Munich Cancer Registry

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ICD-10 C73: Thyroid cancer

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	6,440
Diseases	6,483
Creation date	04/13/2016
Export date	12/23/2015
Population	4.64 m

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

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

http://www.tumorregister-muenchen.de/en/facts/base/bC73__E-ICD-10-C73-Thyroid-cancer-incidence-and-mortality.pdf

Global Statements about the statistics on the Internet −
Baseline Statistics (grey button), **Survival** (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.64 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR.

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 2016

[#] 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).

[##] 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.

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

Code	Description
C73	Malignant neoplasm of thyroid gland

INCIDENCE

Table 1

All patients with invasive cancer by year of diagnosis, proportions of DCO, multiple primaries, deaths, and active follow-up (incl. DCO)

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	209	9	4.3	25.8	32.5	93.3	
1999	201	5	2.5	25.4	23.4	95.5	
2000	234	5	2.1	24.8	23.9	97.9	
2001	196	5	2.6	20.4	23.0	96.9	
2002	313	14	4.5	25.6	27.2	94.9	#
2003	302	8	2.6	19.9	21.9	92.7	
2004	354	9	2.5	16.1	16.1	91.5	
2005	371	7	1.9	20.8	14.8	88.4	
2006	422	9	2.1	20.1	14.5	82.7	
2007	580	7	1.2	16.2	13.3	60.0	#
2008	658	12	1.8	14.6	10.6	46.0	
2009	625	4	0.6	17.0	8.6	43.2	
2010	522	15	2.9	17.0	10.5	42.0	
2011	461	8	1.7	17.6	10.0	45.1	
2012	434	1	0.2	15.2	10.1	49.1	
2013	434	13	3.0	15.0	9.9	98.4	
2014	167	8	4.8	14.4	9.0	97.0	##
1998-2014	6483	139	2.1	18.2	14.6	69.9	

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

Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be found in the respective headings.

Table 1a

All patients with invasive cancer
by year of diagnosis and gender
(incl. DCO)

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	209	43	166	20.6
1999	201	54	147	26.9
2000	234	62	172	26.5
2001	196	53	143	27.0
2002	313	80	233	25.6
2003	302	84	218	27.8
2004	354	107	247	30.2
2005	371	82	289	22.1
2006	422	117	305	27.7
2007	580	172	408	29.7
2008	658	170	488	25.8
2009	625	180	445	28.8
2010	522	120	402	23.0
2011	461	139	322	30.2
2012	434	140	294	32.3
2013	434	172	262	39.6
2014	167	50	117	29.9
1998-2014	6483	1825	4658	28.2

Table 2

Incidence measures by year of diagnosis including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	43	166	3.9	14.1	2.7	9.7	3.5	12.1	4.0	13.4
1999	54	147	4.8	12.4	3.3	9.2	4.4	11.1	5.4	12.0
2000	62	172	5.4	14.3	3.6	10.4	4.9	12.7	5.7	13.4
2001	53	143	4.6	11.8	3.1	7.9	4.1	10.0	4.4	10.8
2002	80	233	4.3	11.9	3.0	8.4	3.8	10.5	4.2	11.4
2003	84	218	4.5	11.1	2.9	8.1	3.9	9.9	4.4	10.4
2004	107	247	5.7	12.5	3.9	8.9	5.0	11.0	5.7	11.8
2005	82	289	4.3	14.5	2.8	10.0	3.7	12.6	4.2	13.4
2006	117	305	6.1	15.2	4.1	10.5	5.3	13.4	5.8	14.2
2007	172	408	7.8	17.7	5.2	12.5	6.7	15.6	7.3	16.5
2008	170	488	7.6	21.0	5.3	14.5	6.8	18.2	7.4	19.5
2009	180	445	8.1	19.1	5.6	14.0	7.1	17.1	7.6	18.2
2010	120	402	5.3	17.2	3.3	12.0	4.4	14.9	4.9	15.9
2011	139	322	6.1	13.6	4.1	9.7	5.2	11.7	5.6	12.7
2012	140	294	6.1	12.5	4.1	9.3	5.2	11.2	5.7	11.8
2013	172	262	7.5	11.1	5.2	7.4	6.6	9.4	7.1	10.2
2014	50	117	2.2	5.0	1.3	3.6	1.8	4.4	2.1	4.5
1998-2014	1825	4658	5.7	13.9	3.8	9.8	4.9	12.1	5.4	13.0

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 patients)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	209	55.0	16.2	13.0	89.6	33.4	43.0	54.4	67.3	77.1
1999	201	53.3	16.0	16.7	88.4	30.0	42.9	53.9	62.5	75.8
2000	234	53.8	16.8	11.3	93.7	32.1	42.4	55.1	65.5	76.1
2001	196	54.3	14.9	17.6	95.4	35.2	42.4	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	302	54.2	16.1	7.6	100	33.6	43.1	55.0	64.7	73.5
2004	354	53.5	15.9	14.8	91.6	32.3	41.9	53.2	64.7	75.1
2005	371	55.1	15.5	13.5	98.2	36.5	43.3	54.8	66.1	74.2
2006	422	54.2	14.6	15.1	94.9	34.9	43.4	55.1	65.1	73.1
2007	580	52.9	14.8	9.3	92.0	34.2	42.1	52.5	63.9	72.3
2008	658	54.4	15.2	12.7	97.7	34.4	43.1	54.9	65.1	73.6
2009	625	52.6	15.7	12.7	93.1	31.9	41.9	52.5	63.6	72.3
2010	522	54.5	15.9	14.3	94.5	34.9	43.0	54.2	65.8	76.2
2011	461	53.6	16.7	10.1	91.5	32.3	40.9	53.0	67.2	75.2
2012	434	52.4	15.6	6.0	91.7	32.3	41.3	52.0	64.2	72.9
2013	434	54.3	16.3	11.6	93.9	33.0	42.0	53.8	66.4	76.2
2014	167	54.5	16.4	7.7	93.1	34.3	43.5	53.2	64.9	75.4
1998-2014	6483	53.9	15.7	6.0	100	33.6	42.6	54.1	65.1	74.5

Table 3a

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	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	62	57.9	17.8	15.9	93.7	32.7	46.6	57.2	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	84	58.7	14.1	24.0	87.9	36.2	50.6	59.7	67.5	77.0
2004	107	55.9	15.4	16.1	88.1	36.4	45.2	57.4	66.5	75.8
2005	82	58.6	14.2	20.1	91.3	41.7	48.3	58.2	68.7	78.2
2006	117	56.3	13.9	19.6	93.4	37.4	46.6	58.0	65.4	72.3
2007	172	54.1	14.0	23.1	84.6	36.7	43.3	53.6	65.1	72.6
2008	170	55.3	14.6	12.7	89.5	34.9	46.6	56.8	64.8	72.9
2009	180	54.6	15.0	13.4	84.7	33.5	46.2	57.6	66.0	71.2
2010	120	58.3	14.6	24.1	88.5	38.6	47.4	57.4	70.4	76.3
2011	139	54.3	15.5	17.3	86.7	35.4	42.8	53.2	67.2	74.6
2012	140	55.8	15.4	19.6	91.7	35.9	44.2	57.4	66.7	74.3
2013	172	54.5	15.4	11.6	89.9	34.2	44.0	55.3	65.6	73.7
2014	50	60.0	14.8	27.0	86.6	40.3	49.4	60.2	72.8	80.0
1998-2014	1825	55.9	15.0	7.8	93.7	35.9	45.6	56.7	66.5	74.7

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	55.0	16.8	13.0	89.6	33.0	42.2	54.4	68.4	77.2
1999	147	51.4	15.6	16.7	86.8	28.0	40.9	52.3	61.5	73.2
2000	172	52.4	16.2	11.3	91.0	31.9	41.5	53.7	64.5	72.4
2001	143	54.1	15.7	17.6	95.4	34.4	40.6	54.8	65.0	74.3
2002	233	55.4	16.1	10.0	91.2	34.5	46.5	55.7	66.7	75.0
2003	218	52.4	16.5	7.6	100	32.8	40.2	53.3	63.2	73.5
2004	247	52.4	16.0	14.8	91.6	31.6	40.0	52.6	63.6	74.3
2005	289	54.1	15.7	13.5	98.2	34.2	42.4	54.0	65.3	73.4
2006	305	53.4	14.8	15.1	94.9	34.8	42.2	54.5	63.7	73.2
2007	408	52.3	15.1	9.3	92.0	33.2	41.4	51.8	63.9	72.2
2008	488	54.1	15.4	16.2	97.7	34.2	42.4	54.3	65.2	74.2
2009	445	51.8	15.9	12.7	93.1	31.6	39.8	51.3	62.7	73.0
2010	402	53.4	16.1	14.3	94.5	34.1	41.6	52.7	63.9	76.1
2011	322	53.3	17.2	10.1	91.5	30.4	40.7	52.7	67.6	75.5
2012	294	50.8	15.4	6.0	90.3	30.9	39.3	50.6	62.1	70.4
2013	262	54.1	16.8	20.7	93.9	32.6	41.3	53.4	67.6	78.4
2014	117	52.1	16.6	7.7	93.1	31.0	40.7	49.8	62.6	72.7
1998-2014	4658	53.1	15.9	6.0	100	32.8	41.4	53.0	64.4	74.3

Table 4

Age distribution by 5-year age group and gender for period 2007-2014 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
5-9	3	0.1	0.1			0.0	3	0.1	0.1
10-14	19	0.5	0.6	5	0.4	0.4	14	0.5	0.6
15-19	22	0.6	1.1	9	0.8	1.2	13	0.5	1.1
20-24	87	2.2	3.4	18	1.6	2.8	69	2.5	3.6
25-29	113	2.9	6.3	26	2.3	5.1	87	3.2	6.8
30-34	230	5.9	12.2	48	4.2	9.3	182	6.6	13.4
35-39	334	8.6	20.8	80	7.0	16.3	254	9.3	22.7
40-44	409	10.5	31.4	102	8.9	25.2	307	11.2	33.9
45-49	436	11.2	42.6	118	10.3	35.5	318	11.6	45.5
50-54	426	11.0	53.6	140	12.2	47.8	286	10.4	56.0
55-59	419	10.8	64.4	132	11.5	59.3	287	10.5	66.5
60-64	411	10.6	75.0	141	12.3	71.7	270	9.9	76.3
65-69	343	8.8	83.8	124	10.8	82.5	219	8.0	84.3
70-74	280	7.2	91.0	101	8.8	91.3	179	6.5	90.9
75-79	173	4.5	95.5	57	5.0	96.3	116	4.2	95.1
80-84	98	2.5	98.0	29	2.5	98.9	69	2.5	97.6
85+	78	2.0	100.0	13	1.1	100.0	65	2.4	100.0
All ages	3881	100.0		1143	100.0		2738	100.0	

Included in the statistics are 23.4% multiple primaries in males and 17.0% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 2007-2014

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=20 %	Females DCO rate n=48 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4			0.0	0.0				
5- 9		3	0.0	0.4				3.8
10-14	5	14	0.5	1.6			5.0	15.7
15-19	9	13	0.9	1.4			4.2	7.9
20-24	18	69	1.6	6.3			4.8	22.2
25-29	26	87	2.2	7.1			4.7	13.2
30-34	48	180	3.8	14.4			6.2	15.6
35-39	79	250	6.1	19.8			6.8	12.6
40-44	101	307	6.2	20.1	1.0		5.5	8.2
45-49	116	315	7.3	20.8			3.6	5.8
50-54	140	286	10.8	22.3			2.9	4.2
55-59	131	284	12.3	25.3			1.8	3.8
60-64	140	266	14.3	25.1	0.7	1.1	1.3	2.9
65-69	120	219	12.5	21.0	1.7		0.8	1.9
70-74	100	177	11.0	16.9	5.0	0.6	0.6	1.5
75-79	57	114	10.4	16.0	8.8	4.4	0.5	1.1
80-84	29	69	8.3	12.3	10.3	18.8	0.3	0.8
85+	13	65	5.6	11.2	23.1	40.0	0.2	0.6
All ages	1132	2718			1.8	1.8	1.2	3.0
Incidence								
Raw			6.3	14.5				
WS			4.2	10.3				
ES			5.4	12.7				
BRD-S			5.9	13.5				

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).

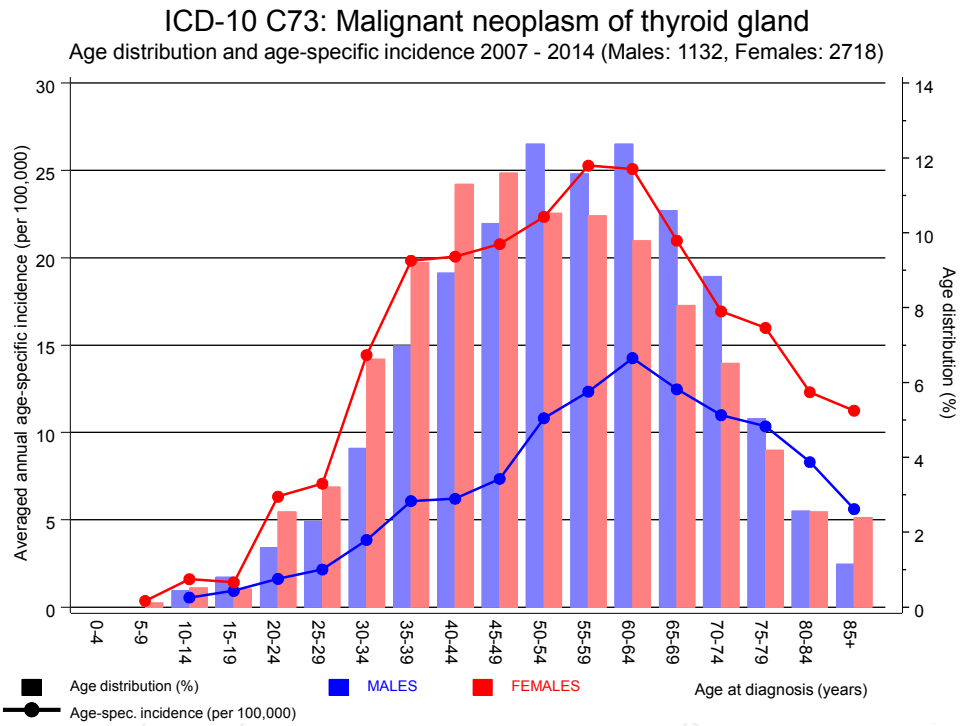


Figure 6. Age distribution and age-specific incidence

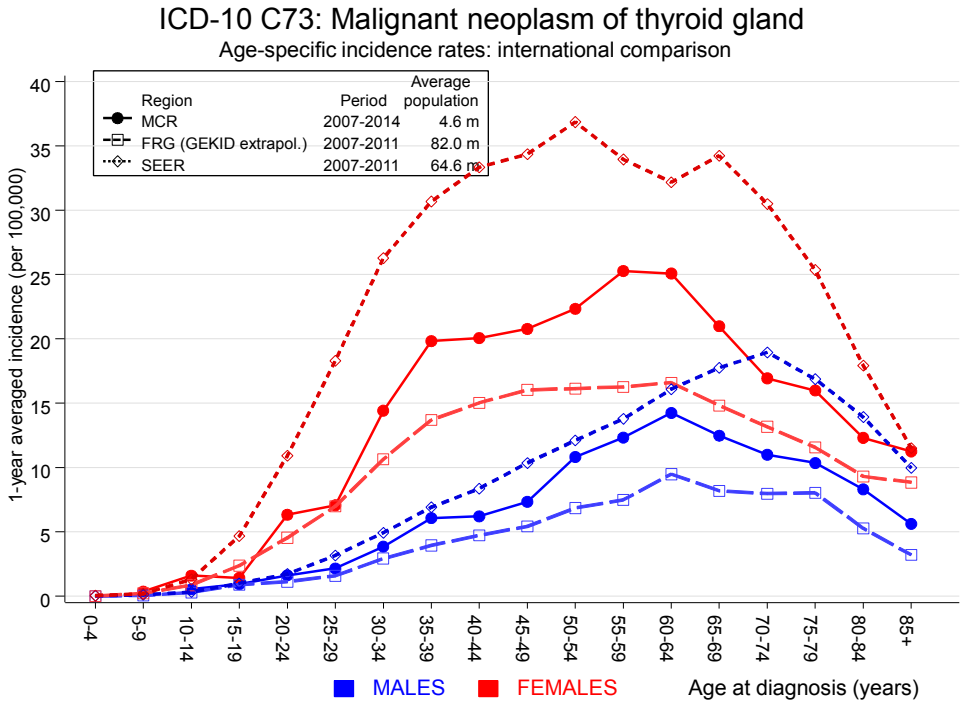


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

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, 2014. http://www.gekid.de. Last access: 02/11/2015

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

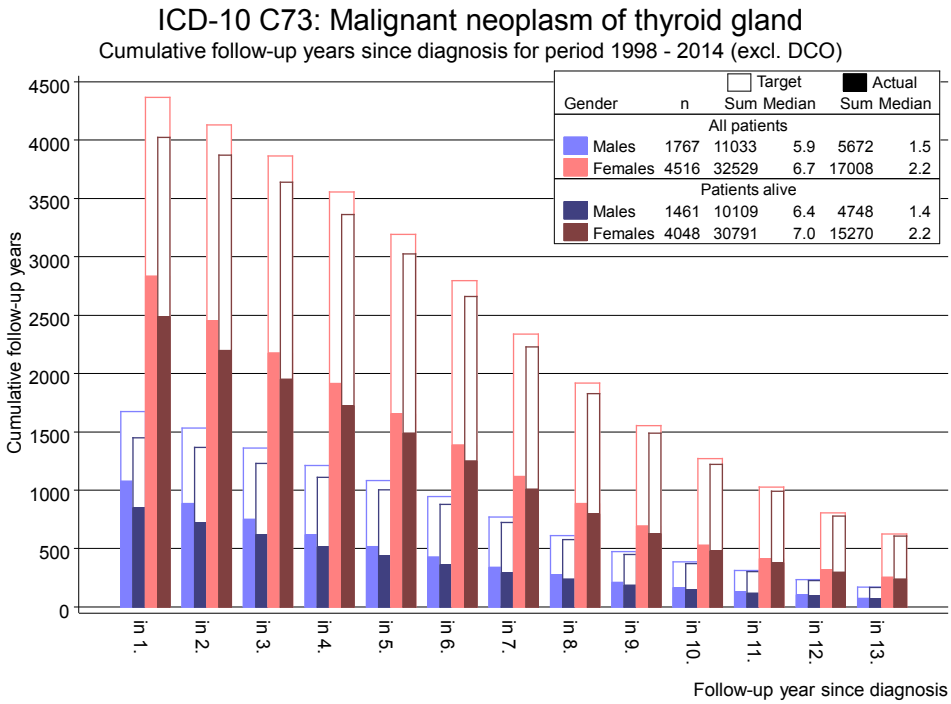


Figure 7. Cumulative follow-up years depending on time since diagnosis

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

Table 8a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	2	0.7	2.9	0.4	10.6		2.3	
C15	Oesophagus	5	1.2	4.0	1.3	9.4	#	6.7	
C16	Stomach	4	2.2	1.8	0.5	4.6		3.1	
C18	Colon	12	5.4	2.2	1.1	3.9	#	11.7	
C19-C20	Rectum	13	3.4	3.8	2.0	6.5	#	17.0	
C21	Anus/canal	2	0.1	13.7	1.7	49.6	#	3.3	
C22	Liver	4	1.7	2.4	0.7	6.1		4.1	25.0
C25	Pancreas	3	2.1	1.4	0.3	4.2		1.6	
C32	Larynx	3	0.7	4.2	0.9	12.2		4.1	
C33-C34	Lung	16	7.2	2.2	1.3	3.6	#	15.6	6.3
C43	Malign. melanoma	10	2.9	3.5	1.7	6.4	#	12.6	
C61	Prostate	37	17.4	2.1	1.5	2.9	#	34.8	
C64	Kidney	4	2.3	1.8	0.5	4.5		3.1	
C67	Bladder	6	2.3	2.6	0.9	5.6		6.5	16.7
C70-C72	CNS cancer	2	0.9	2.2	0.3	8.0		2.0	
C73	Thyroid	14	0.6	25.0	13.7	41.9	#	23.9	
C76-C79	CUP	4	1.0	4.2	1.1	10.6	#	5.4	
C82-C85	NHL	7	2.4	3.0	1.2	6.1	#	8.2	
C90	Mult. myeloma	3	0.7	4.2	0.9	12.3		4.1	
C91-C96	Leukaemia	2	0.9	2.2	0.3	7.9		1.9	
Other primaries		6	2.7	2.2	0.8	4.8		5.8	
Not observed		0	2.4	0.0	0.0	1.6		-4.2	
All mult. primaries		159	61.2	2.6	2.2	3.0	#	173.6	1.9

Patients	1742
Median age at second malignancy (years)	67.6
Person-years	5631
Mean observation time (years)	3.2
Median observation time (years)	1.6

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Table 8b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998–2014
FEMALES

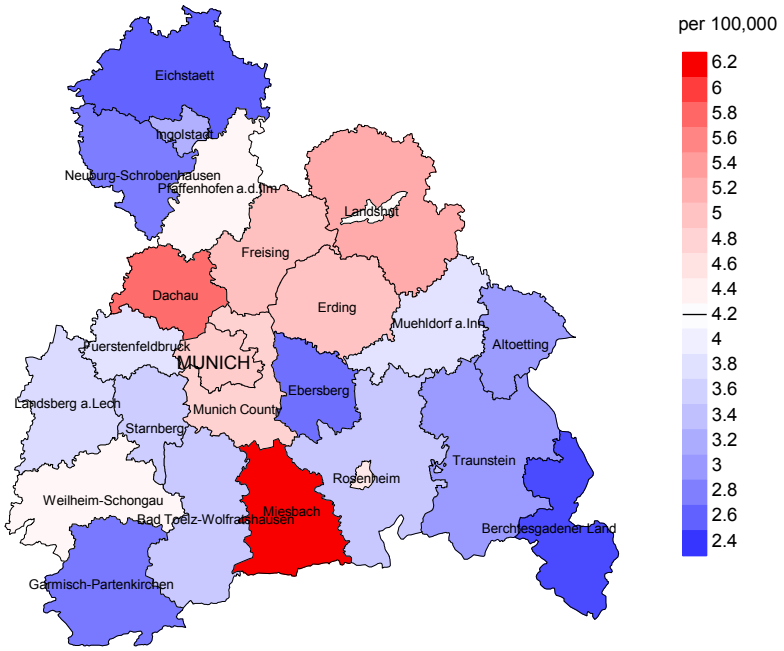
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C07–C08	Salivary gland	2	0.2	10.4	1.3	37.5	#	1.1	
C09–C10	Oropharynx	2	0.6	3.1	0.4	11.2		0.8	50.0
C16	Stomach	6	3.3	1.8	0.7	3.9		1.6	
C18	Colon	22	9.6	2.3	1.4	3.5	#	7.4	
C19–C20	Rectum	14	4.6	3.0	1.7	5.1	#	5.6	
C22	Liver	3	1.2	2.5	0.5	7.4		1.1	33.3
C23–C24	Bile	3	1.3	2.3	0.5	6.6		1.0	33.3
C25	Pancreas	9	4.2	2.1	1.0	4.1		2.8	
C33–C34	Lung	28	9.1	3.1	2.1	4.5	#	11.2	7.1
C38,C45	Mesothelioma	5	0.2	26.1	8.5	60.9	#	2.8	
C43	Malign. melanoma	10	5.5	1.8	0.9	3.3		2.6	
C46,C49	Soft tissue	3	0.7	4.3	0.9	12.5		1.4	
C48	Peritoneal	2	0.5	4.2	0.5	15.2		0.9	
C50	Breast	119	43.2	2.8	2.3	3.3	#	44.9	0.8
C51	Vulva	3	1.0	3.0	0.6	8.7		1.2	
C54	Corpus uteri	14	7.0	2.0	1.1	3.4	#	4.2	
C56	Ovary	12	5.0	2.4	1.2	4.2	#	4.1	
C64	Kidney	14	2.8	5.1	2.8	8.5	#	6.7	
C67	Bladder	3	1.7	1.8	0.4	5.2		0.8	
C70–C72	CNS cancer	4	1.8	2.3	0.6	5.8		1.3	
C73	Thyroid	29	3.4	8.6	5.8	12.4	#	15.2	
C74–C80	Cancer others	3	0.3	10.1	2.1	29.5	#	1.6	
C76–C79	CUP	9	1.7	5.4	2.5	10.2	#	4.3	
C82–C85	NHL	14	4.2	3.3	1.8	5.6	#	5.8	
C90	Mult. myeloma	2	1.2	1.6	0.2	5.8		0.4	
C91–C96	Leukaemia	18	1.7	10.5	6.2	16.6	#	9.6	11.1
Other primaries		9	5.5	1.6	0.7	3.1		2.1	11.1
Not observed		0	2.3	0.0	0.0	1.6		−1.4	
All mult. primaries		362	123.8	2.9	2.6	3.2	#	141.1	2.5

Patients	4464
Median age at second malignancy (years)	64.5
Person-years	16884
Mean observation time (years)	3.8
Median observation time (years)	2.3

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Average incidence (world standard population) 2007 - 2014: Males



Average incidence (world standard population) 2007 - 2014: Females

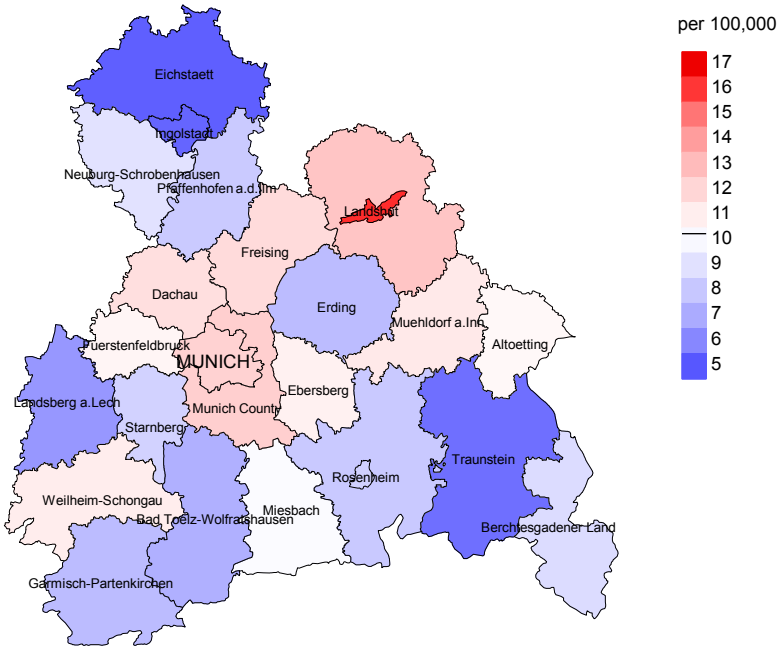
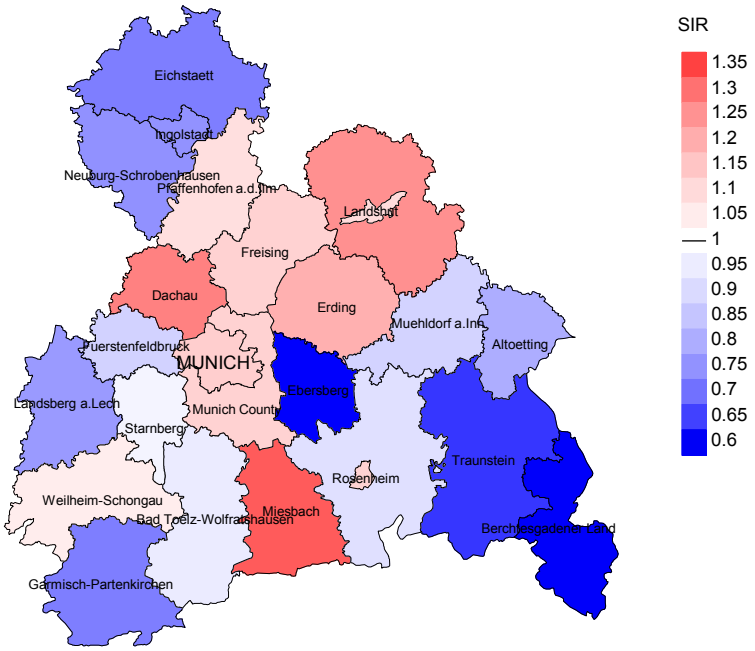


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.2/100,000 WS N=1,132, females 10.3/100,000 WS N=2,718).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 80 women were identified with newly diagnosed thyroid cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 10.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 7.8 and 15.0/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

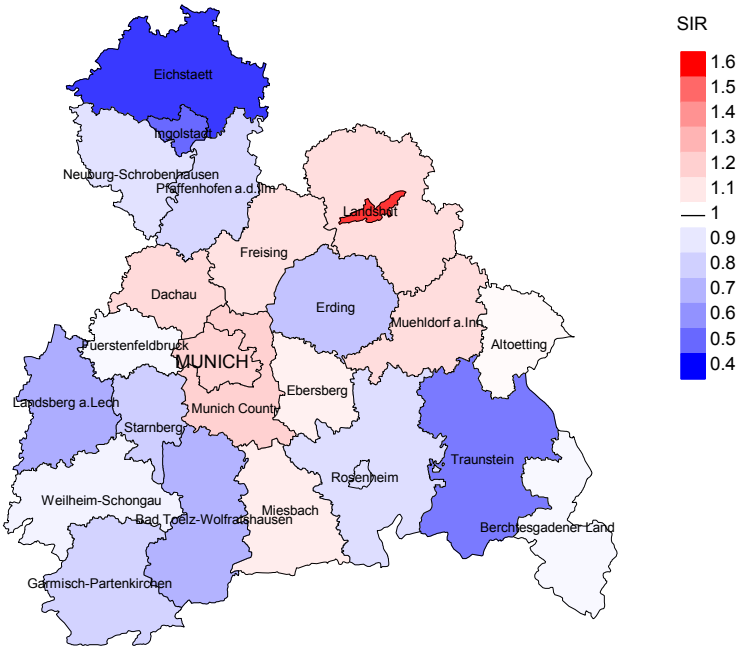


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,132, females N=2,718).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 80 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 1.06. Though, the value of this parameter may vary with an underlying probability of 99% between 0.78 and 1.40, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	209	93.3	4.3	68	32.5	97.1
1999	201	95.5	2.5	47	23.4	95.7
2000	234	97.9	2.1	56	23.9	98.2
2001	196	96.9	2.6	45	23.0	97.8
2002	313	94.9	4.5	85	27.2	97.6
2003	302	92.7	2.6	66	21.9	97.0
2004	354	91.5	2.5	57	16.1	100.0
2005	371	88.4	1.9	55	14.8	98.2
2006	422	82.7	2.1	61	14.5	98.4
2007	580	60.0	1.2	77	13.3	96.1
2008	658	46.0	1.8	70	10.6	98.6
2009	625	43.2	0.6	54	8.6	100.0
2010	522	42.0	2.9	55	10.5	96.4
2011	461	45.1	1.7	46	10.0	100.0
2012	434	49.1	0.2	44	10.1	97.7
2013	434	98.4	3.0	43	9.9	100.0
2014	167	97.0	4.8	15	9.0	100.0
1998-2014	6483	69.9	2.1	944	14.6	98.0

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	209	53	96.2	18	8.6
1999	201	45	88.9	12	6.0
2000	234	48	91.7	13	5.6
2001	196	38	86.8	13	6.6
2002	313	69	98.6	26	8.3
2003	302	81	93.8	18	6.0
2004	354	68	95.6	20	5.6
2005	371	84	100.0	20	5.4
2006	422	100	98.0	18	4.3
2007	580	92	93.5	24	4.1
2008	658	73	98.6	24	3.6
2009	625	87	97.7	19	3.0
2010	522	114	98.2	30	5.7
2011	461	134	100.0	32	6.9
2012	434	118	95.8	17	3.9
2013	434	122	100.0	28	6.5
2014	167	119	99.2	15	9.0
1998-2014	6483	1445	97.0	347	5.4

Table 10c

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

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	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	84	76.2	23.8	77.4
2006	100	71.0	29.0	82.7
2007	92	73.9	26.1	83.7
2008	73	68.5	31.5	87.5
2009	87	74.7	25.3	87.1
2010	114	71.9	28.1	75.9
2011	134	67.2	32.8	80.6
2012	118	61.9	38.1	67.3
2013	122	62.3	37.7	70.5
2014	119	68.1	31.9	79.7
1998-2014	1445	70.3	29.7	81.3

Table 11a

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

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	18	73.3	73.3	59.1	73.3
1999	18	68.9	69.2	63.7	70.5
2000	22	76.8	76.8	76.5	76.8
2001	14	72.2	70.7	75.0	71.1
2002	21	74.8	74.7	87.0	75.5
2003	26	74.8	74.9	73.2	74.9
2004	27	72.3	73.8	71.3	70.7
2005	29	79.1	79.4	68.6	76.6
2006	36	72.2	71.1	80.1	71.5
2007	35	73.3	73.3	66.6	73.3
2008	19	77.1	77.7	70.8	77.7
2009	26	73.0	68.7	79.2	70.6
2010	41	72.3	71.5	81.1	71.6
2011	44	71.6	68.0	77.3	70.4
2012	45	75.0	74.7	75.6	75.0
2013	47	76.1	68.3	81.8	71.6
2014	47	70.4	70.3	76.3	70.3
1998-2014	515	73.3	72.3	76.6	73.1

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

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

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	35	78.1	77.4	79.8	79.3
1999	27	74.7	72.0	76.9	71.7
2000	26	77.0	71.2	89.6	76.5
2001	24	79.1	67.3	80.0	78.9
2002	48	76.6	76.7	75.2	76.6
2003	55	76.9	77.7	74.8	78.4
2004	41	79.4	78.4	80.3	76.5
2005	55	78.0	76.1	83.6	76.1
2006	64	76.6	75.3	83.5	75.4
2007	57	78.0	78.0	75.9	78.1
2008	54	76.6	73.0	81.2	76.2
2009	61	77.5	76.9	82.5	80.0
2010	73	77.0	72.3	82.8	73.4
2011	90	78.5	78.1	81.3	78.1
2012	73	79.3	78.7	80.0	77.7
2013	75	78.5	76.5	79.4	77.1
2014	72	76.5	76.0	78.7	75.6
1998-2014	930	77.7	76.2	80.0	76.7

By 2010, life expectancy at birth was 77.5 years for boys and 82.6 years for girls.

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	0.37
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	0.22	1.2	0.28
2004	20	1.1	0.19	0.5	0.14	0.8	0.17	1.2	0.22
2005	22	1.2	0.27	0.6	0.20	0.9	0.24	1.3	0.31
2006	29	1.5	0.25	0.8	0.18	1.2	0.23	1.6	0.28
2007	26	1.2	0.15	0.6	0.11	0.9	0.13	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	0.27	0.7	0.21	1.0	0.23	1.3	0.26
2011	31	1.4	0.22	0.7	0.17	1.0	0.20	1.3	0.23
2012	35	1.5	0.25	0.7	0.17	1.1	0.21	1.5	0.27
2013	28	1.2	0.16	0.6	0.12	0.9	0.14	1.2	0.17
2014	34	1.5	0.68	0.7	0.55	1.1	0.61	1.4	0.70
1998-2014	385	1.2	0.21	0.6	0.16	0.9	0.19	1.3	0.23

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	0.07	1.1	0.08	1.3	0.10
2001	16	1.3	0.11	0.6	0.07	0.8	0.08	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	0.07	1.3	0.09	1.7	0.12
2007	42	1.8	0.10	0.7	0.05	1.0	0.07	1.4	0.09
2008	36	1.6	0.07	0.6	0.04	0.9	0.05	1.2	0.06
2009	46	2.0	0.10	0.7	0.05	1.1	0.06	1.3	0.07
2010	50	2.1	0.13	0.8	0.07	1.3	0.09	1.6	0.10
2011	59	2.5	0.19	0.8	0.08	1.3	0.11	1.8	0.14
2012	38	1.6	0.13	0.6	0.06	0.9	0.08	1.2	0.10
2013	48	2.0	0.18	0.8	0.10	1.1	0.12	1.5	0.15
2014	47	2.0	0.40	0.7	0.21	1.1	0.26	1.5	0.32
1998-2014	631	1.9	0.14	0.7	0.07	1.1	0.09	1.5	0.11

Table 13

Age distribution of age at death (cancer-related) for period 2007-2014
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
25-29	2	0.3	0.3			0.0	2	0.5	0.5
30-34	2	0.3	0.7	1	0.5	0.5	1	0.3	0.8
35-39	4	0.7	1.4	3	1.4	1.8	1	0.3	1.1
40-44	2	0.3	1.7	1	0.5	2.3	1	0.3	1.4
45-49	12	2.0	3.7	4	1.8	4.1	8	2.2	3.5
50-54	17	2.9	6.6	9	4.1	8.1	8	2.2	5.7
55-59	28	4.7	11.4	10	4.5	12.7	18	4.9	10.6
60-64	67	11.4	22.7	37	16.7	29.4	30	8.1	18.7
65-69	69	11.7	34.4	31	14.0	43.4	38	10.3	29.0
70-74	107	18.1	52.5	43	19.5	62.9	64	17.3	46.3
75-79	99	16.8	69.3	41	18.6	81.4	58	15.7	62.1
80-84	83	14.1	83.4	26	11.8	93.2	57	15.4	77.5
85+	98	16.6	100.0	15	6.8	100.0	83	22.5	100.0
All ages	590	100.0		221	100.0		369	100.0	

Included in the statistics are 23.4% multiple primaries in males and 17.0% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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		0.2	0.02		3.1
30-34	1	1	0.1	0.02	0.1	0.01	1.1	0.9
35-39	3	1	0.2	0.04	0.1	0.00	1.7	0.4
40-44	1	1	0.1	0.01	0.1	0.00	0.2	0.2
45-49	4	8	0.3	0.03	0.5	0.03	0.4	0.7
50-54	9	8	0.7	0.06	0.6	0.03	0.5	0.4
55-59	10	18	0.9	0.08	1.6	0.06	0.3	0.7
60-64	37	30	3.8	0.26	2.8	0.11	0.8	0.8
65-69	31	38	3.2	0.25	3.6	0.17	0.4	0.7
70-74	43	64	4.7	0.43	6.1	0.36	0.5	1.0
75-79	41	58	7.4	0.72	8.1	0.50	0.5	0.9
80-84	26	57	7.4	0.90	10.2	0.83	0.4	0.9
85+	15	83	6.5	1.15	14.4	1.28	0.2	1.0
All ages	221	369					0.4	0.8
Mortality								
Raw			1.2	0.19	2.0	0.13		
WS			0.6	0.14	0.7	0.07		
ES			0.9	0.16	1.1	0.08		
BRD-S			1.2	0.20	1.5	0.11		
PYLL-70								
per 100,000			5.6		6.6			
ES			4.9		5.6			
AYLL-70			9.3		9.8			

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

Table 15a

Multiple primaries in deaths in period 1998–2014
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	5	2.3	1	20.0	2	40.0	2	40.0
C09–C10 Oropharynx	6	2.8	3	50.0			3	50.0
C15 Oesophagus	7	3.3	2	28.6	1	14.3	4	57.1
C16 Stomach	5	2.3					5	100.0
C18 Colon	12	5.6	7	58.3	2	16.7	3	25.0
C19–C20 Rectum	7	3.3	2	28.6			5	71.4
C22 Liver	4	1.9					4	100.0
C25 Pancreas	4	1.9	1	25.0			3	75.0
C32 Larynx	5	2.3	3	60.0	1	20.0	1	20.0
C33–C34 Lung	29	13.6	5	17.2	1	3.4	23	79.3
C43 Malign. melanoma	13	6.1	9	69.2			4	30.8
C44 Skin others	7	3.3	2	28.6	2	28.6	3	42.9
C46,C49 Soft tissue	3	1.4	1	33.3			2	66.7
C61 Prostate	32	15.0	23	71.9			9	28.1
C64 Kidney	10	4.7	6	60.0			4	40.0
C67 Bladder	16	7.5	7	43.8	1	6.3	8	50.0
C70–C72 CNS cancer	5	2.3	2	40.0			3	60.0
C73 Thyroid	3	1.4			3	100.0		
C76–C79 CUP	8	3.7	1	12.5	1	12.5	6	75.0
C82–C85 NHL	7	3.3	1	14.3			6	85.7
C90 Mult. myeloma	5	2.3	3	60.0			2	40.0
C91–C96 Leukaemia	7	3.3					7	100.0
Other primaries	14	6.5	8	57.1	1	7.1	5	35.7
All mult. primaries	214	100.0	87	40.7	15	7.0	112	52.3

Multiple primaries with number of cases 1 to 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 15b

Multiple primaries in deaths in period 1998–2014
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	9	2.2	2	22.2			7	77.8
C18	Colon	23	5.6	9	39.1	2	8.7	12	52.2
C19–C20	Rectum	11	2.7	3	27.3	1	9.1	7	63.6
C22	Liver	7	1.7	1	14.3	1	14.3	5	71.4
C25	Pancreas	10	2.4					10	100.0
C33–C34	Lung	43	10.5	5	11.6	7	16.3	31	72.1
C43	Malign. melanoma	10	2.4	6	60.0			4	40.0
C44	Skin others	10	2.4	7	70.0			3	30.0
C50	Breast	102	24.9	47	46.1	1	1.0	54	52.9
C53	Cervix uteri	7	1.7	6	85.7			1	14.3
C54	Corpus uteri	10	2.4	6	60.0			4	40.0
C56	Ovary	24	5.9	5	20.8			19	79.2
C64	Kidney	23	5.6	13	56.5	1	4.3	9	39.1
C67	Bladder	11	2.7	3	27.3			8	72.7
C70–C72	CNS cancer	17	4.2	1	5.9	2	11.8	14	82.4
C76–C79	CUP	11	2.7	1	9.1			10	90.9
C82–C85	NHL	11	2.7	3	27.3			8	72.7
C90	Mult. myeloma	5	1.2	2	40.0			3	60.0
C91–C96	Leukaemia	26	6.4	1	3.8			25	96.2
Other primaries		39	9.5	9	23.1	6	15.4	24	61.5
All mult. primaries		409	100.0	130	31.8	21	5.1	258	63.1

Multiple primaries with number of cases 1 to 4 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 2007-2014
(**First primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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		0.2	0.02		3.4
30-34	1	1	0.1	0.02	0.1	0.01	1.2	1.1
35-39	3		0.2	0.04	0.0		1.8	
40-44	1		0.1	0.01	0.0		0.2	
45-49	2	6	0.1	0.02	0.4	0.02	0.2	0.6
50-54	6	7	0.5	0.05	0.5	0.03	0.4	0.5
55-59	10	12	0.9	0.09	1.1	0.05	0.4	0.6
60-64	30	22	3.1	0.25	2.1	0.09	0.8	0.8
65-69	21	31	2.2	0.24	3.0	0.16	0.4	0.8
70-74	33	53	3.6	0.46	5.1	0.37	0.5	1.0
75-79	27	43	4.9	0.73	6.0	0.48	0.4	0.9
80-84	21	45	6.0	1.00	8.0	0.94	0.4	0.9
85+	8	64	3.5	1.60	11.1	1.39	0.2	0.9
All ages	163	286					0.4	0.8
Mortality								
Raw			0.9	0.17	1.5	0.12		
WS			0.4	0.12	0.5	0.06		
ES			0.7	0.14	0.8	0.07		
BRD-S			0.9	0.18	1.1	0.09		
PYLL-70								
per 100,000			4.5		4.9			
ES			4.0		4.2			
AYLL-70			9.7		9.5			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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		0.2	0.02		3.6
30-34	1	1	0.1	0.02	0.1	0.01	1.2	1.2
35-39	3		0.2	0.04	0.0		1.9	
40-44	1		0.1	0.01	0.0		0.3	
45-49	1	3	0.1	0.01	0.2	0.01	0.1	0.3
50-54	5	3	0.4	0.04	0.2	0.01	0.3	0.2
55-59	7	7	0.7	0.07	0.6	0.03	0.3	0.4
60-64	19	10	1.9	0.17	0.9	0.05	0.6	0.4
65-69	9	16	0.9	0.12	1.5	0.09	0.2	0.5
70-74	27	26	3.0	0.40	2.5	0.20	0.5	0.6
75-79	20	25	3.6	0.59	3.5	0.32	0.4	0.6
80-84	14	30	4.0	0.67	5.4	0.68	0.3	0.7
85+	8	48	3.5	1.60	8.3	1.04	0.2	0.9
All ages	115	171					0.4	0.6
Mortality								
Raw			0.6	0.13	0.9	0.07		
WS			0.3	0.09	0.3	0.03		
ES			0.5	0.11	0.5	0.04		
BRD-S			0.6	0.13	0.7	0.06		
PYLL-70								
per 100,000			3.3		2.8			
ES			2.9		2.4			
AYLL-70			11.4		10.6			

* See corresponding tables with multiple primaries.

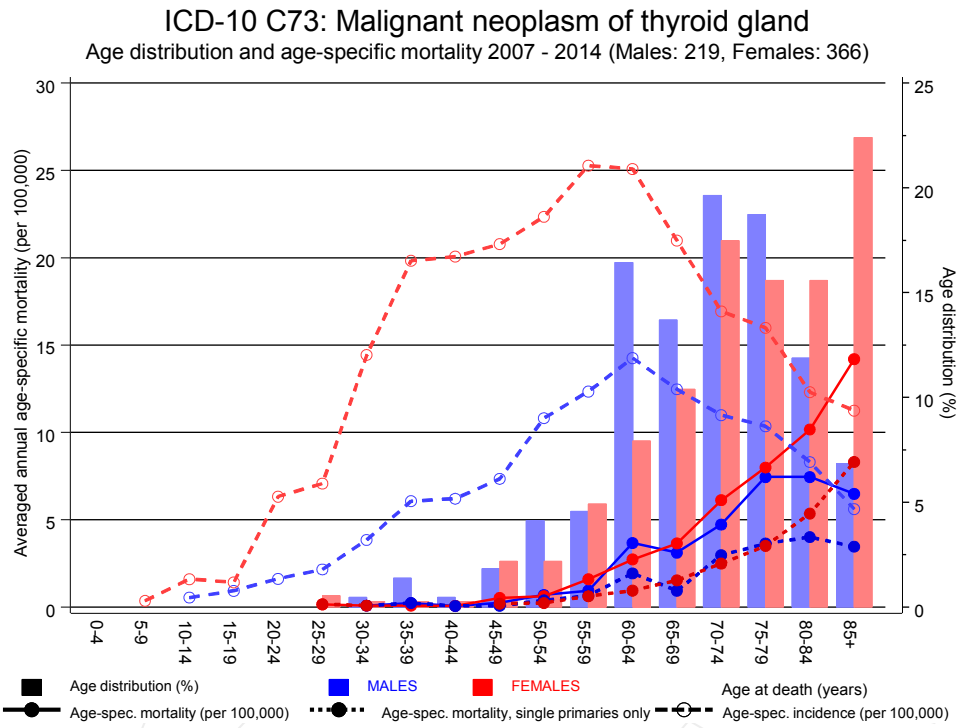
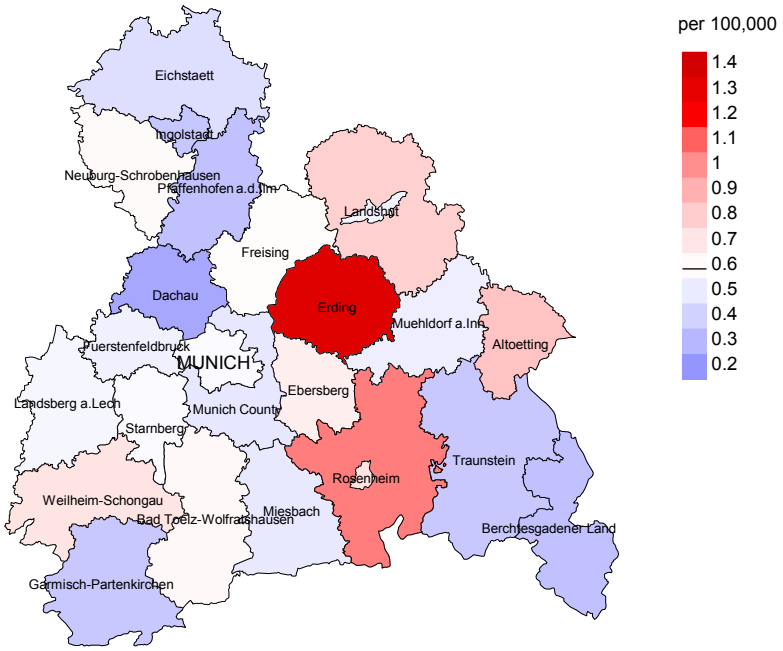


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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) 2007 - 2014: Males



Average mortality (world standard population) 2007 - 2014: Females

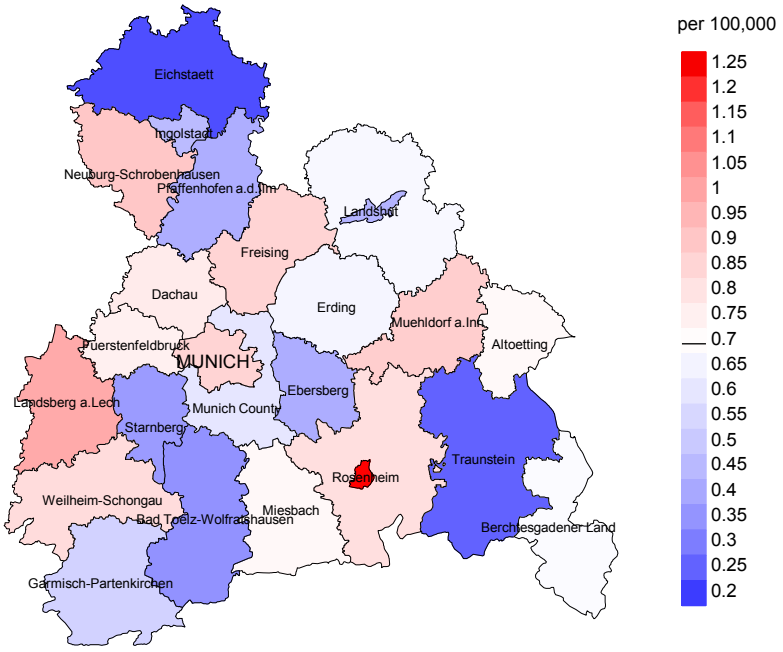
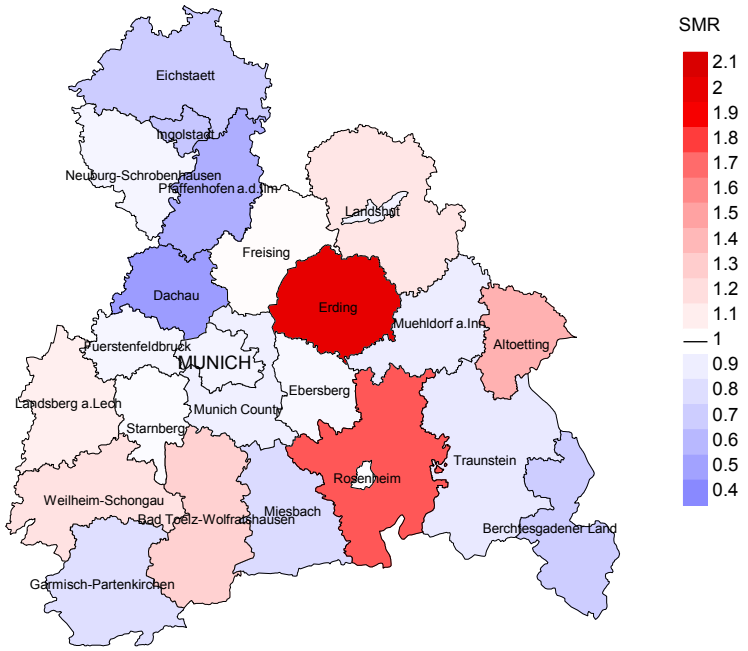


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.6/100,000 WS N=219, females 0.7/100,000 WS N=365).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 8 women died from thyroid cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.3/100,000.

Standardized mortality ratio (SMR) 2007 - 2014: Males



Standardized mortality ratio (SMR) 2007 - 2014: Females

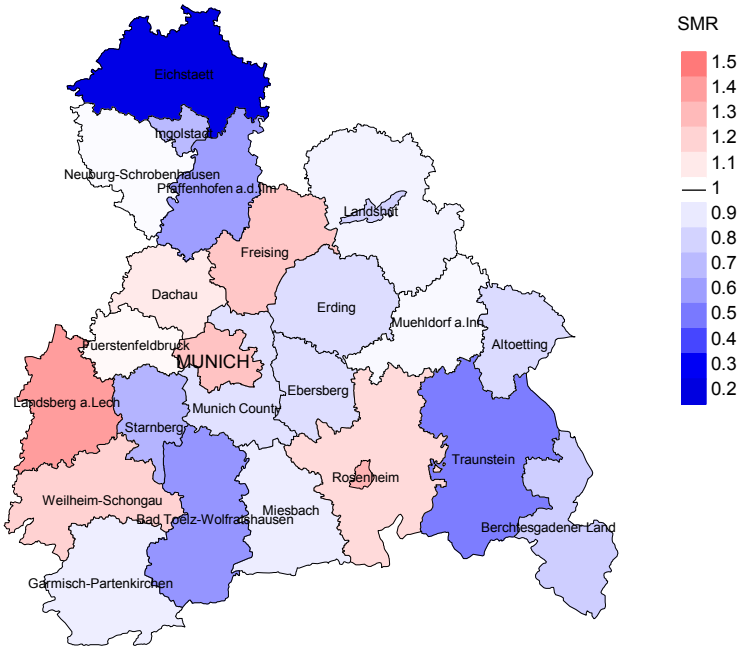


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=219, females N=365).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 8 women died from thyroid cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.84. Though, the value of this parameter may vary with an underlying probability of 99% between 0.27 and 1.96, 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, where applicable. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head/neck and lung).

The index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MI- index. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

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

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