Munich Cancer Registry

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

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

Cancer statistics: Baseline statistics

GIST: Gastroint. stromal tumor

Year of diagnosis	1998-2011
Patients	795
Diseases	796
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_hGISTE.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, April 2013

[#] 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 2011 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-O-3 codes (morphology) used for specifying cancer site

Code	Description
8936/0	Gastrointestinal stromal tumor, benign
8936/1	Gastrointestinal stromal tumor, NOS
8936/3	Gastrointestinal stromal sarcoma

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	4			25.0	100.0	100.0
1999	8				75.0	100.0
2000	18			38.9	61.1	94.4
2001	28			35.7	53.6	100.0
2002	48			29.2	58.3	97.9
2003	49			32.7	36.7	98.0
2004	73			26.0	45.2	95.9
2005	67			34.3	35.8	92.5
2006	62			22.6	17.7	88.7
2007	90			25.6	23.3	72.2 ##
2008	90			31.1	17.8	62.2
2009	93			36.6	17.2	59.1
2010	93			33.3	15.1	94.6
2011	73			31.5	1.4	80.8 ###
1998-2011	796			30.5	27.4	83.2

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	4	1	3	25.0
1999	8	5	3	62.5
2000	18	9	9	50.0
2001	28	17	11	60.7
2002	48	24	24	50.0
2003	49	22	27	44.9
2004	73	36	37	49.3
2005	67	33	34	49.3
2006	62	27	35	43.5
2007	90	49	41	54.4
2008	90	44	46	48.9
2009	93	48	45	51.6
2010	93	52	41	55.9
2011	73	48	25	65.8
1998-2011	796	415	381	52.1

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	1	3	0.1	0.3	0.0	0.1	0.1	0.2	0.1	0.2
1999	5	3	0.4	0.3	0.3	0.2	0.5	0.2	0.5	0.2
2000	9	9	0.8	0.7	0.4	0.4	0.7	0.6	0.8	0.7
2001	17	11	1.5	0.9	0.8	0.5	1.3	0.7	1.7	0.8
2002	24	24	1.3	1.2	0.7	0.8	1.1	1.0	1.4	1.1
2003	22	27	1.2	1.4	0.8	0.7	1.0	1.0	1.1	1.2
2004	36	37	1.9	1.9	1.1	1.0	1.5	1.4	2.0	1.7
2005	33	34	1.7	1.7	1.0	0.8	1.4	1.1	1.7	1.4
2006	27	35	1.4	1.7	0.8	0.9	1.2	1.3	1.3	1.5
2007	49	41	2.2	1.8	1.3	0.8	1.9	1.2	2.2	1.5
2008	44	46	2.0	2.0	1.1	0.9	1.5	1.3	1.9	1.6
2009	48	45	2.2	1.9	1.2	0.9	1.7	1.3	2.1	1.6
2010	52	41	2.3	1.8	1.2	0.9	1.8	1.3	2.2	1.5
2011	48	25	2.1	1.1	1.1	0.5	1.6	0.7	2.0	0.9
1998-2011	415	381	1.7	1.4	0.9	0.7	1.4	1.0	1.7	1.2

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	4	80.5	9.8	69.7	90.0	69.7	72.2	81.1	88.8	90.0
1999	8	61.9	12.9	46.4	88.3	46.4	52.2	62.5	65.7	88.3
2000	18	61.2	14.3	36.6	79.1	37.6	55.1	62.0	73.2	77.9
2001	28	65.6	11.9	31.9	80.5	52.7	57.9	67.9	73.9	80.3
2002	48	65.5	13.3	19.3	89.0	51.5	57.4	65.8	75.8	81.6
2003	49	64.5	13.9	17.9	92.1	46.8	58.2	65.5	72.7	81.8
2004	73	64.8	14.5	16.7	87.8	47.1	56.3	65.1	76.2	80.9
2005	67	67.5	12.9	34.3	89.4	48.8	60.4	69.0	77.6	82.3
2006	62	65.0	12.2	35.9	90.5	50.9	57.2	65.4	72.7	80.0
2007	90	66.9	9.8	46.5	88.3	53.0	59.5	67.0	74.0	80.1
2008	90	66.8	14.0	26.5	97.0	45.7	60.0	69.3	74.7	83.5
2009	93	66.9	12.3	32.6	93.5	50.4	56.8	68.9	75.9	81.2
2010	93	67.0	11.1	32.0	88.5	52.7	59.1	67.6	75.1	82.5
2011	73	65.1	14.2	30.0	88.3	44.7	52.8	70.0	76.6	80.9
1998-2011	796	66.1	12.8	16.7	97.0	49.4	58.0	67.2	75.5	81.4

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	1	87.5		87.5	87.5	87.5	87.5	87.5	87.5	87.5
1999	5	61.2	17.0	46.4	88.3	46.4	51.4	53.0	67.1	88.3
2000	9	60.7	15.8	36.6	79.1	36.6	55.1	64.0	72.5	79.1
2001	17	66.5	12.8	31.9	80.5	53.6	58.2	70.2	76.7	80.4
2002	24	69.1	10.9	44.8	89.0	54.6	61.3	68.4	79.0	81.6
2003	22	62.1	15.7	17.9	92.1	39.2	57.1	64.9	69.5	77.9
2004	36	64.1	14.9	16.7	84.6	41.0	57.2	65.3	76.1	80.5
2005	33	64.9	13.1	34.3	89.4	44.2	60.4	67.2	74.6	77.7
2006	27	62.3	12.8	35.9	89.2	46.3	53.7	62.0	68.2	80.0
2007	49	65.2	9.3	47.4	83.2	52.0	58.5	64.3	72.3	78.8
2008	44	65.6	12.3	26.5	88.0	46.3	60.4	68.9	73.5	78.4
2009	48	65.1	12.5	40.8	93.5	48.4	53.6	66.7	74.9	79.8
2010	52	66.9	12.3	32.0	88.5	51.3	57.2	67.8	76.7	82.5
2011	48	65.7	14.9	30.0	88.3	44.6	53.6	69.9	77.7	82.1
1998-2011	415	65.2	12.9	16.7	93.5	49.1	57.1	66.6	74.8	80.5

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	3	78.2	10.6	69.7	90.0	69.7	69.7	74.8	90.0	90.0
1999	3	63.1	1.3	61.7	64.3	61.7	61.7	63.2	64.3	64.3
2000	9	61.6	13.5	41.1	77.9	41.1	55.2	60.0	73.2	77.9
2001	11	64.1	10.7	40.4	79.2	52.7	57.0	66.9	69.9	73.7
2002	24	61.9	14.6	19.3	85.9	46.8	52.6	62.4	73.6	79.1
2003	27	66.5	12.1	27.1	83.9	56.0	59.6	66.9	74.2	81.8
2004	37	65.5	14.2	22.1	87.8	47.9	56.2	64.6	76.9	81.0
2005	34	70.1	12.3	43.8	85.7	51.2	64.3	73.0	80.8	84.0
2006	35	67.2	11.4	39.5	90.5	55.6	58.4	65.7	76.2	84.7
2007	41	68.9	10.1	46.5	88.3	57.7	61.6	68.3	77.0	81.5
2008	46	67.9	15.5	27.2	97.0	44.3	58.9	70.8	78.4	86.3
2009	45	68.9	11.9	32.6	89.4	52.8	61.3	70.0	77.2	84.6
2010	41	67.2	9.5	47.1	85.0	58.2	60.3	67.6	73.3	79.8
2011	25	64.1	13.1	44.1	83.1	46.1	49.0	70.0	74.7	78.5
1998-2011	381	67.0	12.5	19.3	97.0	51.2	59.1	67.9	75.9	82.6

Table 4

Age distribution by 5-year age group and gender for period 1998-2011 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
15-19	3	0.4	0.4	2	0.5	0.5	1	0.3	0.3
20-24	1	0.1	0.5			0.5	1	0.3	0.5
25-29	3	0.4	0.9	1	0.2	0.7	2	0.5	1.0
30-34	6	0.8	1.6	5	1.2	1.9	1	0.3	1.3
35-39	13	1.6	3.3	9	2.2	4.1	4	1.0	2.4
40-44	22	2.8	6.0	12	2.9	7.0	10	2.6	5.0
45-49	38	4.8	10.8	19	4.6	11.6	19	5.0	10.0
50-54	63	7.9	18.7	44	10.6	22.2	19	5.0	15.0
55-59	91	11.4	30.2	43	10.4	32.5	48	12.6	27.6
60-64	105	13.2	43.3	54	13.0	45.5	51	13.4	40.9
65-69	125	15.7	59.0	65	15.7	61.2	60	15.7	56.7
70-74	120	15.1	74.1	60	14.5	75.7	60	15.7	72.4
75-79	103	12.9	87.1	52	12.5	88.2	51	13.4	85.8
80-84	71	8.9	96.0	35	8.4	96.6	36	9.4	95.3
85+	32	4.0	100.0	14	3.4	100.0	18	4.7	100.0
All ages	796	100.0		415	100.0		381	100.0	

Included in the statistics are 44.0% multiple primaries in males and 33.3% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2011

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=0 %	Females DCO rate n=0 %	Males Prop.all cancers n=132509 %	Females Prop.all cancers n=129521 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14			0.0	0.0				
15-19	2	1	0.2	0.1			0.7	0.4
20-24		1	0.0	0.1				0.2
25-29	1	2	0.1	0.1			0.1	0.2
30-34	5	1	0.3	0.1			0.4	0.1
35-39	9	4	0.4	0.2			0.5	0.1
40-44	12	10	0.5	0.5			0.4	0.2
45-49	19	19	1.0	1.0			0.4	0.3
50-54	44	19	2.6	1.1			0.6	0.2
55-59	43	48	2.8	2.9			0.3	0.4
60-64	54	51	3.5	3.2			0.3	0.3
65-69	65	60	4.8	4.0			0.3	0.4
70-74	59	60	5.7	4.9			0.3	0.4
75-79	52	51	7.7	5.1			0.3	0.3
80-84	35	36	8.6	4.5			0.3	0.3
85+	14	18	5.0	2.4			0.2	0.1
All ages	414	381			0.0	0.0	0.3	0.3
Incidence								
Raw			1.6	1.4				
WS			0.9	0.7				
ES			1.3	1.0				
BRD-S			1.7	1.2				

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 1998-2011
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C17	Small intestine	4	0.1	60.3	16.4	154.4	#	41.5	
C18	Colon	7	1.4	5.1	2.0	10.4	#	59.2	
C32	Larynx	2	0.1	13.5	1.6	48.9	#	19.5	
C33-C34	Lung	2	1.7	1.2	0.1	4.3		3.2	
C61	Prostate	8	4.0	2.0	0.9	4.0		42.7	
C64	Kidney	3	0.5	6.1	1.3	17.9	#	26.5	
C76-C79	CUP	3	0.2	12.4	2.6	36.2	#	29.1	
C82-C85	NHL	4	0.5	7.4	2.0	19.0	#	36.5	
C90	Mult. myeloma	2	0.2	11.5	1.4	41.5	#	19.3	
Other primaries		7	2.8	2.5	1.0	5.2	#	44.4	
Not observed		0	2.5	0.0	0.0	1.4		-26.9	
All mult. primaries		42	14.0	3.0	2.2	4.0	#	295.1	

Patients	290
Mean age at second malignancy (years)	70.1
Person-years	948
Mean observation time (years)	3.3
Median observation time (years)	2.7

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 1998-2011
FEMALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C18	Colon	3	1.1	2.8	0.6	8.1		20.4	
C19-C20	Rectum	2	0.5	4.2	0.5	15.1		16.2	
C25	Pancreas	3	0.5	6.3	1.3	18.3	#	26.8	
C50	Breast	4	3.3	1.2	0.3	3.1		7.5	
C54	Corpus uteri	2	0.6	3.3	0.4	11.8		14.7	
C64	Kidney	3	0.3	10.8	2.2	31.5	#	28.9	
C82-C85	NHL	2	0.4	4.9	0.6	17.6		16.9	
Other primaries		7	2.0	3.5	1.4	7.3	#	53.3	
Not observed		0	2.3	0.0	0.0	1.6		-24.1	
All mult. primaries		26	10.9	2.4	1.6	3.5	#	160.6	

Patients	269
Mean age at second malignancy (years)	72.0
Person-years	941
Mean observation time (years)	3.5
Median observation time (years)	3.1

The occurrence of second malignancy is statistically significant.

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

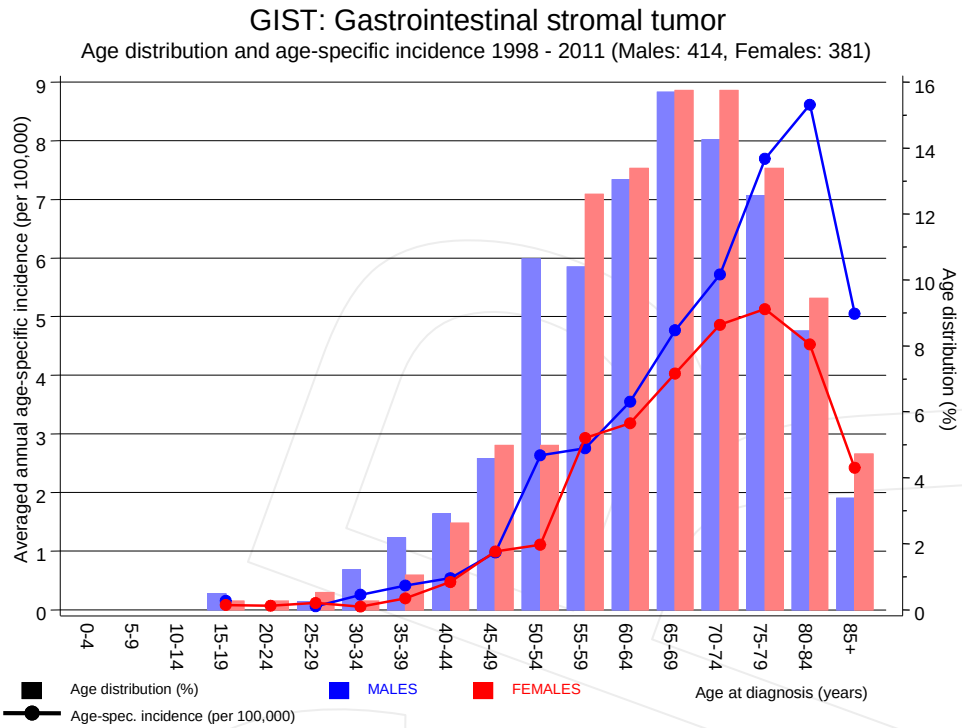


Figure 7. Age distribution and age-specific incidence

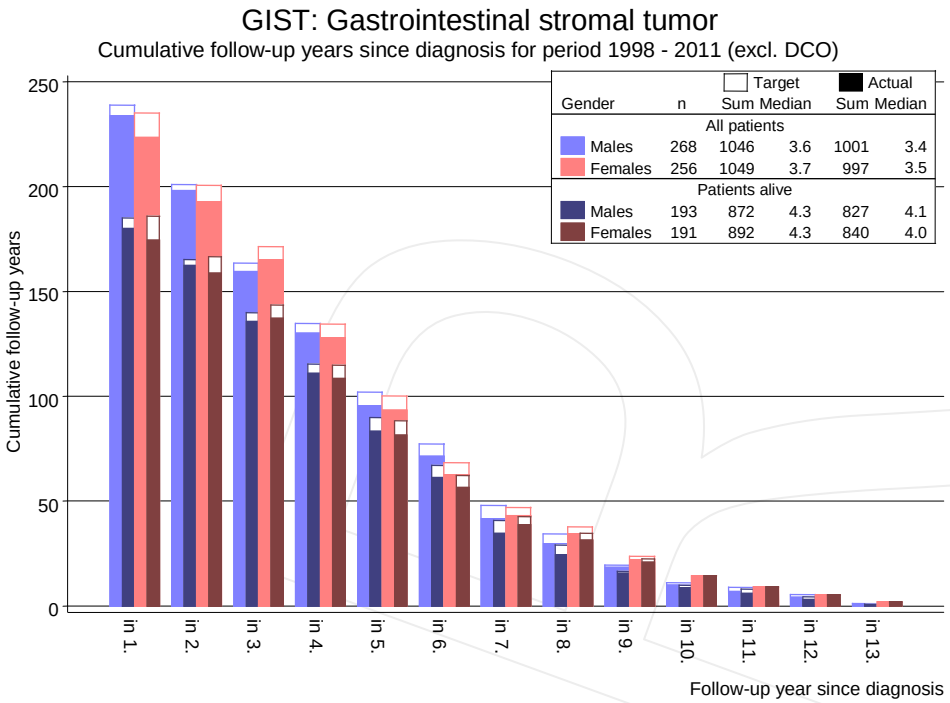
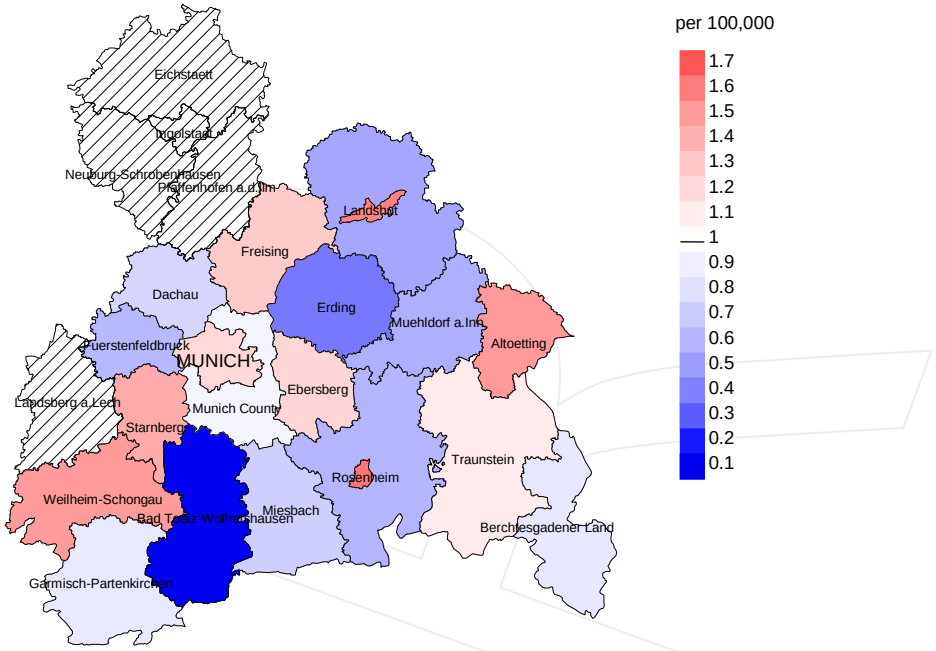


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

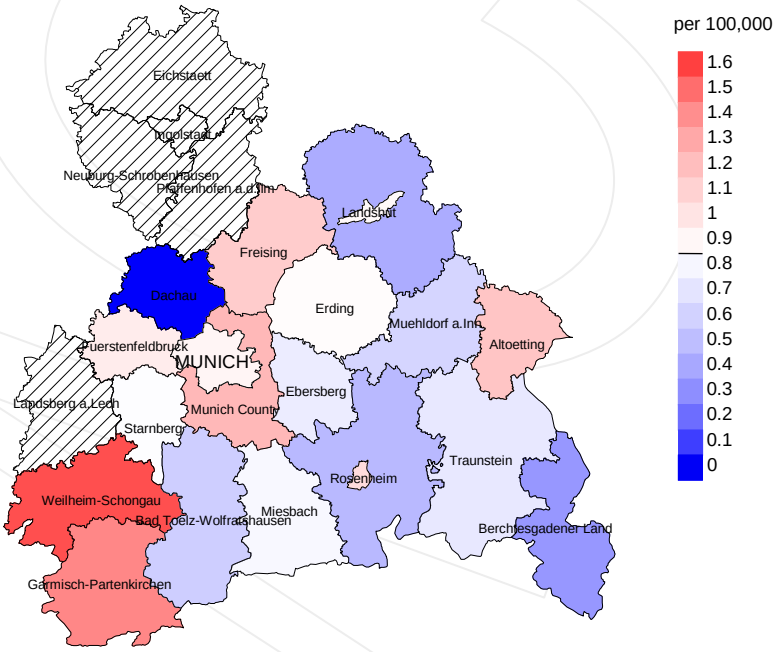
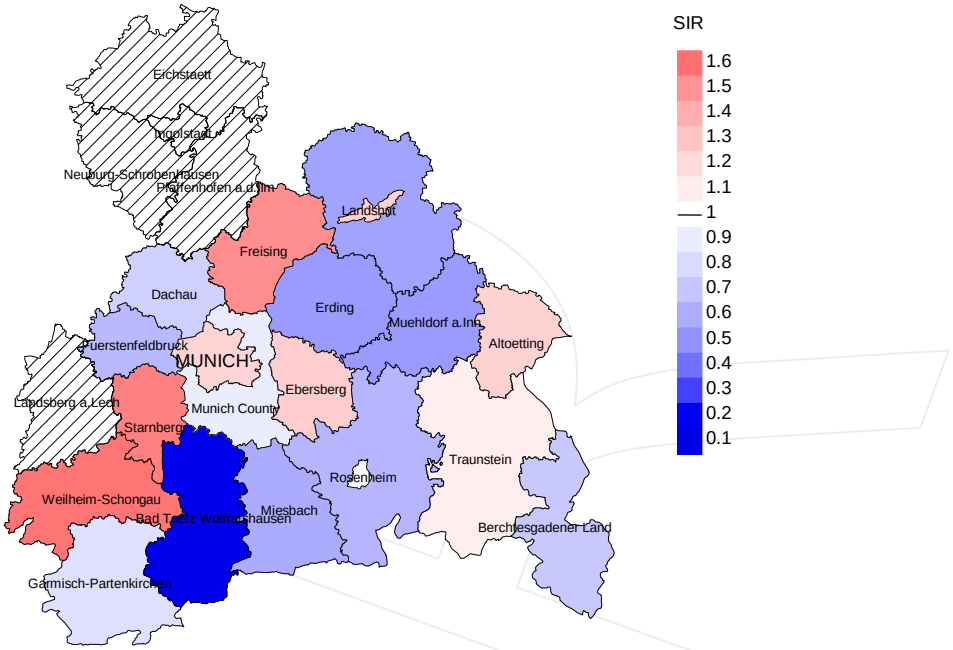


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.0/100,000 WS N=197, females 0.9/100,000 WS N=209). 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 6 women were identified with newly diagnosed gastroint. stromal tumor. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.7/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.2 and 2.2/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

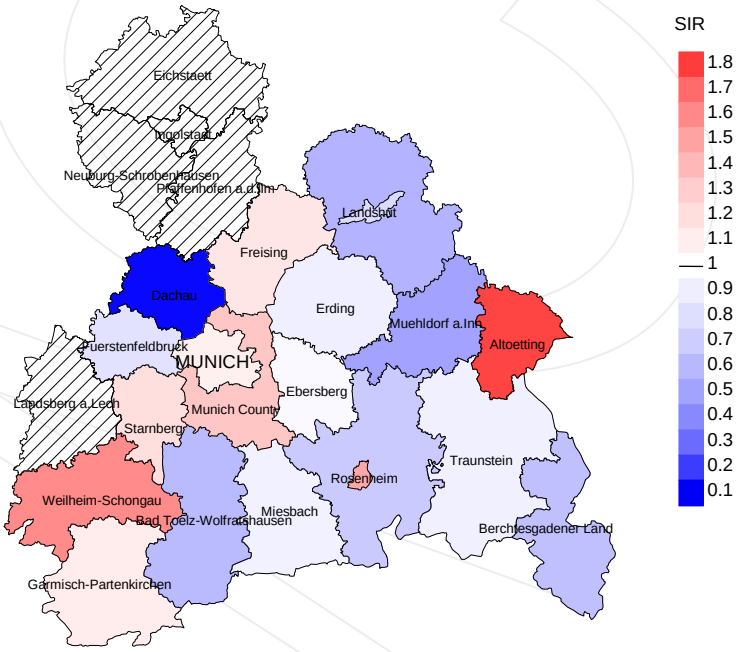


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=197, females N=209). 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 6 women were identified with newly diagnosed gastroint. stromal tumor. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.97. Though, the value of this parameter may vary with an underlying probability of 99% between 0.25 and 2.53, 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	4	100.0		4	100.0	100.0
1999	8	100.0		6	75.0	66.7
2000	18	94.4		11	61.1	100.0
2001	28	100.0		15	53.6	80.0
2002	48	97.9		28	58.3	96.4
2003	49	98.0		18	36.7	100.0
2004	73	95.9		33	45.2	93.9
2005	67	92.5		24	35.8	95.8
2006	62	88.7		11	17.7	100.0
2007	90	72.2		21	23.3	100.0
2008	90	62.2		16	17.8	93.8
2009	93	59.1		16	17.2	100.0
2010	93	94.6		14	15.1	100.0
2011	73	80.8		1	1.4	100.0
1998-2011	796	83.2		218	27.4	95.4

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 4.52 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	4	1	100.0	1	25.0
1999	8	1	100.0		
2000	18	3	66.7	2	11.1
2001	28	5	100.0	2	7.1
2002	48	12	100.0	6	12.5
2003	49	13	92.3	2	4.1
2004	73	23	82.6	10	13.7
2005	67	21	95.2	5	7.5
2006	62	18	94.4	2	3.2
2007	90	22	95.5	5	5.6
2008	90	28	100.0	4	4.4
2009	93	23	100.0	6	6.5
2010	93	32	93.8	6	6.5
2011	73	20	95.0	1	1.4
1998-2011	796	222	94.6	52	6.5

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	1		100.0	100.0
1999	1	100.0		100.0
2000	3	33.3	66.7	100.0
2001	5	100.0		100.0
2002	12	58.3	41.7	66.7
2003	13	76.9	23.1	91.7
2004	23	65.2	34.8	89.5
2005	21	81.0	19.0	80.0
2006	18	61.1	38.9	70.6
2007	22	77.3	22.7	81.0
2008	28	85.7	14.3	85.7
2009	23	65.2	34.8	73.9
2010	32	62.5	37.5	76.7
2011	20	75.0	25.0	73.7
1998-2011	222	71.2	28.8	80.0

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	1	87.6		87.6	87.6
1999					
2000	2	84.4	79.2	89.5	79.2
2001	3	71.1	71.1		71.1
2002	6	79.3	80.3	78.2	80.3
2003	9	69.5	73.2	62.2	71.7
2004	11	71.0	68.9	80.5	71.0
2005	9	71.1	70.6	72.8	72.9
2006	9	75.2	73.5	77.2	73.5
2007	13	67.6	66.2	75.1	66.2
2008	9	75.2	72.1	85.8	72.1
2009	11	75.2	73.0	81.2	73.0
2010	21	73.7	71.9	76.6	72.3
2011	9	79.0	76.6	81.9	77.2
1998-2011	113	73.5	71.7	77.7	72.2

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					
1999	1	77.8	77.8		77.8
2000	1	78.5		78.5	78.5
2001	2	60.2	60.2		60.2
2002	6	71.8	69.5	76.3	72.0
2003	4	64.5	64.5		64.5
2004	12	78.1	75.6	80.7	78.3
2005	12	69.4	69.6	68.3	69.6
2006	9	78.1	78.5	77.3	78.0
2007	9	76.5	71.4	86.5	72.6
2008	19	75.0	74.1	81.9	74.1
2009	12	79.7	74.4	87.1	76.0
2010	11	74.3	70.8	80.6	71.9
2011	11	68.9	68.9	68.8	67.0
1998-2011	109	74.2	71.9	80.5	72.4

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
1999									
2000	1	0.1	0.11	0.0	0.09	0.1	0.12	0.1	0.18
2001	3	0.3	0.18	0.2	0.19	0.2	0.18	0.3	0.16
2002	3	0.2	0.13	0.1	0.08	0.1	0.11	0.2	0.17
2003	6	0.3	0.27	0.2	0.20	0.2	0.25	0.4	0.34
2004	9	0.5	0.25	0.2	0.23	0.3	0.23	0.5	0.23
2005	7	0.4	0.22	0.2	0.19	0.3	0.23	0.4	0.27
2006	5	0.3	0.19	0.1	0.15	0.2	0.18	0.3	0.20
2007	11	0.5	0.22	0.3	0.20	0.4	0.21	0.5	0.21
2008	7	0.3	0.16	0.2	0.14	0.2	0.15	0.3	0.17
2009	8	0.4	0.17	0.2	0.14	0.2	0.14	0.4	0.17
2010	13	0.6	0.25	0.3	0.21	0.4	0.22	0.5	0.24
2011	5	0.2	0.10	0.1	0.08	0.1	0.08	0.2	0.11
1999-2011	78	0.3	0.20	0.2	0.17	0.2	0.18	0.3	0.21

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
1999	1	0.1	0.33	0.0	0.13	0.0	0.21	0.1	0.35
2000									
2001	2	0.2	0.18	0.1	0.18	0.1	0.18	0.1	0.17
2002	4	0.2	0.17	0.1	0.12	0.1	0.14	0.2	0.16
2003	4	0.2	0.15	0.1	0.16	0.2	0.16	0.2	0.14
2004	6	0.3	0.16	0.1	0.09	0.2	0.11	0.2	0.14
2005	10	0.5	0.29	0.2	0.30	0.3	0.31	0.4	0.31
2006	6	0.3	0.17	0.1	0.11	0.2	0.12	0.2	0.15
2007	6	0.3	0.15	0.1	0.13	0.2	0.14	0.2	0.14
2008	17	0.7	0.37	0.3	0.30	0.4	0.33	0.5	0.34
2009	7	0.3	0.16	0.1	0.13	0.2	0.14	0.3	0.16
2010	7	0.3	0.17	0.1	0.14	0.2	0.14	0.3	0.16
2011	10	0.4	0.40	0.2	0.37	0.3	0.35	0.3	0.36
1999-2011	80	0.3	0.22	0.1	0.18	0.2	0.19	0.3	0.20

Table 13

Age distribution of age at death (cancer-related) for period 1999-2011
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
25-29	1	0.6	0.6			0.0	1	1.3	1.3
30-34	0	0.0	0.6			0.0			1.3
35-39	1	0.6	1.3	1	1.3	1.3			1.3
40-44	2	1.3	2.5			1.3	2	2.5	3.8
45-49	5	3.1	5.7	2	2.5	3.8	3	3.8	7.5
50-54	5	3.1	8.8	2	2.5	6.3	3	3.8	11.3
55-59	10	6.3	15.1	5	6.3	12.7	5	6.3	17.5
60-64	15	9.4	24.5	7	8.9	21.5	8	10.0	27.5
65-69	24	15.1	39.6	15	19.0	40.5	9	11.3	38.8
70-74	27	17.0	56.6	16	20.3	60.8	11	13.8	52.5
75-79	23	14.5	71.1	10	12.7	73.4	13	16.3	68.8
80-84	29	18.2	89.3	17	21.5	94.9	12	15.0	83.8
85+	17	10.7	100.0	4	5.1	100.0	13	16.3	100.0
All ages	159	100.0		79	100.0		80	100.0	

Included in the statistics are 44.0% multiple primaries in males and 33.3% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1999-2011
(**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		1	0.0		0.1	0.53		1.0
30-34			0.0		0.0			
35-39	1		0.0	0.12	0.0		0.3	
40-44		2	0.0		0.1	0.21		0.2
45-49	2	3	0.1	0.11	0.2	0.16	0.1	0.2
50-54	2	3	0.1	0.05	0.2	0.17	0.1	0.1
55-59	5	5	0.3	0.12	0.3	0.11	0.1	0.1
60-64	7	8	0.5	0.14	0.5	0.16	0.1	0.1
65-69	15	9	1.1	0.24	0.6	0.16	0.1	0.1
70-74	16	11	1.6	0.28	0.9	0.19	0.1	0.1
75-79	10	13	1.5	0.20	1.4	0.27	0.1	0.1
80-84	17	12	4.3	0.50	1.6	0.34	0.2	0.1
85+	4	13	1.5	0.30	1.8	0.76	0.1	0.1
All ages	79	80					0.1	0.1
Mortality								
Raw			0.3	0.20	0.3	0.22		
WS			0.2	0.17	0.1	0.18		
ES			0.2	0.18	0.2	0.19		
BRD-S			0.3	0.21	0.3	0.20		
PYLL-70								
per 100,000			1.2		1.7			
ES			1.1		1.5			
AYLL-70			8.3		11.7			

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

Table 15a

Multiple primaries in deaths in period 1999-2011
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	1	1.8	1	100.0				
C16 Stomach	5	8.9			4	80.0	1	20.0
C17 Small intestine	5	8.9			3	60.0	2	40.0
C18 Colon	6	10.7			3	50.0	3	50.0
C19-C20 Rectum	4	7.1			2	50.0	2	50.0
C21 Anus/canal	1	1.8					1	100.0
C22 Liver	1	1.8			1	100.0		
C25 Pancreas	4	7.1	1	25.0	3	75.0		
C32 Larynx	2	3.6	2	100.0				
C33-C34 Lung	4	7.1	2	50.0	2	50.0		
C38,C45 Mesothelioma	1	1.8					1	100.0
C43 Malign. melanoma	2	3.6	2	100.0				
C44 Skin others	1	1.8					1	100.0
C61 Prostate	8	14.3	7	87.5			1	12.5
C64 Kidney	2	3.6	1	50.0	1	50.0		
C67 Bladder	1	1.8	1	100.0				
C76-C79 CUP	1	1.8			1	100.0		
C82-C85 NHL	3	5.4	1	33.3			2	66.7
C90 Mult. myeloma	1	1.8					1	100.0
C91-C96 Leukaemia	3	5.4	1	33.3			2	66.7
All mult. primaries	56	100.0	19	33.9	20	35.7	17	30.4

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 15b

Multiple primaries in deaths in period 1999-2011
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	7	17.1			6	85.7	1	14.3
C17	Small intestine	3	7.3			2	66.7	1	33.3
C18	Colon	2	4.9			1	50.0	1	50.0
C25	Pancreas	5	12.2			1	20.0	4	80.0
C33-C34	Lung	4	9.8	2	50.0	1	25.0	1	25.0
C43	Malign. melanoma	1	2.4					1	100.0
C46,C49	Soft tissue	2	4.9			1	50.0	1	50.0
C50	Breast	10	24.4	8	80.0			2	20.0
C53	Cervix uteri	1	2.4	1	100.0				
C56	Ovary	3	7.3			3	100.0		
C70-C72	CNS cancer	2	4.9	2	100.0				
C74-C80	Cancer others	1	2.4					1	100.0
All mult. primaries		41	100.0	13	31.7	15	36.6	13	31.7

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

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers for period 2000-2011
(**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			0.0		0.0			
35-39	1		0.1	0.14	0.0		0.3	
40-44		2	0.0		0.1	0.24		0.2
45-49		3	0.0		0.2	0.19		0.2
50-54	2	2	0.1	0.05	0.1	0.12	0.1	0.1
55-59	3	4	0.2	0.10	0.3	0.12	0.1	0.1
60-64	4	5	0.3	0.12	0.3	0.13	0.1	0.1
65-69	10	5	0.8	0.22	0.4	0.13	0.1	0.1
70-74	8	5	0.8	0.29	0.4	0.12	0.1	0.1
75-79	4	9	0.6	0.13	1.0	0.26	0.0	0.1
80-84	9	8	2.3	0.43	1.1	0.36	0.1	0.1
85+	3	9	1.2	0.47	1.3	0.62	0.1	0.1
All ages	44	52					0.1	0.1
Mortality								
Raw			0.2	0.16	0.2	0.19		
WS			0.1	0.13	0.1	0.15		
ES			0.1	0.15	0.1	0.16		
BRD-S			0.2	0.17	0.2	0.18		
PYLL-70								
per 100,000			0.8		1.3			
ES			0.7		1.1			
AYLL-70			8.0		12.3			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2000-2011
(**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			0.0		0.0			
35-39	1		0.1	0.14	0.0		0.3	
40-44		1	0.0		0.1	0.14		0.1
45-49		2	0.0		0.1	0.13		0.1
50-54	2	2	0.1	0.05	0.1	0.13	0.1	0.1
55-59	3	4	0.2	0.12	0.3	0.12	0.1	0.1
60-64	4	4	0.3	0.12	0.3	0.11	0.1	0.1
65-69	8	5	0.6	0.20	0.4	0.14	0.1	0.1
70-74	7	4	0.7	0.30	0.4	0.11	0.1	0.1
75-79	4	9	0.6	0.14	1.0	0.28	0.1	0.1
80-84	6	6	1.6	0.33	0.8	0.28	0.1	0.1
85+	2	9	0.8	0.31	1.3	0.62	0.0	0.1
All ages	37	46					0.1	0.1
Mortality								
Raw			0.2	0.15	0.2	0.18		
WS			0.1	0.12	0.1	0.14		
ES			0.1	0.13	0.1	0.15		
BRD-S			0.2	0.15	0.2	0.17		
PYLL-70								
per 100,000			0.7		1.0			
ES			0.7		0.8			
AYLL-70			8.6		11.1			

* See corresponding tables with multiple primaries.

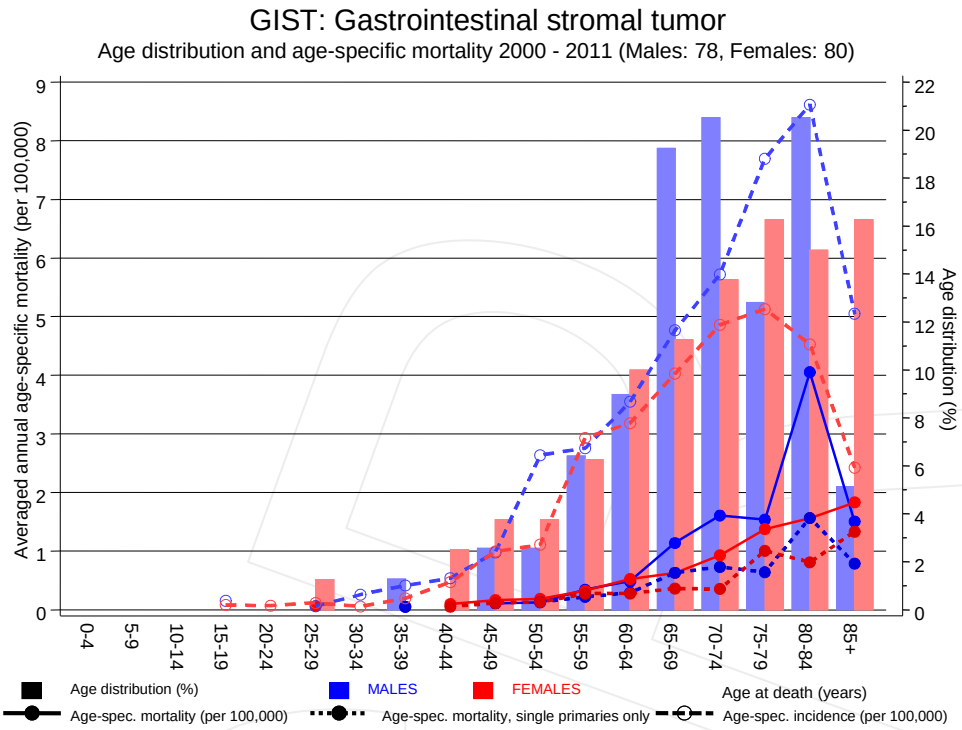
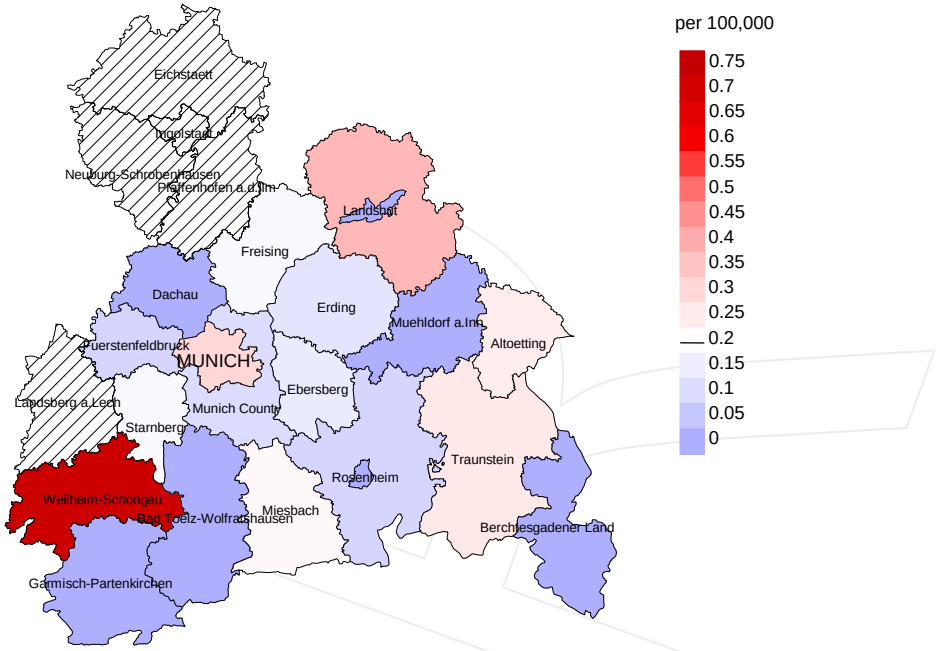


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



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

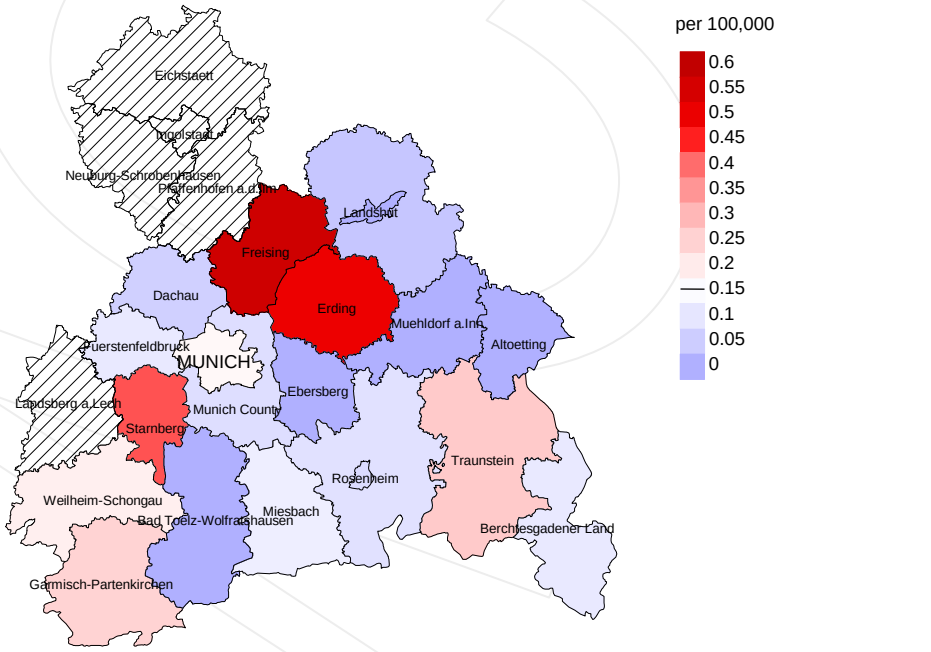
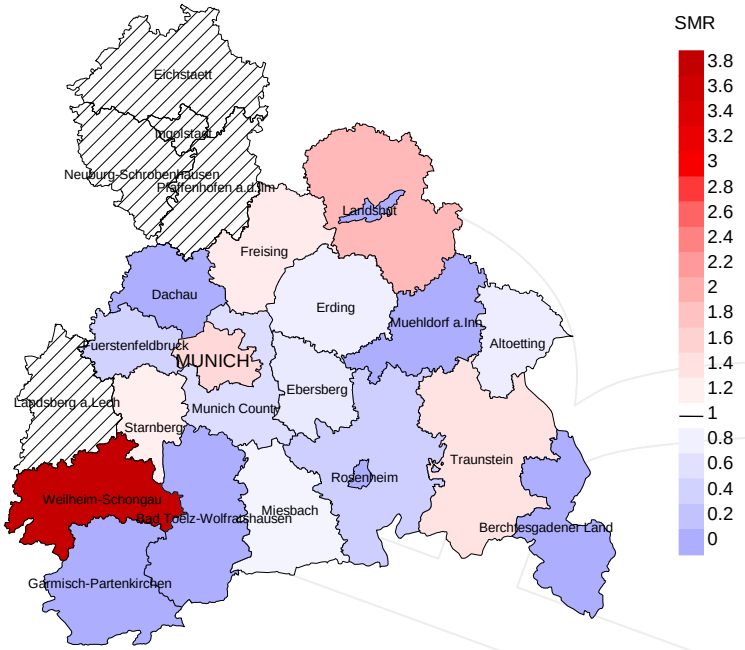


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.2/100,000 WS N=45, females 0.2/100,000 WS N=46). 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 0 women died from gastroint. stromal tumor. 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 1.4/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

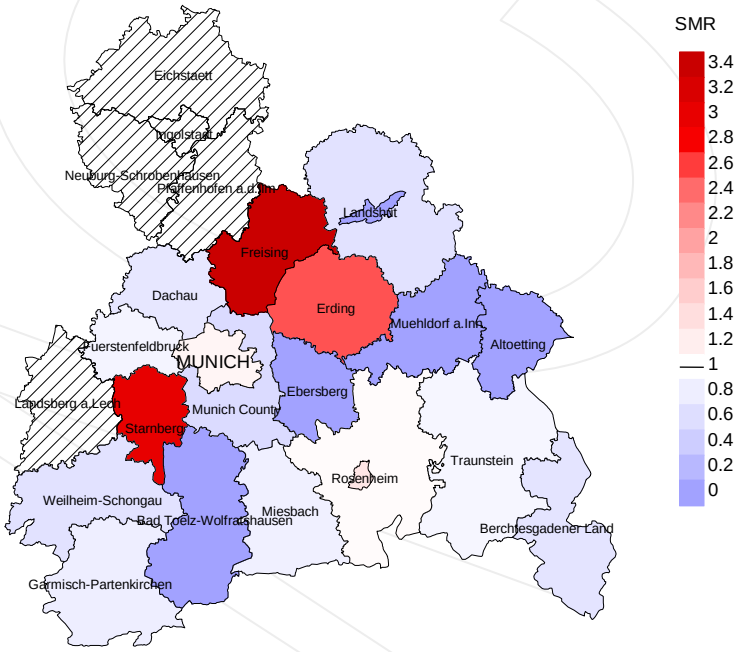


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=45, females N=46). 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 0 women died from gastroint. stromal tumor. 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 3.99, 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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