Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

ICD-10 C22: Liver cancer

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	6,111
Diseases	6,119
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/bC22__E-ICD-10-C22-Liver-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
C22.-	Malignant neoplasm of liver and intrahepatic bile ducts
C22.0	Liver cell carcinoma
C22.1	Intrahepatic bile duct carcinoma
C22.2	Hepatoblastoma
C22.3	Angiosarcoma of liver
C22.4	Other sarcomas of liver
C22.7	Other specified carcinomas of liver
C22.9	Liver, unspecified

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	182	67	36.8	9.3	97.3	100.0	
1999	211	80	37.9	9.5	96.7	99.1	
2000	218	88	40.4	11.5	94.5	100.0	
2001	195	69	35.4	14.4	97.4	98.5	
2002	351	147	41.9	16.8	98.3	99.7	#
2003	333	133	39.9	16.2	96.1	99.7	
2004	340	135	39.7	19.1	94.7	98.8	
2005	352	126	35.8	19.9	95.7	98.9	
2006	398	126	31.7	20.9	93.2	98.7	
2007	454	133	29.3	18.5	92.1	96.5	#
2008	480	107	22.3	21.0	88.8	94.0	
2009	463	110	23.8	21.2	87.0	92.4	
2010	446	98	22.0	23.5	89.0	95.1	
2011	443	99	22.3	21.9	81.3	91.4	
2012	507	105	20.7	22.3	76.3	93.3	
2013	456	100	21.9	20.4	73.0	99.6	
2014	290	96	33.1	25.2	57.2	97.9	##
1998-2014	6119	1819	29.7	19.4	87.6	96.7	

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	182	129	53	70.9
1999	211	141	70	66.8
2000	218	156	62	71.6
2001	195	155	40	79.5
2002	351	252	99	71.8
2003	333	241	92	72.4
2004	340	251	89	73.8
2005	352	254	98	72.2
2006	398	287	111	72.1
2007	454	338	116	74.4
2008	480	354	126	73.8
2009	463	335	128	72.4
2010	446	350	96	78.5
2011	443	336	107	75.8
2012	507	360	147	71.0
2013	456	311	145	68.2
2014	290	201	89	69.3
1998-2014	6119	4451	1668	72.7

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	129	53	11.6	4.5	7.2	1.9	10.6	2.9	13.6	3.8
1999	141	70	12.6	5.9	7.4	2.4	11.2	3.7	14.6	4.9
2000	156	62	13.7	5.2	8.2	2.1	12.2	3.2	15.2	4.5
2001	155	40	13.4	3.3	7.9	1.7	11.7	2.2	15.2	2.7
2002	252	99	13.5	5.1	7.6	2.0	11.3	3.0	14.5	4.2
2003	241	92	12.9	4.7	6.9	1.8	10.4	2.8	13.9	3.8
2004	251	89	13.3	4.5	7.3	1.9	11.0	2.7	14.2	3.6
2005	254	98	13.4	4.9	7.2	2.2	10.6	3.0	13.5	3.7
2006	287	111	15.0	5.5	7.9	2.2	11.8	3.3	15.1	4.2
2007	338	116	15.3	5.0	8.2	2.1	12.0	3.1	15.4	3.9
2008	354	126	15.9	5.4	8.5	2.4	12.3	3.4	15.5	4.4
2009	335	128	15.0	5.5	7.6	2.1	11.1	3.2	14.2	4.2
2010	350	96	15.5	4.1	7.7	1.5	11.5	2.2	14.7	2.9
2011	336	107	14.7	4.5	7.4	1.9	10.7	2.7	13.8	3.4
2012	360	147	15.8	6.2	7.8	2.7	11.5	3.9	14.8	5.0
2013	311	145	13.6	6.1	6.8	2.6	10.1	3.8	12.9	4.9
2014	201	89	8.8	3.8	4.3	1.5	6.4	2.2	8.3	2.8
1998-2014	4451	1668	13.9	5.0	7.3	2.1	10.8	3.0	13.9	3.9

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	182	68.4	12.1	16.5	92.2	54.9	60.8	68.7	76.8	83.6
1999	211	69.9	11.8	10.8	95.7	57.5	62.4	70.0	78.2	84.0
2000	218	70.2	11.8	25.1	94.3	55.8	63.5	69.7	77.9	86.1
2001	195	67.9	13.4	0.6	98.8	50.5	61.0	68.9	77.2	82.3
2002	351	69.5	11.1	29.3	94.0	55.8	62.4	69.8	77.5	82.3
2003	333	70.1	12.1	10.9	98.8	57.4	63.3	70.7	78.7	83.0
2004	340	69.7	12.0	3.1	93.4	54.6	62.1	70.5	78.1	84.3
2005	352	69.3	13.0	1.0	100	57.0	63.1	68.9	77.8	83.7
2006	398	69.8	11.3	20.4	96.6	54.6	62.8	69.8	78.3	84.6
2007	454	69.3	12.1	0.3	96.7	54.7	62.1	70.5	77.8	84.1
2008	480	68.5	12.5	1.1	97.9	54.8	62.1	69.3	76.8	83.0
2009	463	70.6	11.3	1.4	95.8	57.3	65.1	71.0	77.9	84.1
2010	446	70.9	11.2	0.8	98.5	57.0	63.9	71.3	78.2	85.1
2011	443	69.7	12.9	0.7	98.3	54.7	63.9	71.2	77.7	83.4
2012	507	69.7	11.9	1.5	97.8	54.9	64.0	71.6	77.2	82.6
2013	456	70.2	11.7	0.6	96.7	55.9	63.8	71.3	78.1	83.6
2014	290	71.0	11.4	18.4	98.1	56.8	64.2	72.4	77.7	85.4
1998-2014	6119	69.8	12.0	0.3	100	55.7	63.0	70.5	77.8	83.8

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	129	67.1	11.5	16.5	89.1	55.0	60.6	66.6	74.7	82.6
1999	141	68.0	11.3	10.8	95.7	56.4	61.7	69.0	75.7	79.7
2000	156	69.2	12.2	25.1	94.3	55.5	62.6	68.4	76.0	87.9
2001	155	67.4	11.6	31.6	95.3	50.5	61.0	68.3	75.6	81.6
2002	252	68.2	10.1	36.0	93.8	55.6	62.1	68.0	75.4	81.2
2003	241	68.8	11.2	25.1	92.4	56.6	62.6	68.7	76.8	82.0
2004	251	68.6	10.9	22.5	93.4	54.7	61.2	69.0	75.9	81.9
2005	254	68.2	9.8	34.4	93.0	57.0	62.2	67.5	75.2	80.4
2006	287	68.6	10.4	41.8	96.6	55.0	61.8	69.0	76.1	81.9
2007	338	68.5	11.4	0.3	96.7	56.0	61.7	69.9	76.0	81.1
2008	354	67.8	11.1	6.5	97.9	55.0	61.5	68.7	74.6	80.8
2009	335	69.7	11.2	1.4	94.7	56.6	63.9	70.4	76.6	83.4
2010	350	69.7	10.7	0.8	94.9	56.2	62.7	70.7	76.7	82.6
2011	336	69.1	11.1	0.8	92.3	55.2	63.8	70.5	76.3	81.3
2012	360	69.2	10.9	1.5	91.3	54.9	63.5	70.9	76.5	81.8
2013	311	69.6	11.1	0.6	96.7	56.0	63.5	70.0	77.2	82.5
2014	201	70.3	10.9	18.4	95.6	57.3	63.6	72.0	76.9	83.6
1998-2014	4451	68.8	11.0	0.3	97.9	55.6	62.3	69.6	76.2	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	53	71.5	13.2	34.6	92.2	52.8	64.3	74.9	79.6	87.3
1999	70	73.7	12.0	35.7	94.0	59.4	64.2	75.2	83.3	88.3
2000	62	72.7	10.6	33.9	93.4	60.8	65.6	74.8	80.3	83.6
2001	40	69.8	19.0	0.6	98.8	48.2	62.8	72.2	81.2	91.2
2002	99	72.8	12.6	29.3	94.0	58.3	65.3	76.5	80.7	86.9
2003	92	73.5	13.5	10.9	98.8	60.3	66.4	77.2	81.0	86.0
2004	89	73.0	14.3	3.1	93.4	51.3	65.2	74.3	83.6	89.3
2005	98	72.2	18.7	1.0	100	55.2	65.4	75.4	83.8	90.8
2006	111	73.0	13.0	20.4	95.3	54.2	66.0	73.1	83.1	86.7
2007	116	71.7	13.6	25.9	94.8	53.8	64.5	73.1	82.6	87.1
2008	126	70.6	15.6	1.1	96.7	52.5	64.0	73.5	81.4	86.0
2009	128	73.1	11.2	39.7	95.8	58.4	66.4	73.8	82.0	86.4
2010	96	75.0	11.9	15.6	98.5	60.8	69.0	74.7	85.2	87.7
2011	107	71.4	17.4	0.7	98.3	47.8	65.7	75.4	82.2	88.0
2012	147	70.8	14.0	1.5	97.8	54.7	65.3	73.6	79.4	86.0
2013	145	71.4	12.9	2.7	95.4	55.9	64.6	72.7	80.0	87.3
2014	89	72.7	12.3	30.0	98.1	56.1	65.6	72.9	79.8	88.6
1998-2014	1668	72.3	13.9	0.6	100	56.2	65.4	74.2	81.7	87.3

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.%
0-4	15	0.4	0.4	9	0.3	0.3	6	0.6	0.6
5-9	2	0.1	0.5	2	0.1	0.4			0.6
10-14	0	0.0	0.5			0.4			0.6
15-19	4	0.1	0.6	2	0.1	0.5	2	0.2	0.8
20-24	3	0.1	0.7	1	0.0	0.5	2	0.2	1.0
25-29	4	0.1	0.8	2	0.1	0.6	2	0.2	1.3
30-34	9	0.3	1.0	4	0.2	0.8	5	0.5	1.8
35-39	12	0.3	1.4	5	0.2	1.0	7	0.7	2.5
40-44	27	0.8	2.1	15	0.6	1.5	12	1.3	3.8
45-49	72	2.0	4.2	54	2.1	3.6	18	1.9	5.7
50-54	177	5.0	9.2	141	5.5	9.1	36	3.8	9.4
55-59	285	8.1	17.2	225	8.7	17.8	60	6.3	15.7
60-64	414	11.7	28.9	339	13.1	30.9	75	7.9	23.6
65-69	597	16.9	45.8	465	18.0	48.9	132	13.8	37.4
70-74	726	20.5	66.3	552	21.4	70.3	174	18.2	55.7
75-79	537	15.2	81.5	396	15.3	85.6	141	14.8	70.4
80-84	376	10.6	92.1	246	9.5	95.1	130	13.6	84.1
85+	279	7.9	100.0	127	4.9	100.0	152	15.9	100.0
All ages	3539	100.0		2585	100.0		954	100.0	

Included in the statistics are 27.4% multiple primaries in males and 24.4% 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=564 %	Females DCO rate n=283 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4	9	6	1.0	0.7			5.1	4.3
5- 9	2		0.2	0.0			2.1	
10-14			0.0	0.0				
15-19	2	2	0.2	0.2			0.9	1.2
20-24	1	2	0.1	0.2			0.3	0.6
25-29	2	2	0.2	0.2			0.4	0.3
30-34	4	5	0.3	0.4		20.0	0.5	0.4
35-39	5	7	0.4	0.6			0.4	0.4
40-44	15	12	0.9	0.8	6.7	8.3	0.8	0.3
45-49	54	18	3.4	1.2	14.8	16.7	1.7	0.3
50-54	141	36	10.9	2.8	20.6	11.1	2.9	0.5
55-59	225	60	21.2	5.3	13.3	11.7	3.1	0.8
60-64	339	75	34.5	7.1	17.4	16.0	3.1	0.8
65-69	465	132	48.3	12.6	19.8	13.6	3.0	1.2
70-74	552	174	60.7	16.6	16.8	25.9	3.3	1.5
75-79	396	140	71.9	19.6	21.0	27.9	3.2	1.4
80-84	245	130	70.1	23.2	38.8	36.2	2.9	1.5
85+	127	152	54.9	26.3	58.3	69.7	2.1	1.5
All ages	2584	953			21.8	29.7	2.8	1.1
Incidence								
Raw			14.3	5.1				
WS			7.3	2.1				
ES			10.7	3.1				
BRD-S			13.6	3.9				

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).

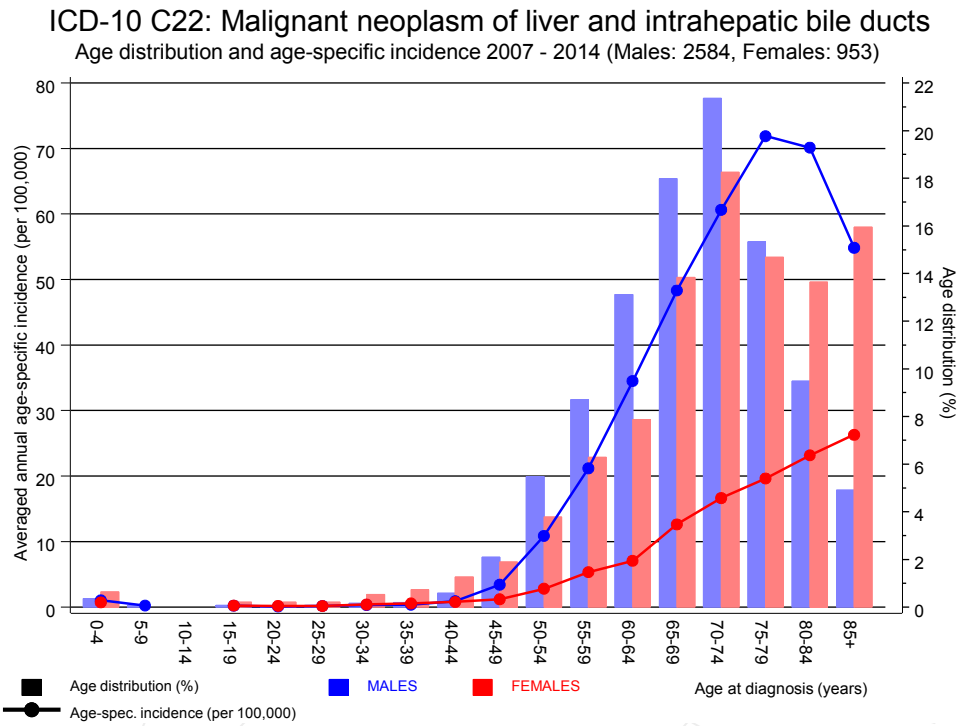


Figure 6. Age distribution and age-specific incidence

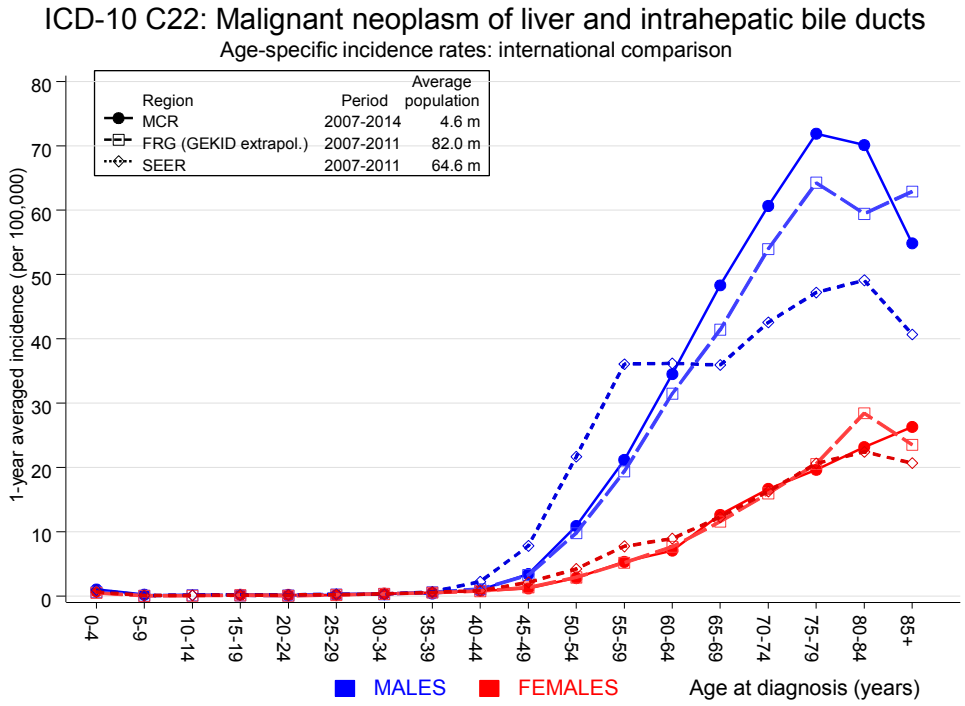


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

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.

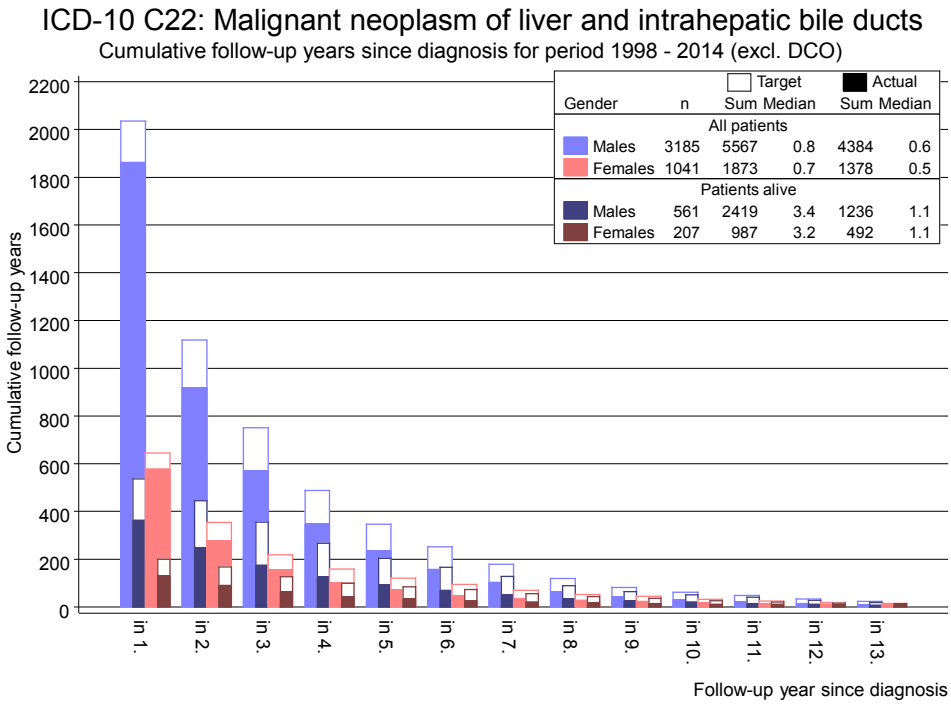


Figure 7. Cumulative follow-up years depending on time since diagnosis

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	4	0.6	6.4	1.7	16.3	#	7.5	
C12-C13	Hypopharynx	2	0.4	4.7	0.6	16.9		3.5	
C15	Oesophagus	11	1.4	7.8	3.9	14.0	#	21.4	9.1
C16	Stomach	6	3.1	2.0	0.7	4.3		6.5	
C17	Small intestine	2	0.4	5.1	0.6	18.3		3.6	
C18	Colon	24	7.5	3.2	2.1	4.8	#	36.9	12.5
C19-C20	Rectum	7	4.2	1.7	0.7	3.4		6.2	57.1
C22	Liver	6	2.2	2.8	1.0	6.0	#	8.5	66.7
C23-C24	Bile	4	0.8	5.3	1.4	13.6	#	7.2	25.0
C25	Pancreas	12	2.8	4.3	2.2	7.4	#	20.5	8.3
C33-C34	Lung	33	9.2	3.6	2.5	5.0	#	53.1	30.3
C43	Malign. melanoma	4	3.3	1.2	0.3	3.1		1.5	
C50	Breast	2	0.2	9.8	1.2	35.3	#	4.0	50.0
C61	Prostate	25	22.9	1.1	0.7	1.6		4.6	32.0
C64	Kidney	14	2.7	5.2	2.8	8.6	#	25.2	14.3
C67	Bladder	13	3.4	3.8	2.0	6.5	#	21.4	
C73	Thyroid	2	0.5	4.0	0.5	14.6		3.4	
C76-C79	CUP	3	1.3	2.4	0.5	6.9		3.9	
C82-C85	NHL	11	3.0	3.6	1.8	6.5	#	17.8	27.3
C90	Mult. myeloma	2	1.0	2.1	0.2	7.4		2.3	100.0
C91-C96	Leukaemia	4	1.2	3.2	0.9	8.2		6.1	25.0
Other primaries		7	2.5	2.8	1.1	5.7	#	10.0	14.3
Not observed		0	3.3	0.0	0.0	1.1		-7.5	
All mult. primaries		198	78.0	2.5	2.2	2.9	#	267.7	21.2

Patients	3460
Median age at second malignancy (years)	71.6
Person-years	4481
Mean observation time (years)	1.3
Median observation time (years)	0.5

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

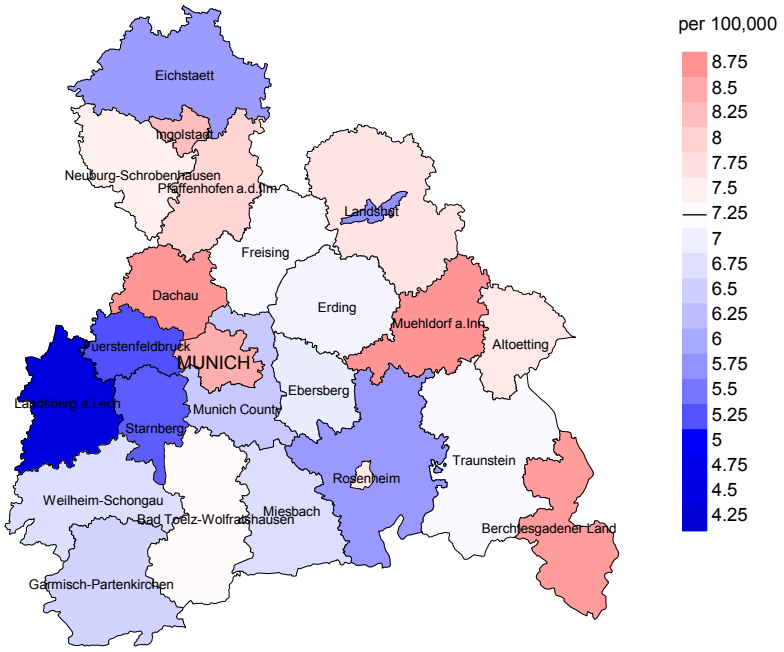
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C09–C10	Oropharynx	2	0.1	31.3	3.8	113.0	#	13.4	
C16	Stomach	4	0.6	7.0	1.9	17.9	#	23.8	25.0
C18	Colon	14	1.6	8.6	4.7	14.5	#	85.8	28.6
C22	Liver	2	0.2	9.9	1.2	35.9	#	12.5	
C23–C24	Bile	2	0.2	8.4	1.0	30.5	#	12.2	
C33–C34	Lung	4	1.2	3.3	0.9	8.5		19.3	50.0
C50	Breast	10	5.0	2.0	1.0	3.7		34.9	10.0
C54	Corpus uteri	2	1.0	2.1	0.3	7.6		7.3	
C64	Kidney	4	0.4	9.4	2.6	24.0	#	24.8	50.0
C70–C72	CNS cancer	2	0.2	8.8	1.1	31.8	#	12.3	50.0
C73	Thyroid	2	0.3	7.5	0.9	26.9		12.0	50.0
C82–C85	NHL	2	0.6	3.1	0.4	11.3		9.4	
Other primaries		9	2.6	3.4	1.6	6.5	#	44.2	11.1
Not observed		0	2.5	0.0	0.0	1.5		-17.6	
All mult. primaries		59	16.5	3.6	2.7	4.6	#	294.4	22.0

Patients	1202
Median age at second malignancy (years)	74.9
Person-years	1442
Mean observation time (years)	1.2
Median observation time (years)	0.5

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

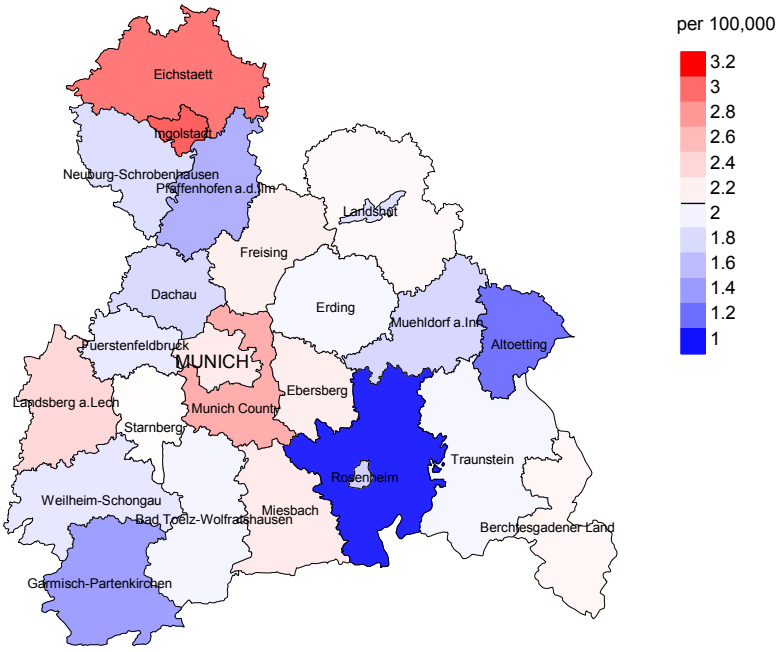
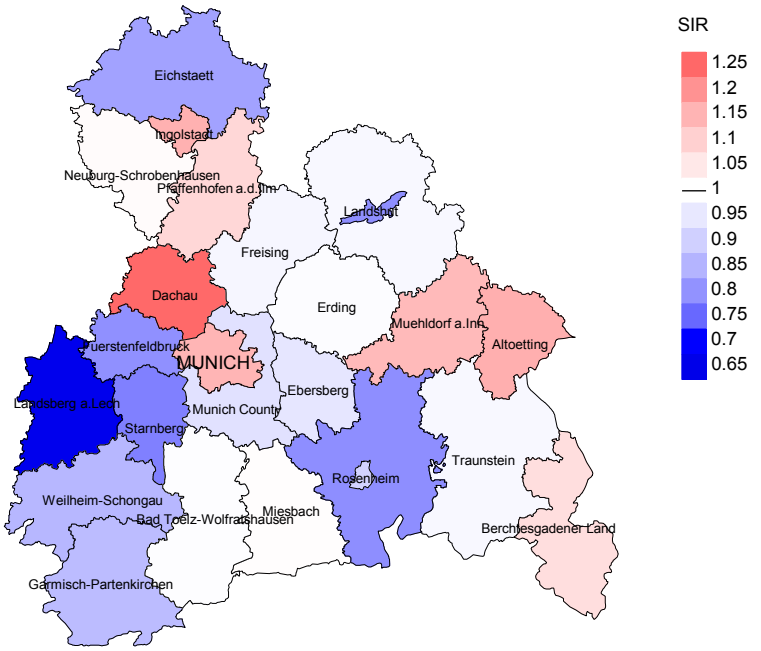


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 7.3/100,000 WS N=2,584, females 2.1/100,000 WS N=953).

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 29 women were identified with newly diagnosed liver cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 2.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.2 and 3.8/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

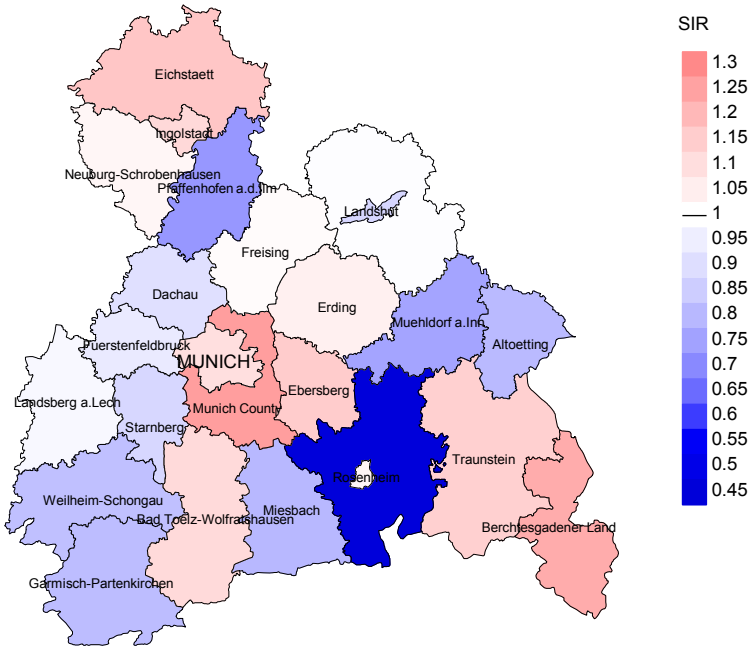


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=2,584, females N=953).

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 29 women were identified with newly diagnosed liver cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.15. Though, the value of this parameter may vary with an underlying probability of 99% between 0.68 and 1.83, 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	182	100.0	36.8	177	97.3	96.0
1999	211	99.1	37.9	204	96.7	97.1
2000	218	100.0	40.4	206	94.5	95.6
2001	195	98.5	35.4	190	97.4	95.8
2002	351	99.7	41.9	345	98.3	98.0
2003	333	99.7	39.9	320	96.1	97.5
2004	340	98.8	39.7	322	94.7	98.1
2005	352	98.9	35.8	337	95.7	98.2
2006	398	98.7	31.7	371	93.2	99.2
2007	454	96.5	29.3	418	92.1	97.6
2008	480	94.0	22.3	426	88.8	98.8
2009	463	92.4	23.8	403	87.0	99.0
2010	446	95.1	22.0	397	89.0	99.0
2011	443	91.4	22.3	360	81.3	98.3
2012	507	93.3	20.7	387	76.3	98.4
2013	456	99.6	21.9	333	73.0	97.6
2014	290	97.9	33.1	166	57.2	97.6
1998-2014	6119	96.7	29.7	5362	87.6	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	182	171	97.1	112	61.5
1999	211	197	95.4	134	63.5
2000	218	192	97.4	129	59.2
2001	195	185	96.8	110	56.4
2002	351	266	98.1	222	63.2
2003	333	272	98.2	198	59.5
2004	340	257	98.1	188	55.3
2005	352	287	96.2	197	56.0
2006	398	334	98.5	233	58.5
2007	454	319	97.8	229	50.4
2008	480	352	98.9	234	48.8
2009	463	356	98.3	229	49.5
2010	446	362	98.9	211	47.3
2011	443	368	98.4	209	47.2
2012	507	383	99.0	240	47.3
2013	456	385	98.7	230	50.4
2014	290	323	97.8	154	53.1
1998-2014	6119	5009	98.0	3259	53.3

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	171	83.0	17.0	95.8
1999	197	87.8	12.2	96.3
2000	192	91.7	8.3	95.2
2001	185	93.5	6.5	99.4
2002	266	92.5	7.5	98.1
2003	272	92.6	7.4	98.1
2004	257	93.4	6.6	98.0
2005	287	90.6	9.4	97.1
2006	334	94.3	5.7	98.5
2007	319	90.0	10.0	95.5
2008	352	90.6	9.4	96.0
2009	356	94.4	5.6	98.3
2010	362	89.8	10.2	93.9
2011	368	89.1	10.9	94.5
2012	383	86.4	13.6	94.7
2013	385	89.9	10.1	94.5
2014	323	86.7	13.3	92.4
1998-2014	5009	90.4	9.6	96.1

Table 11a

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

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	123	68.5	68.7	66.2	69.2
1999	133	70.3	70.2	74.3	70.4
2000	130	70.9	71.3	67.3	71.3
2001	144	68.1	67.8	74.5	68.4
2002	181	68.7	68.8	68.1	68.8
2003	207	69.7	70.0	63.1	70.0
2004	187	69.8	69.7	71.6	69.8
2005	204	68.2	68.1	69.3	68.1
2006	252	69.6	69.5	71.8	70.0
2007	247	71.7	71.4	72.8	71.7
2008	262	69.4	69.4	73.6	69.4
2009	258	69.9	69.9	73.6	70.1
2010	269	72.1	72.1	71.9	72.1
2011	283	70.9	71.3	69.1	71.3
2012	288	71.8	71.9	69.6	71.8
2013	272	72.5	72.6	71.9	72.8
2014	236	72.9	71.5	75.0	72.4
1998-2014	3676	70.5	70.5	70.9	70.7

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	48	75.2	73.7	79.0	75.3
1999	64	76.6	76.5	82.0	77.0
2000	62	76.7	77.0	71.8	77.0
2001	41	72.8	72.5	89.4	73.1
2002	85	75.4	75.2	76.6	75.3
2003	65	76.5	76.3	80.7	76.5
2004	70	77.2	76.3	79.7	77.0
2005	83	74.7	74.7	72.2	74.8
2006	82	76.7	76.5	80.2	76.7
2007	72	74.0	73.6	75.2	74.0
2008	90	75.2	74.8	78.1	75.5
2009	98	74.7	74.7	75.1	74.7
2010	93	76.6	76.7	74.3	76.6
2011	85	73.2	74.2	69.2	74.1
2012	95	74.7	75.1	71.9	75.6
2013	113	74.5	74.3	82.2	74.5
2014	87	74.3	73.8	75.7	74.0
1998-2014	1333	75.3	75.0	76.5	75.5

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	102	9.2	0.79	5.5	0.76	8.3	0.79	11.0	0.80
1999	114	10.2	0.81	6.0	0.80	9.2	0.82	12.4	0.85
2000	120	10.5	0.77	6.0	0.74	9.3	0.76	12.3	0.81
2001	134	11.6	0.86	6.8	0.86	10.1	0.87	13.1	0.86
2002	167	9.0	0.67	5.0	0.66	7.5	0.66	9.8	0.68
2003	190	10.1	0.79	5.5	0.79	8.3	0.79	10.9	0.79
2004	173	9.2	0.69	5.0	0.68	7.6	0.69	9.7	0.69
2005	183	9.7	0.72	5.2	0.72	7.6	0.73	9.9	0.74
2006	237	12.4	0.83	6.4	0.82	9.6	0.82	12.4	0.82
2007	221	10.0	0.65	5.0	0.61	7.6	0.63	10.2	0.66
2008	239	10.7	0.68	5.6	0.66	8.3	0.68	10.8	0.70
2009	243	10.9	0.73	5.4	0.72	8.2	0.73	10.4	0.73
2010	241	10.7	0.69	5.0	0.65	7.7	0.66	10.4	0.70
2011	250	10.9	0.74	5.3	0.72	7.9	0.74	10.3	0.75
2012	249	10.9	0.69	5.0	0.64	7.6	0.66	10.2	0.69
2013	239	10.5	0.77	4.9	0.72	7.5	0.74	10.0	0.78
2014	204	8.9	1.01	4.3	0.99	6.5	1.01	8.5	1.03
1998-2014	3306	10.3	0.74	5.3	0.72	8.0	0.73	10.4	0.75

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	40	3.4	0.77	1.5	0.79	2.2	0.79	3.0	0.81
1999	59	5.0	0.84	1.9	0.79	3.0	0.82	4.1	0.84
2000	56	4.7	0.90	1.7	0.83	2.8	0.86	4.0	0.91
2001	39	3.2	0.98	1.5	0.90	2.2	0.98	2.7	1.02
2002	79	4.0	0.80	1.6	0.79	2.4	0.79	3.3	0.78
2003	62	3.1	0.67	1.3	0.73	2.0	0.72	2.6	0.69
2004	67	3.4	0.75	1.2	0.63	1.9	0.69	2.6	0.73
2005	77	3.9	0.79	1.5	0.65	2.2	0.74	2.9	0.77
2006	78	3.9	0.70	1.6	0.72	2.3	0.70	3.0	0.70
2007	66	2.9	0.57	1.1	0.53	1.6	0.53	2.1	0.54
2008	80	3.4	0.63	1.3	0.54	2.0	0.59	2.6	0.61
2009	93	4.0	0.73	1.6	0.74	2.3	0.73	3.1	0.74
2010	84	3.6	0.88	1.2	0.77	1.9	0.83	2.7	0.92
2011	78	3.3	0.74	1.3	0.66	1.9	0.72	2.4	0.72
2012	82	3.5	0.56	1.3	0.50	2.0	0.52	2.6	0.53
2013	107	4.5	0.74	1.8	0.68	2.7	0.70	3.6	0.73
2014	76	3.2	0.85	1.3	0.88	1.9	0.87	2.5	0.91
1998-2014	1223	3.7	0.73	1.4	0.68	2.1	0.71	2.9	0.73

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.%
0-4	1	0.0	0.0	1	0.1	0.1			0.0
5-9	1	0.0	0.1	1	0.1	0.1			0.0
10-14	0	0.0	0.1			0.1			0.0
15-19	3	0.1	0.2	1	0.1	0.2	2	0.3	0.3
20-24	0	0.0	0.2			0.2			0.3
25-29	1	0.0	0.2	1	0.1	0.2			0.3
30-34	4	0.2	0.4	2	0.1	0.3	2	0.3	0.6
35-39	8	0.3	0.7	3	0.2	0.5	5	0.7	1.3
40-44	13	0.5	1.2	9	0.5	1.0	4	0.6	1.9
45-49	46	1.8	3.0	36	1.9	2.9	10	1.5	3.4
50-54	97	3.8	6.8	84	4.5	7.3	13	1.9	5.4
55-59	180	7.0	13.9	143	7.6	14.9	37	5.5	10.9
60-64	301	11.8	25.6	237	12.6	27.5	64	9.6	20.5
65-69	415	16.2	41.9	323	17.1	44.6	92	13.8	34.3
70-74	503	19.7	61.6	390	20.7	65.2	113	16.9	51.3
75-79	446	17.5	79.1	337	17.9	83.1	109	16.3	67.6
80-84	312	12.2	91.3	215	11.4	94.5	97	14.5	82.2
85+	223	8.7	100.0	104	5.5	100.0	119	17.8	100.0
All ages	2554	100.0		1887	100.0		667	100.0	

Included in the statistics are 27.4% multiple primaries in males and 24.4% 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.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	1		0.1	0.11	0.0		8.3	
5- 9	1		0.1	0.50	0.0		4.8	
10-14			0.0		0.0			
15-19	1	2	0.1	0.50	0.2	1.00	2.8	9.1
20-24			0.0		0.0			
25-29	1		0.1	0.50	0.0		1.6	
30-34	2	2	0.2	0.50	0.2	0.40	2.3	1.8
35-39	3	5	0.2	0.60	0.4	0.71	1.7	1.9
40-44	9	4	0.6	0.60	0.3	0.33	2.0	0.6
45-49	36	10	2.3	0.67	0.7	0.56	3.5	0.8
50-54	84	13	6.5	0.60	1.0	0.36	4.5	0.7
55-59	143	37	13.5	0.64	3.3	0.62	4.6	1.4
60-64	237	64	24.1	0.70	6.0	0.85	5.0	1.8
65-69	323	92	33.6	0.69	8.8	0.70	4.5	1.8
70-74	390	113	42.9	0.71	10.8	0.65	4.3	1.7
75-79	337	109	61.2	0.85	15.3	0.77	4.0	1.7
80-84	215	97	61.6	0.87	17.3	0.75	2.9	1.5
85+	104	119	44.9	0.82	20.6	0.78	1.7	1.4
All ages	1887	667					3.8	1.5
Mortality								
Raw			10.4	0.73	3.6	0.70		
WS			5.1	0.70	1.4	0.64		
ES			7.6	0.72	2.1	0.67		
BRD-S			10.1	0.74	2.7	0.69		
PYLL-70								
per 100,000			45.5		13.1			
ES			40.6		11.3			
AYLL-70			8.7		9.1			

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	23	2.9	19	82.6	2	8.7	2	8.7
C09–C10 Oropharynx	18	2.3	16	88.9	2	11.1		
C12–C13 Hypopharynx	13	1.7	10	76.9	2	15.4	1	7.7
C15 Oesophagus	21	2.7	10	47.6	8	38.1	3	14.3
C16 Stomach	23	2.9	12	52.2	9	39.1	2	8.7
C18 Colon	96	12.2	66	68.8	25	26.0	5	5.2
C19–C20 Rectum	44	5.6	34	77.3	6	13.6	4	9.1
C25 Pancreas	10	1.3	1	10.0	7	70.0	2	20.0
C32 Larynx	20	2.5	18	90.0	2	10.0		
C33–C34 Lung	64	8.2	20	31.3	19	29.7	25	39.1
C43 Malign. melanoma	26	3.3	22	84.6	1	3.8	3	11.5
C44 Skin others	50	6.4	36	72.0			14	28.0
C61 Prostate	148	18.9	124	83.8	8	5.4	16	10.8
C62 Testis	8	1.0	8	100.0				
C64 Kidney	43	5.5	28	65.1	9	20.9	6	14.0
C67 Bladder	67	8.5	49	73.1	5	7.5	13	19.4
C70–C72 CNS cancer	9	1.1	8	88.9			1	11.1
C76–C79 CUP	9	1.1	6	66.7	1	11.1	2	22.2
C82–C85 NHL	26	3.3	17	65.4	5	19.2	4	15.4
C90 Mult. myeloma	13	1.7	6	46.2	3	23.1	4	30.8
C91–C96 Leukaemia	9	1.1	2	22.2	1	11.1	6	66.7
Other primaries	45	5.7	25	55.6	11	24.4	9	20.0
All mult. primaries	785	100.0	537	68.4	126	16.1	122	15.5

Multiple primaries with number of cases 1 to 6 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 ←%
C03–C06	Oral cavity	6	2.3	5	83.3	1	16.7		
C16	Stomach	8	3.0	4	50.0	2	25.0	2	25.0
C18	Colon	29	11.0	19	65.5	7	24.1	3	10.3
C19–C20	Rectum	6	2.3	5	83.3	1	16.7		
C23–C24	Bile	3	1.1	1	33.3	1	33.3	1	33.3
C33–C34	Lung	6	2.3	4	66.7			2	33.3
C43	Malign. melanoma	6	2.3	6	100.0				
C44	Skin others	17	6.4	9	52.9	1	5.9	7	41.2
C50	Breast	68	25.8	59	86.8	4	5.9	5	7.4
C51	Vulva	5	1.9	4	80.0			1	20.0
C53	Cervix uteri	7	2.7	7	100.0				
C54	Corpus uteri	16	6.1	13	81.3	1	6.3	2	12.5
C56	Ovary	9	3.4	8	88.9			1	11.1
C64	Kidney	10	3.8	4	40.0	3	30.0	3	30.0
C67	Bladder	8	3.0	6	75.0	2	25.0		
C69	Eye melanoma	4	1.5	4	100.0				
C70–C72	CNS cancer	6	2.3	3	50.0	1	16.7	2	33.3
C73	Thyroid	7	2.7	5	71.4	1	14.3	1	14.3
C76–C79	CUP	6	2.3	2	33.3	3	50.0	1	16.7
C82–C85	NHL	12	4.5	10	83.3	2	16.7		
C90	Mult. myeloma	3	1.1	2	66.7	1	33.3		
Other primaries		22	8.3	12	54.5	4	18.2	6	27.3
All mult. primaries		264	100.0	192	72.7	35	13.3	37	14.0

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 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.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	1		0.1	0.11	0.0		10.0	
5- 9	1		0.1	0.50	0.0		5.0	
10-14			0.0		0.0			
15-19	1	2	0.1	0.50	0.2	1.00	3.0	10.0
20-24			0.0		0.0			
25-29	1		0.1	0.50	0.0		1.8	
30-34	2		0.2	0.50	0.0		2.3	
35-39	3	5	0.2	0.60	0.4	0.71	1.8	2.2
40-44	9	4	0.6	0.60	0.3	0.40	2.1	0.7
45-49	32	9	2.0	0.67	0.6	0.53	3.5	0.9
50-54	71	11	5.5	0.56	0.9	0.37	4.4	0.7
55-59	133	31	12.5	0.66	2.8	0.60	5.1	1.4
60-64	200	52	20.4	0.68	4.9	0.85	5.1	1.8
65-69	270	76	28.1	0.70	7.3	0.72	4.8	1.9
70-74	313	91	34.4	0.72	8.7	0.62	4.5	1.8
75-79	247	83	44.9	0.89	11.6	0.79	4.0	1.7
80-84	164	79	47.0	0.87	14.1	0.76	3.1	1.6
85+	74	96	32.0	0.77	16.6	0.77	1.7	1.4
All ages	1522	539					4.0	1.6
Mortality								
Raw			8.4	0.73	2.9	0.69		
WS			4.2	0.69	1.1	0.63		
ES			6.2	0.71	1.7	0.66		
BRD-S			8.1	0.74	2.2	0.69		
PYLL-70								
per 100,000			40.2		11.0			
ES			36.0		9.5			
AYLL-70			8.9		9.2			

* 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.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	1		0.1	0.11	0.0		10.0	
5- 9	1		0.1	0.50	0.0		5.0	
10-14			0.0		0.0			
15-19	1	2	0.1	0.50	0.2	1.00	3.0	11.1
20-24			0.0		0.0			
25-29	1		0.1	0.50	0.0		2.0	
30-34	2		0.2	0.50	0.0		2.4	
35-39	3	5	0.2	0.60	0.4	0.71	1.9	2.4
40-44	9	4	0.6	0.60	0.3	0.44	2.3	0.8
45-49	32	9	2.0	0.67	0.6	0.53	3.7	1.0
50-54	71	11	5.5	0.57	0.9	0.39	4.9	0.8
55-59	130	29	12.2	0.68	2.6	0.57	5.6	1.5
60-64	196	51	20.0	0.69	4.8	0.86	5.8	2.1
65-69	260	75	27.0	0.70	7.2	0.72	5.5	2.2
70-74	302	89	33.2	0.72	8.5	0.62	5.3	2.2
75-79	239	80	43.4	0.88	11.2	0.81	4.9	2.0
80-84	153	75	43.8	0.86	13.4	0.76	3.8	1.8
85+	66	93	28.5	0.71	16.1	0.75	1.9	1.7
All ages	1467	523					4.6	1.8
Mortality								
Raw			8.1	0.73	2.8	0.69		
WS			4.1	0.69	1.1	0.63		
ES			6.0	0.71	1.6	0.66		
BRD-S			7.8	0.73	2.1	0.69		
PYLL-70								
per 100,000			39.6		10.8			
ES			35.5		9.3			
AYLL-70			9.0		9.2			

* See corresponding tables with multiple primaries.

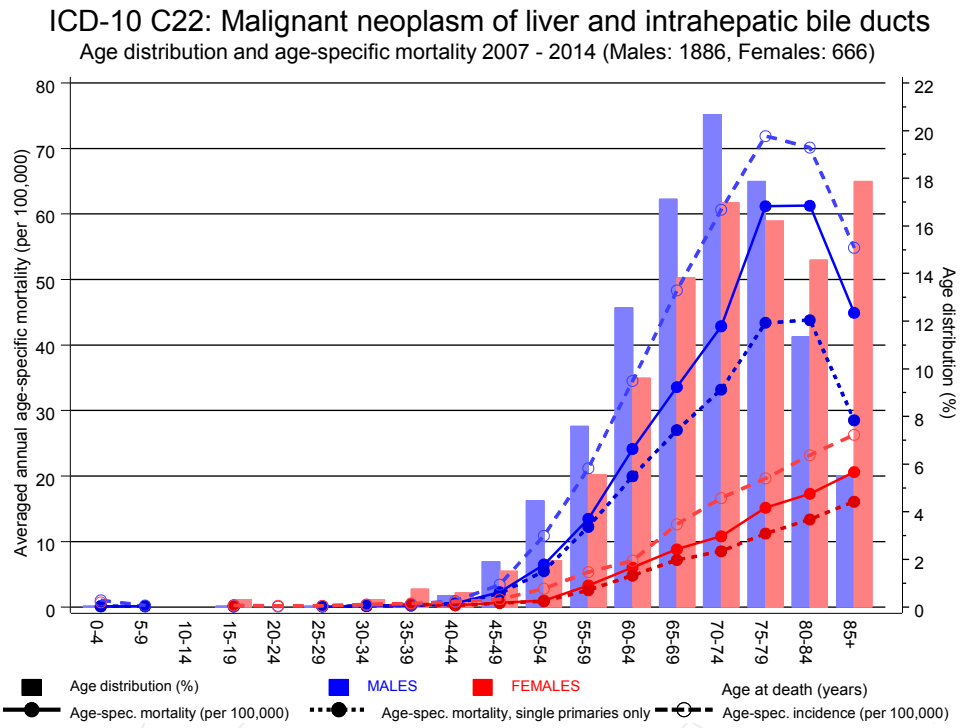
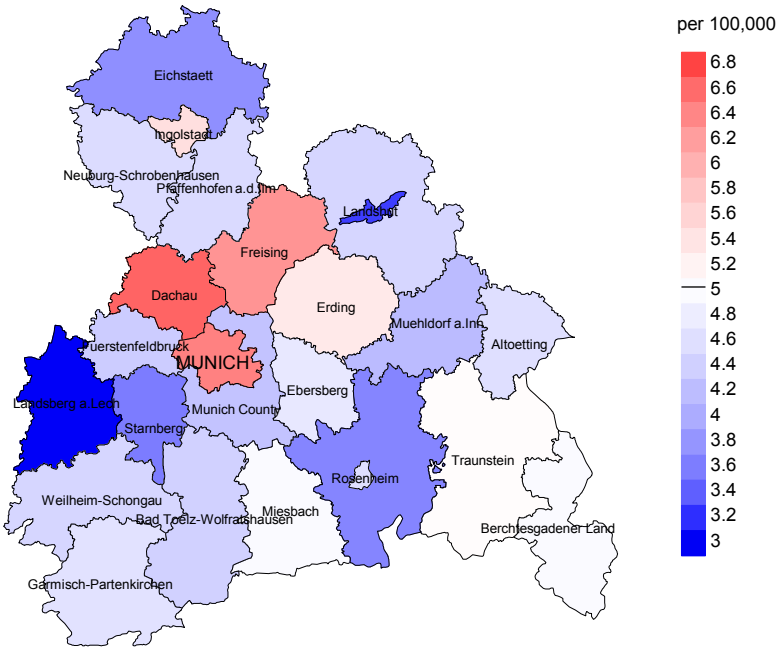


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at liver 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

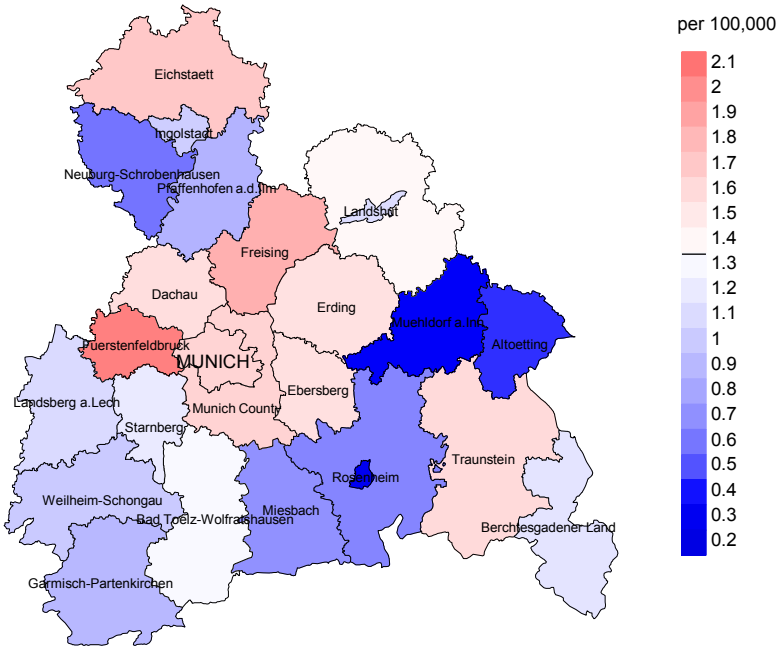
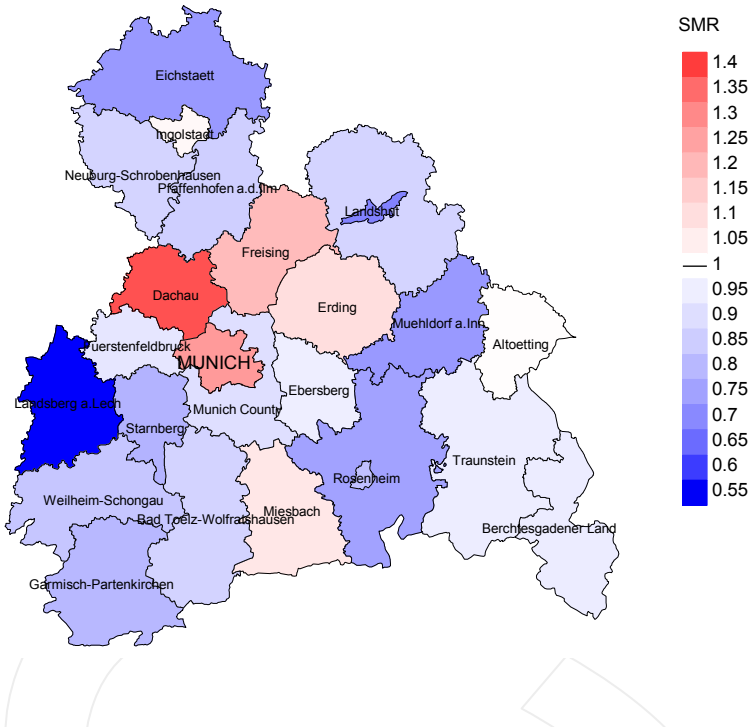


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 5.0/100,000 WS N=1,877, females 1.3/100,000 WS N=664).

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 23 women died from liver cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 1.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.8 and 2.9/100,000.

Standardized mortality ratio (SMR) 2007 - 2014: Males



Standardized mortality ratio (SMR) 2007 - 2014: Females

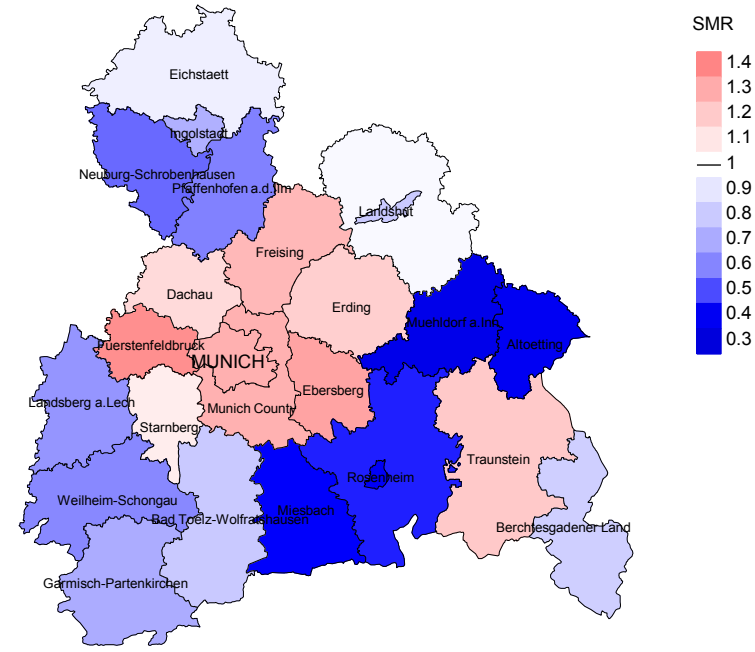


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,877, females N=664).

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 23 women died from liver cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.32. Though, the value of this parameter may vary with an underlying probability of 99% between 0.72 and 2.21, 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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