Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

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	1998-2013
Patients	499
Diseases	501
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 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 4.64 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, May 2015

[#] 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 2014 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.

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

Code	Description
C69.-	Malignant neoplasm of eye and adnexa
C69.0	Conjunctiva
C69.1	Cornea
C69.2	Retina
C69.3	Choroid
C69.4	Ciliary body
C69.5	Lacrimal gland and duct
C69.6	Orbit
C69.8	Overlapping lesion of eye and adnexa
C69.9	Eye, unspecified

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	63.6	90.9	
1999	23			21.7	43.5	95.7	
2000	27			48.1	77.8	96.3	
2001	13			46.2	84.6	100.0	
2002	35			28.6	48.6	85.7	#
2003	38			31.6	42.1	81.6	
2004	50			32.0	60.0	80.0	
2005	55	1	1.8	20.0	50.9	89.1	
2006	43			32.6	41.9	83.7	
2007	47			25.5	63.8	74.5	# ##
2008	42			26.2	45.2	69.0	
2009	33			33.3	39.4	72.7	
2010	27			33.3	40.7	70.4	
2011	26			30.8	50.0	76.9	
2012	14			7.1	28.6	78.6	
2013	6			16.7	16.7	100.0	###
1998-2013	501	1	0.2	28.5	51.1	82.0	

\# 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	55	22	33	40.0
2006	43	18	25	41.9
2007	47	25	22	53.2
2008	42	24	18	57.1
2009	33	14	19	42.4
2010	27	15	12	55.6
2011	26	14	12	53.8
2012	14	9	5	64.3
2013	6	4	2	66.7
1998-2013	501	247	254	49.3

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 4.64 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	22	33	1.2	1.7	0.8	0.8	1.1	1.1	1.2	1.3
2006	18	25	0.9	1.2	0.6	0.7	0.8	0.9	0.9	1.0
2007	25	22	1.1	1.0	0.7	0.5	0.9	0.7	1.2	0.8
2008	24	18	1.1	0.8	0.6	0.3	0.9	0.5	1.1	0.6
2009	14	19	0.6	0.8	0.4	0.6	0.5	0.7	0.6	0.7
2010	15	12	0.7	0.5	0.4	0.4	0.5	0.5	0.6	0.4
2011	14	12	0.6	0.5	0.3	0.4	0.4	0.5	0.6	0.5
2012	9	5	0.4	0.2	0.3	0.2	0.3	0.2	0.4	0.2
2013	4	2	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1
1998-2013	247	254	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	55	65.3	19.3	0.3	91.9	39.3	56.5	70.6	80.6	83.8
2006	43	64.8	16.4	7.3	94.2	48.2	55.1	65.6	74.3	85.2
2007	47	65.6	17.4	0.2	96.8	43.1	53.2	69.4	78.7	83.7
2008	42	67.8	14.9	28.8	89.6	44.0	60.4	69.7	79.3	83.4
2009	33	59.2	20.7	1.0	86.4	38.6	49.1	62.9	74.7	82.2
2010	27	57.4	25.7	0.2	86.4	6.4	43.6	68.1	74.7	84.2
2011	26	64.8	22.5	0.4	97.2	44.4	56.2	67.6	79.5	84.0
2012	14	60.9	28.1	1.1	84.2	2.6	46.2	72.2	82.6	83.8
2013	6	65.1	11.9	43.7	76.1	43.7	60.8	68.5	72.7	76.1
1998-2013	501	62.1	19.7	0.2	97.2	39.8	54.1	65.4	75.1	82.5

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	22	61.8	23.2	0.3	89.7	34.3	55.8	68.1	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	15	62.2	24.2	0.4	86.4	28.4	44.9	70.1	82.9	84.2
2011	14	73.5	10.0	56.2	88.5	62.2	65.9	72.8	83.6	84.0
2012	9	62.5	26.1	1.1	82.9	1.1	62.2	71.5	80.7	82.9
2013	4	60.4	12.0	43.7	72.0	43.7	52.3	62.9	68.5	72.0
1998-2013	247	62.8	18.9	0.2	89.7	40.8	56.5	66.5	74.7	81.6

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	33	67.6	16.3	30.7	91.9	40.2	61.7	70.9	81.8	83.8
2006	25	66.1	19.7	7.3	94.2	40.9	57.7	67.7	77.3	91.5
2007	22	66.9	15.5	40.4	96.8	47.4	53.2	66.0	79.5	84.4
2008	18	71.2	10.7	44.0	84.2	54.8	65.3	72.4	82.4	83.4
2009	19	56.1	20.5	1.0	86.4	36.8	46.3	53.2	74.7	85.8
2010	12	51.4	27.3	0.2	85.8	6.4	37.9	58.3	74.6	75.7
2011	12	54.6	28.8	0.4	97.2	1.1	49.8	57.4	73.6	79.5
2012	5	57.9	34.6	2.6	84.2	2.6	46.2	72.9	83.8	84.2
2013	2	74.4	2.4	72.7	76.1	72.7	72.7	74.4	76.1	76.1
1998-2013	254	61.5	20.5	0.2	97.2	36.8	52.1	64.6	75.8	83.8

Table 4

Age distribution by 5-year age group and gender for period 1998-2013 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	19	3.8	3.8	10	4.0	4.0	9	3.5	3.5
5-9	7	1.4	5.2	2	0.8	4.9	5	2.0	5.5
10-14	0	0.0	5.2			4.9			5.5
15-19	1	0.2	5.4	1	0.4	5.3			5.5
20-24	0	0.0	5.4			5.3			5.5
25-29	3	0.6	6.0	2	0.8	6.1	1	0.4	5.9
30-34	9	1.8	7.8	2	0.8	6.9	7	2.8	8.7
35-39	14	2.8	10.6	7	2.8	9.7	7	2.8	11.4
40-44	23	4.6	15.2	9	3.6	13.4	14	5.5	16.9
45-49	24	4.8	20.0	8	3.2	16.6	16	6.3	23.2
50-54	34	6.8	26.7	15	6.1	22.7	19	7.5	30.7
55-59	39	7.8	34.5	17	6.9	29.6	22	8.7	39.4
60-64	71	14.2	48.7	41	16.6	46.2	30	11.8	51.2
65-69	61	12.2	60.9	35	14.2	60.3	26	10.2	61.4
70-74	68	13.6	74.5	40	16.2	76.5	28	11.0	72.4
75-79	45	9.0	83.4	22	8.9	85.4	23	9.1	81.5
80-84	58	11.6	95.0	28	11.3	96.8	30	11.8	93.3
85+	25	5.0	100.0	8	3.2	100.0	17	6.7	100.0
All ages	501	100.0		247	100.0		254	100.0	

Included in the statistics are 41.3% multiple primaries in males and 33.7% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2013

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=158258 %	Females Prop.all cancers n=153136 %
0- 4	10	9	0.7	0.6			3.1	3.7
5- 9	2	5	0.1	0.4			1.1	4.0
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	0.0			0.2	0.1
30-34	2	7	0.1	0.3			0.1	0.3
35-39	7	7	0.3	0.3			0.3	0.2
40-44	9	14	0.3	0.6			0.3	0.2
45-49	8	16	0.3	0.7			0.1	0.2
50-54	15	19	0.7	0.9			0.2	0.2
55-59	17	22	0.9	1.1			0.1	0.2
60-64	41	29	2.3	1.5			0.2	0.2
65-69	35	26	2.2	1.5			0.1	0.1
70-74	40	28	3.1	1.8			0.1	0.2
75-79	22	23	2.7	1.9			0.1	0.1
80-84	28	30	5.6	3.2	3.6		0.2	0.2
85+	8	17	2.3	1.9			0.1	0.1
All ages	247	253			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 1998-2013
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C18	Colon	2	1.4	1.4	0.2	5.0		6.6	
C19-C20	Rectum	2	0.8	2.5	0.3	9.1		14.4	
C33-C34	Lung	8	1.7	4.8	2.1	9.4	#	75.6	25.0
C43	Malign. melanoma	3	0.5	5.5	1.1	15.9	#	29.3	
C61	Prostate	11	4.3	2.6	1.3	4.6	#	80.0	9.1
C67	Bladder	2	0.7	3.1	0.4	11.0		16.1	
Other primaries		6	1.3	4.6	1.7	10.0	#	56.2	
Not observed		0	3.8	0.0	0.0	1.0	#	-45.6	
All mult. primaries		34	14.6	2.3	1.6	3.3	#	232.7	8.8

Patients	174
Median age at second malignancy (years)	73.5
Person-years	836
Mean observation time (years)	4.8
Median observation time (years)	3.8

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 1998-2013
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16 Stomach	2	0.4	5.0	0.6	18.2		17.0	50.0
C50 Breast	9	3.0	3.0	1.4	5.6	#	63.1	11.1
C54 Corpus uteri	2	0.5	3.7	0.4	13.3		15.5	
C70-C72 CNS cancer	2	0.1	14.5	1.8	52.2	#	19.7	
C76-C79 CUP	2	0.2	10.4	1.3	37.6	#	19.2	
C82-C85 NHL	2	0.4	5.1	0.6	18.4		17.0	
Other primaries	14	3.2	4.4	2.4	7.4	#	114.8	
Not observed	0	2.4	0.0	0.0	1.6		-25.2	
All mult. primaries	33	10.3	3.2	2.2	4.5	#	241.1	6.1

Patients	189
Median age at second malignancy (years)	63.7
Person-years	943
Mean observation time (years)	5.0
Median observation time (years)	4.7

The occurrence of second malignancy is statistically significant.

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

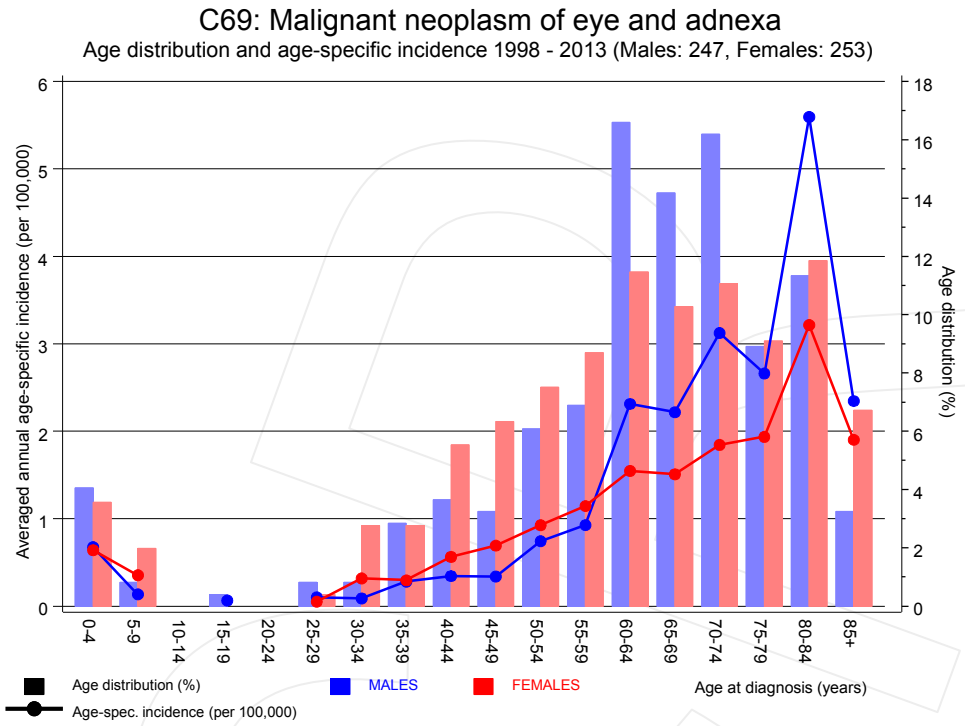


Figure 7. Age distribution and age-specific incidence

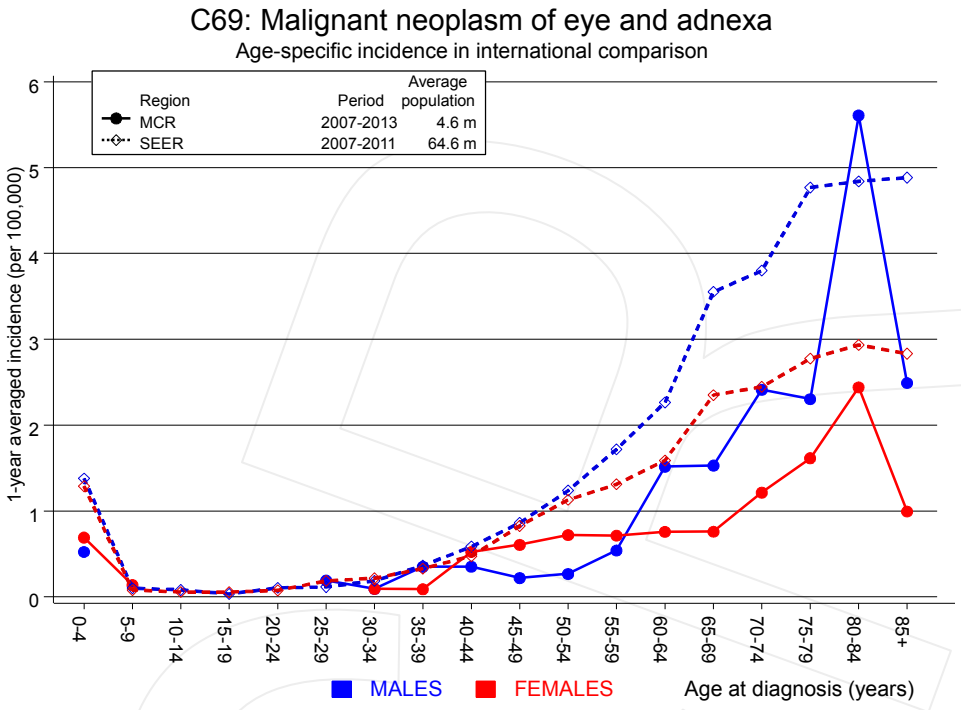


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

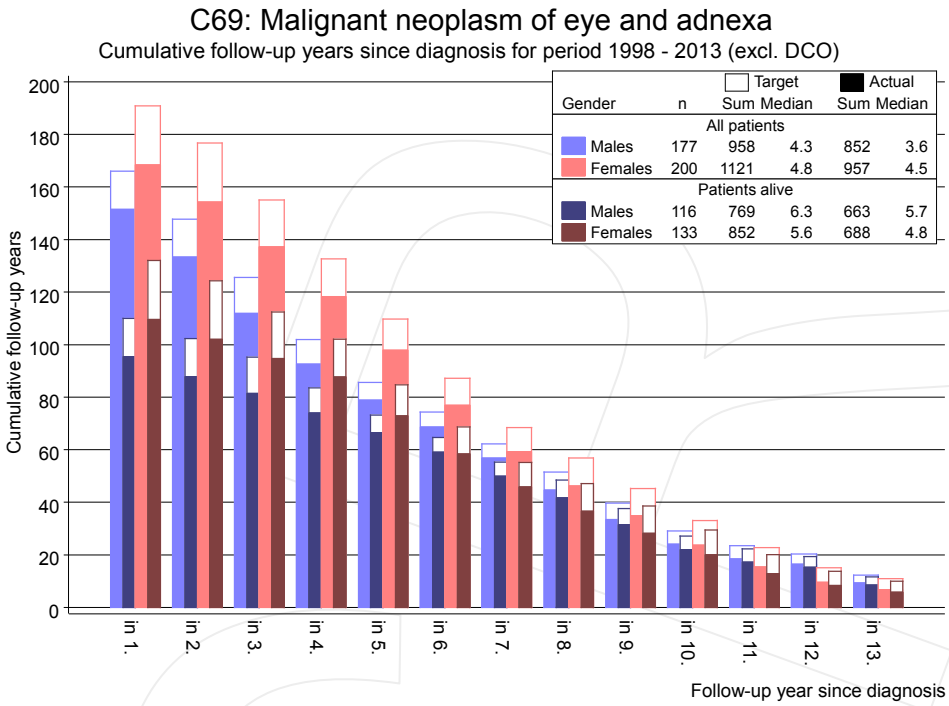
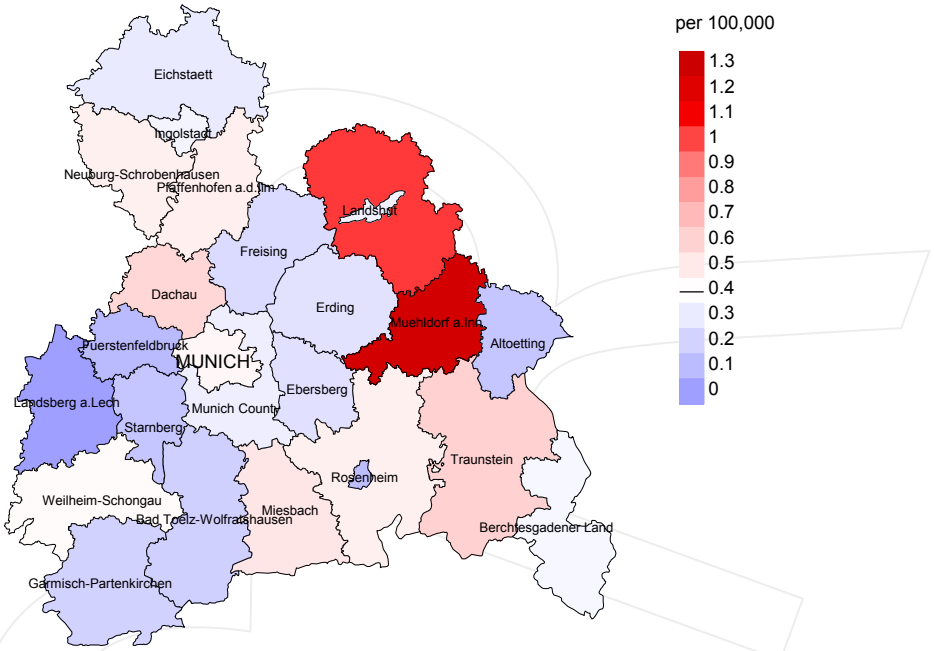


Figure 8. Cumulative follow-up years depending on time since diagnosis

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) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

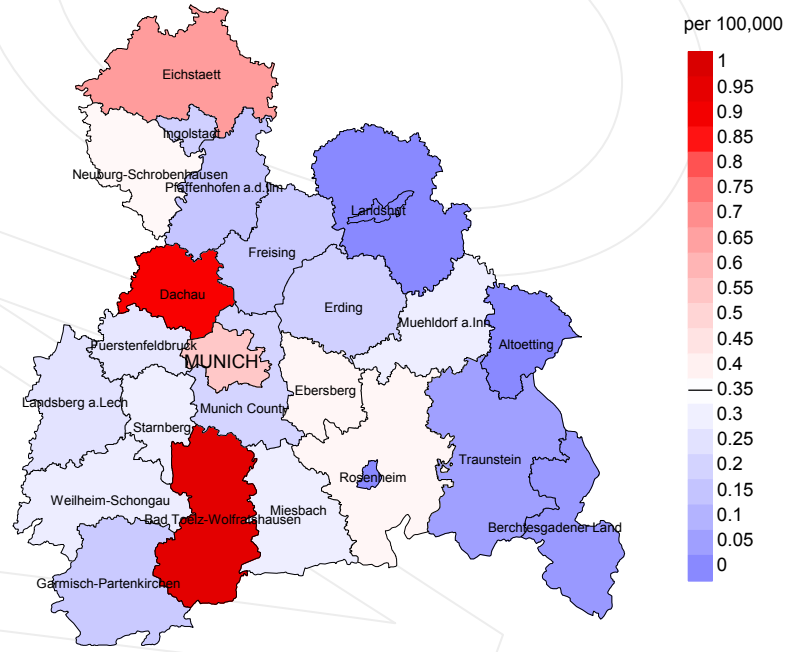
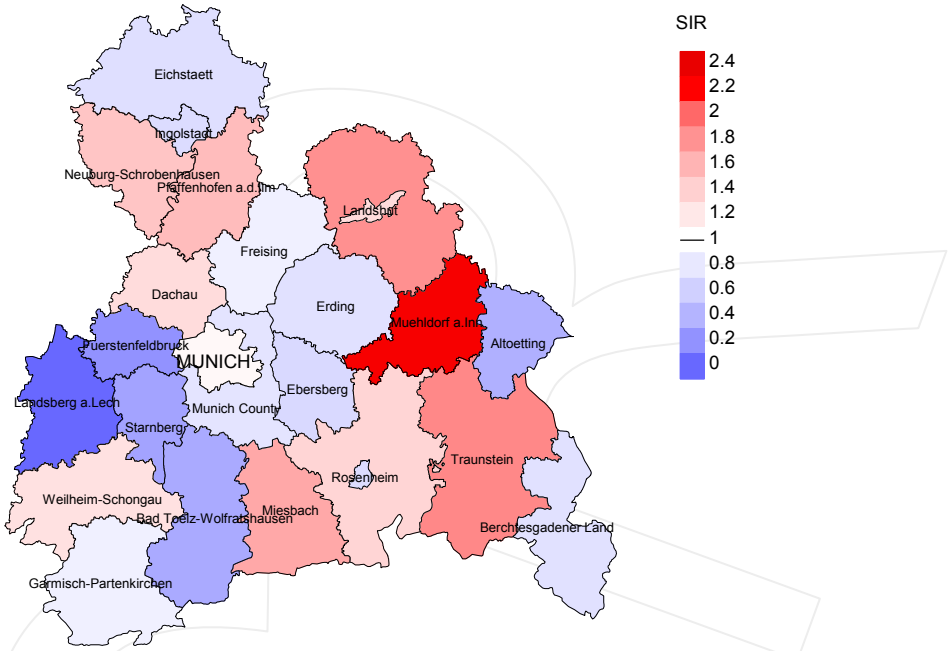


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.4/100,000 WS N=105, females 0.4/100,000 WS N=90).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 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 0.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.6/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

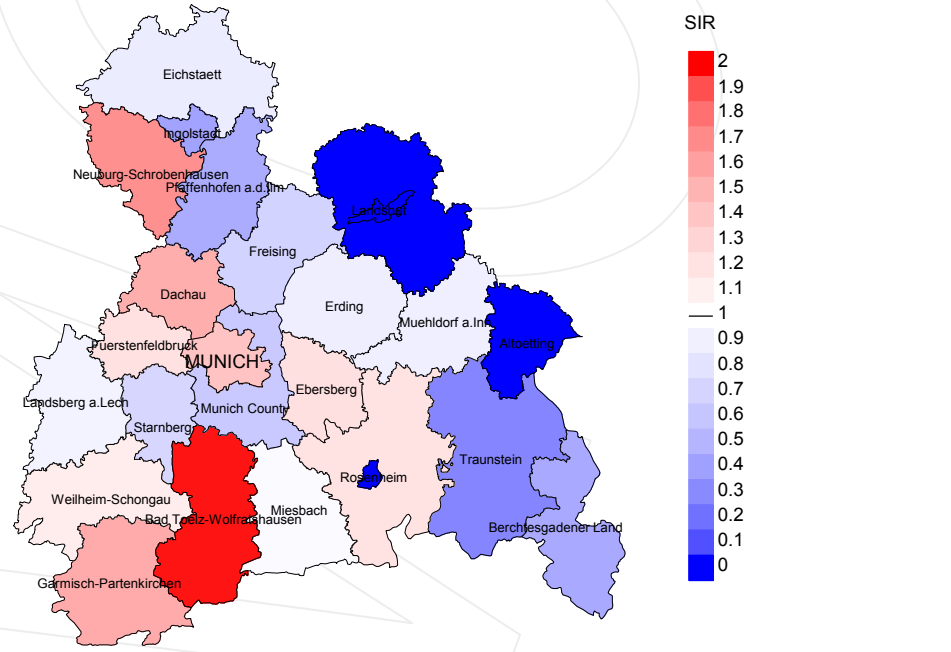


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=105, females N=90).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 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 1.22. Though, the value of this parameter may vary with an underlying probability of 99% between 0.14 and 4.45, 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 4.64 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		14	63.6	85.7
1999	23	95.7		10	43.5	100.0
2000	27	96.3		21	77.8	95.2
2001	13	100.0		11	84.6	100.0
2002	35	85.7		17	48.6	94.1
2003	38	81.6		16	42.1	93.8
2004	50	80.0		30	60.0	90.0
2005	55	89.1	1.8	28	50.9	92.9
2006	43	83.7		18	41.9	100.0
2007	47	74.5		30	63.8	90.0
2008	42	69.0		19	45.2	84.2
2009	33	72.7		13	39.4	100.0
2010	27	70.4		11	40.7	100.0
2011	26	76.9		13	50.0	92.3
2012	14	78.6		4	28.6	100.0
2013	6	100.0		1	16.7	100.0
1998-2013	501	82.0	0.2	256	51.1	93.4

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 4.64 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	55	37	94.6	8	14.5
2006	43	30	96.7	2	4.7
2007	47	34	100.0	3	6.4
2008	42	36	91.7	1	2.4
2009	33	42	97.6	4	12.1
2010	27	39	97.4	1	3.7
2011	26	45	93.3	1	3.8
2012	14	25	100.0	1	7.1
2013	6	38	100.0	1	16.7
1998-2013	501	478	95.6	28	5.6

Table 10c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-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	39	64.1	35.9	73.7
2011	45	66.7	33.3	73.8
2012	25	60.0	40.0	60.0
2013	38	63.2	36.8	71.1
1998-2013	478	69.5	30.5	76.1

Table 11a

Medians 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 (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	5	77.4	77.4	71.0	67.0
1999	5	86.2	86.2	82.4	83.3
2000	6	78.1	76.4	78.2	78.6
2001	3	81.8	79.3	87.2	79.3
2002	15	70.4	69.8	72.3	71.2
2003	15	62.9	69.0	61.0	65.9
2004	15	71.8	71.0	83.5	68.0
2005	20	74.6	70.6	82.3	72.5
2006	15	76.8	74.7	86.2	73.8
2007	11	73.3	65.5	81.3	67.4
2008	17	72.3	68.1	85.1	68.3
2009	20	76.7	69.0	84.1	69.0
2010	17	80.0	78.9	81.3	79.7
2011	24	75.2	75.2	76.7	75.0
2012	15	76.1	66.8	86.1	66.8
2013	15	77.8	82.9	77.7	83.6
1998-2013	218	75.0	72.2	82.3	72.9

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 11b

Medians 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 (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	12	78.7	72.9	90.5	72.9
1999	9	65.3	70.3	27.6	75.3
2000	13	75.6	71.7	78.7	71.7
2001	8	75.3	74.8	93.6	75.8
2002	13	80.8	74.9	85.9	74.9
2003	16	71.2	67.2	86.1	67.2
2004	17	73.4	70.6	83.4	71.1
2005	17	82.4	78.2	86.1	78.4
2006	15	80.0	67.9	83.7	68.4
2007	23	71.0	69.6	88.6	69.6
2008	19	79.0	68.0	90.6	73.3
2009	22	74.0	71.1	87.2	71.1
2010	22	78.4	66.9	90.3	67.2
2011	21	81.2	77.6	81.8	75.4
2012	10	79.2	64.6	87.0	64.6
2013	23	76.2	70.0	83.4	70.9
1998-2013	260	77.6	70.7	85.6	71.1

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	0.68	0.4	0.53	0.7	0.65	0.9	0.70
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	0.80	0.2	0.54	0.4	0.74	0.5	0.89
2011	16	0.7	1.14	0.3	0.97	0.4	1.03	0.7	1.07
2012	10	0.4	1.11	0.3	0.94	0.4	1.20	0.4	1.11
2013	11	0.5	2.75	0.2	1.71	0.3	2.25	0.4	2.93
1998-2013	154	0.5	0.62	0.3	0.49	0.4	0.59	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	0.36	0.2	0.27	0.3	0.31	0.4	0.33
2006	9	0.4	0.36	0.2	0.33	0.3	0.36	0.4	0.38
2007	19	0.8	0.86	0.4	0.74	0.5	0.75	0.6	0.78
2008	12	0.5	0.67	0.2	0.70	0.3	0.70	0.4	0.65
2009	19	0.8	1.00	0.4	0.63	0.5	0.80	0.6	0.89
2010	13	0.6	1.08	0.3	0.71	0.4	0.88	0.5	1.10
2011	14	0.6	1.17	0.2	0.45	0.3	0.66	0.4	0.83
2012	5	0.2	1.00	0.1	0.62	0.2	0.96	0.2	0.92
2013	13	0.6	6.50	0.3	10.9	0.4	9.24	0.5	7.02
1998-2013	178	0.6	0.70	0.3	0.51	0.4	0.60	0.5	0.66

Table 13

Age distribution of age at death (cancer-related) for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
20-24	1	0.3	0.3			0.0	1	0.6	0.6
25-29	0	0.0	0.3			0.0			0.6
30-34	3	0.9	1.2	1	0.6	0.6	2	1.1	1.7
35-39	3	0.9	2.1	1	0.6	1.3	2	1.1	2.8
40-44	7	2.1	4.2	4	2.6	3.9	3	1.7	4.5
45-49	6	1.8	6.0	2	1.3	5.2	4	2.2	6.7
50-54	19	5.7	11.7	7	4.5	9.7	12	6.7	13.4
55-59	30	9.0	20.7	15	9.7	19.5	15	8.4	21.8
60-64	35	10.5	31.2	18	11.7	31.2	17	9.5	31.3
65-69	47	14.1	45.3	16	10.4	41.6	31	17.3	48.6
70-74	55	16.5	61.9	29	18.8	60.4	26	14.5	63.1
75-79	45	13.5	75.4	23	14.9	75.3	22	12.3	75.4
80-84	37	11.1	86.5	20	13.0	88.3	17	9.5	84.9
85+	45	13.5	100.0	18	11.7	100.0	27	15.1	100.0
All ages	333	100.0		154	100.0		179	100.0	

Included in the statistics are 41.3% multiple primaries in males and 33.7% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**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		1	0.0		0.1	1.00		2.0
25-29			0.0		0.0			
30-34	1	2	0.0	0.50	0.1	0.29	0.5	0.9
35-39	1	2	0.0	0.14	0.1	0.29	0.3	0.4
40-44	4	3	0.2	0.44	0.1	0.21	0.5	0.3
45-49	2	4	0.1	0.25	0.2	0.25	0.1	0.2
50-54	7	12	0.3	0.47	0.6	0.63	0.2	0.4
55-59	15	15	0.8	0.88	0.8	0.68	0.3	0.3
60-64	18	17	1.0	0.44	0.9	0.57	0.2	0.3
65-69	16	31	1.0	0.46	1.8	1.19	0.1	0.4
70-74	29	26	2.3	0.73	1.7	0.93	0.2	0.3
75-79	23	22	2.8	1.05	1.9	0.96	0.2	0.2
80-84	20	17	4.0	0.71	1.8	0.57	0.2	0.2
85+	18	27	5.3	2.25	3.0	1.59	0.2	0.2
All ages	154	179					0.2	0.2
Mortality								
Raw			0.5	0.62	0.6	0.70		
WS			0.3	0.49	0.3	0.51		
ES			0.4	0.59	0.4	0.60		
BRD-S			0.5	0.65	0.5	0.66		
PYLL-70								
per 100,000			2.7		3.6			
ES			2.3		3.2			
AYLL-70			11.1		11.1			

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

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10	Oropharynx	1	1.2					1	100.0
C11	Nasopharynx	1	1.2					1	100.0
C18	Colon	6	7.1			1	16.7	5	83.3
C19-C20	Rectum	2	2.4	1	50.0	1	50.0		
C22	Liver	3	3.6					3	100.0
C23-C24	Bile	2	2.4	1	50.0			1	50.0
C25	Pancreas	1	1.2					1	100.0
C33-C34	Lung	12	14.3					12	100.0
C43	Malign. melanoma	11	13.1	5	45.5	3	27.3	3	27.3
C44	Skin others	2	2.4	1	50.0			1	50.0
C61	Prostate	16	19.0	6	37.5	1	6.3	9	56.3
C64	Kidney	5	6.0	2	40.0			3	60.0
C66	Ureter	1	1.2					1	100.0
C67	Bladder	3	3.6			1	33.3	2	66.7
C68	Urethra	1	1.2			1	100.0		
C69	Eye carcinoma	1	1.2					1	100.0
C70-C72	CNS cancer	3	3.6	2	66.7			1	33.3
C73	Thyroid	1	1.2					1	100.0
C76-C79	CUP	2	2.4					2	100.0
C82-C85	NHL	4	4.8	1	25.0			3	75.0
C90	Mult. myeloma	2	2.4	2	100.0				
C91-C96	Leukaemia	4	4.8					4	100.0
All mult. primaries		84	100.0	21	25.0	8	9.5	55	65.5

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 1998-2013
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C07-C08	Salivary gland	1	1.2					1	100.0
C16	Stomach	3	3.6	1	33.3			2	66.7
C18	Colon	2	2.4	1	50.0			1	50.0
C19-C20	Rectum	2	2.4	1	50.0			1	50.0
C22	Liver	3	3.6					3	100.0
C23-C24	Bile	1	1.2					1	100.0
C25	Pancreas	3	3.6					3	100.0
C33-C34	Lung	8	9.6	2	25.0	1	12.5	5	62.5
C43	Malign. melanoma	12	14.5	3	25.0			9	75.0
C46,C49	Soft tissue	1	1.2	1	100.0				
C50	Breast	25	30.1	15	60.0	1	4.0	9	36.0
C53	Cervix uteri	1	1.2					1	100.0
C54	Corpus uteri	6	7.2	2	33.3			4	66.7
C56	Ovary	2	2.4					2	100.0
C64	Kidney	1	1.2					1	100.0
C67	Bladder	1	1.2			1	100.0		
C69	Eye melanoma	1	1.2			1	100.0		
C70-C72	CNS cancer	3	3.6					3	100.0
C73	Thyroid	2	2.4	1	50.0			1	50.0
C76-C79	CUP	1	1.2			1	100.0		
C90	Mult. myeloma	2	2.4					2	100.0
C91-C96	Leukaemia	2	2.4					2	100.0
All mult. primaries		83	100.0	27	32.5	5	6.0	51	61.4

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 1998-2013
(**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		1	0.0		0.1	1.00		2.1
25-29			0.0		0.0			
30-34	1	2	0.0	0.50	0.1	0.29	0.6	1.0
35-39	1	2	0.0	0.14	0.1	0.29	0.3	0.4
40-44	4	2	0.2	0.44	0.1	0.18	0.5	0.2
45-49	2	4	0.1	0.25	0.2	0.27	0.1	0.2
50-54	7	12	0.3	0.50	0.6	0.67	0.2	0.5
55-59	13	14	0.7	1.08	0.7	0.78	0.3	0.3
60-64	16	14	0.9	0.50	0.7	0.64	0.2	0.3
65-69	13	27	0.8	0.45	1.6	1.59	0.1	0.4
70-74	25	18	2.0	0.76	1.2	0.75	0.2	0.2
75-79	20	20	2.4	1.25	1.7	1.05	0.2	0.2
80-84	16	15	3.2	0.70	1.6	0.58	0.2	0.2
85+	15	23	4.4	5.00	2.6	1.53	0.2	0.2
All ages	133	154					0.2	0.3
Mortality								
Raw			0.4	0.66	0.5	0.72		
WS			0.2	0.51	0.2	0.51		
ES			0.4	0.62	0.3	0.61		
BRD-S			0.5	0.69	0.4	0.67		
PYLL-70								
per 100,000			2.5		3.4			
ES			2.2		2.9			
AYLL-70			11.6		11.4			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**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		1	0.0		0.1	1.00		2.3
25-29			0.0		0.0			
30-34	1	2	0.0	0.50	0.1	0.33	0.6	1.1
35-39	1	2	0.0	0.14	0.1	0.29	0.3	0.5
40-44	3	2	0.1	0.33	0.1	0.20	0.4	0.2
45-49	2	2	0.1	0.25	0.1	0.14	0.1	0.1
50-54	6	9	0.3	0.43	0.4	0.64	0.2	0.4
55-59	12	12	0.7	1.20	0.6	0.80	0.3	0.3
60-64	11	14	0.6	0.44	0.7	0.74	0.2	0.3
65-69	13	22	0.8	0.54	1.3	1.57	0.2	0.4
70-74	18	11	1.4	0.64	0.7	0.55	0.2	0.2
75-79	11	13	1.3	1.00	1.1	0.87	0.1	0.2
80-84	6	9	1.2	0.32	1.0	0.41	0.1	0.1
85+	8	15	2.3	2.67	1.7	1.15	0.1	0.2
All ages	92	114					0.2	0.2
Mortality								
Raw			0.3	0.53	0.4	0.62		
WS			0.2	0.41	0.2	0.45		
ES			0.2	0.50	0.3	0.54		
BRD-S			0.3	0.54	0.3	0.59		
PYLL-70								
per 100,000			2.1		2.8			
ES			1.9		2.5			
AYLL-70			11.6		11.4			

* See corresponding tables with multiple primaries.

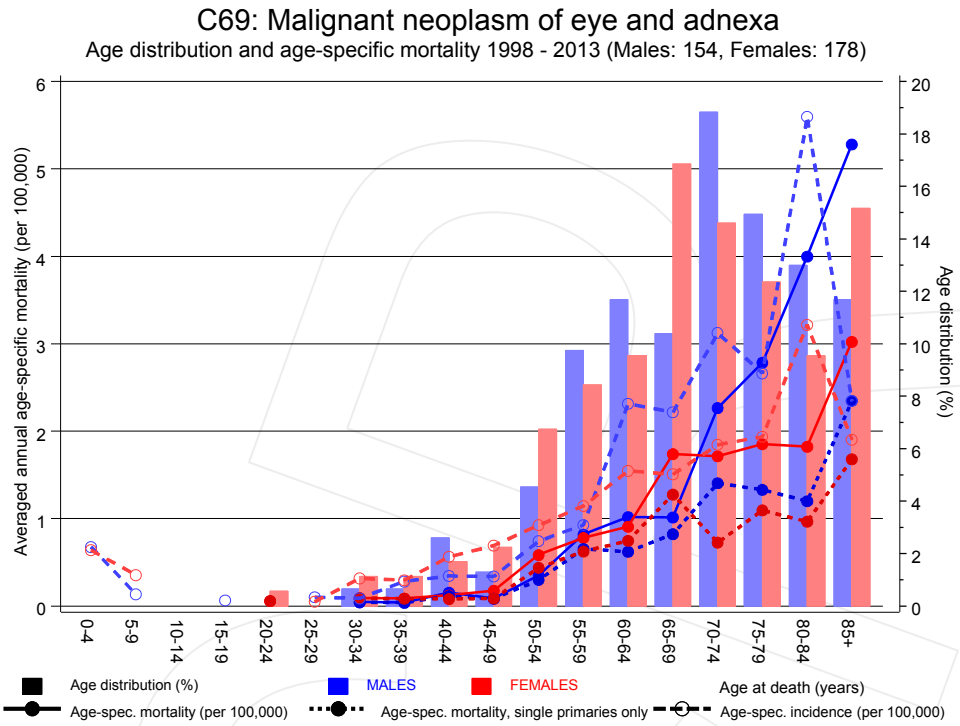
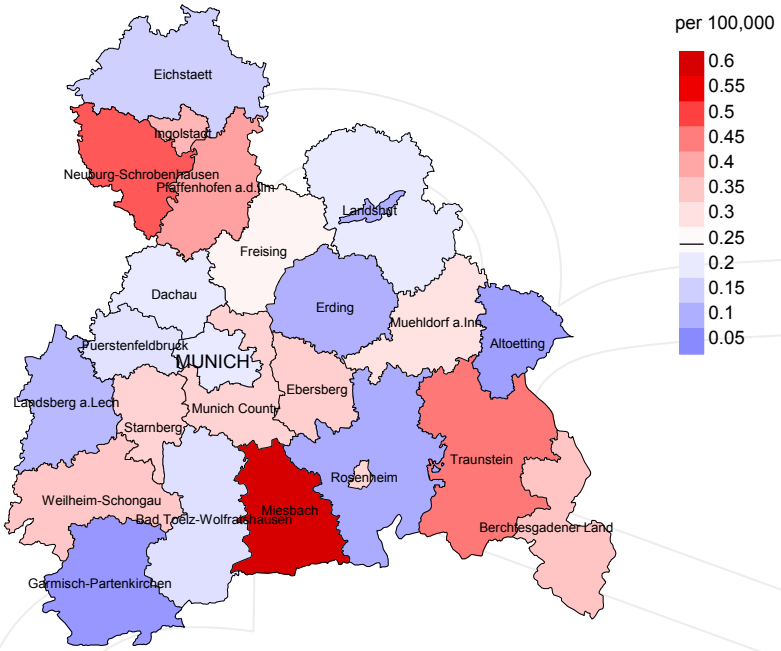


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

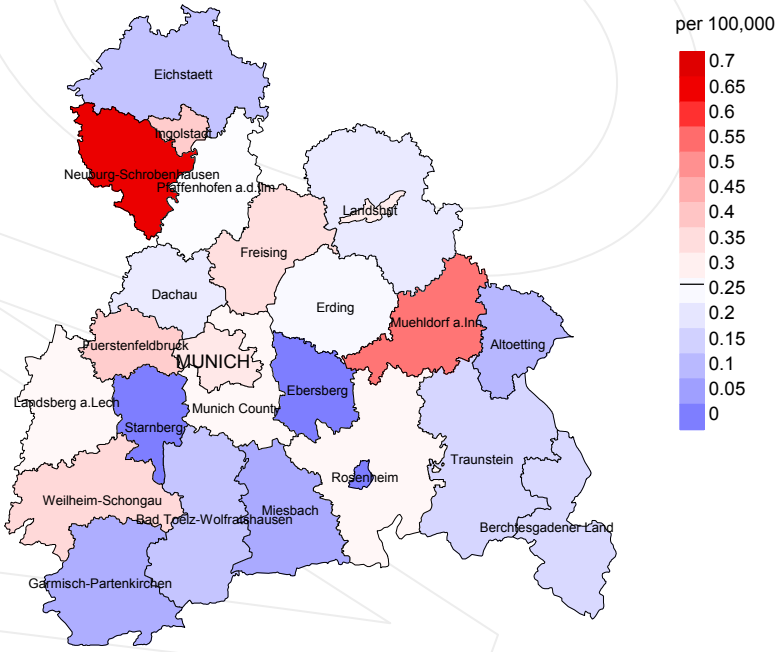
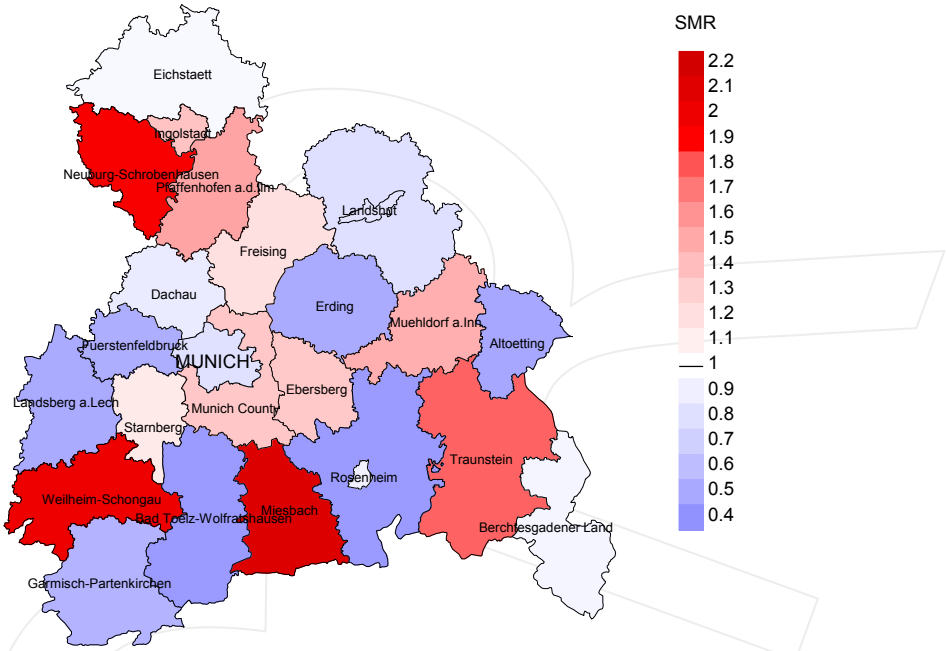


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.2/100,000 WS N=80, females 0.3/100,000 WS N=95).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 0 women died from eye cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.2/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

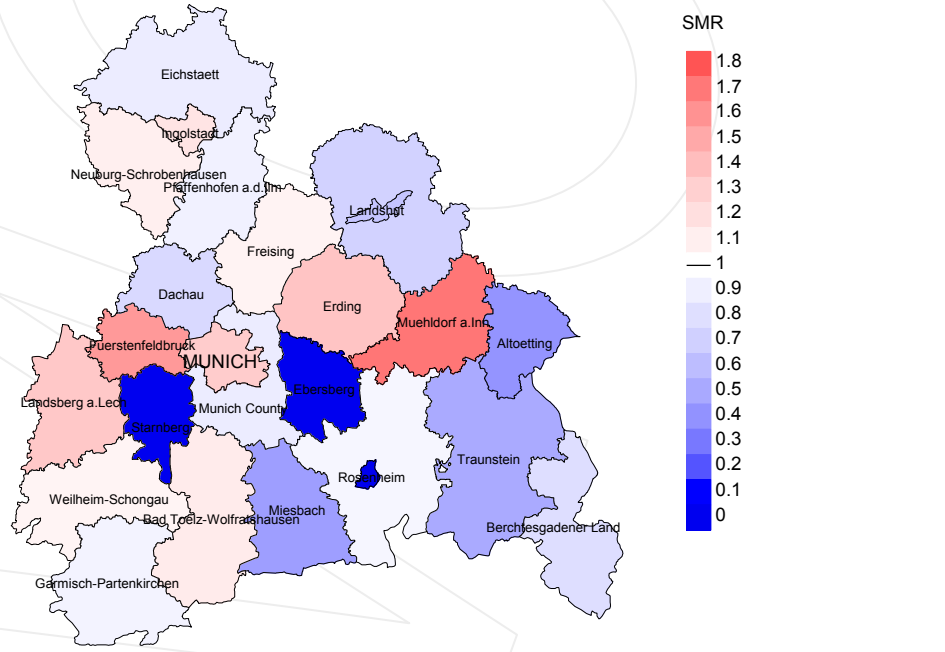


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=80, females N=95).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 0 women died from eye cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 2.10, 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 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

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
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)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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