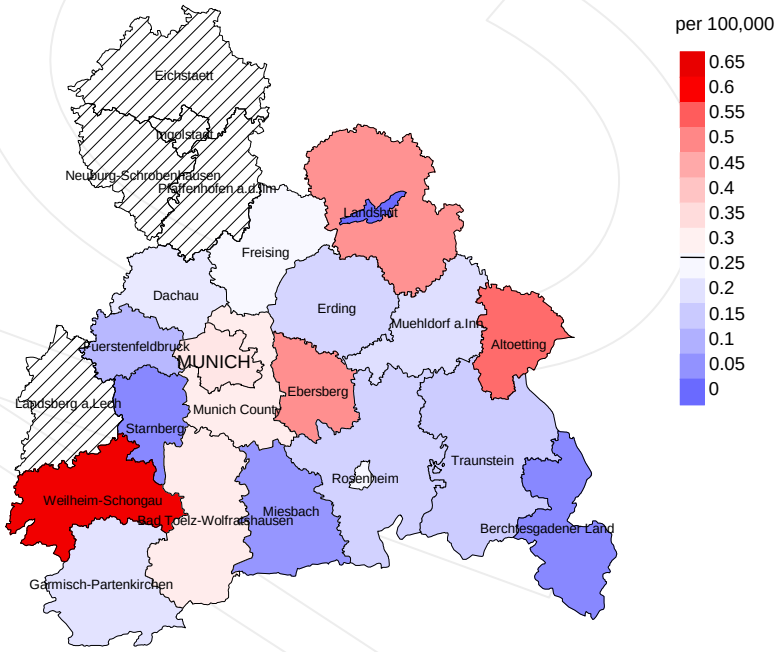
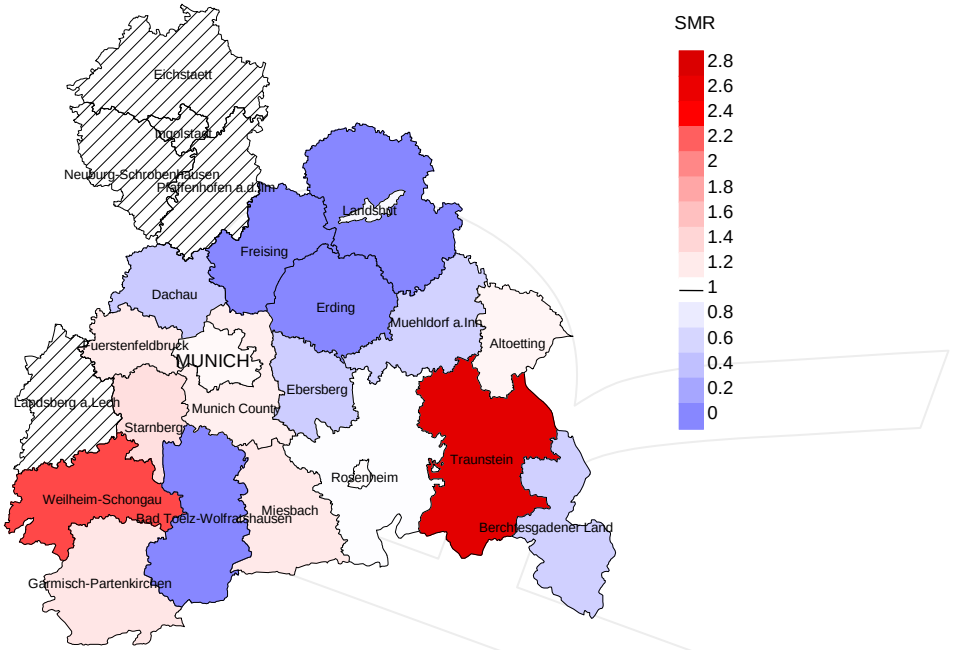


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.3/100,000 WS N=62, females 0.3/100,000 WS N=72). Since cancer data are not available in some counties until 2007, the local mortality rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 4 women died from eye cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.7/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

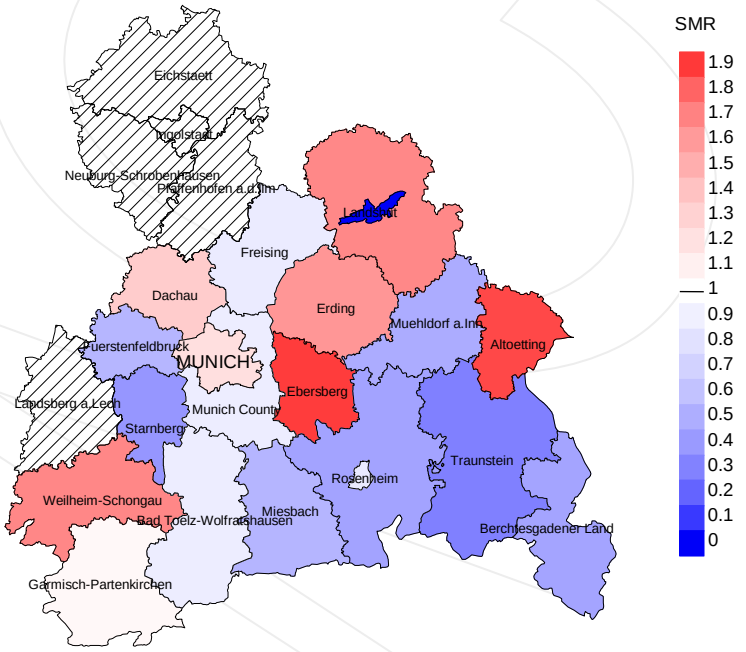


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=62, females N=72). Since cancer data are not available in some counties until 2007, the local SMR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 4 women died from eye cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.89. Though, the value of this parameter may vary with an underlying probability of 99% between 0.32 and 5.97, 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. 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 tumor-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

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

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