

# Munich Cancer Registry



- ▶ Survival
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- ▶ *Deutsch*

## ICD-10 C19, C20: Rectal cancer

### Incidence and Mortality

Year of diagnosis	1998-2016
Patients	17,919
Diseases	17,939
Creation date	08/21/2018
Export date	08/09/2018
Population	4.81 m



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<https://www.tumorregister-muenchen.de/en>

<https://www.tumorregister-muenchen.de/en/facts/base/bC1920E-ICD-10-C19-C20-Rectal-cancer-incidence-and-mortality.pdf>

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**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<sup>#</sup>, with a total of 4.69 million inhabitants, account for the frequency of cancer diseases<sup>##</sup> 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<sup>###</sup> 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](mailto:tumor@ibe.med.uni-muenchen.de).

Munich Cancer Registry, August 2018

<sup>#</sup> 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 2.65 million to 4.10 in 2002, and to 4.69 million in 2007).

<sup>##</sup> 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.

<sup>###</sup> 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

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (ALL PATIENTS) (incl. DCO)

Year of diagnosis	All cases n	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	560	18	3.2	9.8	9.7	73.6	96.1
1999	637	26	4.1	9.4	9.5	72.4	96.2
2000	609	26	4.3	10.5	9.4	71.4	96.9
2001	627	24	3.8	11.1	9.2	62.8	94.3
2002	1113	77	6.9	11.4	9.0	70.8	97.0 #
2003	1095	65	5.9	11.6	8.7	65.0	96.1
2004	996	45	4.5	11.8	8.2	64.5	95.6
2005	1042	45	4.3	12.0	7.8	64.8	96.6
2006	1085	33	3.0	12.3	7.4	59.1	94.1
2007	1241	41	3.3	12.6	7.0	60.0	77.5 #
2008	1150	48	4.2	12.8	6.6	55.7	71.6
2009	1119	48	4.3	12.9	6.0	55.8	72.1
2010	1103	43	3.9	13.1	5.4	51.6	69.6
2011	1098	31	2.8	13.3	5.1	48.5	70.7
2012	1056	41	3.9	13.5	4.5	44.2	71.9
2013	1001	39	3.9	13.5	3.9	39.7	68.5
2014	979	29	3.0	13.6	3.5	35.3	75.2
2015	779	30	3.9	13.7	3.4	26.6	98.3
2016	649	32	4.9	13.7	3.3	19.3	68.7 ##
1998-2016	17939	741	4.1	13.7	9.7	54.7	83.5

17,939 cases diagnosed 1998-2016 are related to a total of 17,919 patients. Currently, in 4,335 (24.2 %) of these 17,919 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 3,474 / 686 / 175 (19.4 % / 3.8 % / 1.0 %) patients exist having 2 / 3 / 4+ malignancies.

# 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 retrieved from the respective headings.

How to interpret:

In 2014, a subgroup of 979 cases has been diagnosed, of which 13.6 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.5 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (MALES) (incl. DCO)

Year of diagnosis	Males n	Males %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	314	56.1	7	2.2	7.0	10.6	72.9	95.9
1999	361	56.7	9	2.5	7.4	10.4	72.6	95.8
2000	349	57.3	7	2.0	9.5	10.2	70.5	96.6
2001	359	57.3	11	3.1	10.2	10.1	64.9	94.7
2002	646	58.0	36	5.6	10.9	9.8	72.1	97.1 #
2003	627	57.3	30	4.8	11.3	9.5	65.4	97.4
2004	574	57.6	21	3.7	11.6	9.0	65.2	96.0
2005	596	57.2	20	3.4	11.8	8.6	65.1	97.7
2006	648	59.7	10	1.5	12.2	8.2	58.6	93.8
2007	746	60.1	20	2.7	12.5	7.7	59.7	76.8 #
2008	687	59.7	18	2.6	12.8	7.2	53.3	69.9
2009	689	61.6	18	2.6	13.1	6.7	57.0	73.0
2010	687	62.3	25	3.6	13.3	6.0	50.7	69.7
2011	667	60.7	12	1.8	13.4	5.8	47.8	70.2
2012	635	60.1	16	2.5	13.7	5.0	44.7	72.3
2013	623	62.2	21	3.4	13.7	4.1	38.2	67.4
2014	602	61.5	11	1.8	13.8	3.3	34.4	75.1
2015	514	66.0	13	2.5	13.9	2.8	24.9	98.1
2016	416	64.1	16	3.8	14.0	3.0	17.3	67.8 ##
1998-2016	10740	59.9	321	3.0	14.0	10.6	53.9	83.1

10,740 cases diagnosed 1998-2016 are related to a total of 10,728 patients. Currently, in 2,727 (25.4 %) of these 10,728 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 2,181 / 422 / 124 (20.3 % / 3.9 % / 1.2 %) patients exist having 2 / 3 / 4+ malignancies.

# 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 retrieved from the respective headings.

How to interpret:

In 2014, a subgroup of 602 cases has been diagnosed, of which 13.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.3 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1b

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (FEMALES) (incl. DCO)

Year of diagnosis	Females n	Females %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	246	43.9	11	4.5	13.4	8.4	74.4	96.3
1999	276	43.3	17	6.2	11.9	8.2	72.1	96.7
2000	260	42.7	19	7.3	11.9	8.1	72.7	97.3
2001	268	42.7	13	4.9	12.3	7.9	60.1	93.7
2002	467	42.0	41	8.8	12.1	7.7	69.0	97.0 #
2003	468	42.7	35	7.5	12.0	7.4	64.5	94.2
2004	422	42.4	24	5.7	12.2	7.0	63.5	95.0
2005	446	42.8	25	5.6	12.3	6.6	64.3	95.3
2006	437	40.3	23	5.3	12.4	6.3	59.7	94.5
2007	495	39.9	21	4.2	12.6	5.9	60.4	78.6 #
2008	463	40.3	30	6.5	12.8	5.6	59.2	74.1
2009	430	38.4	30	7.0	12.7	4.9	53.7	70.7
2010	416	37.7	18	4.3	12.9	4.4	53.1	69.5
2011	431	39.3	19	4.4	13.1	3.9	49.7	71.5
2012	421	39.9	25	5.9	13.2	3.7	43.5	71.3
2013	378	37.8	18	4.8	13.2	3.6	42.1	70.4
2014	377	38.5	18	4.8	13.2	3.9	36.9	75.3
2015	265	34.0	17	6.4	13.3	4.4	29.8	98.9
2016	233	35.9	16	6.9	13.3	3.6	22.7	70.4 ##
1998-2016	7199	40.1	420	5.8	13.3	8.4	55.9	84.0

7,199 cases diagnosed 1998-2016 are related to a total of 7,191 patients. Currently, in 1,608 (22.4 %) of these 7,191 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,293 / 264 / 51 (18.0 % / 3.7 % / 0.7 %) patients exist having 2 / 3 / 4+ malignancies.

# 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 retrieved from the respective headings.

How to interpret:

In 2014, a subgroup of 377 cases has been diagnosed, of which 13.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.9 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 2

Incidence measures by year of diagnosis including DCO cases  
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,  
and from 4.10 to 4.81 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	314	246	28.3	20.9	17.3	9.3	25.3	13.9	31.5	17.7
1999	361	276	32.3	23.3	19.4	10.5	28.7	15.6	35.6	20.0
2000	349	260	30.6	21.6	18.2	8.9	27.1	13.5	33.7	17.7
2001	359	268	31.0	22.0	18.5	10.4	26.9	15.1	33.9	18.8
2002	646	467	34.7	23.9	20.0	10.4	29.3	15.6	36.5	19.9
2003	627	468	33.4	23.8	19.1	10.6	28.1	15.5	34.8	19.5
2004	574	422	30.5	21.3	17.0	9.7	24.9	14.2	30.7	17.8
2005	596	446	31.5	22.4	17.5	9.5	25.5	14.1	31.6	18.0
2006	648	437	33.8	21.8	18.4	9.4	26.7	13.8	33.2	17.5
2007	746	495	33.7	21.4	18.0	9.1	26.4	13.5	33.0	17.1
2008	687	463	30.9	20.0	16.3	8.2	23.8	12.2	29.8	15.7
2009	689	430	30.9	18.5	16.0	8.0	23.4	11.7	29.4	14.7
2010	687	416	30.5	17.8	15.8	7.2	23.1	10.7	28.8	13.9
2011	667	431	29.8	18.4	15.1	7.9	22.0	11.4	27.5	14.0
2012	635	421	28.0	17.8	13.9	7.5	20.7	11.0	25.9	13.8
2013	623	378	27.1	15.9	13.7	7.0	19.9	10.1	24.7	12.6
2014	602	377	25.8	15.7	13.2	6.6	19.1	9.6	23.6	11.9
2015	514	265	21.6	10.9	10.5	4.3	15.5	6.5	19.6	8.2
2016	416	233	17.3	9.5	8.5	4.0	12.4	5.8	15.7	7.3
1998-2016	10740	7199	29.2	18.8	15.6	8.0	22.8	11.8	28.3	14.9

The computation of the incidence measures includes all cancers, irrespective of first or subsequent malignancy.

Table 3

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

Year of diagnosis	Cases n	Std.		Min.	Max.	Median				
		Mean	dev.			10%	25%	50%	75%	90%
1998	560	68.2	12.3	30.5	102	53.6	59.4	68.4	77.2	85.3
1999	637	68.4	12.2	34.1	102	52.4	59.3	69.0	77.2	85.5
2000	609	69.5	12.3	33.4	95.9	54.0	60.4	69.2	79.2	86.7
2001	627	68.0	12.2	26.6	97.1	52.9	60.5	67.3	77.1	83.9
2002	1113	68.8	11.7	29.9	104	54.1	61.0	69.3	76.9	83.0
2003	1095	68.9	11.8	27.1	101	53.9	61.1	68.8	77.2	83.8
2004	996	68.2	11.9	21.3	97.3	53.4	60.8	67.9	77.3	83.5
2005	1042	69.1	11.8	19.0	99.6	54.0	61.3	68.9	77.7	84.2
2006	1085	68.6	12.1	21.2	98.7	52.8	62.0	68.5	77.9	83.7
2007	1241	69.3	11.8	30.5	97.5	53.1	62.6	69.3	78.0	84.4
2008	1150	69.7	11.9	28.2	102	53.9	62.4	69.9	78.5	84.8
2009	1119	69.0	12.1	20.7	102	51.9	61.6	70.2	77.7	84.2
2010	1103	69.6	12.5	21.1	101	52.7	61.6	70.9	78.9	85.2
2011	1098	69.1	12.9	20.1	99.1	51.1	60.6	70.4	78.4	85.8
2012	1056	69.3	12.4	26.1	99.6	52.9	60.1	70.7	78.0	84.7
2013	1001	68.1	12.8	20.0	98.2	50.4	59.6	70.3	76.9	83.6
2014	979	69.1	12.7	20.7	96.2	52.2	60.4	70.1	78.1	85.3
2015	779	70.0	12.2	18.3	105	53.2	61.3	71.6	79.3	85.2
2016	649	69.2	12.9	19.8	96.5	51.3	60.4	71.2	78.5	84.4
1998–2016	17939	69.0	12.2	18.3	105	52.9	61.0	69.6	77.9	84.6

Table 3a

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

Year of diagnosis	Cases n	Std.		Min.	Max.	Median				
		Mean	dev.			10%	25%	50%	75%	90%
1998	314	65.8	11.8	32.6	94.4	51.6	58.2	64.1	74.0	82.9
1999	361	66.3	11.4	34.1	94.2	52.2	58.3	65.7	73.4	82.5
2000	349	66.8	11.6	34.4	95.9	52.7	58.9	65.4	75.0	83.6
2001	359	67.1	10.6	36.4	93.6	54.1	60.6	66.0	73.8	81.1
2002	646	67.1	10.6	32.8	93.0	53.9	60.6	66.8	74.1	81.3
2003	627	67.4	10.6	27.1	93.1	53.9	60.7	67.7	74.6	81.2
2004	574	66.8	10.4	29.9	93.3	54.3	60.7	66.2	74.9	79.8
2005	596	67.1	10.7	19.0	99.6	53.8	60.3	67.1	74.2	80.6
2006	648	66.9	10.8	25.7	94.7	52.8	60.4	67.3	74.5	80.9
2007	746	68.0	10.9	31.1	95.5	53.2	62.1	68.0	75.3	81.8
2008	687	68.0	10.7	28.2	96.0	53.9	62.1	68.5	75.1	80.7
2009	689	68.0	11.1	20.7	95.4	52.0	61.5	69.6	75.3	80.8
2010	687	68.1	11.9	21.1	98.3	52.5	60.6	69.4	75.9	83.0
2011	667	68.0	11.5	26.3	93.6	51.9	61.3	69.7	75.8	82.1
2012	635	68.4	11.4	26.1	99.6	53.2	59.7	69.7	76.8	82.7
2013	623	67.7	11.8	20.0	98.2	51.1	60.3	69.8	75.7	81.7
2014	602	68.0	12.0	20.7	96.2	52.7	59.9	68.7	77.0	83.1
2015	514	69.2	11.5	18.3	105	53.5	60.9	70.3	77.8	83.1
2016	416	68.6	12.2	19.8	94.3	52.2	60.5	70.5	77.6	83.4
1998–2016	10740	67.6	11.2	18.3	105	53.1	60.4	68.1	75.4	81.7



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		
				Min.	Max.	10%	25%	50%	75%	90%
1998	246	71.3	12.2	30.5	102	55.3	62.2	72.5	78.8	87.7
1999	276	71.1	12.8	38.4	102	52.7	61.5	73.0	79.8	87.5
2000	260	73.0	12.3	33.4	94.7	56.1	62.8	75.0	81.9	88.5
2001	268	69.3	14.1	26.6	97.1	51.1	60.0	70.2	79.7	86.8
2002	467	71.2	12.6	29.9	104	54.5	62.2	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	446	71.7	12.6	32.8	96.8	54.5	63.2	72.1	81.4	87.1
2006	437	71.0	13.4	21.2	98.7	52.5	63.5	72.1	81.1	86.6
2007	495	71.3	12.8	30.5	97.5	53.0	63.6	72.3	81.5	87.0
2008	463	72.3	13.0	29.3	102	53.7	63.4	73.3	82.4	87.9
2009	430	70.7	13.4	29.2	102	51.8	61.8	71.4	80.8	87.1
2010	416	72.0	13.1	23.0	101	52.9	63.4	73.9	82.4	87.1
2011	431	70.7	14.8	20.1	99.1	50.4	60.1	71.7	82.8	88.9
2012	421	70.7	13.6	26.1	97.4	52.1	61.6	72.3	81.2	86.9
2013	378	68.8	14.4	25.3	96.5	49.0	57.7	72.1	79.3	85.9
2014	377	70.8	13.7	29.4	95.3	51.5	61.1	72.5	81.4	87.8
2015	265	71.6	13.4	34.3	95.3	50.8	62.1	73.5	81.0	88.4
2016	233	70.4	14.1	30.8	96.5	51.0	59.9	72.8	80.8	88.1
1998-2016	7199	71.0	13.3	20.1	104	52.5	62.0	72.5	81.2	87.2

Table 4

Age distribution by 5-year age group and sex for period 2007-2016  
(incl. DCO)

Age at diagnosis Years	Cases n	Males			Females				
		%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4									
5-9									
10-14									
15-19	2	0.0	0.0	2	0.0	0.0			0.0
20-24	7	0.1	0.1	4	0.1	0.1	3	0.1	0.1
25-29	15	0.1	0.2	5	0.1	0.2	10	0.3	0.3
30-34	50	0.5	0.7	29	0.5	0.6	21	0.5	0.9
35-39	71	0.7	1.4	40	0.6	1.3	31	0.8	1.7
40-44	181	1.8	3.2	105	1.7	3.0	76	1.9	3.6
45-49	401	3.9	7.1	227	3.6	6.6	174	4.5	8.1
50-54	674	6.6	13.8	417	6.7	13.2	257	6.6	14.6
55-59	923	9.1	22.8	622	9.9	23.2	301	7.7	22.3
60-64	1151	11.3	34.2	817	13.0	36.2	334	8.5	30.9
65-69	1488	14.6	48.8	1040	16.6	52.8	448	11.5	42.3
70-74	1735	17.1	65.8	1149	18.3	71.1	586	15.0	57.3
75-79	1423	14.0	79.8	899	14.3	85.5	524	13.4	70.7
80-84	1076	10.6	90.4	547	8.7	94.2	529	13.5	84.3
85+	978	9.6	100.0	363	5.8	100.0	615	15.7	100.0
All ages	10175	100.0		6266	100.0		3909	100.0	

Table 5

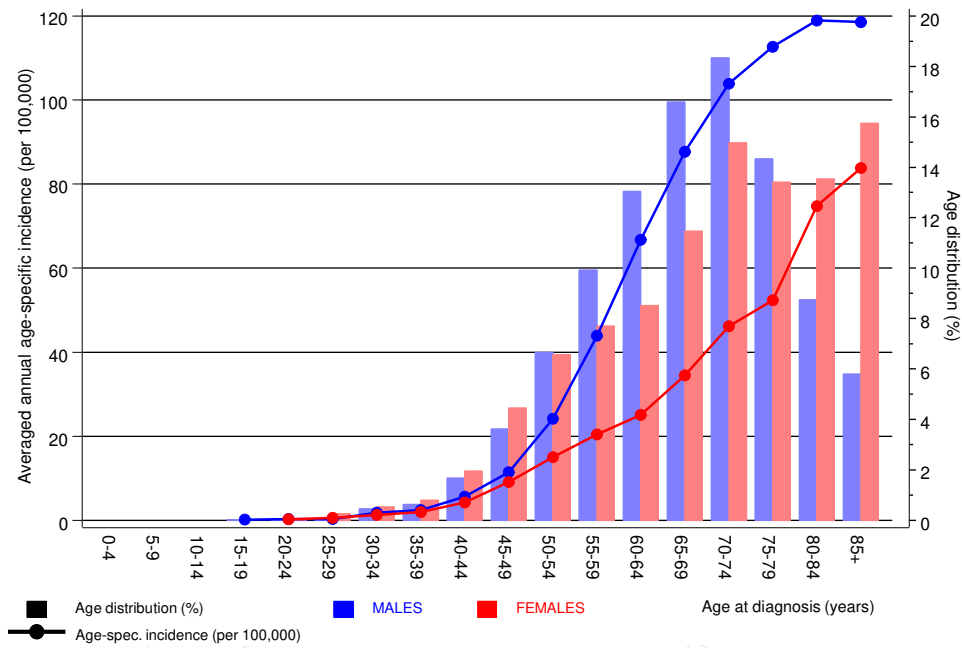
Age-specific incidence, DCO rate and proportion of all cancers for period 2007-2016

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid.	Females Age- spec. incid.	Males DCO rate n=170 %	Females DCO rate n=211 %	Males	Females
							Prop.all cancers n=113978 %	Prop.all cancers n=112253 %
0- 4								
5- 9								
10-14								
15-19	2		0.2				0.8	
20-24	4	3	0.3	0.2			0.9	0.8
25-29	5	10	0.3	0.6			0.7	1.2
30-34	29	21	1.8	1.3			3.0	1.4
35-39	40	31	2.5	1.9			2.9	1.2
40-44	105	76	5.6	4.2		1.3	4.8	1.7
45-49	227	174	11.5	9.1	0.9		5.8	2.5
50-54	417	257	24.1	15.0	0.2	1.2	6.8	3.0
55-59	622	301	43.9	20.5	1.6		6.7	3.2
60-64	817	333	66.7	25.0	0.7	1.5	6.2	3.0
65-69	1039	448	87.7	34.5	1.9	0.9	5.6	3.2
70-74	1149	585	103.9	46.2	2.0	2.4	5.5	4.0
75-79	898	524	112.7	52.3	2.9	4.2	5.4	3.9
80-84	547	529	118.9	74.8	4.0	8.1	5.0	4.8
85+	363	615	118.6	83.8	16.5	19.3	4.6	4.8
All ages	6264	3907			2.7	5.4	5.5	3.5
Incidence								
Raw			27.4	16.5				
WS			14.0	6.9				
ES			20.5	10.2				
BRD-S			25.5	12.8				

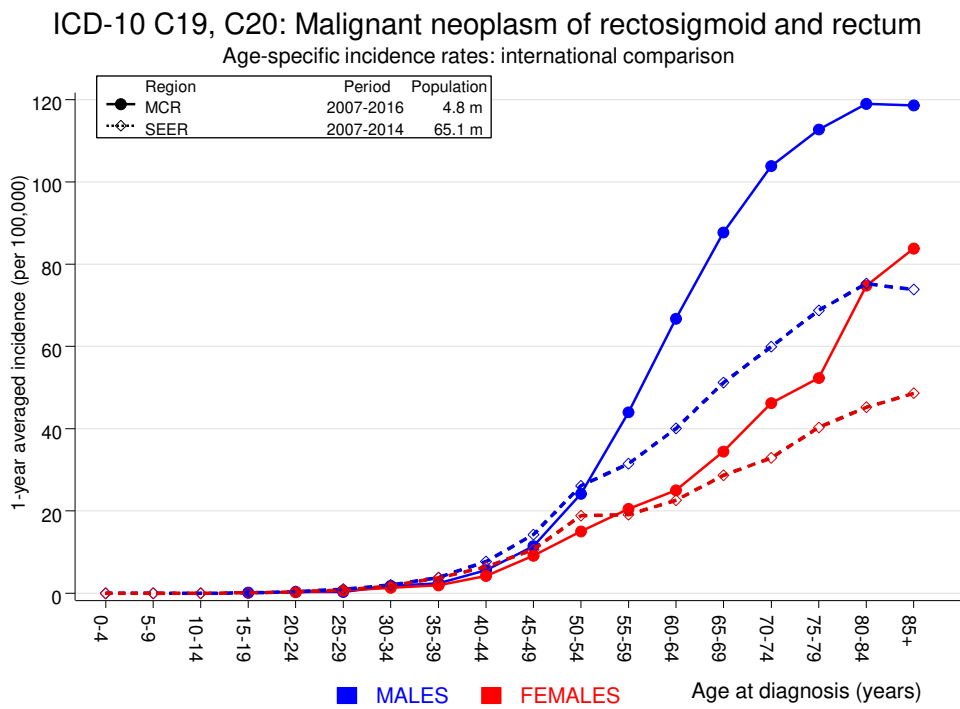
The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

ICD-10 C19, C20: Malignant neoplasm of rectosigmoid and rectum

Age distribution and age-specific incidence 2007 - 2016 (Males: 6264, Females: 3907)



**Figure 6.** Age distribution (males: mean=68.2 yrs, median=69.2 yrs; females: mean=71.0 yrs, median=72.5 yrs) 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>.

Table 7a

Standardized incidence ratio (SIR, with 95% confidence limits),  
excess absolute risk (EAR) and DCO rate of further malignancies  
for period 1998–2016

## MALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C03–C06 Oral cavity	5	5.0	1.0	0.3	2.3	-0.0	20.0
C07–C08 Salivary gland	3	1.4	2.1	0.4	6.3	0.5	
C09–C10 Oropharynx	6	6.2	1.0	0.4	2.1	-0.1	
C12–C13 Hypopharynx	3	3.4	0.9	0.2	2.6	-0.1	
C15 Oesophagus	29	11.4	2.5	1.7	3.7 #	5.0	3.4
C16 Stomach	56	25.1	2.2	1.7	2.9 #	8.9	10.7
C17 Small intestine	19	3.3	5.8	3.5	9.0 #	4.5	
C18 Colon	336	60.1	5.6	5.0	6.2 #	79.0	0.6
C19–C20 Rectum	12	33.3	0.4	0.2	0.6 #	-6.1	25.0
C21 Anus/canal	3	1.3	2.3	0.5	6.6	0.5	
C22 Liver	53	17.5	3.0	2.3	4.0 #	10.2	7.5
C23–C24 Bile	15	6.1	2.5	1.4	4.1 #	2.5	13.3
C25 Pancreas	46	23.1	2.0	1.5	2.7 #	6.6	17.4
C32 Larynx	10	6.3	1.6	0.8	2.9	1.1	20.0
C33–C34 Lung	151	73.0	2.1	1.8	2.4 #	22.3	14.6
C38,C45 Mesothelioma	5	4.2	1.2	0.4	2.8	0.2	
C43 Malign. melanoma	42	26.1	1.6	1.2	2.2 #	4.6	
C46,C49 Soft tissue	5	3.4	1.5	0.5	3.4	0.5	
C50 Breast	2	1.6	1.3	0.2	4.6	0.1	
C60 Penis	3	1.4	2.1	0.4	6.1	0.4	
C61 Prostate	291	181.1	1.6	1.4	1.8 #	31.5	6.5
C62 Testis	2	1.3	1.6	0.2	5.7	0.2	
C64 Kidney	55	21.5	2.6	1.9	3.3 #	9.6	5.5
C65 Renal pelvis	6	2.7	2.3	0.8	4.9	1.0	
C66 Ureter	4	1.5	2.7	0.7	6.9	0.7	
C67 Bladder	46	28.0	1.6	1.2	2.2 #	5.2	6.5
C70–C72 CNS cancer	17	7.9	2.2	1.3	3.5 #	2.6	23.5
C73 Thyroid	6	3.9	1.6	0.6	3.4	0.6	16.7
C76–C79 CUP	11	10.4	1.1	0.5	1.9	0.2	
C81 Hodgkin lymphoma	2	1.3	1.5	0.2	5.4	0.2	
C82–C85 NHL	40	25.1	1.6	1.1	2.2 #	4.3	5.0
C90 Mult. myeloma	11	8.1	1.4	0.7	2.4	0.8	18.2
C91–C96 Leukaemia	23	10.1	2.3	1.4	3.4 #	3.7	30.4
Others, specified	2	0.9	2.2	0.3	8.1	0.3	
Not observed	0	7.2	0.0	0.0	0.5 #	-2.1	
All further malignancies	1320	624.2	2.1	2.0	2.2 #	199.3	7.0
Patients		10064					
Median age at next malignancy (years)		72.3					
Person-years		34907					
Mean observation time (years)		3.5					
Median observation time (years)		2.2					

# The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category "Others, specified".

Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits),  
excess absolute risk (EAR) and DCO rate of further malignancies  
for period 1998–2016

## FEMALES

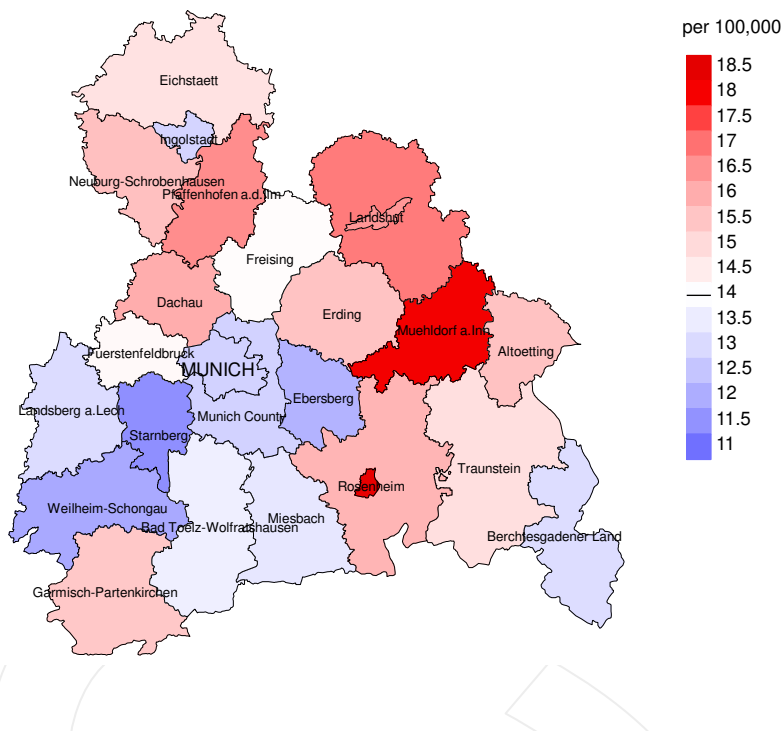
Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C09–C10 Oropharynx	2	1.1	1.9	0.2	6.7	0.4	
C11 Nasopharynx	2	0.1	19.1	2.3	69.0 #	0.8	
C15 Oesophagus	5	1.8	2.8	0.9	6.4	1.3	
C16 Stomach	22	11.8	1.9	1.2	2.8 #	4.3	9.1
C17 Small intestine	15	1.4	10.5	5.9	17.3 #	5.7	6.7
C18 Colon	168	32.3	5.2	4.5	6.1 #	57.2	1.2
C19–C20 Rectum	8	13.1	0.6	0.3	1.2	-2.2	12.5
C21 Anus/canal	6	1.6	3.8	1.4	8.3 #	1.9	
C22 Liver	6	3.8	1.6	0.6	3.5	0.9	50.0
C23–C24 Bile	11	4.7	2.3	1.2	4.2 #	2.6	9.1
C25 Pancreas	25	14.6	1.7	1.1	2.5 #	4.4	28.0
C33–C34 Lung	52	21.3	2.4	1.8	3.2 #	12.9	19.2
C40–C41 Bone	2	0.2	8.1	1.0	29.2	0.7	
C43 Malign. melanoma	25	10.4	2.4	1.5	3.5 #	6.1	
C46,C49 Soft tissue	4	1.7	2.3	0.6	5.9	1.0	
C48 Peritoneal	3	1.1	2.8	0.6	8.3	0.8	
C50 Breast	165	85.1	1.9	1.7	2.3 #	33.7	5.5
C51 Vulva	6	3.2	1.9	0.7	4.0	1.2	16.7
C52 Vagina	4	0.6	6.7	1.8	17.1 #	1.4	25.0
C53 Cervix uteri	6	3.6	1.7	0.6	3.7	1.0	33.3
C54 Corpus uteri	26	16.0	1.6	1.1	2.4 #	4.2	7.7
C55,C57 Fem. genitals un	3	0.9	3.5	0.7	10.1	0.9	
C56 Ovary	34	12.1	2.8	1.9	3.9 #	9.2	20.6
C64 Kidney	22	7.5	3.0	1.8	4.5 #	6.1	9.1
C65 Renal pelvis	3	1.0	3.1	0.6	9.0	0.9	
C67 Bladder	13	6.4	2.0	1.1	3.5 #	2.8	23.1
C69 Eye melanoma	2	0.3	6.0	0.7	21.5	0.7	
C70–C72 CNS cancer	3	4.0	0.7	0.2	2.2	-0.4	66.7
C73 Thyroid	5	4.3	1.2	0.4	2.7	0.3	
C76–C79 CUP	4	6.1	0.7	0.2	1.7	-0.9	
C82–C85 NHL	23	12.1	1.9	1.2	2.8 #	4.6	4.3
C90 Mult. myeloma	10	3.9	2.6	1.2	4.7 #	2.6	40.0
C91–C96 Leukaemia	11	5.1	2.2	1.1	3.9 #	2.5	45.5
Others, specified	6	1.8	3.4	1.3	7.5 #	1.8	16.7
Not observed	0	6.3	0.0	0.0	0.6 #	-2.7	
All further malignancies	702	301.2	2.3	2.2	2.5 #	168.8	9.5

Patients	6622
Median age at next malignancy (years)	74.9
Person-years	23735
Mean observation time (years)	3.6
Median observation time (years)	2.2

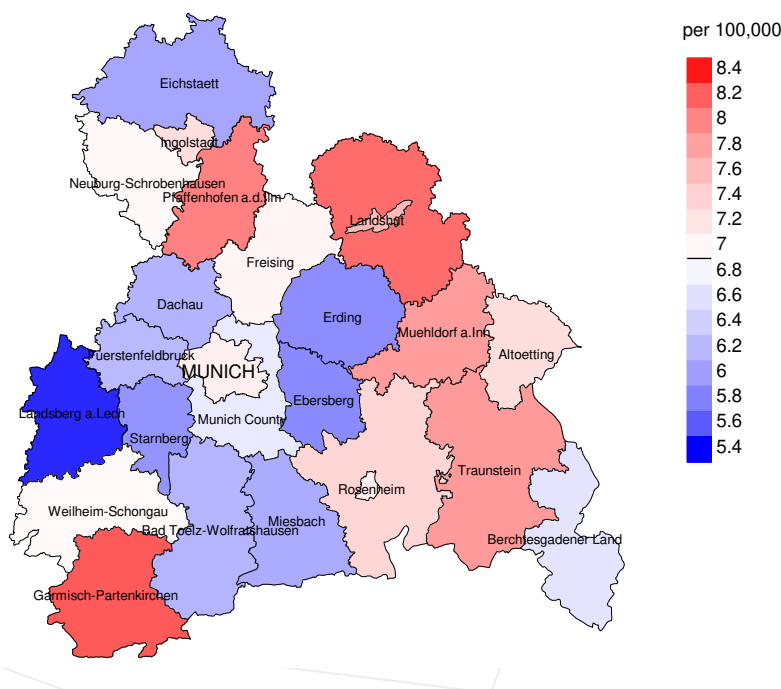
# The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category "Others, specified".

Average incidence (world standard population) 2007 - 2016: Males



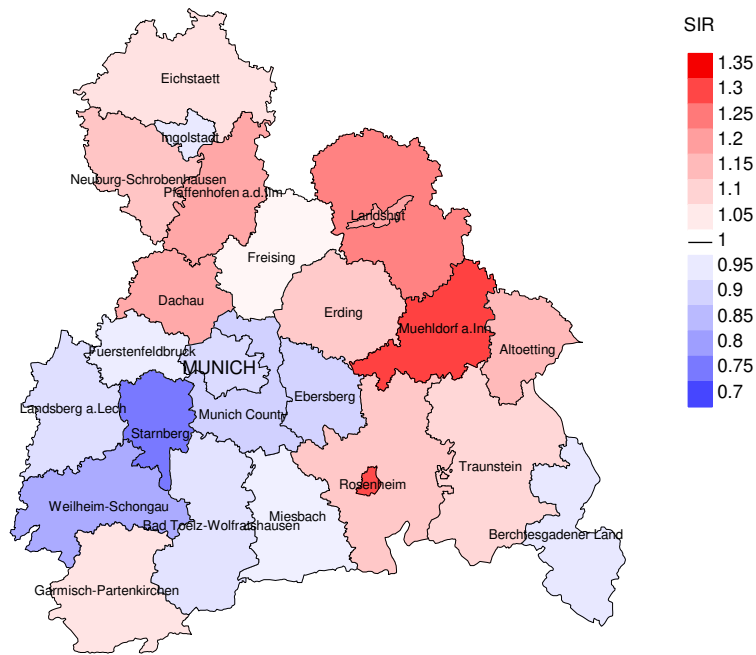
Average incidence (world standard population) 2007 - 2016: Females



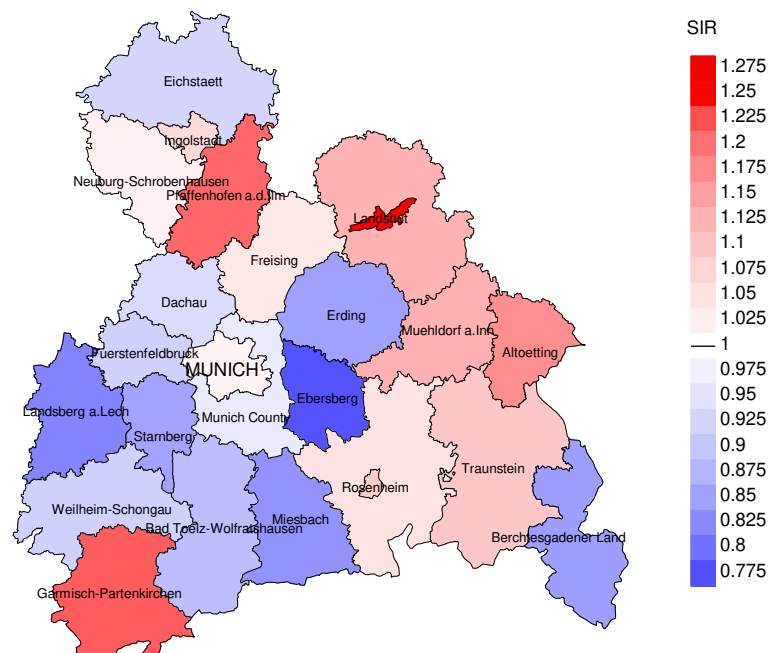
**Figure 8a.** Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2016. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 14.0/100,000 WS N=6,264, females 6.9/100,000 WS N=3,907).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 82 women were identified with newly diagnosed rectal cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 5.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 4.1 and 8.1/100,000.

Standardized incidence ratio (SIR) 2007 - 2016: Males



Standardized incidence ratio (SIR) 2007 - 2016: Females



**Figure 8b.** Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2016. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=6,264, females N=3,907).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 82 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 0.78. Though, the value of this parameter may vary with an underlying probability of 99% between 0.57 and 1.03, and is therefore not statistically striking.



## MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.81 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	560	96.1	3.2	412	73.6	93.4
1999	637	96.2	4.1	461	72.4	94.1
2000	609	96.9	4.3	435	71.4	95.4
2001	627	94.3	3.8	394	62.8	97.7
2002	1113	97.0	6.9	788	70.8	97.0
2003	1095	96.1	5.9	712	65.0	97.8
2004	996	95.6	4.5	642	64.5	98.8
2005	1042	96.6	4.3	675	64.8	97.8
2006	1085	94.1	3.0	641	59.1	98.0
2007	1241	77.5	3.3	744	60.0	98.5
2008	1150	71.6	4.2	640	55.7	98.1
2009	1119	72.1	4.3	624	55.8	96.8
2010	1103	69.6	3.9	569	51.6	96.7
2011	1098	70.7	2.8	533	48.5	97.4
2012	1056	71.9	3.9	467	44.2	95.5
2013	1001	68.5	3.9	397	39.7	92.7
2014	979	75.2	3.0	346	35.3	93.6
2015	779	98.3	3.9	207	26.6	92.3
2016	649	68.7	4.9	125	19.3	83.2
1998-2016	17939	83.5	4.1	9812	54.7	96.5

Table 9b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased within the same year of being diagnosed with cancer (incl. DCO)

(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.81 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	560	337	88.7	62	11.1
1999	637	371	88.7	85	13.3
2000	609	350	93.4	80	13.1
2001	627	392	95.7	77	12.3
2002	1113	558	97.3	189	17.0
2003	1095	584	97.8	145	13.2
2004	996	597	98.2	122	12.2
2005	1042	614	96.1	141	13.5
2006	1085	703	97.3	162	14.9
2007	1241	712	97.9	170	13.7
2008	1150	776	99.0	157	13.7
2009	1119	794	99.5	158	14.1
2010	1103	824	99.0	172	15.6
2011	1098	828	97.1	150	13.7
2012	1056	804	98.4	156	14.8
2013	1001	794	96.9	126	12.6
2014	979	752	97.6	140	14.3
2015	779	854	98.4	119	15.3
2016	649	643	97.7	108	16.6
1998-2016	17939	12287	97.2	2519	14.0

Table 9c

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 2.65 to 4.10 m as of 2002,  
and from 4.10 to 4.81 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	371	76.0	24.0	89.7
2000	350	75.7	24.3	87.8
2001	392	70.9	29.1	86.9
2002	558	78.0	22.0	88.4
2003	584	77.2	22.8	89.5
2004	597	75.5	24.5	88.1
2005	614	73.6	26.4	85.8
2006	703	76.8	23.2	85.8
2007	712	75.0	25.0	85.8
2008	776	74.1	25.9	83.3
2009	794	73.4	26.6	85.1
2010	824	69.9	30.1	81.5
2011	828	71.9	28.1	83.8
2012	804	70.4	29.6	81.0
2013	794	66.2	33.8	79.1
2014	752	68.6	31.4	80.9
2015	854	66.2	33.8	78.3
2016	643	59.6	40.4	76.3
1998-2016	12287	71.7	28.3	83.7

Table 10a

Medians of age at death according to the grouping in Table 9  
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	70.2	80.0	71.7
2001	213	73.3	70.2	79.8	71.8
2002	321	72.7	71.1	80.2	72.0
2003	315	71.0	68.9	81.5	70.4
2004	338	74.8	72.6	80.1	73.6
2005	356	73.7	71.1	80.6	71.8
2006	427	74.8	72.3	80.3	73.8
2007	422	73.2	71.7	78.4	72.4
2008	456	75.4	73.3	80.5	74.0
2009	459	73.1	70.5	79.4	71.9
2010	490	75.2	73.5	81.8	74.0
2011	502	75.5	72.8	82.0	74.2
2012	493	76.0	74.5	81.6	75.0
2013	454	76.6	73.6	81.6	75.1
2014	454	75.7	74.4	79.8	74.8
2015	524	77.3	74.5	83.6	75.8
2016	430	78.0	75.7	82.0	76.8
1998-2016	7251	74.8	72.6	80.9	73.7

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 10b

Medians of age at death according to the grouping in Table 9  
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	151	78.4	77.2	80.9	78.0
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	259	81.2	79.4	84.7	80.2
2005	258	81.2	80.4	83.8	80.7
2006	276	80.8	79.3	85.6	80.0
2007	290	80.7	78.6	85.1	80.0
2008	320	81.2	79.3	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	86.5	79.8
2012	311	82.7	79.1	88.7	80.7
2013	340	82.6	78.3	87.1	80.2
2014	298	82.2	77.3	88.6	80.3
2015	330	81.1	77.4	87.4	78.2
2016	213	82.9	78.0	88.3	80.0
1998–2016	5036	81.1	78.3	86.5	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 11a

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	0.39	6.5	0.38	10.1	0.40	13.4	0.42
1999	172	15.4	0.48	8.9	0.46	13.8	0.48	18.8	0.53
2000	149	13.1	0.43	7.5	0.41	11.6	0.43	15.2	0.45
2001	151	13.0	0.42	7.5	0.40	11.5	0.43	15.1	0.45
2002	241	12.9	0.37	7.1	0.35	10.8	0.37	14.2	0.39
2003	246	13.1	0.39	7.2	0.38	10.9	0.39	14.1	0.40
2004	258	13.7	0.45	6.9	0.40	10.9	0.44	15.2	0.50
2005	267	14.1	0.45	7.2	0.41	10.9	0.43	14.7	0.47
2006	332	17.3	0.51	8.7	0.47	13.6	0.51	18.3	0.55
2007	325	14.7	0.44	7.1	0.40	11.0	0.42	14.9	0.45
2008	346	15.5	0.50	7.3	0.45	11.5	0.49	15.8	0.53
2009	347	15.5	0.50	7.6	0.48	11.5	0.49	14.9	0.51
2010	351	15.6	0.51	7.0	0.44	10.9	0.47	15.1	0.53
2011	373	16.7	0.56	7.7	0.51	11.9	0.54	15.8	0.58
2012	349	15.4	0.55	6.8	0.49	10.7	0.52	14.6	0.56
2013	311	13.5	0.50	6.0	0.44	9.2	0.46	12.6	0.51
2014	322	13.8	0.53	6.1	0.46	9.4	0.49	12.6	0.53
2015	346	14.5	0.67	6.4	0.61	9.8	0.63	13.2	0.67
2016	261	10.9	0.63	4.4	0.51	6.9	0.56	9.7	0.62
1998-2016	5271	14.3	0.49	6.9	0.44	10.7	0.47	14.4	0.51

Table 11b

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	0.47	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	185	9.3	0.41	3.0	0.31	4.8	0.34	6.9	0.38
2006	208	10.4	0.48	3.3	0.35	5.4	0.39	7.8	0.45
2007	209	9.1	0.42	3.3	0.36	5.1	0.38	6.9	0.41
2008	229	9.9	0.49	3.4	0.41	5.3	0.43	7.1	0.45
2009	236	10.1	0.55	3.7	0.46	5.6	0.48	7.5	0.51
2010	225	9.6	0.54	3.1	0.44	5.0	0.46	6.9	0.49
2011	222	9.5	0.52	3.0	0.39	4.8	0.42	6.6	0.47
2012	217	9.2	0.52	3.0	0.40	4.7	0.43	6.4	0.47
2013	215	9.0	0.57	3.0	0.43	4.7	0.47	6.3	0.51
2014	194	8.1	0.51	2.7	0.42	4.2	0.44	5.7	0.48
2015	219	9.0	0.83	3.2	0.73	4.9	0.75	6.3	0.77
2016	122	5.0	0.52	1.6	0.40	2.5	0.44	3.5	0.48
1998-2016	3542	9.2	0.49	3.2	0.40	5.0	0.42	6.8	0.46

Table 12

Age distribution of age at death (cancer-related) for period 2007-2016  
(incl. multiple malignancies)

Age at death Years	Cases			Males			Females		
	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4									
5-9									
10-14									
15-19									
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	9	0.2	0.2	5	0.2	0.2	4	0.2	0.3
35-39	12	0.2	0.4	10	0.3	0.5	2	0.1	0.4
40-44	44	0.8	1.3	29	0.9	1.4	15	0.7	1.1
45-49	94	1.7	3.0	51	1.5	2.9	43	2.1	3.2
50-54	182	3.4	6.3	118	3.5	6.4	64	3.1	6.2
55-59	312	5.8	12.1	207	6.2	12.6	105	5.0	11.3
60-64	475	8.8	20.9	329	9.9	22.5	146	7.0	18.2
65-69	687	12.7	33.5	487	14.6	37.1	200	9.6	27.8
70-74	928	17.1	50.7	632	19.0	56.1	296	14.2	42.0
75-79	907	16.7	67.4	617	18.5	74.6	290	13.9	55.9
80-84	847	15.6	83.0	472	14.2	88.8	375	18.0	73.9
85+	919	17.0	100.0	373	11.2	100.0	546	26.1	100.0
All ages	5419	100.0		3331	100.0		2088	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers  
for period 2007-2016  
(incl. multiple malignancies)

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						
5- 9						
10-14						
15-19						
20-24		2		0.1	0.67	6.1
25-29	1		0.1	0.20	1.4	
30-34	5	4	0.3	0.17	4.8	3.3
35-39	10	2	0.6	0.25	5.0	0.7
40-44	29	15	1.6	0.28	5.9	2.2
45-49	51	43	2.6	0.22	4.4	3.3
50-54	118	64	6.8	0.28	5.7	3.2
55-59	207	105	14.6	0.33	6.1	3.7
60-64	329	146	26.9	0.40	6.6	3.9
65-69	487	200	41.1	0.47	6.7	3.8
70-74	632	296	57.1	0.55	6.8	4.4
75-79	617	290	77.4	0.69	6.9	4.1
80-84	472	375	102.6	0.86	6.3	5.5
85+	373	546	121.8	1.03	5.7	5.9
All ages	3331	2088			6.4	4.5
Mortality						
Raw			14.6	0.53	8.8	0.53
WS			6.6	0.47	3.0	0.43
ES			10.2	0.50	4.7	0.46
BRD-S			13.8	0.54	6.3	0.49
PYLL-70						
per 100,000			53.7		28.6	
ES			46.2		23.9	
AYLL-70			8.8		9.8	



Table 14a

Further malignancies in deaths in period 1998–2016  
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	30	1.5	23	76.7	1	3.3	6	20.0
C15 Oesophagus	33	1.6	5	15.2	5	15.2	23	69.7
C16 Stomach	89	4.4	24	27.0	15	16.9	50	56.2
C18 Colon	334	16.7	73	21.9	158	47.3	103	30.8
C22 Liver	55	2.7	1	1.8	8	14.5	46	83.6
C25 Pancreas	66	3.3	3	4.5	11	16.7	52	78.8
C32 Larynx	26	1.3	20	76.9	1	3.8	5	19.2
C33–C34 Lung	211	10.5	30	14.2	25	11.8	156	73.9
C43 Malign. melanoma	76	3.8	51	67.1			25	32.9
C44 Skin others	126	6.3	56	44.4	9	7.1	61	48.4
C61 Prostate	460	22.9	251	54.6	41	8.9	168	36.5
C64 Kidney	73	3.6	35	47.9	22	30.1	16	21.9
C67 Bladder	97	4.8	35	36.1	7	7.2	55	56.7
C70–C72 CNS cancer	21	1.0	2	9.5	1	4.8	18	85.7
C82–C85 NHL	76	3.8	34	44.7	10	13.2	32	42.1
C91–C96 Leukaemia	28	1.4	8	28.6	3	10.7	17	60.7
Others, specified	205	10.2	75	36.6	19	9.3	111	54.1
All further malignancies	2006	100.0	726	36.2	336	16.7	944	47.1

Further malignancies with number of cases 1 to 19 are pooled in category “Others, specified”.

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 further malignancy.

Table 14b

Further malignancies in deaths in period 1998–2016  
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C16 Stomach	46	3.9	20	43.5	4	8.7	22	47.8
C17 Small intestine	12	1.0			7	58.3	5	41.7
C18 Colon	199	16.9	57	28.6	86	43.2	56	28.1
C23–C24 Bile	13	1.1	2	15.4	2	15.4	9	69.2
C25 Pancreas	48	4.1	4	8.3	4	8.3	40	83.3
C33–C34 Lung	69	5.9	9	13.0	5	7.2	55	79.7
C43 Malign. melanoma	23	2.0	13	56.5	1	4.3	9	39.1
C44 Skin others	39	3.3	20	51.3	2	5.1	17	43.6
C50 Breast	295	25.0	190	64.4	20	6.8	85	28.8
C53 Cervix uteri	56	4.7	43	76.8	1	1.8	12	21.4
C54 Corpus uteri	84	7.1	54	64.3			30	35.7
C56 Ovary	59	5.0	18	30.5	14	23.7	27	45.8
C64 Kidney	24	2.0	13	54.2	4	16.7	7	29.2
C67 Bladder	33	2.8	15	45.5	1	3.0	17	51.5
C73 Thyroid	13	1.1	9	69.2	1	7.7	3	23.1
C82–C85 NHL	28	2.4	10	35.7	7	25.0	11	39.3
C90 Mult. myeloma	17	1.4	4	23.5	1	5.9	12	70.6
C91–C96 Leukaemia	14	1.2	3	21.4	1	7.1	10	71.4
Others, specified	107	9.1	31	29.0	18	16.8	58	54.2
All further malignancies	1179	100.0	515	43.7	179	15.2	485	41.1

Further malignancies with number of cases 1 to 10 are pooled in category "Others, specified".

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 further malignancy.

Table 15

Age-specific mortality (cancer-related) and proportion of all cancers  
for period 2007-2016  
(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								
5- 9								
10-14								
15-19								
20-24		2			0.1	0.67		6.5
25-29	1		0.1	0.25			1.5	
30-34	5	4	0.3	0.17	0.3	0.20	4.9	3.8
35-39	9	2	0.6	0.23	0.1	0.07	4.8	0.8
40-44	29	15	1.6	0.28	0.8	0.22	6.3	2.5
45-49	49	39	2.5	0.24	2.0	0.24	4.7	3.4
50-54	108	59	6.3	0.28	3.4	0.26	6.0	3.5
55-59	185	90	13.1	0.33	6.1	0.35	6.3	3.8
60-64	282	123	23.0	0.39	9.3	0.43	6.8	4.0
65-69	401	165	33.8	0.47	12.7	0.48	6.9	3.9
70-74	501	230	45.3	0.57	18.2	0.47	7.0	4.3
75-79	463	223	58.1	0.69	22.3	0.53	7.0	4.1
80-84	356	311	77.4	0.89	44.0	0.71	6.5	5.8
85+	283	421	92.4	1.06	57.4	0.86	5.9	5.7
All ages	2672	1684					6.5	4.5
Mortality								
Raw			11.7	0.52	7.1	0.52		
WS			5.4	0.46	2.5	0.42		
ES			8.3	0.49	3.8	0.45		
BRD-S			11.0	0.53	5.1	0.48		
PYLL-70								
per 100,000			48.3		25.5			
ES			41.6		21.3			
AYLL-70			9.1		10.2			

\* See corresponding tables with multiple malignancies.

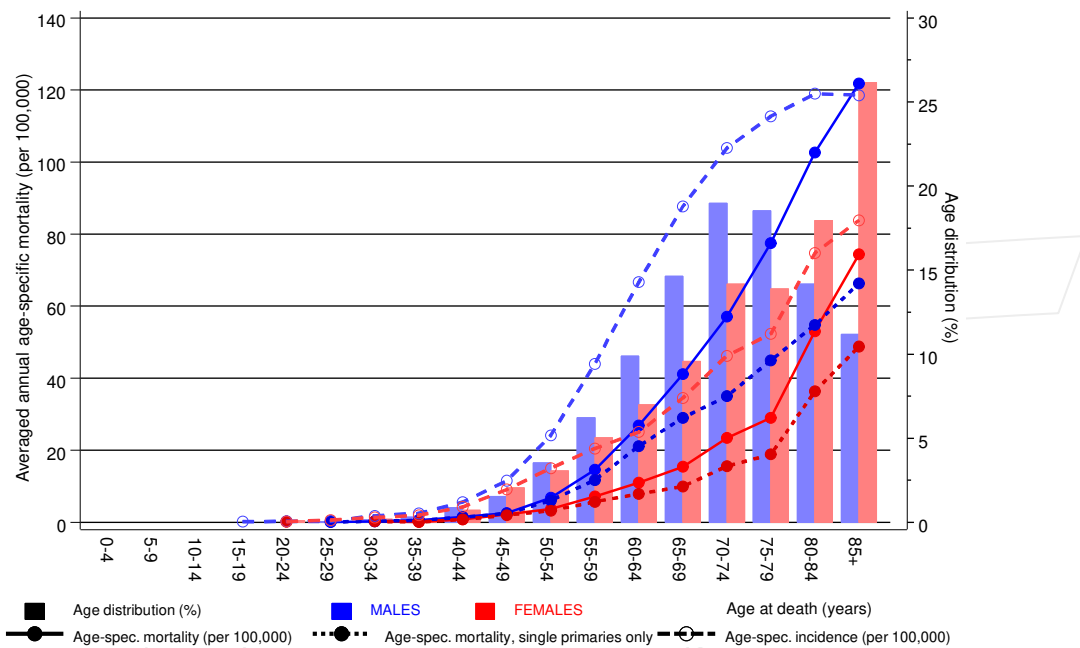
Table 16

Age-specific mortality (cancer-related) and proportion of all cancers  
for period 2007-2016  
(**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								
5- 9								
10-14								
15-19								
20-24		2			0.1	0.67		6.5
25-29	1		0.1	0.25			1.5	
30-34	5	4	0.3	0.17	0.3	0.20	4.9	3.8
35-39	9	2	0.6	0.24	0.1	0.07	4.8	0.8
40-44	27	14	1.4	0.27	0.8	0.21	5.9	2.4
45-49	48	38	2.4	0.24	2.0	0.24	4.6	3.4
50-54	105	55	6.1	0.28	3.2	0.26	5.9	3.3
55-59	166	84	11.7	0.31	5.7	0.34	5.7	3.6
60-64	259	105	21.1	0.38	7.9	0.40	6.3	3.5
65-69	344	129	29.0	0.45	9.9	0.40	6.0	3.1
70-74	387	197	35.0	0.48	15.6	0.43	5.6	3.8
75-79	358	189	44.9	0.58	18.9	0.48	5.6	3.6
80-84	252	257	54.8	0.70	36.3	0.61	4.9	5.0
85+	203	358	66.3	0.81	48.8	0.75	4.6	5.1
All ages	2164	1434					5.5	4.0
Mortality								
Raw			9.5	0.46	6.1	0.47		
WS			4.5	0.41	2.1	0.38		
ES			6.8	0.43	3.3	0.41		
BRD-S			8.9	0.46	4.4	0.43		
PYLL-70								
per 100,000			44.9		23.4			
ES			38.7		19.6			
AYLL-70			9.4		10.8			

\* See corresponding tables with multiple malignancies.

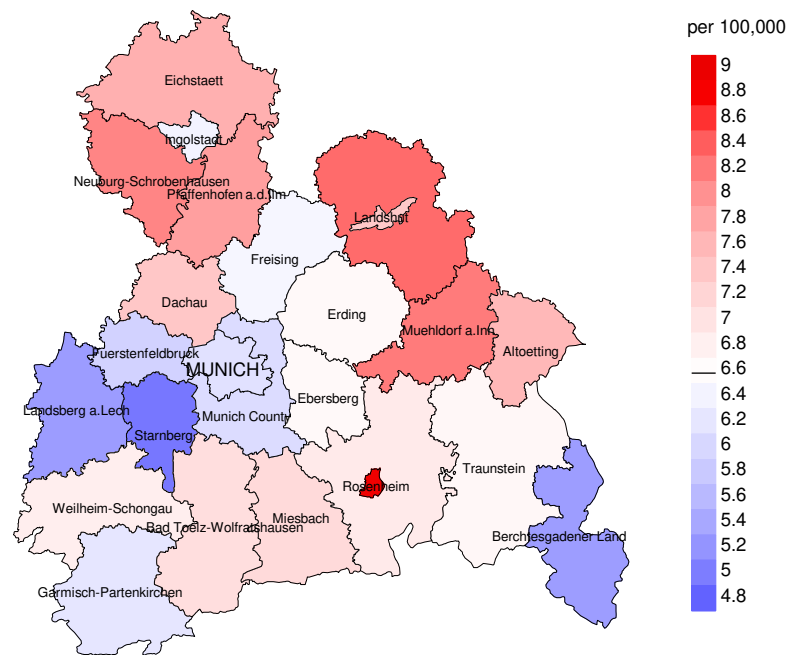
ICD-10 C19, C20: Malignant neoplasm of rectosigmoid and rectum  
 Age distribution and age-specific mortality 2007 - 2016 (Males: 3331, Females: 2088)



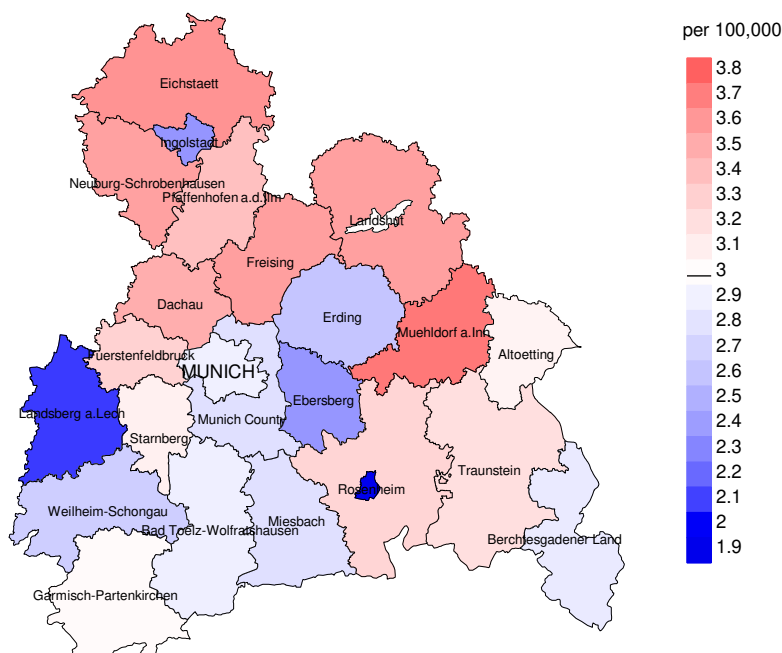
**Figure 17.** Distribution of age at death (bars; males: mean=68.2 yrs, median=68.6 yrs; females: mean=72.1 yrs, median=73.8 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2016: Males



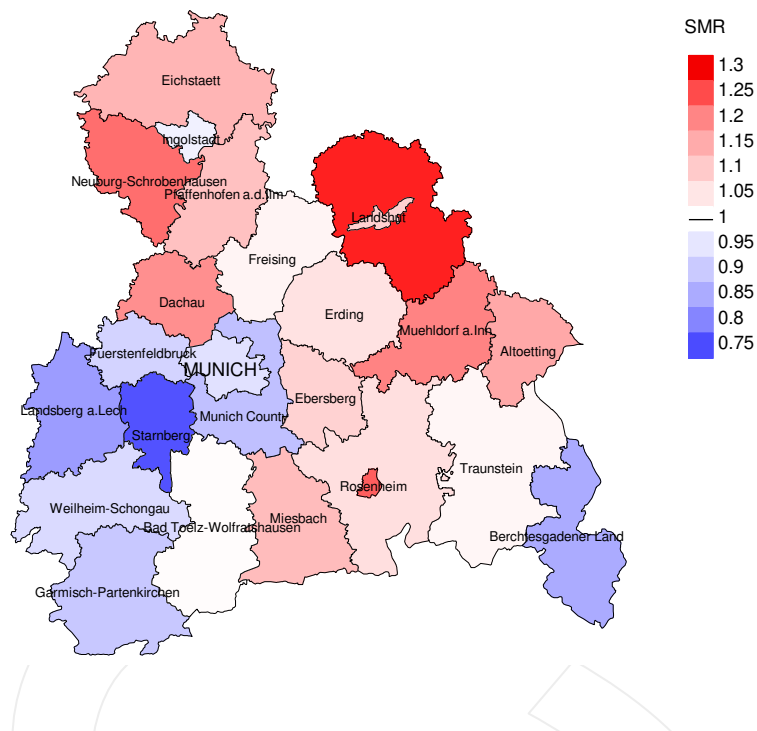
Average mortality (world standard population) 2007 - 2016: Females



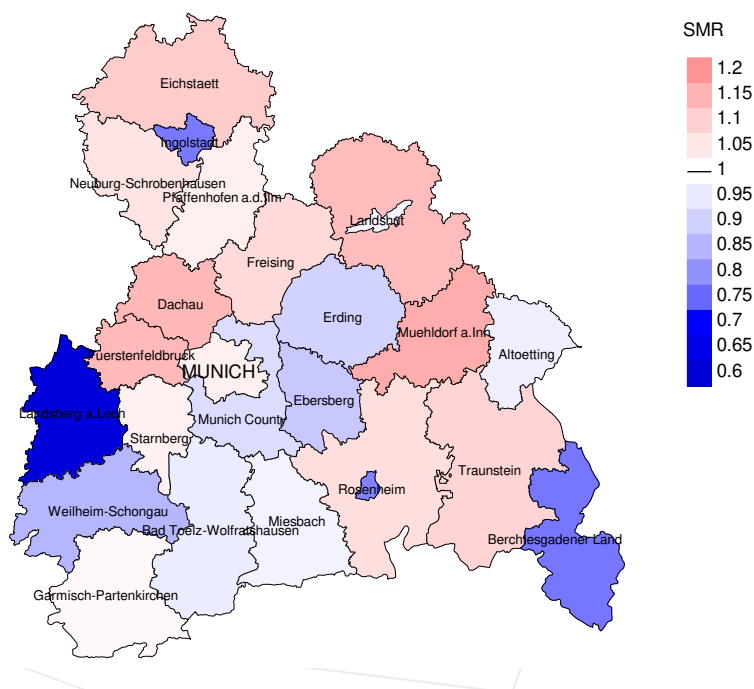
**Figure 18a.** Map of cancer mortality (world standard population) by county averaged for period 2007 to 2016. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 6.6/100,000 WS N=3,331, females 3.0/100,000 WS N=2,088).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 49 women died from rectal cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.5 and 3.8/100,000.

Standardized mortality ratio (SMR) 2007 - 2016: Males



Standardized mortality ratio (SMR) 2007 - 2016: Females



**Figure 18b.** Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2016. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=3,331, females N=2,088).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 49 women died from rectal cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.89. Though, the value of this parameter may vary with an underlying probability of 99% between 0.60 and 1.27, 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**

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

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