Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

ICD-10 C19, C20: Rectal cancer

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	16,038
Diseases	16,057
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/bC1920E-ICD-10-C19-C20-Rectal-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
C19	Malignant neoplasm of rectosigmoid junction
C20	Malignant neoplasm of rectum

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	558	18	3.2	23.5	72.0	97.1
1999	637	25	3.9	21.7	70.8	97.5
2000	604	22	3.6	23.7	69.4	98.3
2001	625	22	3.5	26.7	60.2	95.8
2002	1111	77	6.9	25.0	67.7	97.9 #
2003	1093	65	5.9	23.4	61.9	97.3
2004	995	45	4.5	25.0	60.9	96.0
2005	1038	45	4.3	22.8	61.5	97.7
2006	1081	33	3.1	25.5	55.5	94.8
2007	1235	40	3.2	22.9	56.4	78.0 #
2008	1146	47	4.1	23.0	50.9	72.7
2009	1115	48	4.3	21.2	49.4	69.1
2010	1096	43	3.9	22.8	45.6	66.6
2011	1085	31	2.9	22.4	40.2	68.6
2012	1041	41	3.9	22.1	34.0	74.7
2013	955	39	4.1	18.0	25.5	99.4
2014	642	29	4.5	19.0	15.4	96.6 ##
1998–2014	16057	670	4.2	22.9	52.2	86.5

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	558	313	245	56.1
1999	637	360	277	56.5
2000	604	346	258	57.3
2001	625	359	266	57.4
2002	1111	645	466	58.1
2003	1093	625	468	57.2
2004	995	573	422	57.6
2005	1038	595	443	57.3
2006	1081	645	436	59.7
2007	1235	743	492	60.2
2008	1146	685	461	59.8
2009	1115	687	428	61.6
2010	1096	685	411	62.5
2011	1085	661	424	60.9
2012	1041	626	415	60.1
2013	955	592	363	62.0
2014	642	399	243	62.1
1998-2014	16057	9539	6518	59.4

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	313	245	28.2	20.8	17.2	9.3	25.2	13.9	31.4	17.7
1999	360	277	32.2	23.3	19.4	10.5	28.6	15.6	35.5	20.0
2000	346	258	30.4	21.5	18.1	8.8	26.8	13.4	33.3	17.6
2001	359	266	31.0	21.9	18.5	10.3	27.0	15.0	33.8	18.7
2002	645	466	34.6	23.8	20.0	10.4	29.3	15.6	36.4	19.8
2003	625	468	33.3	23.8	19.0	10.6	28.0	15.5	34.7	19.5
2004	573	422	30.5	21.3	17.0	9.7	24.8	14.2	30.6	17.8
2005	595	443	31.4	22.3	17.5	9.4	25.5	14.0	31.5	17.9
2006	645	436	33.7	21.7	18.3	9.4	26.6	13.7	33.1	17.5
2007	743	492	33.5	21.3	17.9	9.0	26.3	13.4	32.9	17.0
2008	685	461	30.8	19.9	16.2	8.2	23.7	12.2	29.7	15.6
2009	687	428	30.8	18.4	15.9	7.9	23.3	11.7	29.3	14.7
2010	685	411	30.4	17.6	15.7	7.1	23.1	10.6	28.7	13.8
2011	661	424	28.9	18.0	14.8	7.7	21.6	11.1	26.8	13.7
2012	626	415	27.4	17.6	13.9	7.4	20.7	10.9	26.0	13.7
2013	592	363	25.9	15.4	13.2	6.9	19.3	10.0	24.1	12.4
2014	399	243	17.5	10.3	9.4	4.6	13.5	6.7	16.6	8.2
1998-2014	9539	6518	29.8	19.5	16.2	8.4	23.7	12.4	29.4	15.7

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 patients)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	558	68.2	12.3	30.5	102	53.5	59.4	68.3	77.2	85.1
1999	637	68.4	12.3	34.1	102	52.4	59.3	69.0	77.2	85.6
2000	604	69.4	12.2	33.4	95.9	54.0	60.4	69.1	79.0	86.7
2001	625	68.0	12.1	28.3	97.1	52.9	60.5	67.2	76.8	83.8
2002	1111	68.8	11.7	29.9	104	54.1	61.0	69.3	77.0	83.0
2003	1093	68.9	11.8	27.1	101	53.9	61.2	68.8	77.2	83.8
2004	995	68.2	11.8	21.3	97.3	53.5	60.9	67.9	77.3	83.5
2005	1038	69.1	11.8	19.0	99.6	54.0	61.3	68.9	77.7	84.2
2006	1081	68.6	12.1	21.2	98.7	52.8	62.1	68.6	78.0	83.7
2007	1235	69.3	11.8	30.5	97.5	53.1	62.6	69.3	78.1	84.4
2008	1146	69.7	11.9	28.2	102	53.9	62.4	69.9	78.5	84.8
2009	1115	69.0	12.1	20.7	102	51.9	61.6	70.2	77.7	84.1
2010	1096	69.6	12.6	21.1	101	52.7	61.6	70.9	78.9	85.3
2011	1085	69.0	12.9	20.1	99.1	51.1	60.5	70.2	78.3	85.8
2012	1041	69.3	12.4	26.1	99.6	52.9	60.0	70.7	78.0	84.8
2013	955	68.1	12.9	20.0	98.2	50.4	59.5	70.3	77.0	83.6
2014	642	67.7	12.7	20.7	96.2	51.4	59.5	68.5	76.7	83.4
1998-2014	16057	68.9	12.2	19.0	104	52.9	60.9	69.4	77.7	84.4

Table 3a

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	313	65.8	11.8	32.6	94.4	51.6	58.2	64.0	74.0	82.9
1999	360	66.3	11.4	34.1	94.2	52.0	58.3	65.6	73.5	82.6
2000	346	66.8	11.5	34.4	95.9	53.0	58.9	65.3	74.8	83.6
2001	359	67.0	10.6	36.4	93.6	53.9	60.6	65.9	73.7	81.1
2002	645	67.1	10.6	32.8	93.0	53.9	60.6	66.8	74.1	81.3
2003	625	67.4	10.7	27.1	93.1	53.9	60.7	67.7	74.6	81.2
2004	573	66.9	10.4	29.9	93.3	54.3	60.7	66.3	74.9	79.8
2005	595	67.1	10.7	19.0	99.6	53.8	60.3	67.1	74.2	80.6
2006	645	67.0	10.8	25.7	94.7	52.8	60.4	67.3	74.6	81.0
2007	743	68.0	10.9	31.1	95.5	53.2	62.1	67.9	75.3	81.8
2008	685	68.0	10.7	28.2	96.0	53.9	62.1	68.5	75.1	80.7
2009	687	68.0	11.1	20.7	95.4	52.0	61.5	69.6	75.3	80.9
2010	685	68.1	12.0	21.1	98.3	52.7	60.6	69.5	75.9	83.1
2011	661	67.9	11.5	26.3	93.6	51.9	61.0	69.7	75.6	81.8
2012	626	68.3	11.5	26.1	99.6	53.2	59.6	69.5	76.8	82.7
2013	592	67.8	11.8	20.0	98.2	51.1	60.4	69.8	75.7	81.7
2014	399	66.7	11.7	20.7	96.2	51.5	59.1	66.7	75.4	80.7
1998-2014	9539	67.4	11.1	19.0	99.6	53.0	60.3	67.9	75.1	81.5

Table 3b

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	245	71.2	12.2	30.5	102	55.3	62.2	72.5	78.6	87.7
1999	277	71.1	12.8	38.4	102	52.7	61.5	73.0	79.8	87.5
2000	258	73.0	12.3	33.4	94.7	55.7	62.7	75.0	81.8	88.2
2001	266	69.4	13.8	28.3	97.1	51.7	60.1	70.2	79.6	86.7
2002	466	71.2	12.6	29.9	104	54.5	62.3	72.8	80.3	87.6
2003	468	70.8	12.9	29.2	101	53.7	61.7	71.4	81.2	86.8
2004	422	70.0	13.4	21.3	97.3	51.8	61.4	71.2	80.6	85.9
2005	443	71.8	12.6	32.8	96.8	54.6	63.2	72.1	81.4	87.1
2006	436	71.0	13.4	21.2	98.7	52.5	63.5	72.3	81.2	86.6
2007	492	71.3	12.8	30.5	97.5	53.0	63.6	72.3	81.5	87.0
2008	461	72.2	13.0	29.3	102	53.7	63.4	73.3	82.4	87.9
2009	428	70.7	13.4	29.2	102	51.7	61.8	71.4	80.8	87.2
2010	411	72.0	13.2	23.0	101	52.9	63.4	74.0	82.5	87.1
2011	424	70.7	14.7	20.1	99.1	50.7	60.2	71.5	82.8	89.0
2012	415	70.7	13.7	26.1	97.4	52.1	61.2	72.3	81.4	87.1
2013	363	68.8	14.4	25.3	96.5	49.1	57.5	72.1	79.3	85.7
2014	243	69.4	13.9	29.4	95.3	50.2	59.9	71.0	78.9	86.7
1998-2014	6518	71.0	13.3	20.1	104	52.5	62.1	72.3	81.1	87.1

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.%
20-24	7	0.1	0.1	4	0.1	0.1	3	0.1	0.1
25-29	15	0.2	0.3	5	0.1	0.2	10	0.3	0.4
30-34	42	0.5	0.8	24	0.5	0.6	18	0.6	1.0
35-39	58	0.7	1.5	33	0.6	1.3	25	0.8	1.7
40-44	159	1.9	3.4	95	1.9	3.2	64	2.0	3.7
45-49	326	3.9	7.3	186	3.7	6.8	140	4.3	8.0
50-54	541	6.5	13.8	328	6.5	13.3	213	6.6	14.6
55-59	752	9.0	22.9	506	10.0	23.3	246	7.6	22.2
60-64	964	11.6	34.4	678	13.4	36.6	286	8.8	31.0
65-69	1264	15.2	49.6	879	17.3	53.9	385	11.9	42.9
70-74	1433	17.2	66.9	955	18.8	72.7	478	14.8	57.7
75-79	1123	13.5	80.4	691	13.6	86.3	432	13.3	71.1
80-84	849	10.2	90.6	414	8.2	94.5	435	13.4	84.5
85+	782	9.4	100.0	280	5.5	100.0	502	15.5	100.0
All ages	8315	100.0		5078	100.0		3237	100.0	

Included in the statistics are 28.5% multiple primaries in males and 24.3% 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=141 %	Females DCO rate n=176 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
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	4	3	0.4	0.3			1.1	1.0
25-29	5	10	0.4	0.8			0.9	1.5
30-34	24	18	1.9	1.4			3.1	1.6
35-39	33	25	2.5	2.0			2.9	1.3
40-44	95	64	5.8	4.2		1.6	5.2	1.7
45-49	186	140	11.8	9.2	1.1		5.8	2.6
50-54	328	213	25.3	16.6	0.3	0.9	6.7	3.1
55-59	506	246	47.7	21.9	1.8		6.9	3.3
60-64	678	285	69.0	26.9	0.7	1.8	6.3	3.1
65-69	878	385	91.3	36.9	2.1	1.0	5.6	3.4
70-74	955	477	105.0	45.6	1.9	2.7	5.6	4.0
75-79	690	432	125.3	60.6	3.0	4.9	5.5	4.3
80-84	413	435	118.2	77.6	4.4	7.1	4.8	4.9
85+	280	502	120.9	86.9	17.5	19.7	4.6	4.9
All ages	5075	3235			2.8	5.4	5.6	3.6
Incidence								
Raw			28.1	17.3				
WS			14.6	7.3				
ES			21.4	10.8				
BRD-S			26.7	13.6				

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).

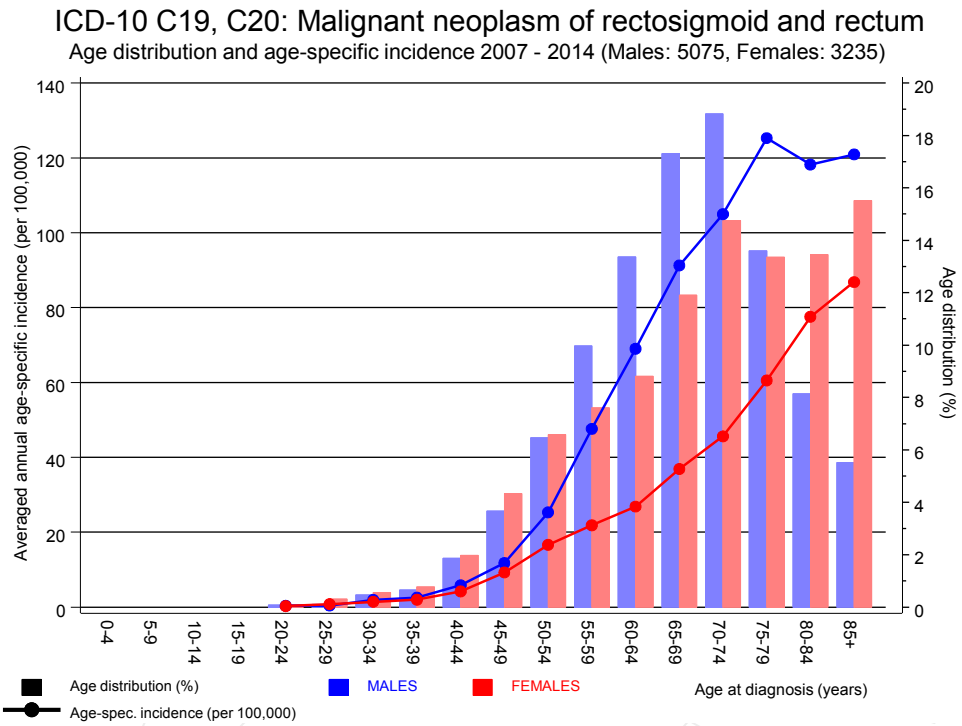


Figure 6. Age distribution and age-specific incidence

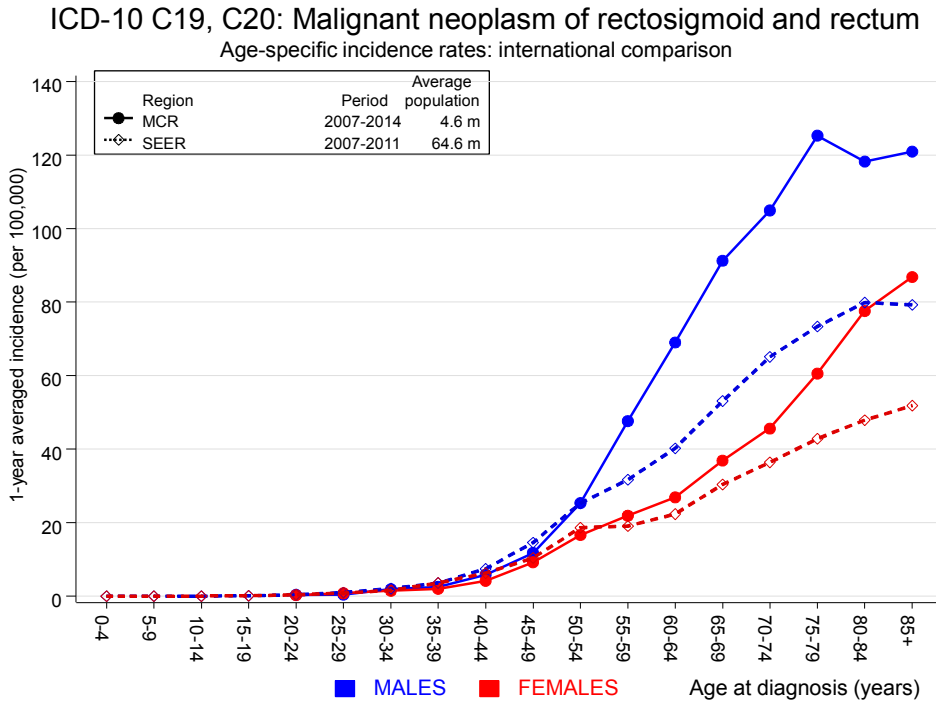


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

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

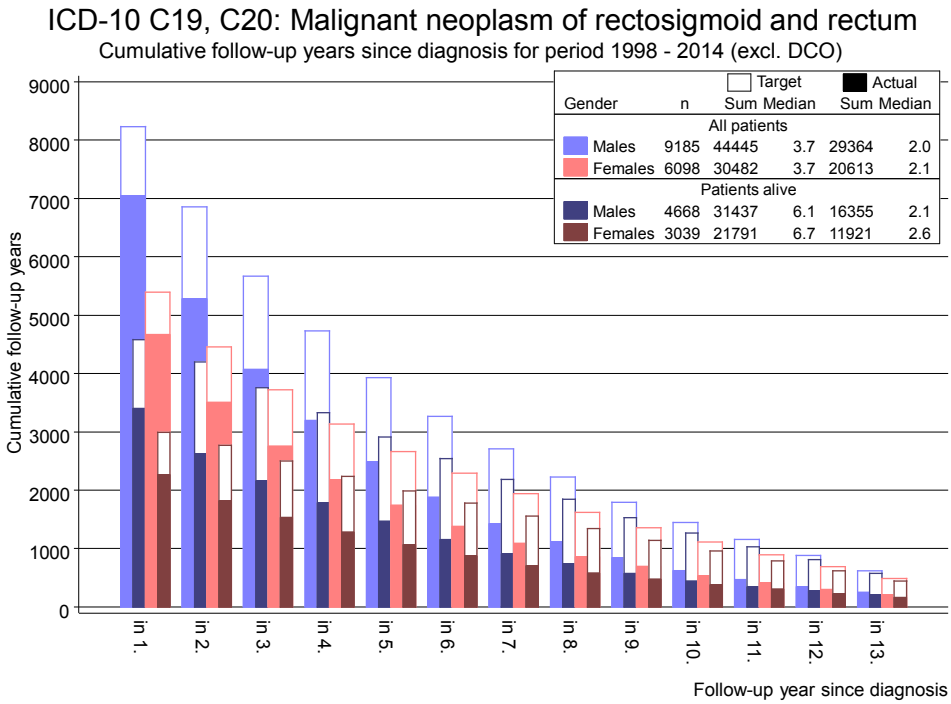


Figure 7. Cumulative follow-up years depending on time since diagnosis

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	4.2	0.5	0.1	1.7		-0.8	
C07-C08	Salivary gland	3	1.1	2.7	0.6	7.8		0.6	
C09-C10	Oropharynx	5	5.2	1.0	0.3	2.2		-0.1	
C12-C13	Hypopharynx	3	2.9	1.0	0.2	3.1		0.0	
C15	Oesophagus	18	9.2	2.0	1.2	3.1	#	3.0	5.6
C16	Stomach	44	21.0	2.1	1.5	2.8	#	7.9	6.8
C17	Small intestine	15	2.6	5.9	3.3	9.7	#	4.3	
C18	Colon	297	50.6	5.9	5.2	6.6	#	84.6	0.7
C19-C20	Rectum	12	28.3	0.4	0.2	0.7	#	-5.6	16.7
C21	Anus/canal	2	1.1	1.9	0.2	6.9		0.3	
C22	Liver	44	14.1	3.1	2.3	4.2	#	10.3	6.8
C23-C24	Bile	14	5.0	2.8	1.5	4.7	#	3.1	14.3
C25	Pancreas	30	18.6	1.6	1.1	2.3	#	3.9	13.3
C32	Larynx	7	5.2	1.3	0.5	2.8		0.6	28.6
C33-C34	Lung	118	60.6	1.9	1.6	2.3	#	19.7	12.7
C38,C45	Mesothelioma	4	3.4	1.2	0.3	3.0		0.2	
C43	Malign. melanoma	30	21.1	1.4	1.0	2.0		3.1	
C46,C49	Soft tissue	4	2.7	1.5	0.4	3.8		0.4	
C60	Penis	3	1.2	2.6	0.5	7.5		0.6	
C61	Prostate	245	154.3	1.6	1.4	1.8	#	31.1	4.9
C62	Testis	2	1.1	1.9	0.2	6.7		0.3	
C64	Kidney	45	17.9	2.5	1.8	3.4	#	9.3	4.4
C65	Renal pelvis	5	2.1	2.3	0.8	5.5		1.0	
C66	Ureter	4	1.2	3.3	0.9	8.5		1.0	
C67	Bladder	41	23.0	1.8	1.3	2.4	#	6.2	7.3
C70-C72	CNS cancer	17	6.6	2.6	1.5	4.1	#	3.6	23.5
C73	Thyroid	5	3.2	1.6	0.5	3.6		0.6	20.0
C76-C79	CUP	10	8.6	1.2	0.6	2.1		0.5	
C81	Hodgkin lymphoma	2	1.1	1.9	0.2	6.8		0.3	
C82-C85	NHL	34	20.5	1.7	1.2	2.3	#	4.6	2.9
C90	Mult. myeloma	7	6.6	1.1	0.4	2.2		0.2	28.6
C91-C96	Leukaemia	19	8.4	2.3	1.4	3.5	#	3.7	31.6
Other primaries		2	1.7	1.2	0.1	4.3		0.1	
Not observed		0	6.4	0.0	0.0	0.6	#	-2.2	
All mult. primaries		1093	521.0	2.1	2.0	2.2	#	196.4	5.9

Patients	9191
Median age at second malignancy (years)	71.8
Person-years	29130
Mean observation time (years)	3.2
Median observation time (years)	2.0

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

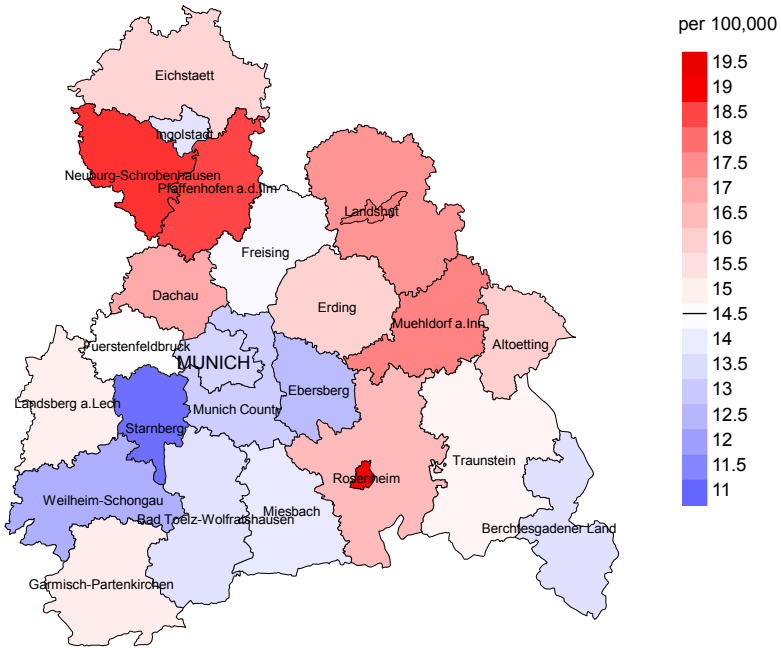
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C09–C10	Oropharynx	2	0.9	2.2	0.3	7.8		0.5	
C11	Nasopharynx	2	0.1	21.7	2.6	78.5	#	0.9	
C15	Oesophagus	5	1.5	3.4	1.1	7.9	#	1.7	
C16	Stomach	19	10.4	1.8	1.1	2.9	#	4.2	10.5
C17	Small intestine	9	1.2	7.6	3.5	14.5	#	3.8	
C18	Colon	147	28.3	5.2	4.4	6.1	#	57.8	1.4
C19–C20	Rectum	7	11.7	0.6	0.2	1.2		−2.3	14.3
C21	Anus/canal	5	1.3	3.7	1.2	8.7	#	1.8	
C22	Liver	4	3.2	1.3	0.3	3.2		0.4	50.0
C23–C24	Bile	10	4.1	2.4	1.2	4.5	#	2.9	10.0
C25	Pancreas	19	12.3	1.5	0.9	2.4		3.2	21.1
C33–C34	Lung	40	18.0	2.2	1.6	3.0	#	10.7	17.5
C40–C41	Bone	2	0.2	10.0	1.2	36.1	#	0.9	
C43	Malign. melanoma	24	8.8	2.7	1.7	4.1	#	7.4	
C46,C49	Soft tissue	4	1.5	2.7	0.7	7.0		1.2	
C48	Peritoneal	3	0.9	3.3	0.7	9.6		1.0	
C50	Breast	132	73.8	1.8	1.5	2.1	#	28.3	4.5
C51	Vulva	5	2.8	1.8	0.6	4.2		1.1	20.0
C52	Vagina	4	0.5	7.5	2.1	19.3	#	1.7	25.0
C53	Cervix uteri	4	3.1	1.3	0.3	3.3		0.4	25.0
C54	Corpus uteri	25	14.0	1.8	1.2	2.6	#	5.4	8.0
C55,C57	Fem. genitals un	3	0.8	4.0	0.8	11.6		1.1	
C56	Ovary	32	10.6	3.0	2.1	4.3	#	10.4	21.9
C64	Kidney	20	6.5	3.1	1.9	4.7	#	6.5	10.0
C65	Renal pelvis	3	0.8	3.6	0.7	10.4		1.1	
C67	Bladder	12	5.5	2.2	1.1	3.8	#	3.2	25.0
C69	Eye melanoma	2	0.3	6.2	0.7	22.3		0.8	
C70–C72	CNS cancer	2	3.5	0.6	0.1	2.1		−0.7	50.0
C73	Thyroid	5	3.8	1.3	0.4	3.1		0.6	
C76–C79	CUP	4	5.2	0.8	0.2	2.0		−0.6	
C82–C85	NHL	16	10.4	1.5	0.9	2.5		2.7	6.3
C90	Mult. myeloma	9	3.3	2.7	1.2	5.1	#	2.8	44.4
C91–C96	Leukaemia	11	4.4	2.5	1.3	4.5	#	3.2	45.5
Other primaries		6	1.5	4.0	1.5	8.8	#	2.2	16.7
Not observed		0	5.5	0.0	0.0	0.7	#	−2.7	
All mult. primaries		597	260.6	2.3	2.1	2.5	#	163.8	9.0

Patients	6148
Median age at second malignancy (years)	75.2
Person-years	20538
Mean observation time (years)	3.3
Median observation time (years)	2.0

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

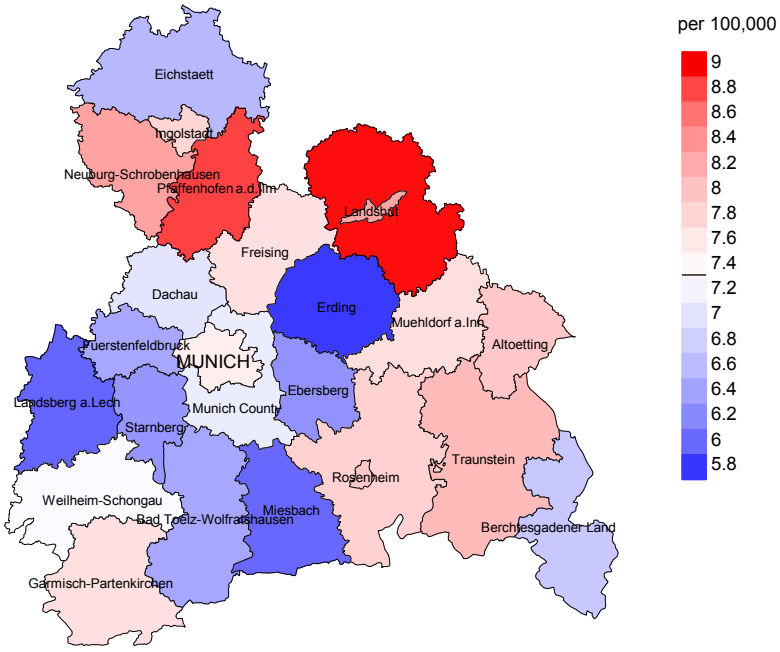
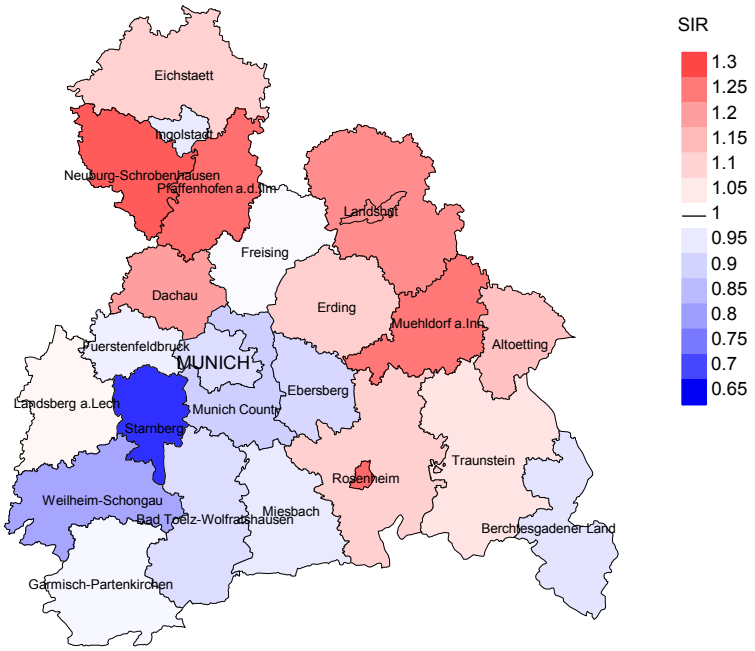


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 14.6/100,000 WS N=5,075, females 7.3/100,000 WS N=3,235).

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 65 women were identified with newly diagnosed rectal cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 6.3/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 4.3 and 9.2/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

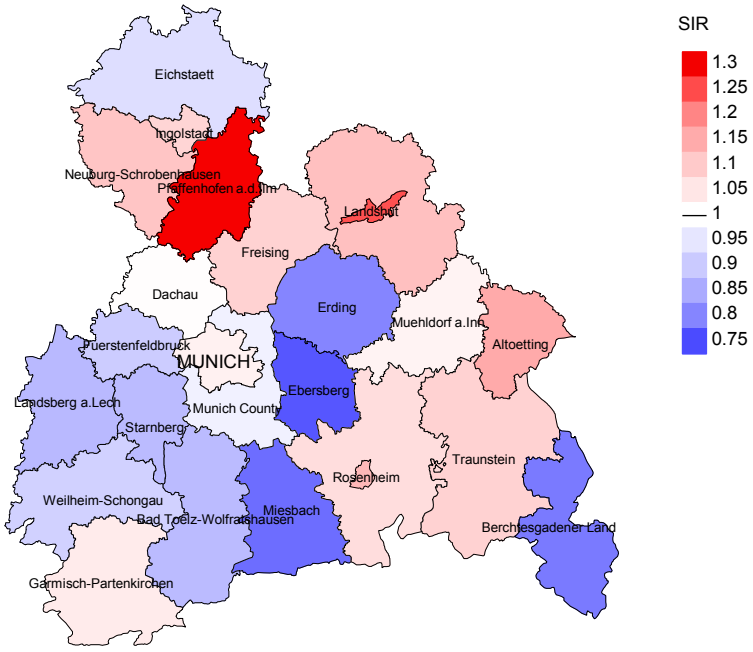


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=5,075, females N=3,235).

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 65 women were identified with newly diagnosed rectal cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.76. Though, the value of this parameter may vary with an underlying probability of 99% between 0.54 and 1.03, 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	558	97.1	3.2	402	72.0	93.3
1999	637	97.5	3.9	451	70.8	94.2
2000	604	98.3	3.6	419	69.4	95.5
2001	625	95.8	3.5	376	60.2	97.9
2002	1111	97.9	6.9	752	67.7	96.8
2003	1093	97.3	5.9	677	61.9	97.9
2004	995	96.0	4.5	606	60.9	98.8
2005	1038	97.7	4.3	638	61.5	98.0
2006	1081	94.8	3.1	600	55.5	98.2
2007	1235	78.0	3.2	696	56.4	98.3
2008	1146	72.7	4.1	583	50.9	98.1
2009	1115	69.1	4.3	551	49.4	97.3
2010	1096	66.6	3.9	500	45.6	97.4
2011	1085	68.6	2.9	436	40.2	97.9
2012	1041	74.7	3.9	354	34.0	97.5
2013	955	99.4	4.1	244	25.5	93.0
2014	642	96.6	4.5	99	15.4	89.9
1998-2014	16057	86.5	4.2	8384	52.2	97.1

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	558	337	88.7	61	10.9
1999	637	372	88.7	85	13.3
2000	604	350	93.4	76	12.6
2001	625	392	95.7	75	12.0
2002	1111	558	97.3	189	17.0
2003	1093	584	97.8	145	13.3
2004	995	598	98.2	122	12.3
2005	1038	614	96.1	141	13.6
2006	1081	702	97.4	163	15.1
2007	1235	712	97.9	170	13.8
2008	1146	776	99.0	157	13.7
2009	1115	794	99.5	158	14.2
2010	1096	825	99.0	173	15.8
2011	1085	828	97.1	150	13.8
2012	1041	803	98.5	156	15.0
2013	955	791	97.0	125	13.1
2014	642	682	98.1	84	13.1
1998-2014	16057	10718	97.1	2230	13.9

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	337	71.2	28.8	87.6
1999	372	75.8	24.2	89.7
2000	350	75.4	24.6	87.8
2001	392	71.2	28.8	86.9
2002	558	78.0	22.0	88.4
2003	584	77.1	22.9	89.5
2004	598	75.3	24.7	88.1
2005	614	73.3	26.7	85.8
2006	702	76.8	23.2	85.8
2007	712	74.7	25.3	85.8
2008	776	73.8	26.2	83.3
2009	794	73.0	27.0	85.1
2010	825	69.6	30.4	81.5
2011	828	71.6	28.4	83.8
2012	803	70.0	30.0	81.0
2013	791	66.0	34.0	79.0
2014	682	67.9	32.1	79.5
1998-2014	10718	72.7	27.3	84.6

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	179	72.3	70.2	78.1	72.1
1999	220	70.7	70.3	73.5	70.9
2000	198	72.6	69.9	79.8	71.7
2001	213	73.3	70.0	80.3	71.8
2002	321	72.7	71.1	80.2	72.0
2003	315	71.0	68.8	81.7	70.4
2004	338	74.8	72.6	80.0	73.6
2005	356	73.7	71.1	80.3	71.8
2006	427	74.8	72.3	80.3	73.8
2007	422	73.2	71.7	78.5	72.4
2008	456	75.4	73.3	80.5	74.0
2009	459	73.1	70.6	79.3	71.9
2010	491	75.2	73.5	81.8	74.0
2011	502	75.5	72.8	82.0	74.2
2012	493	76.0	74.4	81.6	75.0
2013	453	76.5	73.5	81.5	75.2
2014	407	75.8	74.3	80.2	74.7
1998-2014	6250	74.3	72.2	80.4	73.3

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	158	79.6	75.9	85.7	79.1
1999	152	78.7	77.2	81.8	78.1
2000	152	79.2	77.8	83.2	78.8
2001	179	78.8	74.9	86.9	77.0
2002	237	80.4	79.5	84.6	79.6
2003	269	80.2	78.2	83.9	79.0
2004	260	81.2	79.4	84.7	80.1
2005	258	81.2	80.3	83.8	80.7
2006	275	80.8	79.3	85.6	80.0
2007	290	80.7	78.7	85.0	80.0
2008	320	81.2	79.4	86.0	80.0
2009	335	81.6	77.6	87.1	79.1
2010	334	82.2	78.6	86.4	79.8
2011	326	82.0	78.1	86.4	79.8
2012	310	82.9	79.1	88.7	80.7
2013	338	82.7	78.0	87.2	80.2
2014	275	82.2	77.2	88.6	80.1
1998-2014	4468	81.0	78.4	86.3	79.7

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	124	11.2	0.40	6.5	0.38	10.1	0.40	13.4	0.43
1999	172	15.4	0.48	8.9	0.46	13.8	0.48	18.8	0.53
2000	148	13.0	0.43	7.4	0.41	11.5	0.43	15.1	0.45
2001	152	13.1	0.42	7.5	0.41	11.6	0.43	15.2	0.45
2002	241	12.9	0.37	7.1	0.35	10.8	0.37	14.2	0.39
2003	245	13.1	0.39	7.2	0.38	10.8	0.39	14.0	0.40
2004	257	13.7	0.45	6.8	0.40	10.8	0.44	15.1	0.49
2005	266	14.0	0.45	7.1	0.41	10.9	0.43	14.6	0.47
2006	332	17.3	0.51	8.7	0.48	13.6	0.51	18.3	0.55
2007	324	14.6	0.44	7.1	0.40	11.0	0.42	14.9	0.45
2008	345	15.5	0.50	7.3	0.45	11.5	0.49	15.8	0.53
2009	344	15.4	0.50	7.5	0.47	11.4	0.49	14.8	0.51
2010	350	15.5	0.51	7.0	0.44	10.9	0.47	15.1	0.52
2011	373	16.3	0.57	7.5	0.51	11.6	0.54	15.4	0.58
2012	346	15.1	0.55	6.8	0.49	10.7	0.52	14.7	0.56
2013	308	13.5	0.52	6.1	0.46	9.4	0.49	13.0	0.54
2014	286	12.5	0.72	5.6	0.60	8.8	0.65	12.0	0.72
1998-2014	4613	14.4	0.48	7.1	0.44	11.0	0.47	14.8	0.51

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	116	9.9	0.47	3.9	0.41	6.0	0.43	8.3	0.47
1999	110	9.3	0.40	3.5	0.33	5.5	0.35	7.5	0.38
2000	116	9.7	0.45	3.6	0.41	5.6	0.42	7.4	0.42
2001	127	10.4	0.48	4.3	0.42	6.6	0.44	8.7	0.46
2002	194	9.9	0.42	3.3	0.31	5.3	0.34	7.5	0.38
2003	205	10.4	0.44	3.7	0.35	5.9	0.38	7.9	0.41
2004	193	9.8	0.46	3.4	0.35	5.3	0.38	7.4	0.42
2005	184	9.2	0.42	3.0	0.31	4.8	0.34	6.9	0.38
2006	207	10.3	0.48	3.3	0.35	5.4	0.39	7.8	0.45
2007	208	9.0	0.42	3.3	0.36	5.1	0.38	6.9	0.41
2008	228	9.8	0.49	3.4	0.41	5.2	0.43	7.0	0.45
2009	236	10.1	0.55	3.7	0.46	5.6	0.48	7.5	0.51
2010	224	9.6	0.55	3.1	0.44	5.0	0.47	6.8	0.49
2011	220	9.3	0.52	3.0	0.39	4.7	0.42	6.5	0.47
2012	216	9.2	0.52	3.0	0.41	4.7	0.43	6.4	0.47
2013	214	9.1	0.59	3.0	0.44	4.8	0.48	6.5	0.52
2014	177	7.5	0.73	2.6	0.56	4.0	0.61	5.4	0.66
1998-2014	3175	9.5	0.49	3.3	0.39	5.2	0.42	7.1	0.45

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.%
20-24	2	0.0	0.0			0.0	2	0.1	0.1
25-29	1	0.0	0.1	1	0.0	0.0			0.1
30-34	6	0.1	0.2	3	0.1	0.1	3	0.2	0.3
35-39	10	0.2	0.4	9	0.3	0.5	1	0.1	0.3
40-44	41	0.9	1.4	28	1.0	1.5	13	0.8	1.1
45-49	79	1.8	3.2	44	1.6	3.2	35	2.0	3.1
50-54	153	3.5	6.6	101	3.8	6.9	52	3.0	6.1
55-59	244	5.5	12.2	166	6.2	13.1	78	4.5	10.7
60-64	391	8.9	21.0	272	10.1	23.3	119	6.9	17.6
65-69	574	13.0	34.1	400	14.9	38.2	174	10.1	27.7
70-74	776	17.6	51.7	523	19.5	57.7	253	14.7	42.3
75-79	697	15.8	67.5	477	17.8	75.5	220	12.8	55.1
80-84	689	15.6	83.2	367	13.7	89.2	322	18.7	73.8
85+	742	16.8	100.0	290	10.8	100.0	452	26.2	100.0
All ages	4405	100.0		2681	100.0		1724	100.0	

Included in the statistics are 28.5% multiple primaries in males and 24.3% 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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24		2	0.0		0.2	0.67		7.1
25-29	1		0.1	0.20	0.0		1.6	
30-34	3	3	0.2	0.13	0.2	0.17	3.4	2.7
35-39	9	1	0.7	0.27	0.1	0.04	5.1	0.4
40-44	28	13	1.7	0.29	0.8	0.20	6.1	2.1
45-49	44	35	2.8	0.24	2.3	0.25	4.3	2.9
50-54	101	52	7.8	0.31	4.1	0.24	5.4	2.9
55-59	166	78	15.6	0.33	6.9	0.32	5.4	3.0
60-64	272	119	27.7	0.40	11.2	0.42	5.7	3.3
65-69	400	174	41.6	0.46	16.7	0.45	5.6	3.3
70-74	523	253	57.5	0.55	24.2	0.53	5.7	3.8
75-79	477	220	86.6	0.69	30.8	0.51	5.6	3.5
80-84	367	322	105.1	0.89	57.4	0.74	5.0	4.9
85+	290	452	125.3	1.04	78.2	0.90	4.8	5.2
All ages	2681	1724					5.4	3.9
Mortality								
Raw			14.8	0.53	9.2	0.53		
WS			6.9	0.47	3.1	0.43		
ES			10.7	0.50	4.9	0.45		
BRD-S			14.5	0.54	6.6	0.49		
PYLL-70								
per 100,000			56.7		29.0			
ES			49.4		24.5			
AYLL-70			8.9		9.6			

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	28	1.5	23	82.1			5	17.9
C15	Oesophagus	27	1.5	5	18.5	5	18.5	17	63.0
C16	Stomach	77	4.2	20	26.0	14	18.2	43	55.8
C17	Small intestine	16	0.9	2	12.5	3	18.8	11	68.8
C18	Colon	305	16.6	67	22.0	148	48.5	90	29.5
C19–C20	Rectum	11	0.6			3	27.3	8	72.7
C22	Liver	41	2.2	1	2.4	5	12.2	35	85.4
C23–C24	Bile	18	1.0	1	5.6	1	5.6	16	88.9
C25	Pancreas	53	2.9	3	5.7	11	20.8	39	73.6
C32	Larynx	24	1.3	18	75.0	1	4.2	5	20.8
C33–C34	Lung	179	9.7	26	14.5	21	11.7	132	73.7
C38,C45	Mesothelioma	11	0.6			1	9.1	10	90.9
C43	Malign. melanoma	80	4.4	54	67.5			26	32.5
C44	Skin others	100	5.4	44	44.0	9	9.0	47	47.0
C61	Prostate	395	21.5	217	54.9	37	9.4	141	35.7
C62	Testis	11	0.6	10	90.9			1	9.1
C64	Kidney	61	3.3	29	47.5	17	27.9	15	24.6
C67	Bladder	137	7.5	59	43.1	8	5.8	70	51.1
C70–C72	CNS cancer	31	1.7	9	29.0	2	6.5	20	64.5
C76–C79	CUP	15	0.8	2	13.3	3	20.0	10	66.7
C82–C85	NHL	68	3.7	30	44.1	10	14.7	28	41.2
C90	Mult. myeloma	18	1.0	7	38.9			11	61.1
C91–C96	Leukaemia	34	1.8	11	32.4	4	11.8	19	55.9
Other primaries		98	5.3	47	48.0	8	8.2	43	43.9
All mult. primaries		1838	100.0	685	37.3	311	16.9	842	45.8

Multiple primaries with number of cases 1 to 9 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	42	3.8	18	42.9	4	9.5	20	47.6
C18	Colon	183	16.8	52	28.4	81	44.3	50	27.3
C25	Pancreas	42	3.8	4	9.5	4	9.5	34	81.0
C33–C34	Lung	58	5.3	8	13.8	3	5.2	47	81.0
C43	Malign. melanoma	22	2.0	13	59.1	1	4.5	8	36.4
C44	Skin others	27	2.5	11	40.7	2	7.4	14	51.9
C50	Breast	259	23.7	167	64.5	19	7.3	73	28.2
C53	Cervix uteri	54	4.9	43	79.6	2	3.7	9	16.7
C54	Corpus uteri	79	7.2	52	65.8			27	34.2
C56	Ovary	56	5.1	18	32.1	13	23.2	25	44.6
C64	Kidney	23	2.1	12	52.2	4	17.4	7	30.4
C67	Bladder	40	3.7	19	47.5	2	5.0	19	47.5
C70–C72	CNS cancer	18	1.6	6	33.3	5	27.8	7	38.9
C73	Thyroid	11	1.0	7	63.6	1	9.1	3	27.3
C82–C85	NHL	26	2.4	9	34.6	6	23.1	11	42.3
C90	Mult. myeloma	19	1.7	6	31.6	1	5.3	12	63.2
C91–C96	Leukaemia	19	1.7	4	21.1	2	10.5	13	68.4
Other primaries		113	10.4	30	26.5	18	15.9	65	57.5
All mult. primaries		1091	100.0	479	43.9	168	15.4	444	40.7

Multiple primaries with number of cases 1 to 10 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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24		2	0.0		0.2	0.67		7.7
25-29	1		0.1	0.25	0.0		1.8	
30-34	3	3	0.2	0.13	0.2	0.18	3.5	3.2
35-39	8	1	0.6	0.25	0.1	0.04	4.8	0.4
40-44	28	13	1.7	0.30	0.8	0.22	6.6	2.3
45-49	43	32	2.7	0.25	2.1	0.24	4.7	3.1
50-54	92	48	7.1	0.30	3.7	0.25	5.8	3.2
55-59	146	65	13.7	0.32	5.8	0.30	5.6	3.0
60-64	235	99	23.9	0.39	9.3	0.40	6.0	3.5
65-69	329	148	34.2	0.45	14.2	0.50	5.8	3.6
70-74	414	197	45.5	0.56	18.8	0.49	5.9	3.9
75-79	354	172	64.3	0.69	24.1	0.49	5.7	3.5
80-84	271	263	77.6	0.90	46.9	0.73	5.1	5.2
85+	221	351	95.5	1.08	60.7	0.88	5.0	5.2
All ages	2145	1394					5.6	4.1
Mortality								
Raw			11.9	0.52	7.4	0.52		
WS			5.6	0.46	2.6	0.41		
ES			8.6	0.49	4.0	0.44		
BRD-S			11.5	0.53	5.4	0.47		
PYLL-70								
per 100,000			51.0		25.8			
ES			44.4		21.8			
AYLL-70			9.2		9.9			

* 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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24		2	0.0		0.2	0.67		8.3
25-29	1		0.1	0.25	0.0		2.0	
30-34	3	3	0.2	0.13	0.2	0.18	3.5	3.6
35-39	8	1	0.6	0.26	0.1	0.04	5.1	0.5
40-44	26	12	1.6	0.29	0.8	0.21	6.5	2.4
45-49	42	31	2.7	0.26	2.0	0.24	4.9	3.4
50-54	89	44	6.9	0.30	3.4	0.25	6.2	3.3
55-59	129	59	12.1	0.30	5.3	0.28	5.5	3.1
60-64	217	86	22.1	0.38	8.1	0.37	6.4	3.6
65-69	285	116	29.6	0.43	11.1	0.41	6.0	3.4
70-74	329	169	36.2	0.48	16.2	0.44	5.8	4.1
75-79	277	147	50.3	0.58	20.6	0.45	5.7	3.7
80-84	198	221	56.7	0.71	39.4	0.64	4.9	5.4
85+	157	299	67.8	0.81	51.7	0.77	4.6	5.3
All ages	1761	1190					5.6	4.1
Mortality								
Raw			9.7	0.45	6.4	0.46		
WS			4.8	0.41	2.2	0.37		
ES			7.2	0.43	3.4	0.39		
BRD-S			9.4	0.46	4.6	0.42		
PYLL-70								
per 100,000			47.3		23.4			
ES			41.2		19.8			
AYLL-70			9.5		10.5			

* See corresponding tables with multiple primaries.

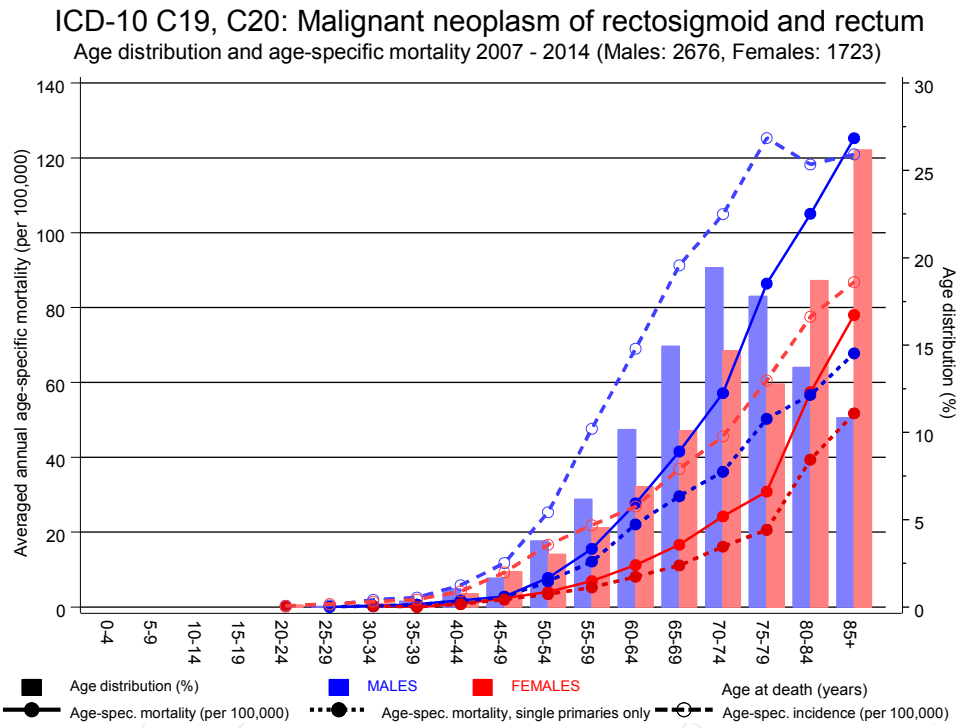


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

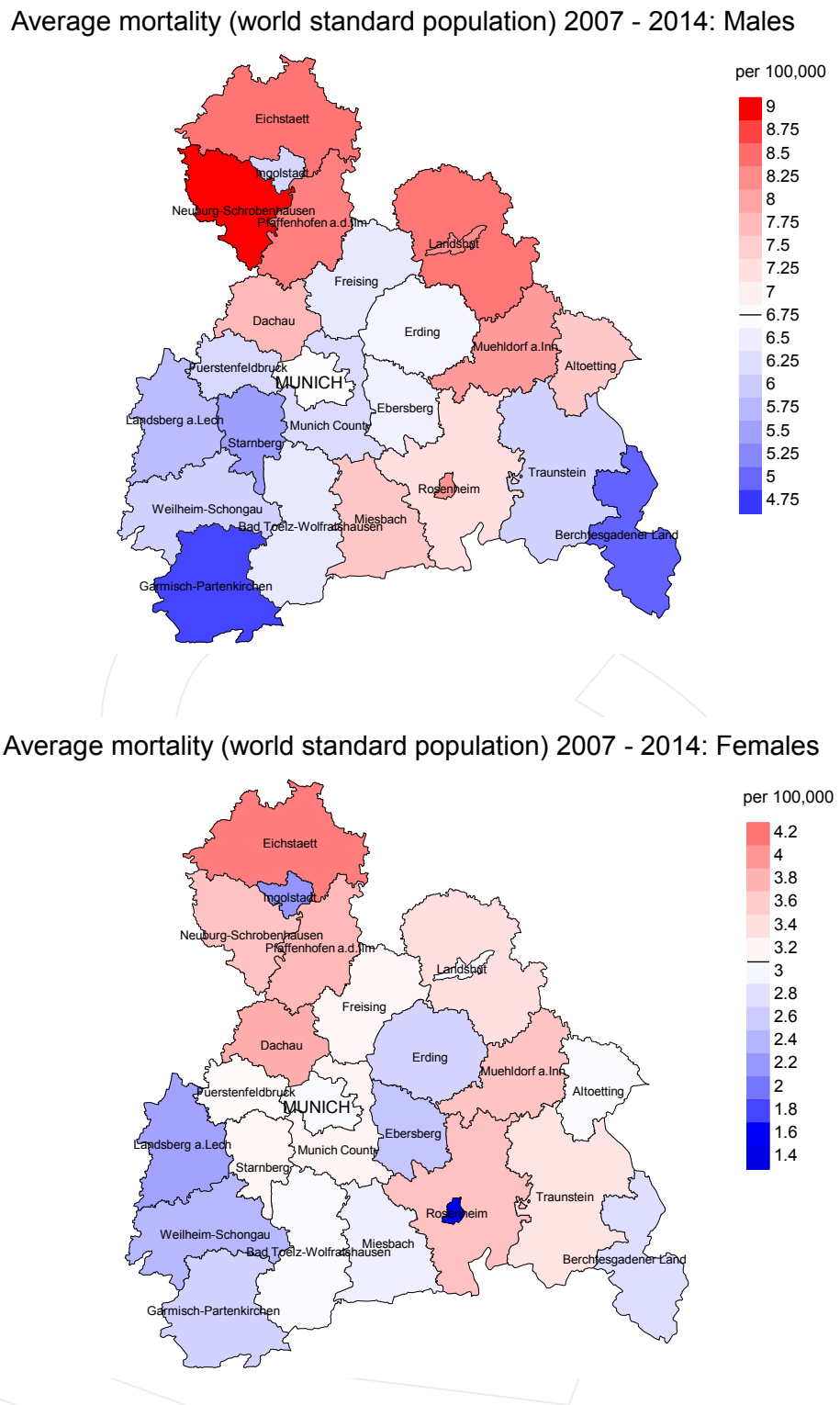
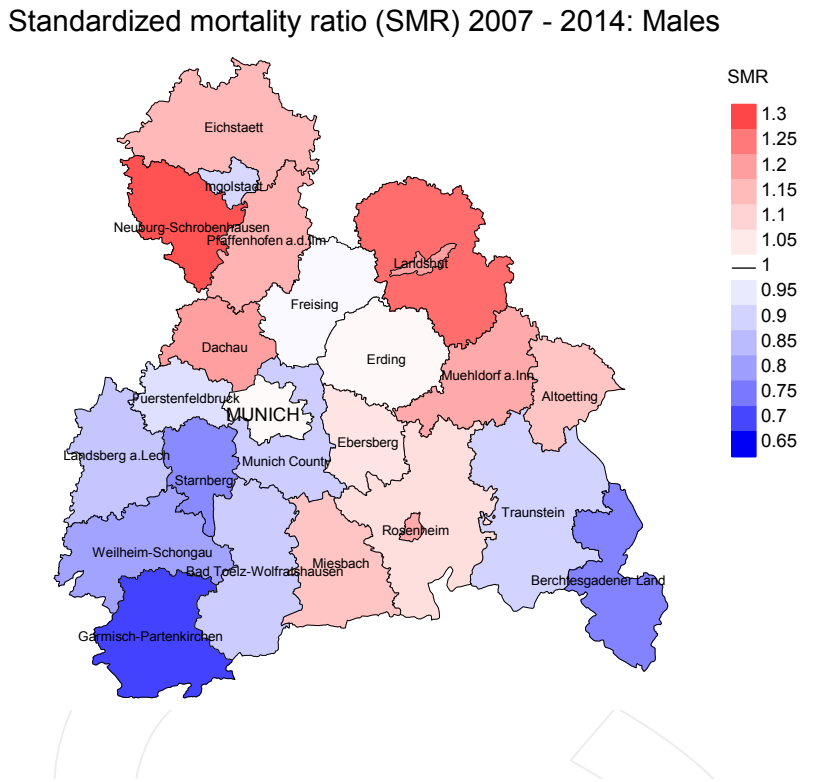


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 6.8/100,000 WS N=2,654, females 3.1/100,000 WS N=1,707).

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 38 women died from rectal cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.5 and 4.1/100,000.



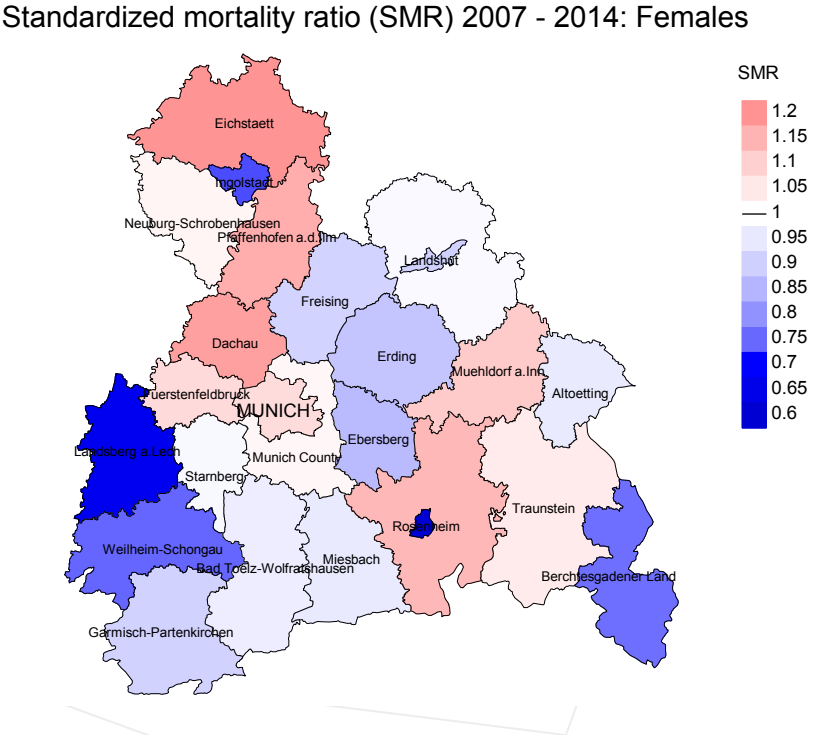


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=2,654, females N=1,707).

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 38 women died from rectal cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.86. Though, the value of this parameter may vary with an underlying probability of 99% between 0.54 and 1.29, 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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