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

C45: Mesothelioma

Year of diagnosis	1998-2011
Patients	977
Diseases	979
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C45__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, 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.

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	40	9	22.5	10.0	100.0	100.0
1999	33	7	21.2	6.1	100.0	100.0
2000	41	20	48.8	9.8	97.6	100.0
2001	45	10	22.2	11.1	97.8	100.0
2002	60	18	30.0	16.7	95.0	100.0
2003	63	12	19.0	17.5	95.2	100.0
2004	81	10	12.3	13.6	96.3	98.8
2005	76	8	10.5	21.1	94.7	97.4
2006	74	8	10.8	21.6	94.6	97.3
2007	102	5	4.9	21.6	88.2	97.1 ##
2008	101	7	6.9	19.8	93.1	95.0
2009	86	5	5.8	23.3	83.7	94.2
2010	93	9	9.7	26.9	75.3	94.6
2011	84	5	6.0	23.8	51.2	81.0 ###
1998-2011	979	133	13.6	19.0	88.2	96.0

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	40	29	11	72.5
1999	33	25	8	75.8
2000	41	32	9	78.0
2001	45	30	15	66.7
2002	60	45	15	75.0
2003	63	50	13	79.4
2004	81	71	10	87.7
2005	76	57	19	75.0
2006	74	60	14	81.1
2007	102	81	21	79.4
2008	101	81	20	80.2
2009	86	70	16	81.4
2010	93	72	21	77.4
2011	84	67	17	79.8
1998-2011	979	770	209	78.7

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	29	11	2.6	0.9	1.6	0.5	2.3	0.7	2.9	0.9
1999	25	8	2.2	0.7	1.3	0.4	2.0	0.5	2.5	0.6
2000	32	9	2.8	0.7	1.7	0.3	2.5	0.5	3.2	0.6
2001	30	15	2.6	1.2	1.6	0.6	2.3	0.9	2.7	1.1
2002	45	15	2.4	0.8	1.4	0.4	2.0	0.6	2.7	0.7
2003	50	13	2.7	0.7	1.5	0.3	2.2	0.4	2.8	0.5
2004	71	10	3.8	0.5	2.0	0.3	2.9	0.4	3.7	0.5
2005	57	19	3.0	1.0	1.6	0.5	2.3	0.6	3.1	0.8
2006	60	14	3.1	0.7	1.6	0.3	2.4	0.4	3.2	0.6
2007	81	21	3.7	0.9	1.8	0.4	2.8	0.6	3.7	0.8
2008	81	20	3.6	0.9	1.8	0.3	2.6	0.5	3.4	0.6
2009	70	16	3.1	0.7	1.5	0.2	2.2	0.4	3.0	0.5
2010	72	21	3.2	0.9	1.5	0.4	2.3	0.6	3.0	0.7
2011	67	17	3.0	0.7	1.3	0.2	2.1	0.4	2.9	0.6
1998-2011	770	209	3.1	0.8	1.6	0.3	2.4	0.5	3.1	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	40	66.8	10.3	48.8	89.2	54.5	59.1	66.1	71.4	84.0
1999	33	67.5	9.3	47.8	86.4	56.1	61.4	67.7	74.3	80.6
2000	41	67.9	15.9	8.5	92.8	55.9	59.3	66.2	78.7	88.4
2001	45	66.0	9.8	45.6	85.4	54.5	57.7	65.6	72.9	79.8
2002	60	67.7	12.5	27.9	88.5	49.6	60.9	66.0	76.2	84.7
2003	63	69.6	10.9	30.7	91.2	58.1	62.1	69.8	77.7	82.6
2004	81	69.9	8.1	44.9	90.1	61.9	65.1	68.8	73.7	81.5
2005	76	69.6	10.3	38.5	88.3	57.5	63.8	70.5	76.7	83.4
2006	74	70.1	9.9	40.6	87.8	57.0	64.9	71.2	77.8	81.7
2007	102	69.4	9.4	40.3	92.4	55.4	64.6	70.4	76.1	79.6
2008	101	71.9	8.8	42.4	88.1	61.9	67.4	71.8	77.2	84.2
2009	86	71.4	9.7	43.8	88.9	59.5	65.2	70.5	79.8	83.5
2010	93	71.1	10.1	36.2	93.6	57.3	66.8	71.9	77.8	83.1
2011	84	72.9	8.4	52.5	87.3	61.2	67.0	73.4	79.3	83.9
1998-2011	979	69.9	10.2	8.5	93.6	57.3	64.0	70.3	77.1	82.8

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	29	67.0	9.9	49.4	89.2	56.7	59.5	66.2	70.5	84.0
1999	25	67.1	9.1	50.8	86.4	56.1	60.9	67.3	74.1	80.6
2000	32	67.6	15.8	8.5	92.8	55.9	59.1	65.6	78.4	85.9
2001	30	64.0	9.3	45.6	83.2	51.5	57.1	64.0	69.1	77.3
2002	45	68.4	11.2	46.4	88.4	50.3	61.8	66.3	75.8	84.5
2003	50	68.5	10.5	30.7	90.3	58.0	62.1	69.6	74.8	80.6
2004	71	70.3	7.7	44.9	90.1	63.1	65.5	68.9	73.7	81.5
2005	57	69.9	9.4	45.1	86.8	57.5	64.5	70.5	76.5	83.4
2006	60	69.6	9.2	46.6	87.8	57.1	64.5	69.7	76.9	80.8
2007	81	70.1	8.8	44.4	92.4	58.2	64.8	70.6	76.1	79.6
2008	81	71.2	7.7	48.5	88.1	61.9	66.4	71.0	74.7	82.3
2009	70	70.4	9.6	43.8	88.9	58.6	65.1	70.3	79.5	81.8
2010	72	71.3	9.1	46.1	91.8	58.9	66.9	71.6	77.6	83.1
2011	67	72.0	8.3	52.5	87.0	58.9	66.4	72.8	78.7	83.5
1998-2011	770	69.7	9.5	8.5	92.8	57.8	64.1	69.9	76.5	81.9

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	11	66.3	12.1	48.8	85.2	53.1	55.9	66.0	76.8	84.0
1999	8	68.8	10.6	47.8	81.3	47.8	63.7	70.7	76.0	81.3
2000	9	69.0	17.4	35.6	90.6	35.6	59.8	71.6	81.4	90.6
2001	15	69.9	9.7	54.5	85.4	56.4	64.4	70.0	79.8	83.6
2002	15	65.5	16.0	27.9	88.5	48.9	57.4	63.8	79.1	85.6
2003	13	74.0	11.6	57.3	91.2	58.1	62.7	77.8	82.6	88.3
2004	10	67.1	10.8	53.1	84.7	53.5	57.5	66.8	76.6	81.7
2005	19	68.5	12.9	38.5	88.3	39.9	62.8	70.9	77.1	84.2
2006	14	72.2	12.5	40.6	86.6	57.0	65.9	76.5	79.6	83.9
2007	21	66.8	11.5	40.3	81.1	49.8	64.6	68.8	76.0	79.3
2008	20	74.6	12.1	42.4	87.8	56.2	70.0	75.7	83.2	86.9
2009	16	75.8	9.0	62.3	87.1	63.3	66.8	77.1	84.0	86.9
2010	21	70.4	13.4	36.2	93.6	54.6	65.3	72.1	78.1	82.2
2011	17	76.3	7.9	57.9	87.3	66.6	71.3	77.2	83.9	85.2
1998-2011	209	70.6	12.2	27.9	93.6	54.5	63.3	71.9	79.8	85.2

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.%
5-9	1	0.1	0.1	1	0.1	0.1			0.0
10-14	0	0.0	0.1			0.1			0.0
15-19	0	0.0	0.1			0.1			0.0
20-24	0	0.0	0.1			0.1			0.0
25-29	1	0.1	0.2			0.1	1	0.5	0.5
30-34	1	0.1	0.3	1	0.1	0.3			0.5
35-39	4	0.4	0.7			0.3	4	1.9	2.4
40-44	8	0.8	1.5	4	0.5	0.8	4	1.9	4.3
45-49	20	2.0	3.6	14	1.8	2.6	6	2.9	7.2
50-54	35	3.6	7.2	28	3.6	6.2	7	3.3	10.5
55-59	72	7.4	14.5	58	7.5	13.8	14	6.7	17.2
60-64	137	14.0	28.5	113	14.7	28.4	24	11.5	28.7
65-69	199	20.3	48.8	169	21.9	50.4	30	14.4	43.1
70-74	199	20.3	69.2	166	21.6	71.9	33	15.8	58.9
75-79	141	14.4	83.6	106	13.8	85.7	35	16.7	75.6
80-84	110	11.2	94.8	80	10.4	96.1	30	14.4	90.0
85+	51	5.2	100.0	30	3.9	100.0	21	10.0	100.0
All ages	979	100.0		770	100.0		209	100.0	

Included in the statistics are 21.6% multiple primaries in males and 20.6% 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=97 %	Females DCO rate n=36 %	Males Prop.all cancers n=132509 %	Females Prop.all cancers n=129521 %
0- 4			0.0	0.0				
5- 9	1		0.1	0.0			0.6	
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				0.1
30-34	1		0.1	0.0			0.1	
35-39		4	0.0	0.2				0.1
40-44	4	4	0.2	0.2			0.1	0.1
45-49	14	6	0.7	0.3	7.1	16.7	0.3	0.1
50-54	28	7	1.7	0.4	3.6	14.3	0.4	0.1
55-59	58	14	3.7	0.9	12.1	21.4	0.5	0.1
60-64	113	24	7.4	1.5	11.5	12.5	0.6	0.2
65-69	169	30	12.4	2.0	11.2	6.7	0.7	0.2
70-74	166	33	16.1	2.7	9.0	12.1	0.8	0.2
75-79	106	35	15.7	3.5	17.0	11.4	0.6	0.2
80-84	80	30	19.7	3.8	16.3	26.7	0.7	0.2
85+	30	21	10.8	2.8	33.3	47.6	0.4	0.1
All ages	770	209			12.6	17.2	0.6	0.2
Incidence								
Raw			3.1	0.8				
WS			1.6	0.3				
ES			2.4	0.5				
BRD-S			3.1	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 1998-2011
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C18 Colon	3	1.3	2.4	0.5	7.0		23.6	
C33-C34 Lung	10	1.6	6.4	3.1	11.8	#	114.1	90.0
C43 Malign. melanoma	2	0.5	4.1	0.5	14.8		20.4	50.0
C61 Prostate	4	3.9	1.0	0.3	2.6		0.9	25.0
C64 Kidney	2	0.5	4.3	0.5	15.6		20.8	
Other primaries	7	2.2	3.1	1.3	6.5	#	64.4	14.3
Not observed	0	3.0	0.0	0.0	1.2		-41.0	
All mult. primaries	28	13.0	2.2	1.4	3.1	#	203.1	42.9

Patients	534
Mean age at second malignancy (years)	71.8
Person-years	740
Mean observation time (years)	1.4
Median observation time (years)	1.0

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 %
C33-C34 Lung	2	0.1	14.8	1.8	53.3 #	101.1	100.0
Other primaries	2	0.2	10.6	1.3	38.3 #	98.2	
Not observed	0	1.5	0.0	0.0	2.4	-83.0	
All mult. primaries	4	1.9	2.2	0.6	5.5	116.4	50.0

Patients	137
Mean age at second malignancy (years)	69.5
Person-years	184
Mean observation time (years)	1.3
Median observation time (years)	0.7

The occurrence of second malignancy is statistically significant.

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

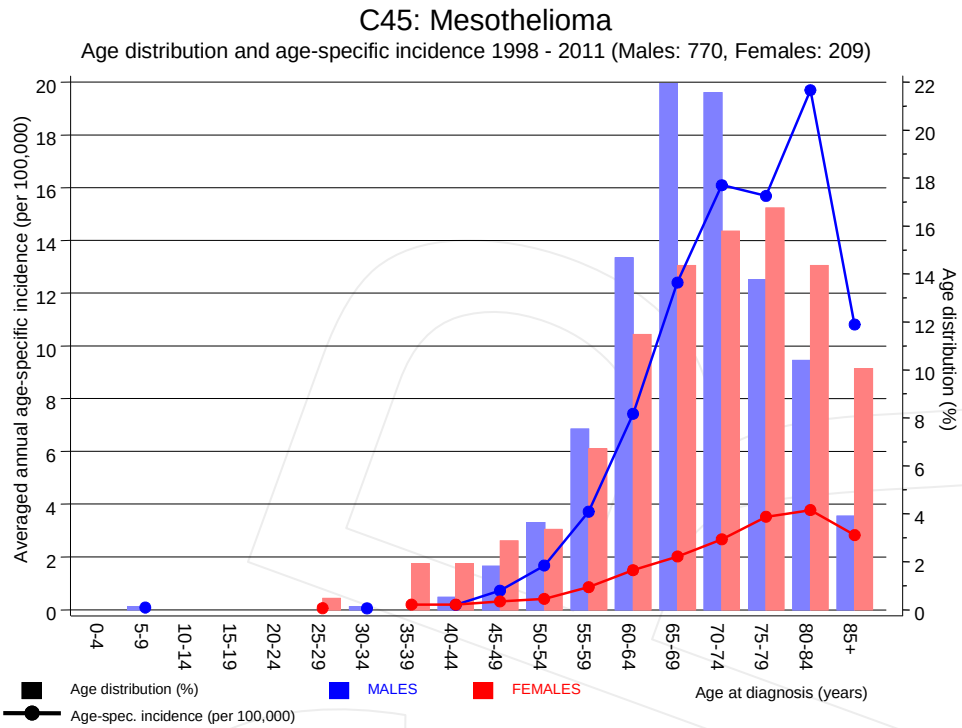


Figure 7. Age distribution and age-specific incidence

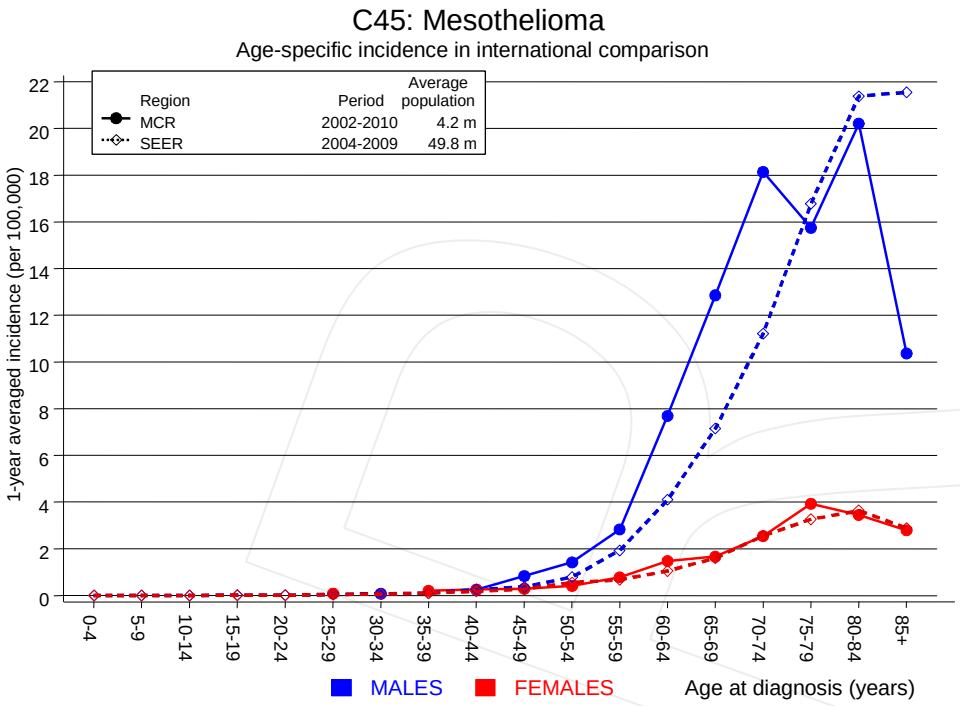


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

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.

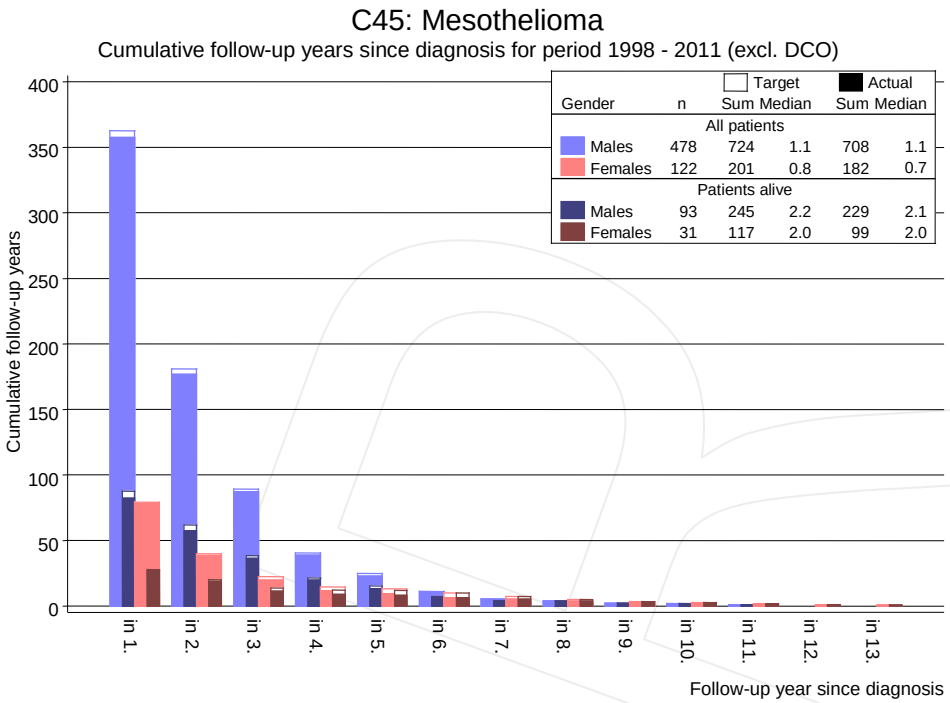
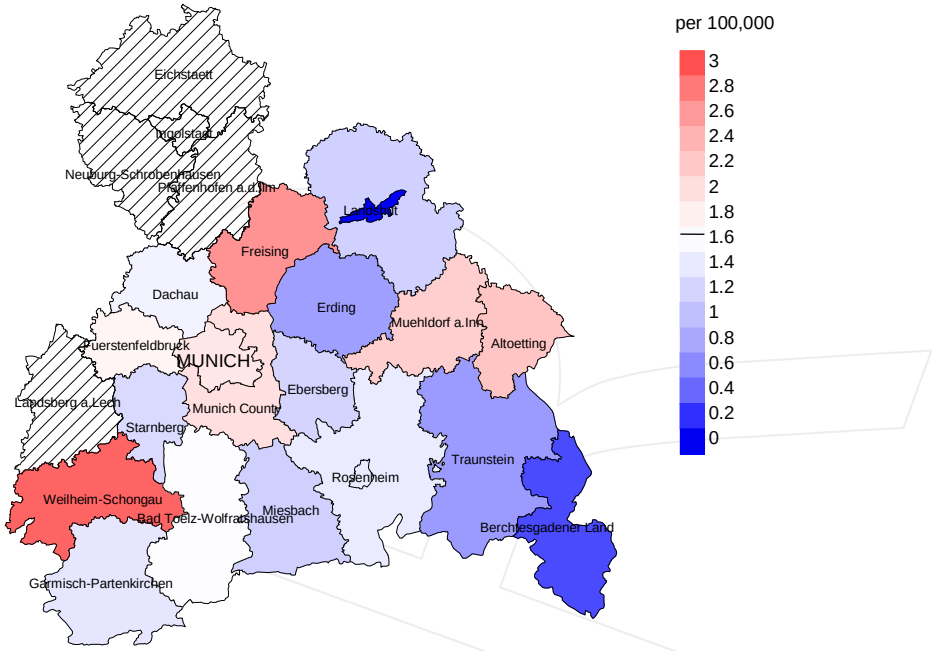


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

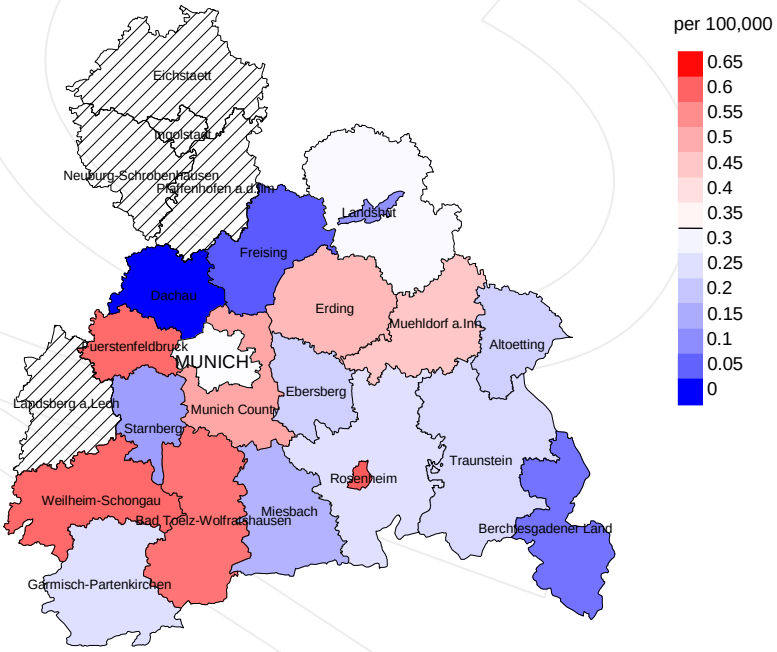
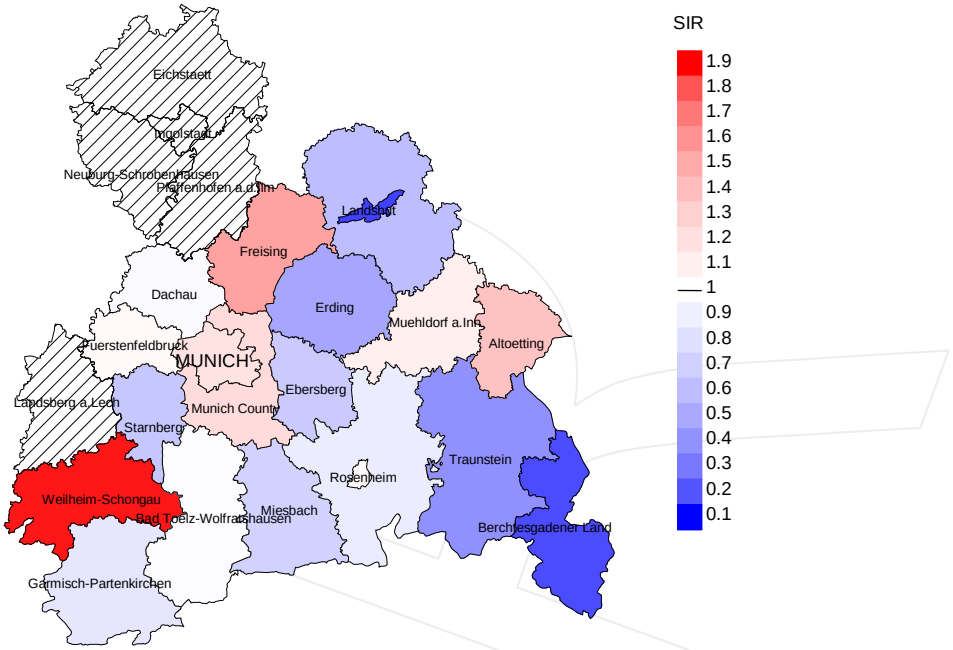


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.6/100,000 WS N=372, females 0.3/100,000 WS N=91). 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 mesothelioma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.0/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

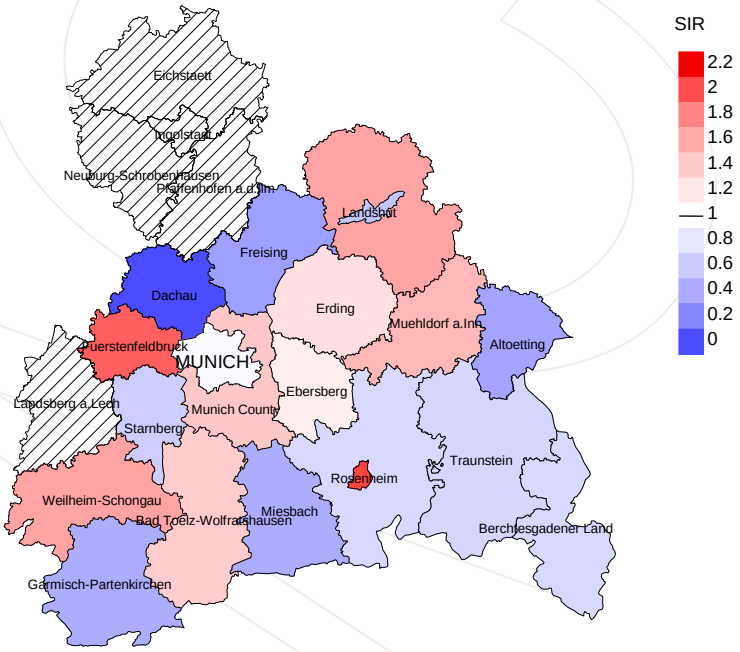


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=372, females N=91). 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 mesothelioma. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.12. Though, the value of this parameter may vary with an underlying probability of 99% between 0.13 and 4.11, 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	40	100.0	22.5	40	100.0	92.5
1999	33	100.0	21.2	33	100.0	93.9
2000	41	100.0	48.8	40	97.6	95.0
2001	45	100.0	22.2	44	97.8	90.9
2002	60	100.0	30.0	57	95.0	98.2
2003	63	100.0	19.0	60	95.2	95.0
2004	81	98.8	12.3	78	96.3	96.2
2005	76	97.4	10.5	72	94.7	100.0
2006	74	97.3	10.8	70	94.6	98.6
2007	102	97.1	4.9	90	88.2	97.8
2008	101	95.0	6.9	94	93.1	98.9
2009	86	94.2	5.8	72	83.7	95.8
2010	93	94.6	9.7	70	75.3	97.1
2011	84	81.0	6.0	43	51.2	97.7
1998-2011	979	96.0	13.6	863	88.2	96.8

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	40	39	94.9	22	55.0
1999	33	28	92.9	12	36.4
2000	41	40	95.0	17	41.5
2001	45	38	94.7	19	42.2
2002	60	51	96.1	25	41.7
2003	63	44	93.2	24	38.1
2004	81	59	96.6	25	30.9
2005	76	61	96.7	24	31.6
2006	74	68	98.5	23	31.1
2007	102	73	95.9	28	27.5
2008	101	94	98.9	36	35.6
2009	86	72	98.6	20	23.3
2010	93	89	96.6	30	32.3
2011	84	87	98.9	27	32.1
1998-2011	979	843	96.8	332	33.9

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	39	87.2	12.8	97.3
1999	28	92.9	7.1	100.0
2000	40	92.5	7.5	100.0
2001	38	89.5	10.5	100.0
2002	51	94.1	5.9	100.0
2003	44	90.9	9.1	100.0
2004	59	89.8	10.2	98.2
2005	61	96.7	3.3	94.9
2006	68	97.1	2.9	98.5
2007	73	93.2	6.8	100.0
2008	94	97.9	2.1	100.0
2009	72	97.2	2.8	100.0
2010	89	95.5	4.5	98.8
2011	87	94.3	5.7	100.0
1998-2011	843	94.2	5.8	99.1

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	31	66.8	67.0	65.7	66.9
1999	22	69.3	69.3		69.3
2000	27	69.8	69.1	79.6	70.0
2001	26	66.3	67.7	56.0	66.8
2002	42	68.0	68.5	57.9	68.1
2003	36	67.4	67.0	73.3	67.0
2004	47	69.6	70.2	65.2	71.0
2005	54	71.0	71.2	66.2	71.5
2006	56	72.3	73.0	55.1	72.8
2007	61	70.7	70.8	68.3	70.5
2008	75	69.9	69.9	69.3	69.9
2009	58	71.3	71.4	69.6	71.8
2010	69	73.5	73.4	75.4	73.7
2011	76	74.0	73.6	79.5	74.0
1998-2011	680	70.6	70.8	68.4	70.9

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

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	8	72.2	70.2	85.6	72.2
1999	6	60.2	62.8	55.0	62.8
2000	13	73.7	73.6	75.2	73.6
2001	12	72.5	73.6	60.9	73.6
2002	9	68.6	67.1	80.3	67.1
2003	8	75.8	74.2	80.5	75.4
2004	12	65.9	65.9		64.1
2005	7	71.9	71.9		71.9
2006	12	73.4	73.4		73.4
2007	12	72.2	73.7	64.9	73.4
2008	19	68.9	68.9		68.9
2009	14	76.3	76.3		76.3
2010	20	75.9	75.9		75.9
2011	11	76.7	76.7		76.7
1998-2011	163	72.2	72.3	70.3	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
1998	27	2.4	0.93	1.5	0.93	2.2	0.93	2.6	0.91
1999	22	2.0	0.88	1.2	0.88	1.7	0.89	2.2	0.90
2000	25	2.2	0.78	1.3	0.76	2.0	0.78	2.5	0.79
2001	23	2.0	0.77	1.2	0.72	1.7	0.72	2.1	0.76
2002	40	2.1	0.89	1.2	0.87	1.8	0.89	2.3	0.86
2003	34	1.8	0.68	1.0	0.70	1.5	0.68	1.9	0.68
2004	41	2.2	0.58	1.1	0.58	1.7	0.59	2.3	0.61
2005	52	2.7	0.91	1.4	0.88	2.1	0.90	2.8	0.90
2006	54	2.8	0.90	1.3	0.82	2.0	0.85	3.0	0.93
2007	58	2.6	0.72	1.3	0.70	1.9	0.70	2.6	0.70
2008	73	3.3	0.90	1.6	0.92	2.4	0.93	3.2	0.95
2009	56	2.5	0.80	1.1	0.77	1.7	0.78	2.3	0.77
2010	65	2.9	0.90	1.3	0.87	2.0	0.89	2.8	0.94
2011	71	3.2	1.06	1.3	0.99	2.1	1.02	3.1	1.08
1998-2011	641	2.6	0.83	1.3	0.81	2.0	0.83	2.6	0.84

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	7	0.6	0.64	0.3	0.53	0.4	0.57	0.6	0.65
1999	4	0.3	0.50	0.2	0.63	0.3	0.59	0.3	0.52
2000	12	1.0	1.33	0.4	1.11	0.6	1.17	0.8	1.40
2001	11	0.9	0.73	0.4	0.63	0.6	0.66	0.8	0.73
2002	8	0.4	0.53	0.2	0.49	0.3	0.50	0.3	0.49
2003	6	0.3	0.46	0.1	0.48	0.2	0.46	0.2	0.47
2004	12	0.6	1.20	0.3	1.30	0.5	1.27	0.5	1.20
2005	7	0.4	0.37	0.1	0.30	0.2	0.34	0.3	0.40
2006	12	0.6	0.86	0.3	0.95	0.4	0.90	0.5	0.88
2007	10	0.4	0.48	0.2	0.36	0.3	0.41	0.4	0.46
2008	19	0.8	0.95	0.4	1.18	0.5	1.10	0.6	0.99
2009	14	0.6	0.88	0.2	0.77	0.3	0.81	0.4	0.87
2010	20	0.9	0.95	0.3	0.70	0.4	0.76	0.6	0.84
2011	11	0.5	0.65	0.1	0.61	0.2	0.62	0.3	0.62
1998-2011	153	0.6	0.73	0.2	0.68	0.4	0.69	0.5	0.72

Table 13

Age distribution of age at death (cancer-related) for period 1998-2011
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
30-34	1	0.1	0.1	1	0.2	0.2			0.0
35-39	1	0.1	0.3			0.2	1	0.7	0.7
40-44	5	0.6	0.9	1	0.2	0.3	4	2.6	3.3
45-49	12	1.5	2.4	9	1.4	1.7	3	2.0	5.2
50-54	21	2.6	5.0	17	2.6	4.4	4	2.6	7.8
55-59	52	6.5	11.6	43	6.7	11.0	9	5.9	13.7
60-64	98	12.3	23.9	81	12.6	23.6	17	11.1	24.8
65-69	166	20.9	44.7	151	23.5	47.1	15	9.8	34.6
70-74	163	20.5	65.2	133	20.7	67.8	30	19.6	54.2
75-79	129	16.2	81.4	105	16.3	84.1	24	15.7	69.9
80-84	99	12.4	93.8	69	10.7	94.9	30	19.6	89.5
85+	49	6.2	100.0	33	5.1	100.0	16	10.5	100.0
All ages	796	100.0		643	100.0		153	100.0	

Included in the statistics are 21.6% multiple primaries in males and 20.6% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**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			0.0		0.0			
30-34	1		0.1	1.00	0.0		0.6	
35-39		1	0.0		0.0	0.25		0.2
40-44	1	4	0.0	0.25	0.2	1.00	0.1	0.4
45-49	9	3	0.5	0.64	0.2	0.50	0.6	0.2
50-54	17	4	1.0	0.61	0.2	0.57	0.6	0.2
55-59	43	9	2.8	0.74	0.5	0.64	0.8	0.2
60-64	81	17	5.3	0.72	1.1	0.71	1.1	0.3
65-69	151	15	11.1	0.89	1.0	0.50	1.5	0.2
70-74	133	30	12.9	0.80	2.4	0.91	1.2	0.4
75-79	105	24	15.5	0.99	2.4	0.69	1.0	0.3
80-84	69	30	17.0	0.86	3.8	1.00	0.8	0.3
85+	33	16	11.9	1.10	2.2	0.76	0.5	0.1
All ages	643	153					1.0	0.3
Mortality								
Raw			2.6	0.84	0.6	0.73		
WS			1.3	0.81	0.2	0.68		
ES			2.0	0.83	0.4	0.69		
BRD-S			2.6	0.85	0.5	0.72		
PYLL-70								
per 100,000			9.2		2.5			
ES			7.9		2.1			
AYLL-70			6.9		10.5			

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

Table 15a

Multiple primaries in deaths in period 1998-2011
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10 Oropharynx	2	1.4	2	100.0				
C12-C13 Hypopharynx	1	0.7	1	100.0				
C16 Stomach	6	4.3	5	83.3			1	16.7
C18 Colon	9	6.5	8	88.9	1	11.1		
C19-C20 Rectum	11	8.0	10	90.9	1	9.1		
C22 Liver	2	1.4	1	50.0	1	50.0		
C23-C24 Bile	1	0.7	1	100.0				
C25 Pancreas	1	0.7					1	100.0
C32 Larynx	1	0.7	1	100.0				
C33-C34 Lung	12	8.7	2	16.7	2	16.7	8	66.7
C38,C45 Mesothelioma	2	1.4					2	100.0
C43 Malign. melanoma	13	9.4	11	84.6			2	15.4
C44 Skin others	10	7.2	7	70.0			3	30.0
C48 Peritoneal	1	0.7					1	100.0
C60 Penis	1	0.7	1	100.0				
C61 Prostate	31	22.5	26	83.9	2	6.5	3	9.7
C64 Kidney	7	5.1	6	85.7			1	14.3
C67 Bladder	8	5.8	6	75.0	1	12.5	1	12.5
C70-C72 CNS cancer	3	2.2	1	33.3	1	33.3	1	33.3
C73 Thyroid	1	0.7	1	100.0				
C76-C79 CUP	3	2.2	3	100.0				
C81 Hodgkin lymphoma	1	0.7	1	100.0				
C82-C85 NHL	7	5.1	4	57.1	3	42.9		
C91-C96 Leukaemia	4	2.9	2	50.0	2	50.0		
All mult. primaries	138	100.0	100	72.5	14	10.1	24	17.4

Multiple primaries with number of cases n<1 are pooled in category "Other primaries".

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 1998-2011
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	1	3.0	1	100.0				
C18	Colon	3	9.1	3	100.0				
C33-C34	Lung	3	9.1	1	33.3			2	66.7
C43	Malign. melanoma	1	3.0	1	100.0				
C44	Skin others	1	3.0	1	100.0				
C50	Breast	8	24.2	7	87.5			1	12.5
C54	Corpus uteri	5	15.2	4	80.0			1	20.0
C56	Ovary	2	6.1			1	50.0	1	50.0
C67	Bladder	2	6.1	2	100.0				
C70-C72	CNS cancer	1	3.0					1	100.0
C73	Thyroid	2	6.1	2	100.0				
C81	Hodgkin lymphoma	1	3.0	1	100.0				
C82-C85	NHL	2	6.1	2	100.0				
C90	Mult. myeloma	1	3.0	1	100.0				
All mult. primaries		33	100.0	26	78.8	1	3.0	6	18.2

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 1998-2011
(**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			0.0		0.0			
40-44	1	3	0.0	0.25	0.1	1.00	0.1	0.3
45-49	9	3	0.5	0.69	0.2	0.50	0.6	0.2
50-54	13	4	0.8	0.54	0.2	0.57	0.5	0.2
55-59	41	9	2.6	0.72	0.5	0.69	0.9	0.3
60-64	72	14	4.7	0.72	0.9	0.70	1.1	0.3
65-69	133	13	9.8	0.94	0.9	0.52	1.6	0.2
70-74	112	25	10.9	0.84	2.0	0.86	1.3	0.4
75-79	82	19	12.1	0.99	1.9	0.68	1.0	0.3
80-84	52	24	12.8	0.81	3.0	0.96	0.8	0.3
85+	25	14	9.0	1.09	1.9	0.78	0.5	0.2
All ages	540	128					1.0	0.3
Mortality								
Raw			2.1	0.84	0.5	0.72		
WS			1.1	0.82	0.2	0.67		
ES			1.7	0.83	0.3	0.69		
BRD-S			2.2	0.84	0.4	0.71		
PYLL-70								
per 100,000			8.1		2.1			
ES			7.0		1.8			
AYLL-70			6.8		10.2			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**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			0.0		0.0			
40-44	1	3	0.0	0.25	0.1	1.00	0.2	0.4
45-49	9	3	0.5	0.69	0.2	0.50	0.7	0.2
50-54	13	4	0.8	0.57	0.2	0.57	0.6	0.2
55-59	40	9	2.6	0.70	0.5	0.69	1.0	0.3
60-64	71	13	4.7	0.73	0.8	0.68	1.2	0.3
65-69	129	12	9.5	0.94	0.8	0.55	1.8	0.2
70-74	105	21	10.2	0.83	1.7	0.81	1.4	0.4
75-79	78	19	11.5	0.98	1.9	0.68	1.1	0.3
80-84	50	24	12.3	0.82	3.0	0.96	0.9	0.4
85+	25	14	9.0	1.09	1.9	0.78	0.6	0.2
All ages	521	122					1.1	0.3
Mortality								
Raw			2.1	0.84	0.5	0.72		
WS			1.1	0.81	0.2	0.66		
ES			1.6	0.83	0.3	0.68		
BRD-S			2.1	0.84	0.4	0.70		
PYLL-70								
per 100,000			8.0		2.0			
ES			6.9		1.7			
AYLL-70			6.9		10.5			

* See corresponding tables with multiple primaries.

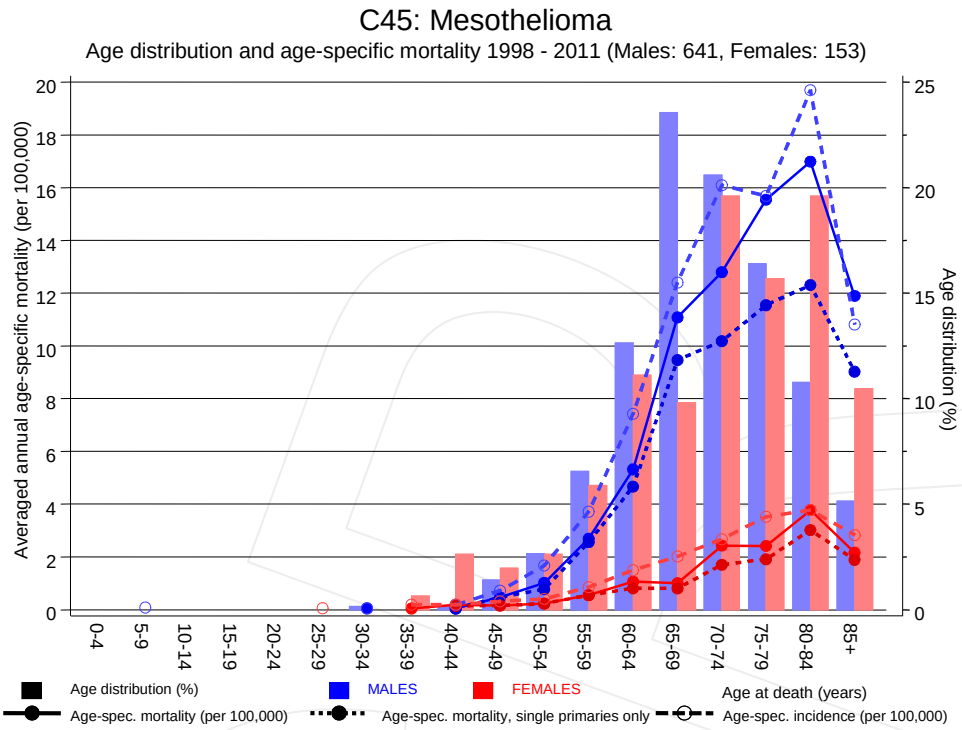
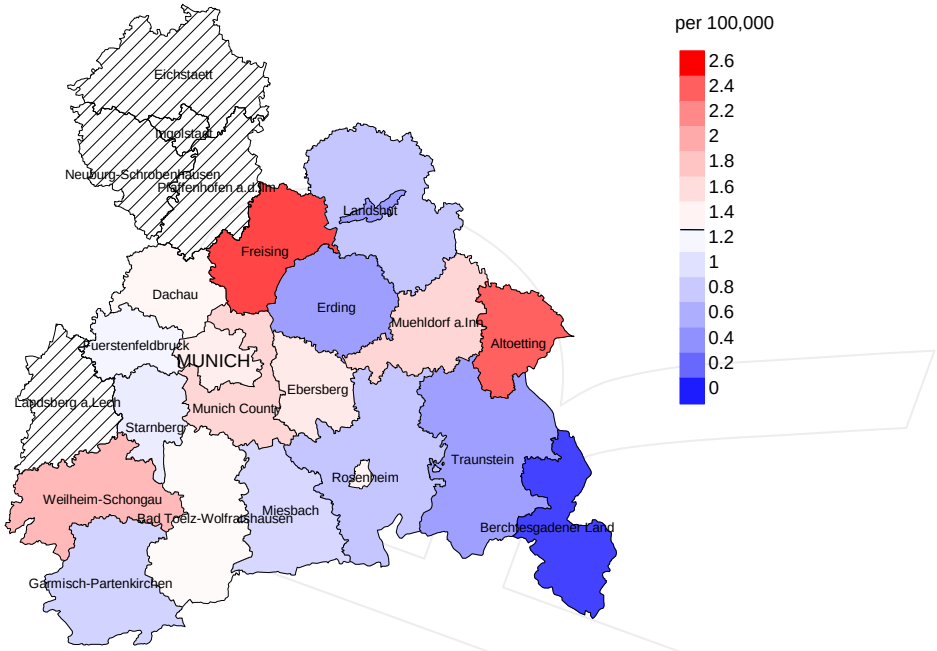


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



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

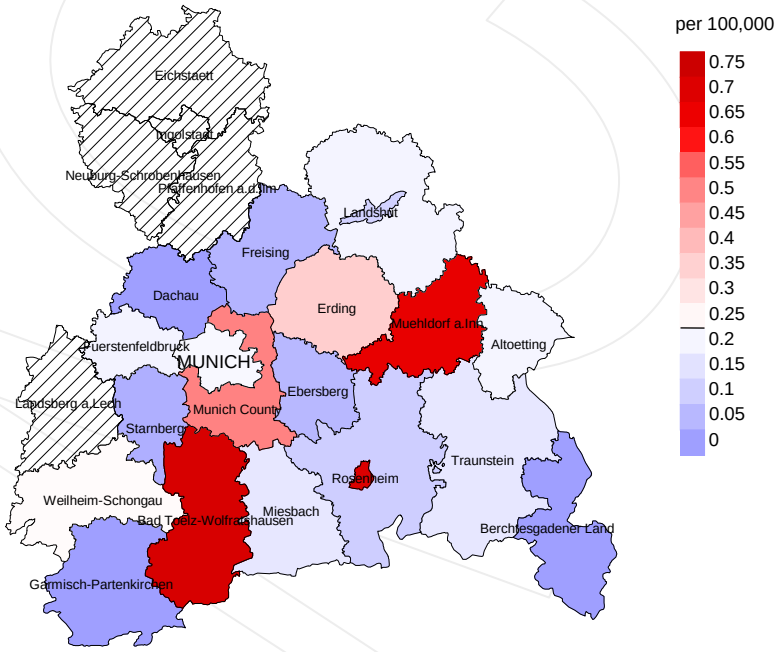
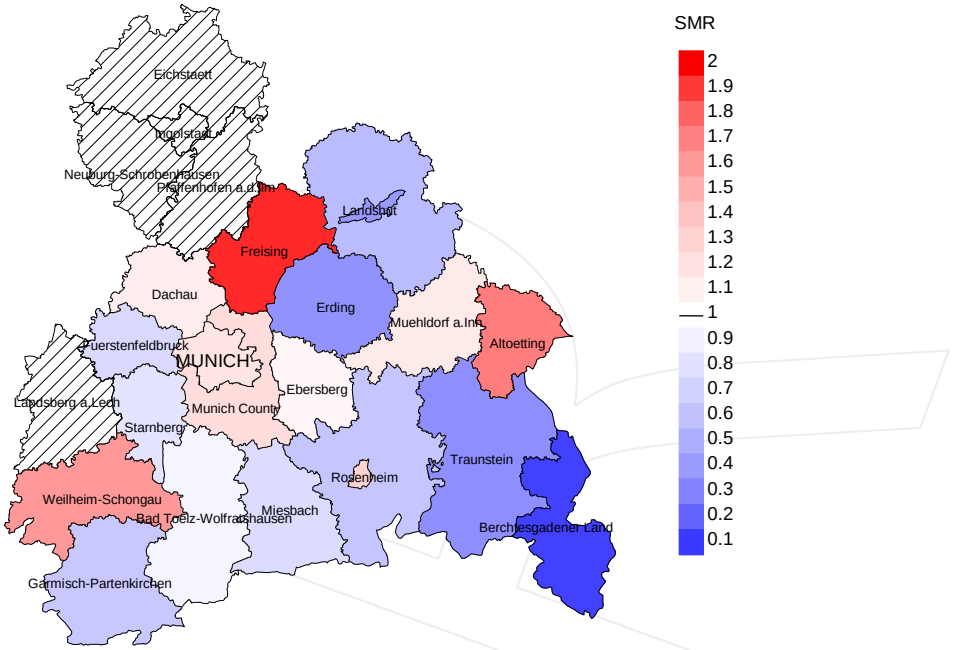


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.3/100,000 WS N=297, females 0.2/100,000 WS N=63). 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 1 women died from mesothelioma. 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 0.4/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

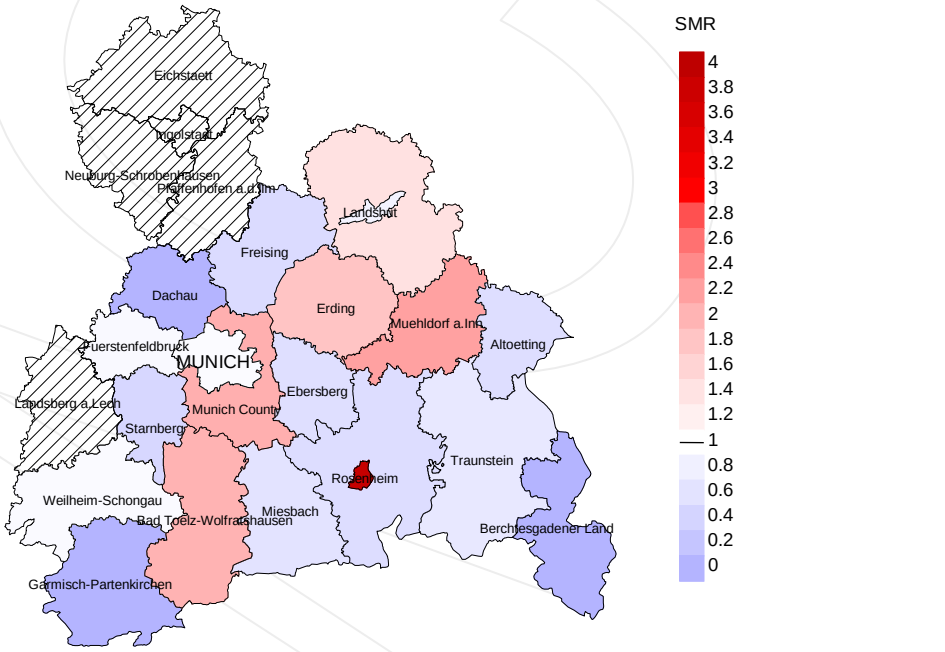


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=297, females N=63). 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 1 women died from mesothelioma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.54. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 4.03, 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

Recommended Citation

Munich Cancer Registry. Baseline statistics C45: Mesothelioma [Internet]. 2013 [updated 2013 Apr 2; cited 2013 Jun 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C45__E.pdf

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