Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage

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

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

Cancer statistics: Baseline statistics

C73: Thyroid cancer

Year of diagnosis	1998-2011
Patients	5274
Diseases	5308
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C73__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	209	9	4.3	23.0	29.2	93.3
1999	200	5	2.5	21.5	22.5	95.5
2000	231	5	2.2	22.5	22.1	97.8
2001	194	5	2.6	17.5	20.1	96.9
2002	313	14	4.5	21.1	24.9	95.2
2003	300	8	2.7	17.7	18.3	93.7
2004	354	9	2.5	12.7	12.7	92.1
2005	367	7	1.9	19.1	12.8	89.4
2006	416	9	2.2	16.1	12.0	85.1
2007	575	6	1.0	13.4	10.1	61.6 ##
2008	655	13	2.0	11.8	9.3	44.6
2009	610	5	0.8	14.6	6.4	44.1
2010	492	15	3.0	13.4	7.5	94.5
2011	392	8	2.0	14.0	8.4	81.1 ###
1998-2011	5308	118	2.2	15.9	13.2	77.0

\# 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	209	43	166	20.6
1999	200	54	146	27.0
2000	231	61	170	26.4
2001	194	53	141	27.3
2002	313	80	233	25.6
2003	300	83	217	27.7
2004	354	107	247	30.2
2005	367	80	287	21.8
2006	416	117	299	28.1
2007	575	170	405	29.6
2008	655	170	485	26.0
2009	610	177	433	29.0
2010	492	115	377	23.4
2011	392	122	270	31.1
1998-2011	5308	1432	3876	27.0

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	43	166	3.9	14.1	2.7	9.7	3.5	12.1	4.0	13.4
1999	54	146	4.8	12.3	3.3	9.1	4.4	11.0	5.4	11.9
2000	61	170	5.4	14.2	3.6	10.2	4.9	12.5	5.6	13.2
2001	53	141	4.6	11.6	3.1	7.8	4.1	9.9	4.4	10.6
2002	80	233	4.3	11.9	3.0	8.4	3.8	10.5	4.2	11.4
2003	83	217	4.4	11.0	2.9	8.0	3.9	9.9	4.3	10.4
2004	107	247	5.7	12.5	3.9	9.0	5.0	11.0	5.7	11.8
2005	80	287	4.2	14.4	2.7	9.9	3.6	12.5	4.1	13.2
2006	117	299	6.1	14.9	4.1	10.3	5.3	13.1	5.8	13.9
2007	170	405	7.7	17.5	5.2	12.5	6.7	15.5	7.2	16.4
2008	170	485	7.6	20.9	5.3	14.4	6.8	18.1	7.4	19.4
2009	177	433	7.9	18.6	5.6	13.6	7.0	16.7	7.5	17.8
2010	115	377	5.1	16.1	3.1	11.3	4.2	14.0	4.7	14.9
2011	122	270	5.4	11.5	3.7	8.1	4.6	9.9	5.1	10.8
1998-2011	1432	3876	5.7	14.7	3.8	10.4	4.9	12.8	5.5	13.7

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	209	54.9	16.2	13.0	89.6	33.4	43.0	54.4	67.3	77.1
1999	200	53.4	16.0	16.8	88.4	30.2	43.1	54.1	62.7	76.5
2000	231	54.0	16.8	11.3	93.7	32.2	42.4	55.4	65.6	76.1
2001	194	54.3	14.8	17.6	95.4	35.6	42.5	55.0	65.0	73.4
2002	313	55.3	16.2	7.8	91.2	34.6	44.9	55.9	66.4	75.0
2003	300	54.0	16.0	7.6	100	33.5	42.8	54.9	64.5	73.5
2004	354	53.4	15.8	14.8	91.6	32.3	41.9	53.2	64.6	75.1
2005	367	55.2	15.6	13.5	98.2	36.5	43.3	54.8	66.2	74.5
2006	416	54.4	14.6	15.1	94.9	34.9	43.7	55.2	65.2	73.1
2007	575	52.8	14.7	9.3	92.0	34.2	42.1	52.5	63.9	72.1
2008	655	54.3	15.2	12.7	97.7	34.4	43.1	54.9	65.1	73.5
2009	610	52.5	15.7	12.7	93.1	31.6	41.7	52.3	63.6	72.2
2010	492	54.5	16.1	10.3	94.5	34.6	43.0	54.2	65.9	76.2
2011	392	53.6	16.5	10.4	91.5	32.4	41.1	52.9	67.9	75.2
1998-2011	5308	53.9	15.6	7.6	100	33.7	42.8	54.2	65.1	74.3

Table 3a

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	43	54.7	13.9	27.2	81.5	37.2	46.2	55.2	66.2	76.2
1999	54	58.5	16.1	17.5	88.4	34.1	50.1	58.4	72.6	79.0
2000	61	58.2	17.8	15.9	93.7	32.7	47.5	57.7	69.9	79.8
2001	53	54.7	12.5	29.9	78.5	39.7	44.4	55.4	65.0	71.3
2002	80	54.9	16.8	7.8	88.6	34.8	43.0	56.5	65.8	75.4
2003	83	58.3	14.1	24.0	87.9	36.2	49.1	59.3	67.2	75.3
2004	107	55.9	15.4	16.1	88.1	36.4	45.2	57.4	66.5	75.8
2005	80	58.5	14.2	20.1	91.3	41.6	48.7	58.2	68.2	78.3
2006	117	56.3	13.9	19.6	93.4	37.4	45.8	58.0	65.4	72.3
2007	170	54.2	13.9	23.1	84.6	36.8	43.4	53.6	65.2	72.7
2008	170	55.3	14.6	12.7	89.5	34.9	46.6	56.8	64.8	72.9
2009	177	54.3	15.1	13.4	84.7	33.1	46.2	57.3	65.8	71.5
2010	115	58.6	14.7	24.1	88.5	38.4	47.5	58.2	70.8	76.4
2011	122	54.0	15.4	17.3	85.5	35.4	42.8	53.1	66.9	74.4
1998-2011	1432	55.9	14.9	7.8	93.7	36.0	45.7	56.6	66.5	74.6

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	166	54.9	16.8	13.0	89.6	33.0	42.2	54.3	68.4	77.2
1999	146	51.5	15.5	16.8	86.8	28.5	41.0	52.3	61.5	73.2
2000	170	52.5	16.2	11.3	91.0	32.0	41.6	53.7	64.6	72.6
2001	141	54.2	15.6	17.6	95.4	34.7	40.7	54.8	65.0	74.3
2002	233	55.4	16.1	10.0	91.2	34.5	46.5	55.9	66.7	75.0
2003	217	52.4	16.5	7.6	100	32.8	40.2	53.2	63.2	73.5
2004	247	52.3	15.9	14.8	91.6	31.6	40.0	52.2	63.5	74.2
2005	287	54.2	15.8	13.5	98.2	35.0	42.4	54.0	65.6	73.5
2006	299	53.6	14.8	15.1	94.9	34.8	42.3	54.6	64.3	73.6
2007	405	52.2	14.9	9.3	92.0	33.2	41.4	51.8	63.9	71.2
2008	485	54.0	15.4	16.2	97.7	34.2	42.3	54.2	65.1	73.6
2009	433	51.7	15.9	12.7	93.1	31.4	39.7	51.0	62.4	72.4
2010	377	53.2	16.3	10.3	94.5	33.8	41.6	52.6	63.9	76.1
2011	270	53.4	17.0	10.4	91.5	30.8	40.7	52.8	68.0	75.4
1998-2011	3876	53.2	15.9	7.6	100	33.0	41.6	53.2	64.5	74.2

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	3	0.1	0.1	1	0.1	0.1	2	0.1	0.1
10-14	27	0.5	0.6	3	0.2	0.3	24	0.6	0.7
15-19	43	0.8	1.4	10	0.7	1.0	33	0.9	1.5
20-24	101	1.9	3.3	23	1.6	2.6	78	2.0	3.5
25-29	159	3.0	6.3	36	2.5	5.1	123	3.2	6.7
30-34	300	5.7	11.9	55	3.8	8.9	245	6.3	13.0
35-39	435	8.2	20.1	88	6.1	15.1	347	9.0	22.0
40-44	524	9.9	30.0	122	8.5	23.6	402	10.4	32.4
45-49	564	10.6	40.6	146	10.2	33.8	418	10.8	43.1
50-54	604	11.4	52.0	172	12.0	45.8	432	11.1	54.3
55-59	620	11.7	63.7	185	12.9	58.7	435	11.2	65.5
60-64	583	11.0	74.7	175	12.2	70.9	408	10.5	76.0
65-69	502	9.5	84.1	162	11.3	82.3	340	8.8	84.8
70-74	355	6.7	90.8	116	8.1	90.4	239	6.2	91.0
75-79	254	4.8	95.6	75	5.2	95.6	179	4.6	95.6
80-84	130	2.4	98.0	40	2.8	98.4	90	2.3	97.9
85+	104	2.0	100.0	23	1.6	100.0	81	2.1	100.0
All ages	5308	100.0		1432	100.0		3876	100.0	

Included in the statistics are 21.0% multiple primaries in males and 16.9% 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=37 %	Females DCO rate n=81 %	Males Prop.all cancers n=132509 %	Females Prop.all cancers n=129521 %
0- 4			0.0	0.0				
5- 9	1	2	0.1	0.2			0.6	1.9
10-14	3	24	0.2	1.9			2.3	15.8
15-19	10	33	0.8	2.6			3.4	13.8
20-24	23	78	1.6	5.2			4.5	17.8
25-29	36	123	2.1	7.1			4.5	13.4
30-34	55	244	2.8	12.9			4.2	14.1
35-39	88	344	4.0	16.6			4.5	10.5
40-44	122	401	5.5	18.9		0.2	4.4	7.6
45-49	144	415	7.4	21.7			3.2	5.7
50-54	172	432	10.3	25.2	1.7	0.2	2.4	4.7
55-59	184	433	11.8	26.4	1.1	1.2	1.5	3.7
60-64	174	401	11.4	25.0	2.9	0.7	0.9	2.7
65-69	158	339	11.6	22.8	1.9	0.3	0.7	2.1
70-74	115	238	11.2	19.3	3.5	4.6	0.5	1.6
75-79	75	177	11.1	17.8	6.7	6.2	0.4	1.2
80-84	40	90	9.8	11.3	15.0	14.4	0.4	0.7
85+	23	81	8.3	10.9	39.1	43.2	0.3	0.6
All ages	1423	3855			2.6	2.1	1.1	3.0
Incidence								
Raw			5.7	14.6				
WS			3.8	10.3				
ES			4.9	12.8				
BRD-S			5.5	13.7				

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 %
C15	Oesophagus	4	0.8	5.1	1.4	13.0	#	8.3	
C16	Stomach	2	1.5	1.3	0.2	4.8		1.3	
C18	Colon	6	3.6	1.7	0.6	3.6		6.3	
C19-C20	Rectum	10	2.4	4.2	2.0	7.8	#	19.8	
C22	Liver	2	1.1	1.9	0.2	6.7		2.4	50.0
C32	Larynx	3	0.5	6.0	1.2	17.5	#	6.5	
C33-C34	Lung	7	4.8	1.5	0.6	3.0		5.7	28.6
C43	Malign. melanoma	4	1.7	2.3	0.6	5.9		5.9	
C61	Prostate	16	11.2	1.4	0.8	2.3		12.5	
C67	Bladder	4	1.4	2.8	0.8	7.2		6.7	25.0
C73	Thyroid	5	0.4	13.1	4.3	30.7	#	11.9	
C76-C79	CUP	2	0.6	3.2	0.4	11.4		3.5	
C82-C85	NHL	3	1.5	2.0	0.4	5.8		3.9	
C90	Mult. myeloma	2	0.5	4.3	0.5	15.7		4.0	
Other primaries		5	1.1	4.5	1.5	10.5	#	10.0	
Not observed		0	6.8	0.0	0.0	0.5	#	-17.5	
All mult. primaries		75	39.8	1.9	1.5	2.4	#	91.1	5.3

Patients	974
Mean age at second malignancy (years)	66.7
Person-years	3866
Mean observation time (years)	4.0
Median observation time (years)	3.2

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 %
C16	Stomach	3	2.4	1.3	0.3	3.7		0.5	
C18	Colon	13	6.8	1.9	1.0	3.3	#	5.1	
C19-C20	Rectum	7	3.3	2.1	0.8	4.3		3.0	
C22	Liver	2	0.8	2.6	0.3	9.6		1.0	50.0
C25	Pancreas	3	2.8	1.1	0.2	3.1		0.2	
C33-C34	Lung	18	6.1	3.0	1.8	4.7	#	9.8	11.1
C38,C45	Mesothelioma	4	0.1	29.2	8.0	74.9	#	3.2	
C43	Malign. melanoma	5	3.6	1.4	0.4	3.2		1.1	
C46,C49	Soft tissue	2	0.5	4.0	0.5	14.4		1.2	
C50	Breast	64	30.6	2.1	1.6	2.7	#	27.5	1.6
C54	Corpus uteri	6	4.8	1.2	0.5	2.7		1.0	
C56	Ovary	10	3.6	2.8	1.3	5.1	#	5.3	
C64	Kidney	8	1.9	4.2	1.8	8.3	#	5.0	
C67	Bladder	3	1.1	2.7	0.6	8.0		1.6	
C70-C72	CNS cancer	2	1.3	1.5	0.2	5.6		0.6	
C73	Thyroid	15	2.6	5.8	3.3	9.6	#	10.2	
C76-C79	CUP	3	1.1	2.7	0.5	7.8		1.5	
C82-C85	NHL	6	2.9	2.1	0.8	4.6		2.6	
C91-C96	Leukaemia	11	1.1	9.7	4.9	17.4	#	8.1	9.1
Other primaries		12	6.5	1.8	1.0	3.2		4.5	8.3
Not observed		0	2.4	0.0	0.0	1.5		-2.0	
All mult. primaries		197	86.5	2.3	2.0	2.6	#	91.1	3.0

Patients	2710
Mean age at second malignancy (years)	63.4
Person-years	12135
Mean observation time (years)	4.5
Median observation time (years)	3.8

The occurrence of second malignancy is statistically significant.

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

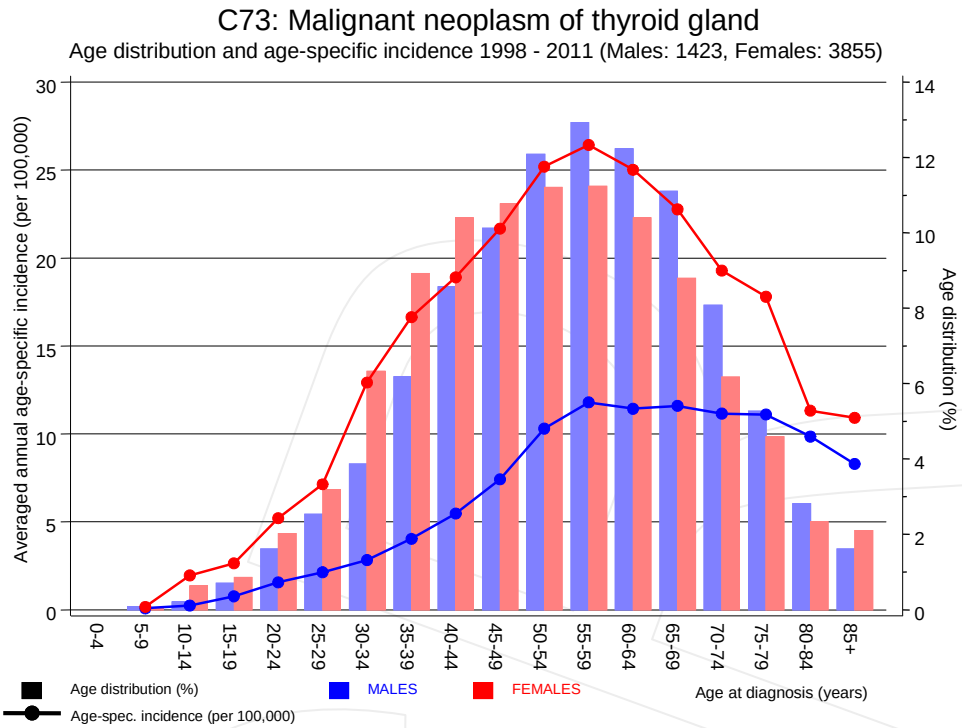


Figure 7. Age distribution and age-specific incidence

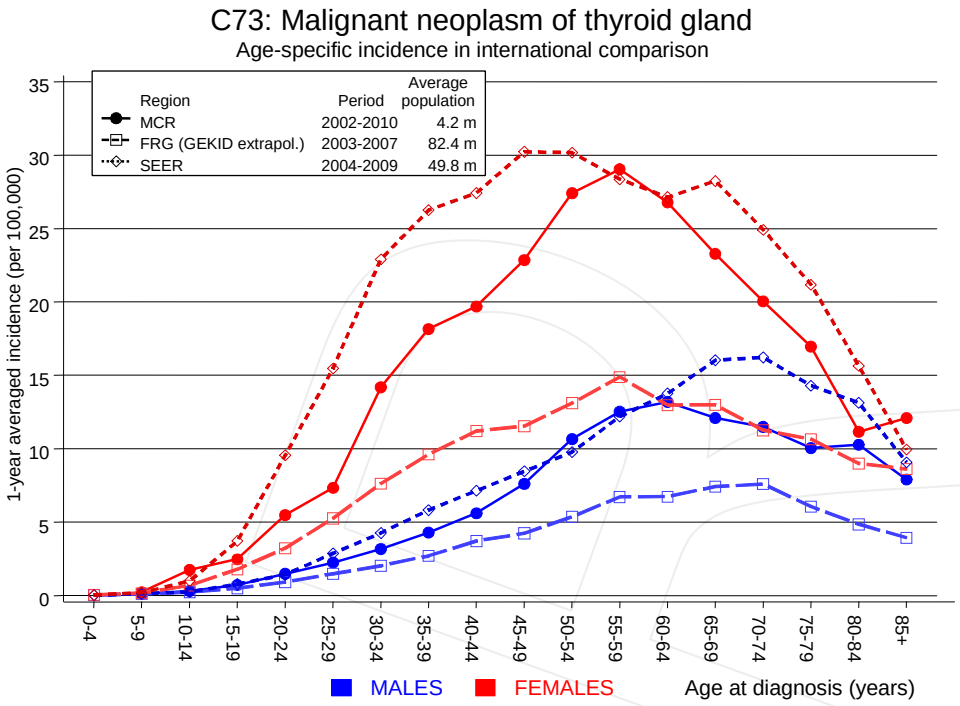


Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2011. http://www.gekid.de. Last access: 05/12/2011

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.

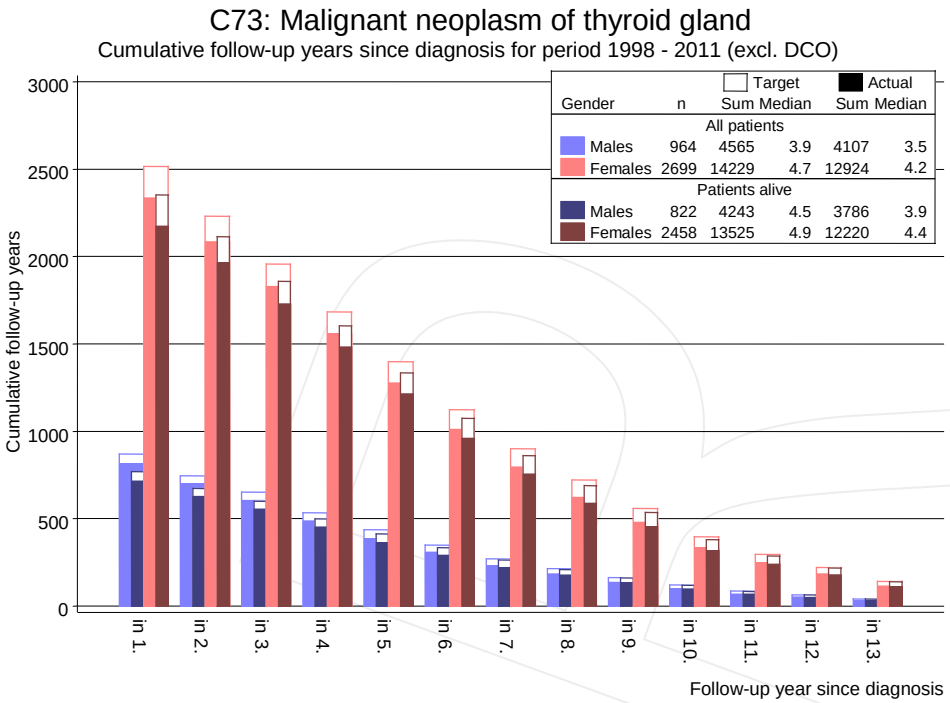
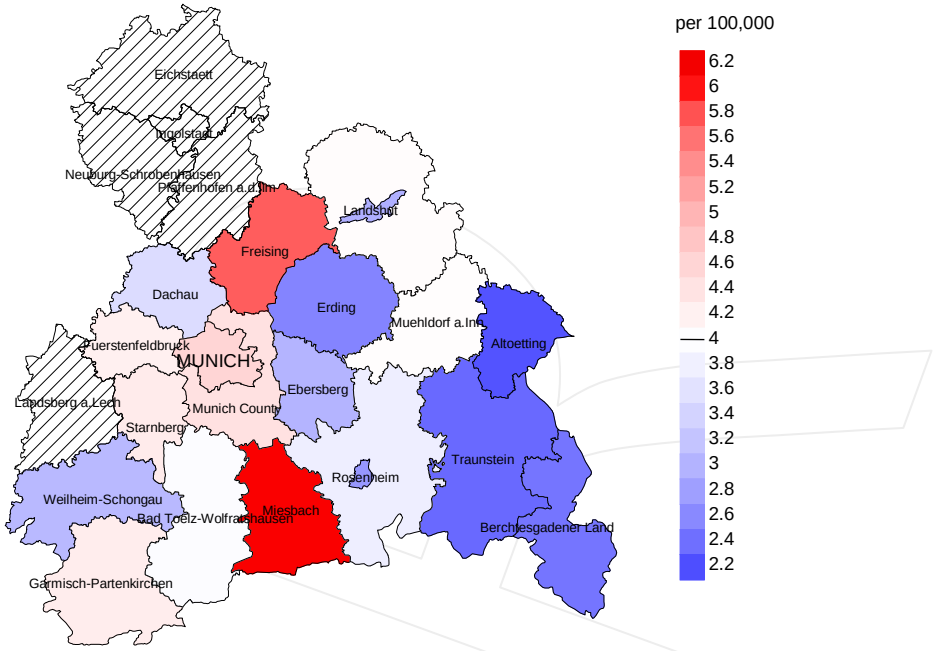


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

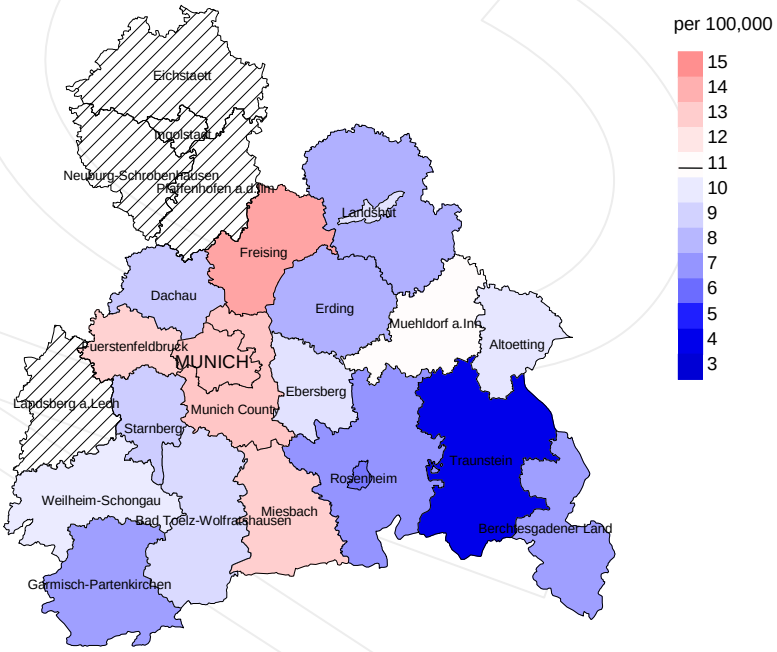
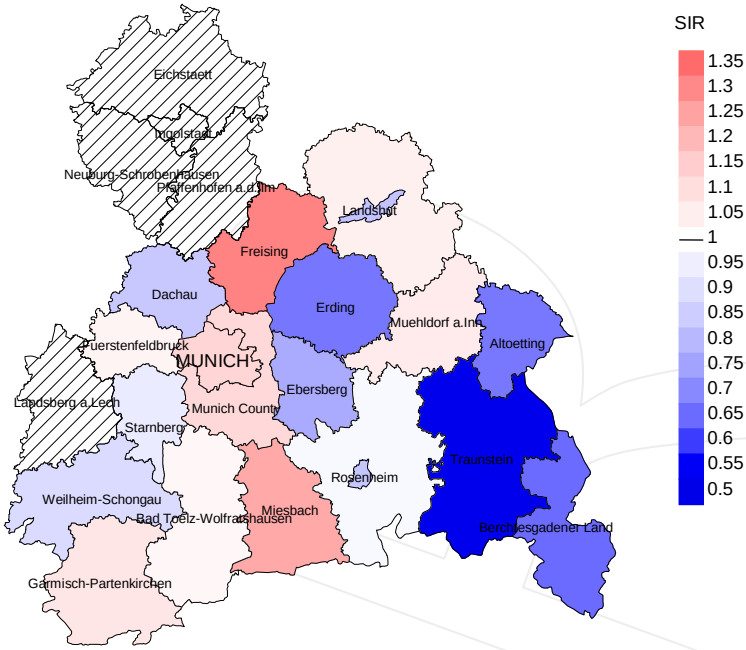


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.0/100,000 WS N=691, females 10.9/100,000 WS N=1,876). 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 54 women were identified with newly diagnosed thyroid cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 9.7/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 6.5 and 14.3/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

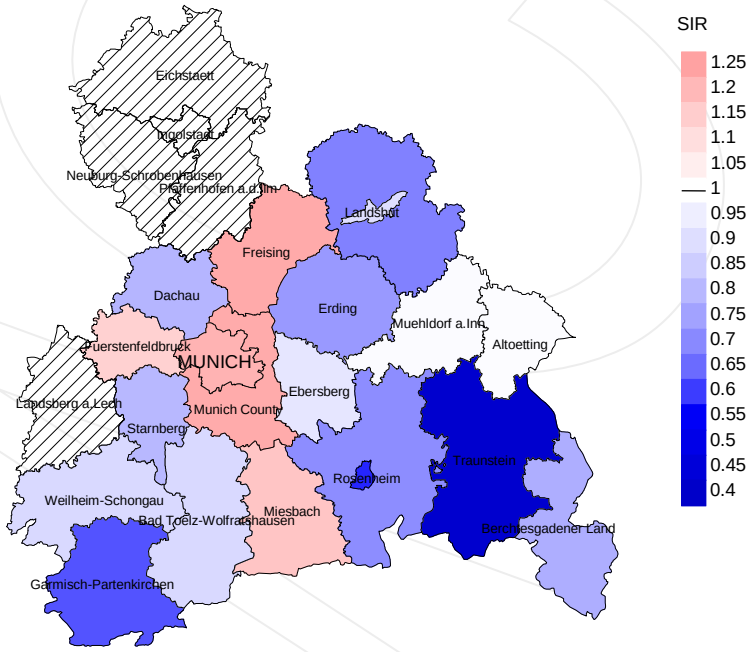


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=691, females N=1,876). 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 54 women were identified with newly diagnosed thyroid cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.92. Though, the value of this parameter may vary with an underlying probability of 99% between 0.63 and 1.30, 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	209	93.3	4.3	61	29.2	96.7
1999	200	95.5	2.5	45	22.5	95.6
2000	231	97.8	2.2	51	22.1	98.0
2001	194	96.9	2.6	39	20.1	97.4
2002	313	95.2	4.5	78	24.9	97.4
2003	300	93.7	2.7	55	18.3	98.2
2004	354	92.1	2.5	45	12.7	100.0
2005	367	89.4	1.9	47	12.8	95.7
2006	416	85.1	2.2	50	12.0	100.0
2007	575	61.6	1.0	58	10.1	94.8
2008	655	44.6	2.0	61	9.3	100.0
2009	610	44.1	0.8	39	6.4	100.0
2010	492	94.5	3.0	37	7.5	97.3
2011	392	81.1	2.0	33	8.4	100.0
1998-2011	5308	77.0	2.2	699	13.2	97.9

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	209	53	96.2	18	8.6
1999	200	45	88.9	12	6.0
2000	231	48	91.7	13	5.6
2001	194	38	86.8	13	6.7
2002	313	69	98.6	26	8.3
2003	300	81	93.8	18	6.0
2004	354	68	95.6	20	5.6
2005	367	83	100.0	20	5.4
2006	416	101	98.0	19	4.6
2007	575	92	93.5	24	4.2
2008	655	72	98.6	25	3.8
2009	610	85	97.6	18	3.0
2010	492	114	98.2	30	6.1
2011	392	127	100.0	28	7.1
1998-2011	5308	1076	96.5	284	5.4

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	53	79.2	20.8	94.1
1999	45	71.1	28.9	87.5
2000	48	75.0	25.0	88.6
2001	38	68.4	31.6	87.9
2002	69	84.1	15.9	98.5
2003	81	66.7	33.3	84.2
2004	68	70.6	29.4	81.5
2005	83	77.1	22.9	78.3
2006	101	71.3	28.7	82.8
2007	92	73.9	26.1	83.7
2008	72	68.1	31.9	87.3
2009	85	74.1	25.9	86.7
2010	114	71.9	28.1	75.9
2011	127	65.4	34.6	79.5
1998-2011	1076	72.2	27.8	84.2

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	18	67.9	69.0	59.1	69.0
1999	18	71.2	71.0	71.8	72.5
2000	22	72.9	72.7	73.9	73.3
2001	14	70.8	69.4	74.0	70.8
2002	21	75.7	75.2	79.1	76.5
2003	26	72.4	73.1	70.1	72.8
2004	27	70.6	70.7	70.3	69.6
2005	29	73.3	73.9	71.4	72.2
2006	37	73.1	71.9	78.2	72.2
2007	35	71.5	72.6	68.5	72.9
2008	19	72.8	75.2	65.9	75.3
2009	26	71.4	68.2	80.0	70.0
2010	41	72.8	71.1	79.0	71.9
2011	42	71.7	69.0	77.2	70.6
1998-2011	375	72.1	71.6	73.8	72.1

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	35	77.2	76.4	79.3	77.9
1999	27	72.1	70.7	75.5	69.8
2000	26	74.3	68.6	87.3	74.3
2001	24	74.7	71.9	80.4	75.2
2002	48	74.4	74.1	75.7	74.3
2003	55	74.4	74.3	74.5	75.0
2004	41	74.6	72.7	78.9	73.2
2005	54	76.6	75.6	80.3	75.2
2006	64	76.5	74.2	80.9	74.2
2007	57	75.8	75.2	77.3	75.5
2008	53	77.0	75.0	80.8	76.7
2009	59	77.6	76.7	80.2	77.2
2010	73	75.3	72.5	81.2	73.0
2011	85	77.9	76.8	79.8	76.7
1998-2011	701	75.9	74.4	79.4	75.1

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	16	1.4	0.37	0.8	0.30	1.3	0.37	1.9	0.48
1999	13	1.2	0.24	0.7	0.21	1.0	0.24	1.4	0.26
2000	18	1.6	0.30	0.8	0.24	1.4	0.30	2.1	0.38
2001	10	0.9	0.19	0.5	0.16	0.8	0.19	1.0	0.23
2002	18	1.0	0.23	0.5	0.16	0.8	0.21	1.1	0.27
2003	20	1.1	0.24	0.5	0.19	0.9	0.23	1.2	0.29
2004	20	1.1	0.19	0.5	0.14	0.8	0.17	1.2	0.22
2005	22	1.2	0.28	0.6	0.20	0.9	0.25	1.3	0.32
2006	30	1.6	0.26	0.8	0.19	1.2	0.24	1.7	0.29
2007	26	1.2	0.15	0.6	0.11	0.9	0.14	1.2	0.17
2008	14	0.6	0.08	0.3	0.05	0.5	0.07	0.7	0.09
2009	19	0.9	0.11	0.4	0.08	0.6	0.09	0.8	0.11
2010	32	1.4	0.28	0.7	0.22	1.0	0.24	1.3	0.27
2011	28	1.2	0.23	0.6	0.18	0.9	0.20	1.2	0.23
1998-2011	286	1.1	0.20	0.6	0.15	0.9	0.18	1.2	0.22

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	26	2.2	0.16	0.8	0.08	1.3	0.11	1.9	0.14
1999	19	1.6	0.13	0.7	0.08	1.1	0.10	1.4	0.12
2000	18	1.5	0.11	0.8	0.08	1.1	0.08	1.3	0.10
2001	16	1.3	0.11	0.6	0.08	0.8	0.09	1.0	0.10
2002	40	2.0	0.17	0.8	0.09	1.2	0.12	1.7	0.15
2003	34	1.7	0.16	0.7	0.08	1.0	0.10	1.3	0.13
2004	28	1.4	0.11	0.5	0.06	0.8	0.07	1.1	0.09
2005	42	2.1	0.15	0.8	0.08	1.2	0.10	1.6	0.12
2006	42	2.1	0.14	0.8	0.08	1.3	0.10	1.7	0.12
2007	42	1.8	0.10	0.7	0.05	1.0	0.07	1.4	0.09
2008	35	1.5	0.07	0.5	0.04	0.8	0.05	1.2	0.06
2009	44	1.9	0.10	0.7	0.05	1.0	0.06	1.3	0.07
2010	50	2.1	0.13	0.8	0.08	1.3	0.09	1.6	0.11
2011	55	2.3	0.21	0.7	0.09	1.2	0.12	1.7	0.16
1998-2011	491	1.9	0.13	0.7	0.07	1.1	0.08	1.5	0.11

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.%
15-19	1	0.1	0.1			0.0	1	0.2	0.2
20-24	0	0.0	0.1			0.0			0.2
25-29	2	0.3	0.4			0.0	2	0.4	0.6
30-34	0	0.0	0.4			0.0			0.6
35-39	4	0.5	0.9	4	1.4	1.4			0.6
40-44	4	0.5	1.4			1.4	4	0.8	1.4
45-49	14	1.8	3.2	6	2.1	3.5	8	1.6	3.0
50-54	28	3.6	6.8	9	3.1	6.6	19	3.9	6.9
55-59	43	5.5	12.3	20	6.9	13.5	23	4.7	11.6
60-64	85	10.9	23.1	41	14.2	27.7	44	8.9	20.5
65-69	78	10.0	33.1	34	11.8	39.4	44	8.9	29.4
70-74	145	18.5	51.7	58	20.1	59.5	87	17.6	47.1
75-79	140	17.9	69.6	53	18.3	77.9	87	17.6	64.7
80-84	120	15.3	84.9	38	13.1	91.0	82	16.6	81.3
85+	118	15.1	100.0	26	9.0	100.0	92	18.7	100.0
All ages	782	100.0		289	100.0		493	100.0	

Included in the statistics are 21.0% multiple primaries in males and 16.9% 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		1	0.0		0.1	0.03		3.4
20-24			0.0		0.0			
25-29		2	0.0		0.1	0.02		2.0
30-34			0.0		0.0			
35-39	4		0.2	0.05	0.0		1.1	
40-44		4	0.0		0.2	0.01		0.4
45-49	6	8	0.3	0.04	0.4	0.02	0.4	0.5
50-54	9	19	0.5	0.05	1.1	0.04	0.3	0.7
55-59	20	23	1.3	0.11	1.4	0.05	0.4	0.6
60-64	41	44	2.7	0.23	2.7	0.11	0.5	0.8
65-69	34	44	2.5	0.21	3.0	0.13	0.3	0.6
70-74	58	87	5.6	0.50	7.0	0.36	0.5	1.1
75-79	53	87	7.8	0.71	8.7	0.49	0.5	1.0
80-84	38	82	9.4	0.95	10.3	0.91	0.4	0.9
85+	26	92	9.4	1.13	12.4	1.14	0.4	0.8
All ages	289	493					0.4	0.8
Mortality								
Raw			1.1	0.20	1.9	0.13		
WS			0.6	0.15	0.7	0.07		
ES			0.9	0.18	1.1	0.08		
BRD-S			1.2	0.22	1.5	0.11		
PYLL-70								
per 100,000			4.7		6.6			
ES			4.1		5.8			
AYLL-70			9.3		10.3			

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 ←%
C03-C06 Oral cavity	2	1.4					2	100.0
C09-C10 Oropharynx	4	2.9	2	50.0			2	50.0
C12-C13 Hypopharynx	1	0.7	1	100.0				
C15 Oesophagus	5	3.6	2	40.0			3	60.0
C16 Stomach	3	2.1					3	100.0
C18 Colon	10	7.1	6	60.0	2	20.0	2	20.0
C19-C20 Rectum	6	4.3	1	16.7			5	83.3
C22 Liver	3	2.1					3	100.0
C23-C24 Bile	1	0.7					1	100.0
C25 Pancreas	3	2.1	1	33.3			2	66.7
C32 Larynx	4	2.9	2	50.0	1	25.0	1	25.0
C33-C34 Lung	20	14.3	2	10.0	2	10.0	16	80.0
C37 Thymus	1	0.7	1	100.0				
C38,C45 Mesothelioma	1	0.7					1	100.0
C43 Malign. melanoma	5	3.6	5	100.0				
C44 Skin others	4	2.9	1	25.0	1	25.0	2	50.0
C46,C49 Soft tissue	2	1.4					2	100.0
C60 Penis	1	0.7					1	100.0
C61 Prostate	18	12.9	12	66.7			6	33.3
C62 Testis	1	0.7	1	100.0				
C64 Kidney	8	5.7	6	75.0			2	25.0
C67 Bladder	13	9.3	6	46.2	1	7.7	6	46.2
C69 Eye melanoma	2	1.4	2	100.0				
C70-C72 CNS cancer	2	1.4					2	100.0
C73 Thyroid	3	2.1			3	100.0		
C74-C80 Cancer others	1	0.7	1	100.0				
C76-C79 CUP	3	2.1			1	33.3	2	66.7
C81 Hodgkin lymphoma	1	0.7	1	100.0				
C82-C85 NHL	5	3.6	1	20.0			4	80.0
C90 Mult. myeloma	2	1.4					2	100.0
C91-C96 Leukaemia	5	3.6					5	100.0
All mult. primaries	140	100.0	54	38.6	11	7.9	75	53.6

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 ←%
C09-C10 Oropharynx	2	0.7			1	50.0	1	50.0
C15 Oesophagus	4	1.4					4	100.0
C16 Stomach	7	2.4	1	14.3			6	85.7
C18 Colon	15	5.1	6	40.0	2	13.3	7	46.7
C19-C20 Rectum	9	3.1	2	22.2	1	11.1	6	66.7
C21 Anus/canal	2	0.7	2	100.0				
C22 Liver	6	2.1	1	16.7	1	16.7	4	66.7
C25 Pancreas	7	2.4					7	100.0
C32 Larynx	3	1.0	1	33.3	1	33.3	1	33.3
C33-C34 Lung	32	11.0	4	12.5	5	15.6	23	71.9
C38,C45 Mesothelioma	2	0.7					2	100.0
C43 Malign. melanoma	8	2.7	4	50.0			4	50.0
C44 Skin others	2	0.7	1	50.0			1	50.0
C50 Breast	76	26.0	36	47.4			40	52.6
C53 Cervix uteri	3	1.0	3	100.0				
C54 Corpus uteri	8	2.7	5	62.5			3	37.5
C56 Ovary	19	6.5	3	15.8			16	84.2
C64 Kidney	20	6.8	10	50.0	1	5.0	9	45.0
C67 Bladder	8	2.7	2	25.0			6	75.0
C70-C72 CNS cancer	10	3.4	1	10.0	1	10.0	8	80.0
C73 Thyroid	2	0.7			2	100.0		
C76-C79 CUP	6	2.1					6	100.0
C82-C85 NHL	8	2.7	3	37.5			5	62.5
C90 Mult. myeloma	2	0.7	1	50.0			1	50.0
C91-C96 Leukaemia	20	6.8					20	100.0
Other primaries	11	3.8	2	18.2	1	9.1	8	72.7
All mult. primaries	292	100.0	88	30.1	16	5.5	188	64.4

Multiple primaries with number of cases n<2 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 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		2	0.0		0.1	0.02		2.1
30-34			0.0		0.0			
35-39	4		0.2	0.05	0.0		1.2	
40-44		2	0.0		0.1	0.01		0.2
45-49	5	8	0.3	0.04	0.4	0.02	0.4	0.5
50-54	6	19	0.4	0.04	1.1	0.05	0.2	0.9
55-59	17	16	1.1	0.11	1.0	0.04	0.4	0.5
60-64	31	34	2.0	0.20	2.1	0.10	0.5	0.7
65-69	26	39	1.9	0.21	2.6	0.13	0.3	0.7
70-74	51	76	4.9	0.55	6.2	0.39	0.6	1.2
75-79	44	65	6.5	0.85	6.5	0.45	0.5	0.9
80-84	28	66	6.9	0.97	8.3	1.06	0.4	0.9
85+	16	75	5.8	1.23	10.1	1.27	0.3	0.8
All ages	228	402					0.4	0.8
Mortality								
Raw			0.9	0.18	1.5	0.11		
WS			0.5	0.13	0.6	0.06		
ES			0.7	0.16	0.9	0.08		
BRD-S			1.0	0.20	1.2	0.10		
PYLL-70								
per 100,000			3.8		5.3			
ES			3.3		4.7			
AYLL-70			9.6		10.0			

* 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		2	0.0		0.1	0.02		2.2
30-34			0.0		0.0			
35-39	4		0.2	0.05	0.0		1.2	
40-44		1	0.0		0.0	0.00		0.1
45-49	2	2	0.1	0.02	0.1	0.01	0.2	0.1
50-54	6	10	0.4	0.04	0.6	0.03	0.3	0.5
55-59	12	11	0.8	0.08	0.7	0.03	0.3	0.4
60-64	23	17	1.5	0.16	1.1	0.05	0.4	0.4
65-69	15	22	1.1	0.14	1.5	0.08	0.2	0.4
70-74	42	49	4.1	0.52	4.0	0.28	0.6	0.9
75-79	32	46	4.7	0.67	4.6	0.35	0.5	0.8
80-84	22	47	5.4	0.76	5.9	0.82	0.4	0.7
85+	12	61	4.3	1.00	8.2	1.07	0.3	0.8
All ages	170	268					0.4	0.6
Mortality								
Raw			0.7	0.15	1.0	0.08		
WS			0.3	0.11	0.4	0.04		
ES			0.5	0.13	0.6	0.05		
BRD-S			0.7	0.16	0.8	0.07		
PYLL-70								
per 100,000			2.8		2.9			
ES			2.4		2.5			
AYLL-70			10.3		10.0			

* See corresponding tables with multiple primaries.

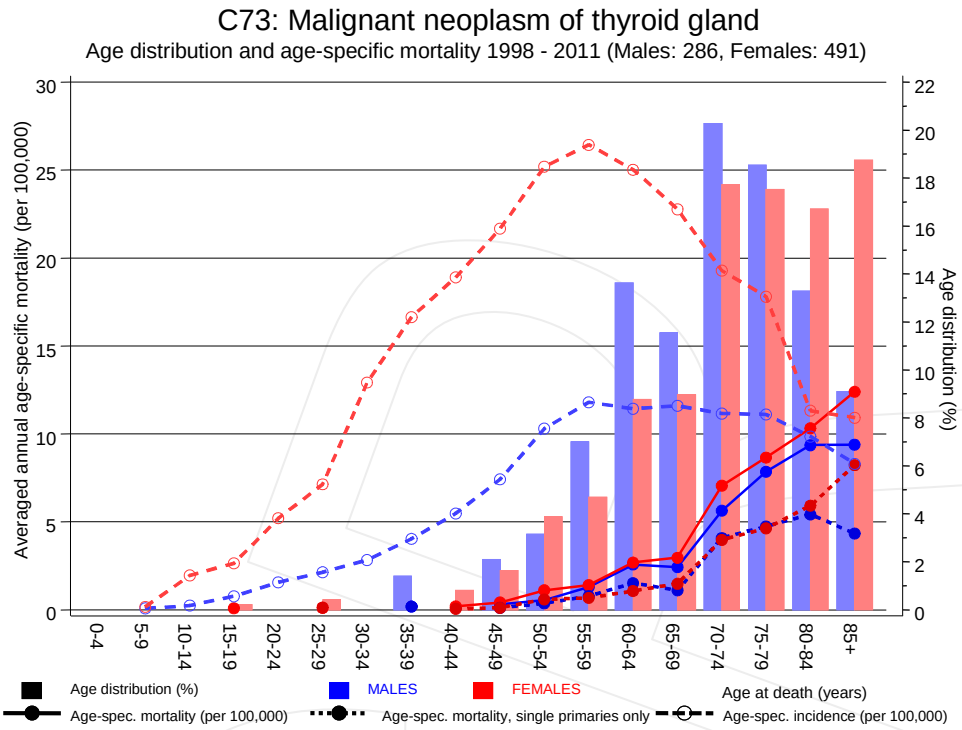
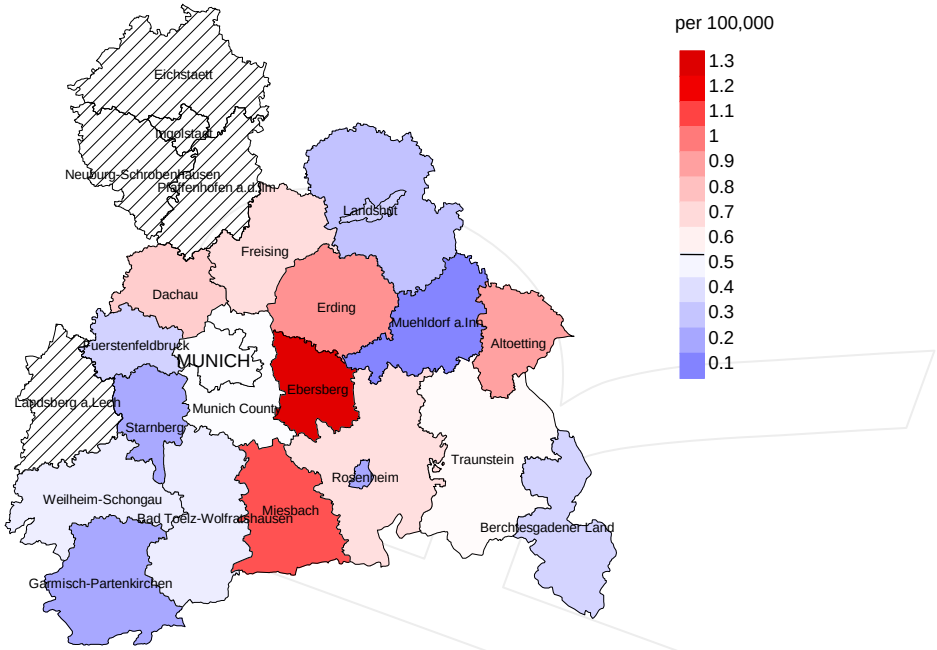


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



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

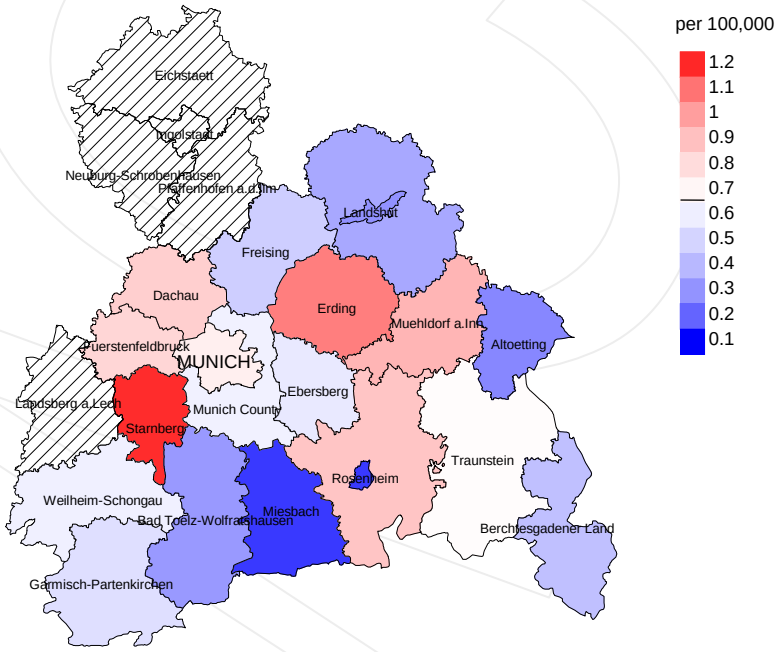
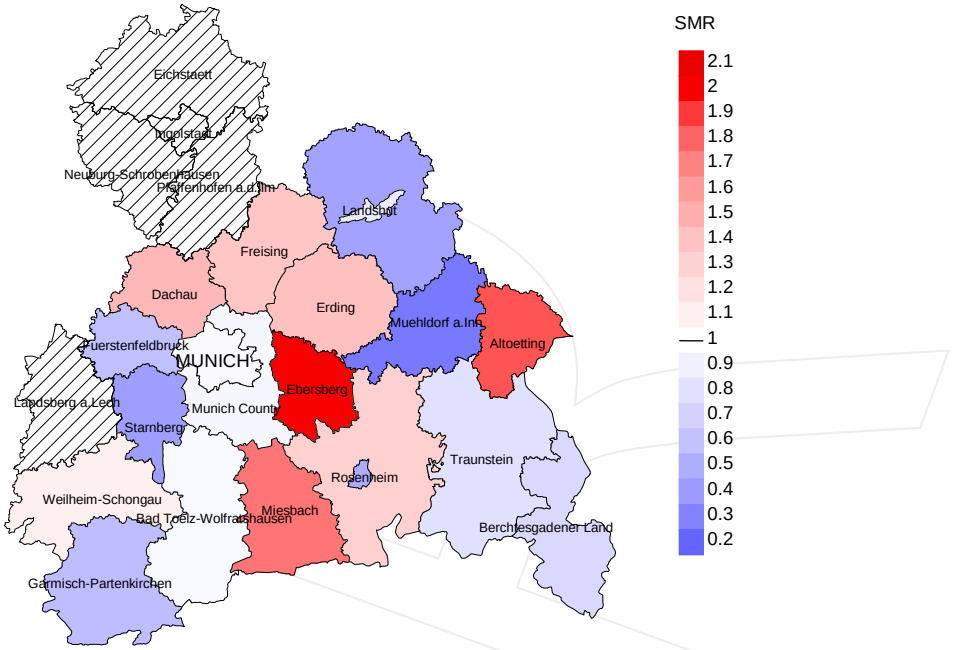


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.5/100,000 WS N=128, females 0.7/100,000 WS N=212). 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 3 women died from thyroid cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 2.2/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

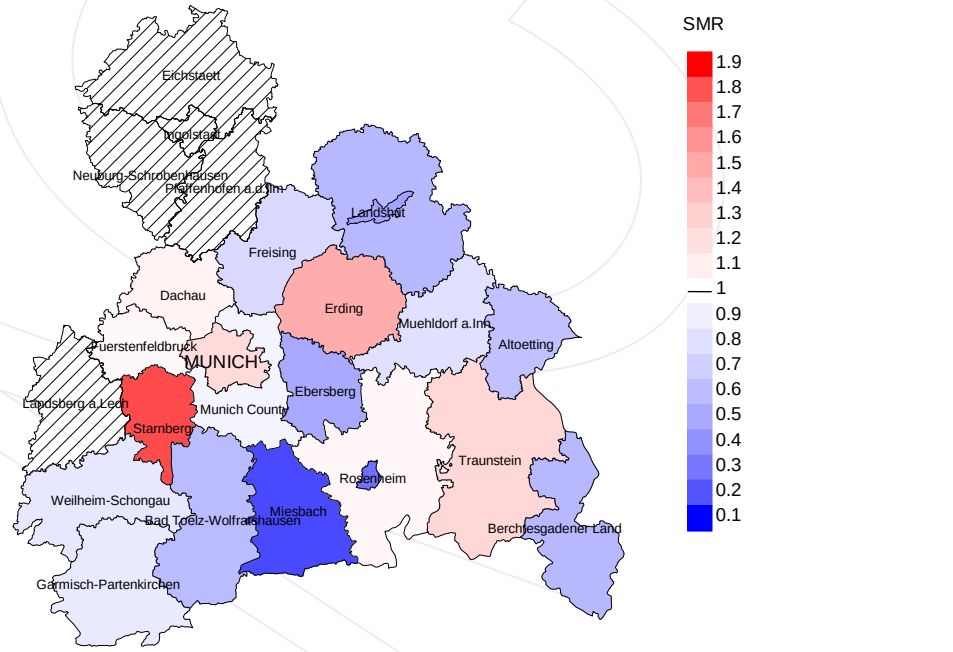


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=128, females N=212). 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 3 women died from thyroid cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.50. Though, the value of this parameter may vary with an underlying probability of 99% between 0.06 and 1.82, 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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