

Munich Cancer Registry



- ▶ Survival
- ▶ Selection Matrix
- ▶ Homepage
- ▶ *Deutsch*

ICD-10 C19, C20: Rectal cancer

Incidence and Mortality

Year of diagnosis	1998-2019
Patients	20,485
Diseases	20,512
Creation date	01/25/2021
Database export	01/07/2021
Population	4.92 m





Munich Cancer Registry
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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[#], with a total of 4.69 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, January 2021

[#] 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).

^{##} 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

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	536	18	3.4	9.5	10.2	78.2	96.3
1999	623	25	4.0	9.2	10.0	75.0	96.6
2000	603	28	4.6	10.4	9.9	75.0	97.2
2001	621	25	4.0	11.1	9.8	67.0	95.0
2002	1111	81	7.3	11.5	9.6	75.9	97.4 #
2003	1095	66	6.0	11.6	9.3	71.1	96.7
2004	997	46	4.6	11.9	8.8	70.6	96.5
2005	1045	47	4.5	12.0	8.4	69.0	97.3
2006	1089	34	3.1	12.3	8.0	66.0	95.7
2007	1246	46	3.7	12.6	7.7	66.4	94.9 #
2008	1155	48	4.2	12.8	7.2	62.3	97.8
2009	1122	54	4.8	12.9	6.8	63.5	98.6
2010	1107	43	3.9	13.1	6.2	59.4	98.3
2011	1100	32	2.9	13.3	5.9	58.9	98.3
2012	1067	42	3.9	13.5	5.5	54.4	97.8
2013	1019	39	3.8	13.5	4.9	51.1	97.7
2014	1009	32	3.2	13.6	4.4	46.3	97.0
2015	939	30	3.2	13.7	4.0	43.1	96.6
2016	914	33	3.6	13.7	3.7	39.3	99.6
2017	788	29	3.7	13.8	3.0	30.8	99.6
2018	719	4	0.6	13.9	2.9	21.8	99.9
2019	607	3	0.5	13.9	2.1	14.3	78.9 ##
1998-2019	20512	805	3.9	13.9	10.2	58.0	96.8

20,512 cases diagnosed 1998-2019 are related to a total of 20,485 patients. Currently, in 5,089 (24.8 %) of these 20,485 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 4,037 / 832 / 220 (19.7 % / 4.1 % / 1.1 %) 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 2017, a subgroup of 788 cases has been diagnosed, of which 13.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.0 % 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	301	56.2	7	2.3	7.3	11.2	78.1	96.3
1999	352	56.5	8	2.3	7.5	11.0	75.9	96.0
2000	344	57.0	8	2.3	9.5	10.9	73.0	96.5
2001	353	56.8	11	3.1	10.3	10.7	68.6	95.2
2002	645	58.1	37	5.7	11.0	10.5	77.8	97.4 #
2003	627	57.3	30	4.8	11.3	10.2	72.1	97.9
2004	574	57.6	22	3.8	11.6	9.7	72.0	96.7
2005	598	57.2	21	3.5	11.8	9.3	68.7	97.7
2006	651	59.8	11	1.7	12.3	8.9	65.6	95.1
2007	749	60.1	22	2.9	12.6	8.4	66.1	94.3 #
2008	691	59.8	18	2.6	12.8	8.0	60.8	98.0
2009	692	61.7	21	3.0	13.1	7.6	65.6	99.0
2010	689	62.2	25	3.6	13.3	6.9	59.2	98.1
2011	667	60.6	12	1.8	13.5	6.7	58.6	98.4
2012	640	60.0	17	2.7	13.7	6.1	55.6	98.1
2013	635	62.3	21	3.3	13.7	5.3	50.4	97.3
2014	620	61.4	14	2.3	13.8	4.6	44.7	97.6
2015	617	65.7	13	2.1	13.9	4.1	42.8	96.4
2016	583	63.8	15	2.6	14.0	3.9	40.0	99.8
2017	477	60.5	19	4.0	14.2	3.1	31.9	99.6
2018	452	62.9	4	0.9	14.2	2.8	24.8	99.8
2019	377	62.1			14.3	1.1	15.4	80.4 ##
1998–2019	12334	60.1	356	2.9	14.3	11.2	57.9	96.9

12,334 cases diagnosed 1998-2019 are related to a total of 12,317 patients. Currently, in 3,236 (26.3 %) of these 12,317 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 2,557 / 529 / 150 (20.8 % / 4.3 % / 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 2017, a subgroup of 477 cases has been diagnosed, of which 14.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.1 % 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	235	43.8	11	4.7	12.3	8.7	78.3	96.2
1999	271	43.5	17	6.3	11.5	8.5	73.8	97.4
2000	259	43.0	20	7.7	11.6	8.5	77.6	98.1
2001	268	43.2	14	5.2	12.1	8.3	64.9	94.8
2002	466	41.9	44	9.4	12.1	8.1	73.2	97.4 #
2003	468	42.7	36	7.7	11.9	7.8	69.7	95.1
2004	423	42.4	24	5.7	12.1	7.4	68.8	96.2
2005	447	42.8	26	5.8	12.3	7.1	69.4	96.9
2006	438	40.2	23	5.3	12.4	6.7	66.7	96.6
2007	497	39.9	24	4.8	12.6	6.4	66.8	96.0 #
2008	464	40.2	30	6.5	12.7	6.1	64.7	97.6
2009	430	38.3	33	7.7	12.6	5.5	60.2	97.9
2010	418	37.8	18	4.3	12.8	5.1	59.8	98.6
2011	433	39.4	20	4.6	13.0	4.7	59.4	98.2
2012	427	40.0	25	5.9	13.1	4.5	52.5	97.4
2013	384	37.7	18	4.7	13.1	4.1	52.3	98.4
2014	389	38.6	18	4.6	13.1	4.0	48.8	96.1
2015	322	34.3	17	5.3	13.3	3.9	43.8	96.9
2016	331	36.2	18	5.4	13.1	3.3	38.1	99.1
2017	311	39.5	10	3.2	13.3	3.0	29.3	99.7
2018	267	37.1			13.3	3.1	16.9	100.0
2019	230	37.9	3	1.3	13.3	3.6	12.6	76.5 ##
1998–2019	8178	39.9	449	5.5	13.3	8.7	58.3	96.7

8,178 cases diagnosed 1998-2019 are related to a total of 8,168 patients. Currently, in 1,853 (22.7 %) of these 8,168 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,480 / 303 / 70 (18.1 % / 3.7 % / 0.9 %) 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 2017, a subgroup of 311 cases has been diagnosed, of which 13.3 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.0 % 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 4.92 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	301	235	27.2	20.0	16.5	9.0	24.2	13.3	30.3	16.9
1999	352	271	31.5	22.8	19.0	10.3	27.9	15.3	34.6	19.7
2000	344	259	30.2	21.6	18.0	8.8	26.6	13.5	33.0	17.6
2001	353	268	30.5	22.0	18.1	10.4	26.5	15.1	33.3	18.8
2002	645	466	34.6	23.8	20.0	10.4	29.3	15.6	36.3	19.8
2003	627	468	33.4	23.8	19.1	10.6	28.1	15.5	34.8	19.5
2004	574	423	30.5	21.4	17.0	9.7	24.8	14.2	30.7	17.8
2005	598	447	31.6	22.5	17.6	9.5	25.6	14.1	31.7	18.1
2006	651	438	34.0	21.8	18.4	9.4	26.8	13.8	33.3	17.5
2007	749	497	33.8	21.5	18.1	9.1	26.6	13.5	33.1	17.2
2008	691	464	31.0	20.0	16.4	8.2	23.9	12.2	29.9	15.7
2009	692	430	31.0	18.5	16.0	8.0	23.5	11.7	29.5	14.7
2010	689	418	30.6	17.9	15.8	7.2	23.2	10.8	28.9	14.0
2011	667	433	29.8	18.5	15.1	7.9	22.0	11.4	27.5	14.1
2012	640	427	28.2	18.1	14.1	7.5	20.9	11.1	26.2	14.0
2013	635	384	27.6	16.1	14.0	7.1	20.2	10.3	25.1	12.8
2014	620	389	26.6	16.2	13.6	6.8	19.7	9.9	24.3	12.2
2015	617	322	25.9	13.2	12.6	5.4	18.6	8.0	23.6	10.0
2016	583	331	24.3	13.5	12.1	5.7	17.5	8.3	22.0	10.3
2017	477	311	19.8	12.6	9.9	5.5	14.4	8.0	17.7	9.8
2018	452	267	18.6	10.8	9.2	5.1	13.3	7.2	16.5	8.7
2019	377	230	15.5	9.3	7.9	4.1	11.3	5.9	13.8	7.2
1998-2019	12334	8178	28.0	17.9	14.8	7.7	21.5	11.2	26.7	14.1

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	536	68.1	12.3	30.5	102	53.2	59.3	68.2	77.2	85.1
1999	623	68.3	12.3	34.1	102	52.3	59.1	69.0	77.2	85.1
2000	603	69.5	12.3	33.4	95.9	54.1	60.4	69.1	79.1	86.8
2001	621	68.0	12.2	26.6	97.1	52.5	60.5	67.3	76.9	83.8
2002	1111	68.7	11.7	29.9	104	54.1	61.0	69.1	76.8	83.0
2003	1095	68.9	11.8	27.1	101	53.9	61.1	68.8	77.2	83.8
2004	997	68.2	11.9	21.3	97.3	53.4	61.0	68.0	77.3	83.5
2005	1045	69.1	11.8	19.0	99.6	53.8	61.3	68.9	77.7	84.2
2006	1089	68.6	12.1	21.2	98.7	52.8	62.1	68.5	77.9	83.7
2007	1246	69.3	11.8	30.5	97.5	53.1	62.6	69.3	78.1	84.4
2008	1155	69.7	11.9	28.2	102	53.9	62.4	69.9	78.5	84.7
2009	1122	69.0	12.1	20.7	102	51.9	61.6	70.2	77.7	84.1
2010	1107	69.6	12.5	21.1	101	52.7	61.6	70.9	79.0	85.3
2011	1100	69.1	12.9	20.1	99.1	51.1	60.5	70.4	78.4	85.8
2012	1067	69.3	12.4	26.1	99.6	52.9	60.1	70.8	77.9	84.7
2013	1019	68.2	12.8	20.0	98.2	50.4	59.8	70.3	77.0	83.6
2014	1009	69.1	12.7	20.7	96.2	52.6	60.4	70.1	78.1	85.4
2015	939	69.7	12.6	18.3	105	52.7	60.8	71.3	79.4	85.1
2016	914	69.0	12.9	19.8	97.4	51.0	60.3	70.9	78.2	84.2
2017	788	68.6	11.9	21.8	98.1	52.9	59.9	69.9	77.4	83.0
2018	719	67.8	12.5	21.2	97.1	51.2	59.1	68.8	77.9	83.1
2019	607	67.6	13.2	21.8	100	50.2	57.4	69.2	77.9	83.2
1998-2019	20512	68.9	12.3	18.3	105	52.6	60.7	69.6	77.9	84.4

Table 3a

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

Year of diagnosis	Cases n	Std.		Median						
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	301	65.7	11.9	32.6	94.4	51.5	58.2	64.0	74.1	82.9
1999	352	66.2	11.3	34.1	94.2	51.8	58.1	65.6	73.4	82.1
2000	344	66.8	11.5	34.4	95.9	53.0	58.9	65.1	74.4	83.6
2001	353	67.0	10.5	36.4	93.6	54.1	60.6	65.9	73.7	81.0
2002	645	67.0	10.6	32.8	93.0	53.9	60.5	66.6	74.0	81.1
2003	627	67.4	10.6	27.1	93.1	53.9	60.7	67.7	74.6	81.2
2004	574	66.9	10.4	29.9	93.3	54.3	60.8	66.4	74.9	79.8
2005	598	67.1	10.7	19.0	99.6	53.7	60.3	67.1	74.1	80.6
2006	651	66.9	10.8	25.7	94.7	52.8	60.4	67.3	74.4	80.9
2007	749	68.0	10.8	31.1	95.5	53.2	62.1	67.9	75.3	81.8
2008	691	67.9	10.7	28.2	96.0	53.9	62.1	68.5	75.1	80.6
2009	692	68.0	11.2	20.7	95.4	52.0	61.5	69.6	75.3	80.6
2010	689	68.1	12.0	21.1	98.3	52.5	60.6	69.4	75.9	83.1
2011	667	68.0	11.5	26.3	93.6	51.9	61.3	69.7	75.8	82.1
2012	640	68.4	11.5	26.1	99.6	53.2	59.7	69.7	76.8	82.7
2013	635	67.7	11.8	20.0	98.2	51.4	60.4	69.8	75.7	81.7
2014	620	68.1	11.9	20.7	96.2	52.7	60.0	68.6	77.0	83.3
2015	617	69.0	11.8	18.3	105	53.1	60.9	69.9	78.0	83.0
2016	583	68.2	12.3	19.8	94.5	51.1	60.2	70.0	77.0	83.1
2017	477	68.1	11.3	21.8	93.5	53.8	60.0	69.5	76.5	82.1
2018	452	68.2	12.0	21.2	97.1	53.2	60.0	68.8	77.8	82.7
2019	377	66.7	12.7	21.8	93.5	50.6	57.1	68.5	76.7	81.6
1998-2019	12334	67.6	11.3	18.3	105	52.9	60.3	68.2	75.6	81.8

Table 3b

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

Year of diagnosis	Cases n	Std.		Min.	Max.	Median				
		Mean	dev.			10%	25%	50%	75%	90%
1998	235	71.2	12.3	30.5	102	55.0	62.1	72.5	78.6	87.5
1999	271	71.1	12.9	38.4	102	52.7	61.5	73.0	79.8	87.5
2000	259	73.1	12.3	33.4	94.7	56.4	62.7	74.9	81.9	88.8
2001	268	69.2	14.1	26.6	97.1	51.1	60.0	70.0	79.7	86.8
2002	466	71.1	12.7	29.9	104	54.5	62.1	72.7	80.3	87.6
2003	468	70.8	12.9	29.2	101	53.7	61.7	71.5	81.2	86.8
2004	423	70.0	13.4	21.3	97.3	51.8	61.4	71.3	80.6	85.9
2005	447	71.7	12.6	32.8	96.8	54.5	63.2	72.1	81.4	87.1
2006	438	71.0	13.4	21.2	98.7	52.5	63.5	72.3	81.2	86.6
2007	497	71.4	12.8	30.5	97.5	53.0	63.7	72.4	81.5	87.0
2008	464	72.3	13.0	29.3	102	53.7	63.5	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	418	72.0	13.1	23.0	101	52.9	63.4	73.9	82.5	87.1
2011	433	70.7	14.8	20.1	99.1	49.6	60.1	71.7	82.8	88.9
2012	427	70.7	13.6	26.1	97.4	52.1	61.6	72.3	81.2	86.9
2013	384	68.9	14.3	25.3	96.5	49.1	57.9	72.1	79.4	85.9
2014	389	70.8	13.6	29.4	95.3	51.6	61.0	72.5	81.4	87.8
2015	322	71.0	14.0	33.6	96.5	50.1	59.5	73.0	81.0	88.4
2016	331	70.4	13.9	30.8	97.4	51.0	60.3	72.6	80.6	87.4
2017	311	69.4	12.7	34.7	98.1	51.3	59.6	70.8	78.5	84.7
2018	267	67.2	13.3	29.5	96.6	49.3	57.4	68.7	78.2	83.4
2019	230	69.1	13.8	32.4	100	49.2	58.6	71.8	79.5	85.5
1998-2019	8178	70.7	13.4	20.1	104	52.0	61.7	72.3	80.9	87.0

Table 4

Age distribution by 5-year age group and sex for period 2007-2019
(incl. DCO)

Age at diagnosis Years	Cases			Males			Females		
	n	%	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	12	0.1	0.1	9	0.1	0.1	3	0.1	0.1
25-29	19	0.1	0.3	8	0.1	0.2	11	0.2	0.3
30-34	67	0.5	0.8	40	0.5	0.7	27	0.6	0.8
35-39	96	0.8	1.5	56	0.7	1.5	40	0.8	1.7
40-44	226	1.8	3.3	124	1.6	3.0	102	2.1	3.7
45-49	518	4.0	7.3	286	3.6	6.7	232	4.7	8.5
50-54	888	6.9	14.3	554	7.0	13.7	334	6.8	15.3
55-59	1195	9.3	23.6	800	10.1	23.8	395	8.1	23.3
60-64	1457	11.4	35.0	1030	13.1	36.9	427	8.7	32.0
65-69	1833	14.3	49.4	1269	16.1	53.0	564	11.5	43.5
70-74	2114	16.5	65.9	1395	17.7	70.6	719	14.7	58.2
75-79	1832	14.3	80.2	1139	14.4	85.1	693	14.1	72.3
80-84	1376	10.8	91.0	732	9.3	94.4	644	13.1	85.5
85+	1157	9.0	100.0	445	5.6	100.0	712	14.5	100.0
All ages	12792	100.0		7889	100.0		4903	100.0	

Table 5

Age-specific incidence, DCO rate and proportion of all cancers for period 2007–2019

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid. %	Females Age- spec. incid. %	Males DCO rate n=201 %	Females DCO rate n=233 %	Males Prop.all cancers n=143063 %	Females Prop.all cancers n=144724 %
0- 4								
5- 9								
10-14								
15-19	2		0.1				0.7	
20-24	9	3	0.5	0.2			1.5	0.6
25-29	8	11	0.4	0.5			0.9	1.0
30-34	40	27	1.9	1.3			3.3	1.4
35-39	56	40	2.6	1.9			3.3	1.2
40-44	124	102	5.3	4.5		1.0	4.8	1.8
45-49	286	232	11.4	9.5	0.7		6.0	2.6
50-54	554	334	23.6	14.4	0.7	0.9	7.1	2.9
55-59	800	395	41.1	19.8	1.5	0.3	6.8	3.2
60-64	1030	426	63.2	24.3	0.8	1.2	6.3	2.9
65-69	1268	564	83.4	33.5	1.7	0.9	5.6	3.2
70-74	1395	718	99.5	44.7	1.7	1.9	5.4	3.8
75-79	1138	693	102.8	50.3	2.9	3.6	5.2	3.8
80-84	732	644	111.5	66.2	4.1	7.1	5.2	4.5
85+	445	712	104.4	73.8	15.1	18.7	4.5	4.6
All ages	7887	4901			2.5	4.8	5.5	3.4
Incidence								
Raw			26.2	15.8				
WS			13.3	6.7				
ES			19.4	9.8				
BRD-S			24.1	12.2				

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 - 2019 (Males: 7887, Females: 4901)

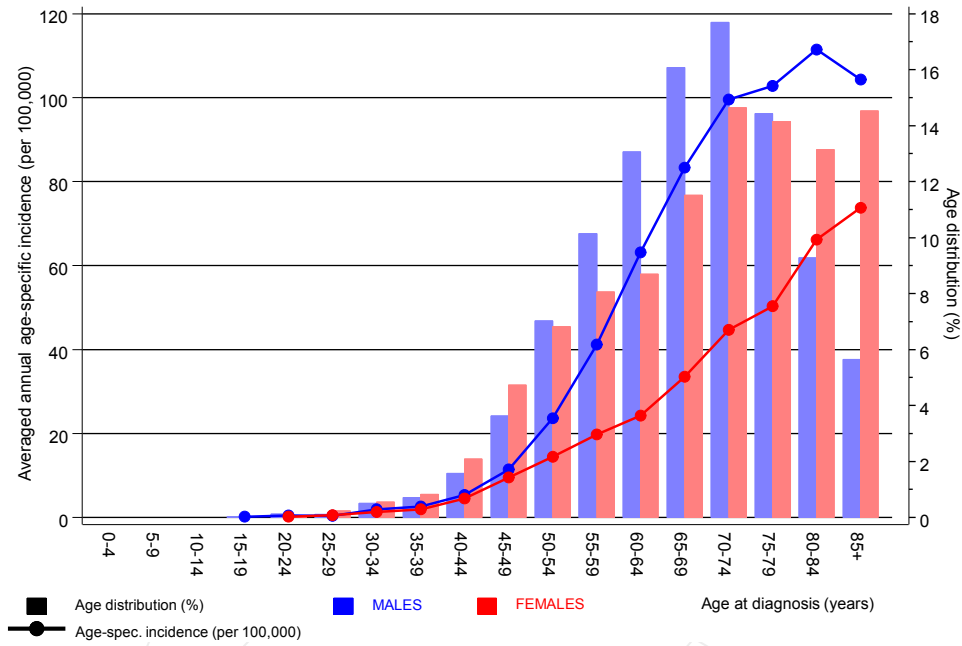


Figure 6. Age distribution (males: mean=68.1 yrs, median=69.1 yrs; females: mean=70.5 yrs, median=72.3 yrs) and age-specific incidence.

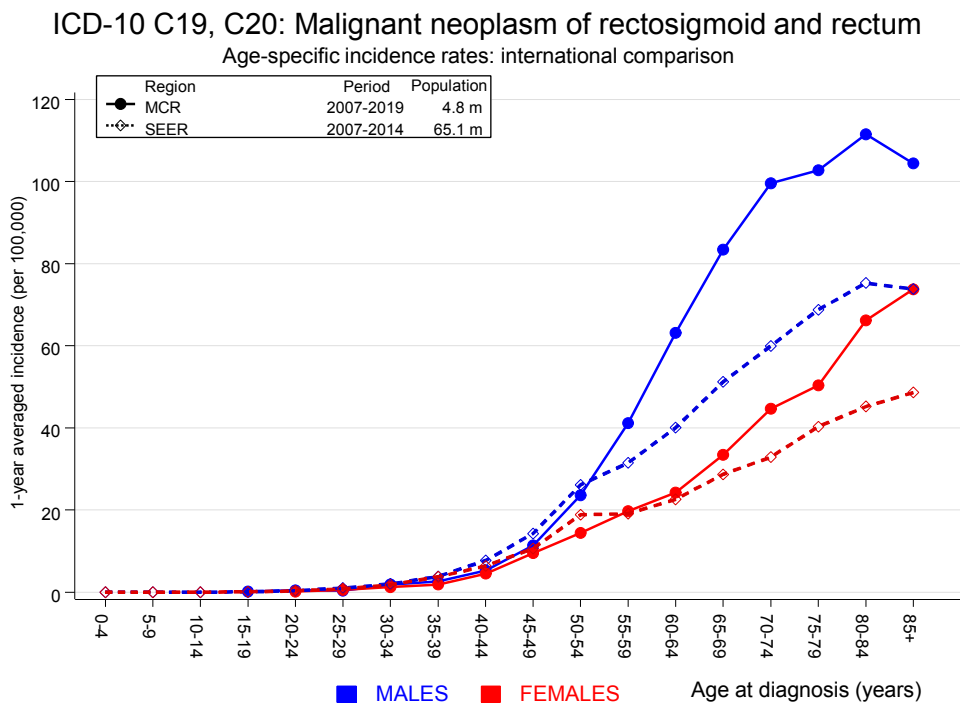


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2019, based on the November 2018 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 1998–2019

MALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C03–C06 Oral cavity	7	6.1	1.2	0.5	2.4	0.2	14.3
C07–C08 Salivary gland	3	1.7	1.7	0.4	5.1	0.3	
C09–C10 Oropharynx	11	7.5	1.5	0.7	2.6	0.8	9.1
C12–C13 Hypopharynx	3	4.1	0.7	0.2	2.1	-0.3	
C15 Oesophagus	41	14.5	2.8	2.0	3.8 #	6.1	2.4
C16 Stomach	73	30.4	2.4	1.9	3.0 #	9.7	9.6
C17 Small intestine	27	4.4	6.2	4.1	9.0 #	5.2	
C18 Colon	410	73.9	5.5	5.0	6.1 #	76.8	0.5
C19–C20 Rectum	17	40.4	0.4	0.2	0.7 #	-5.3	17.6
C21 Anus/canal	4	1.7	2.3	0.6	5.9	0.5	
C22 Liver	65	21.8	3.0	2.3	3.8 #	9.9	9.2
C23–C24 Bile	21	7.9	2.7	1.6	4.1 #	3.0	14.3
C25 Pancreas	55	29.3	1.9	1.4	2.4 #	5.9	14.5
C32 Larynx	13	7.5	1.7	0.9	2.9	1.2	15.4
C33–C34 Lung	190	89.5	2.1	1.8	2.4 #	23.0	13.2
C38,C45 Mesothelioma	7	5.3	1.3	0.5	2.7	0.4	
C43 Malign. melanoma	55	32.9	1.7	1.3	2.2 #	5.1	
C46,C49 Soft tissue	8	4.2	1.9	0.8	3.7	0.9	
C50 Breast	4	2.0	2.0	0.5	5.0	0.4	
C60 Penis	4	1.9	2.1	0.6	5.4	0.5	
C61 Prostate	362	218.9	1.7	1.5	1.8 #	32.7	6.6
C62 Testis	3	1.6	1.9	0.4	5.5	0.3	
C64 Kidney	65	26.1	2.5	1.9	3.2 #	8.9	6.2
C65 Renal pelvis	8	3.4	2.4	1.0	4.7 #	1.1	
C66 Ureter	5	2.0	2.6	0.8	6.0	0.7	
C67 Bladder	66	35.5	1.9	1.4	2.4 #	7.0	4.5
C70–C72 CNS cancer	20	9.5	2.1	1.3	3.3 #	2.4	20.0
C73 Thyroid	6	4.7	1.3	0.5	2.8	0.3	16.7
C76–C79 CUP	19	12.8	1.5	0.9	2.3	1.4	
C81 Hodgkin lymphoma	2	1.7	1.2	0.1	4.3	0.1	
C82–C85 NHL	52	32.1	1.6	1.2	2.1 #	4.5	5.8
C90 Mult. myeloma	19	10.1	1.9	1.1	2.9 #	2.0	10.5
C91–C96 Leukaemia	25	11.5	2.2	1.4	3.2 #	3.1	28.0
Others, specified	4	3.0	1.4	0.4	3.5	0.2	
Not observed	0	7.4	0.0	0.0	0.5 #	-1.7	
All further malignancies	1674	767.3	2.2	2.1	2.3 #	207.2	6.4
Patients		11772					
Median age at next malignancy (years)		72.8					
Person-years		43764					
Mean observation time (years)		3.7					
Median observation time (years)		2.3					

The occurrence of further specified malignancy is statistically significant.

Further observed 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 1998–2019

FEMALES

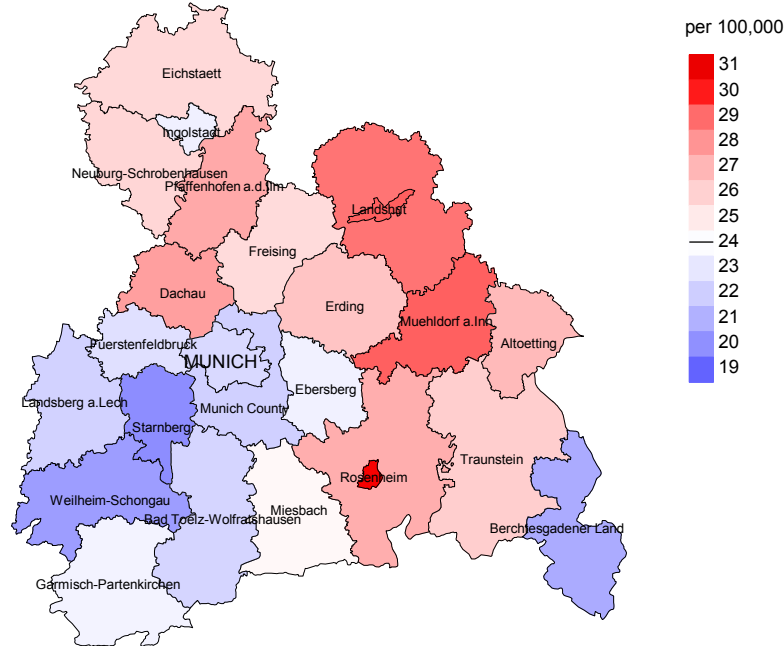
Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C07–C08 Salivary gland	2	0.6	3.3	0.4	11.8	0.5	
C09–C10 Oropharynx	2	1.3	1.5	0.2	5.5	0.2	
C15 Oesophagus	8	2.3	3.5	1.5	7.0 #	2.0	
C16 Stomach	26	13.9	1.9	1.2	2.7 #	4.2	7.7
C17 Small intestine	20	1.8	11.0	6.7	17.0 #	6.3	5.0
C18 Colon	202	38.6	5.2	4.5	6.0 #	56.5	1.0
C19–C20 Rectum	10	15.4	0.6	0.3	1.2	-1.9	10.0
C21 Anus/canal	7	1.9	3.6	1.5	7.4 #	1.7	
C22 Liver	11	4.6	2.4	1.2	4.2 #	2.2	36.4
C23–C24 Bile	13	5.7	2.3	1.2	3.9 #	2.5	7.7
C25 Pancreas	36	18.0	2.0	1.4	2.8 #	6.2	27.8
C33–C34 Lung	71	26.2	2.7	2.1	3.4 #	15.5	15.5
C40–C41 Bone	2	0.3	6.3	0.8	22.6	0.6	
C43 Malign. melanoma	33	12.8	2.6	1.8	3.6 #	7.0	
C46,C49 Soft tissue	6	2.1	2.9	1.1	6.3 #	1.4	
C48 Peritoneal	3	1.3	2.2	0.5	6.5	0.6	
C50 Breast	209	104.2	2.0	1.7	2.3 #	36.2	5.3
C51 Vulva	9	4.0	2.2	1.0	4.2 #	1.7	11.1
C52 Vagina	4	0.7	5.5	1.5	14.2 #	1.1	25.0
C53 Cervix uteri	10	4.2	2.4	1.1	4.3 #	2.0	30.0
C54 Corpus uteri	38	19.4	2.0	1.4	2.7 #	6.4	5.3
C55,C57 Fem. genitals un	3	1.0	3.0	0.6	8.9	0.7	
C56 Ovary	41	14.5	2.8	2.0	3.8 #	9.2	17.1
C64 Kidney	28	8.8	3.2	2.1	4.6 #	6.6	14.3
C65 Renal pelvis	3	1.2	2.5	0.5	7.4	0.6	
C67 Bladder	16	7.8	2.0	1.2	3.3 #	2.8	18.8
C69 Eye melanoma	2	0.5	4.4	0.5	15.9	0.5	
C70–C72 CNS cancer	2	4.7	0.4	0.1	1.5	-0.9	50.0
C73 Thyroid	8	5.0	1.6	0.7	3.1	1.0	12.5
C76–C79 CUP	7	7.4	0.9	0.4	2.0	-0.1	
C82–C85 NHL	27	14.8	1.8	1.2	2.7 #	4.2	3.7
C90 Mult. myeloma	10	4.7	2.1	1.0	3.9 #	1.8	40.0
C91–C96 Leukaemia	11	5.6	2.0	1.0	3.5	1.9	45.5
Others, specified	6	1.7	3.6	1.3	7.8 #	1.5	16.7
Not observed	0	7.5	0.0	0.0	0.5 #	-2.6	
All further malignancies	886	364.5	2.4	2.3	2.6 #	180.3	8.7

Patients	7655
Median age at next malignancy (years)	75.0
Person-years	28923
Mean observation time (years)	3.8
Median observation time (years)	2.2

The occurrence of further specified malignancy is statistically significant.

Further observed malignancies with count 1 are pooled in category "Others, specified".

Average incidence (Germany 1987 standard population) 2007 - 2019: Males



Average incidence (Germany 1987 standard population) 2007 - 2019: Females

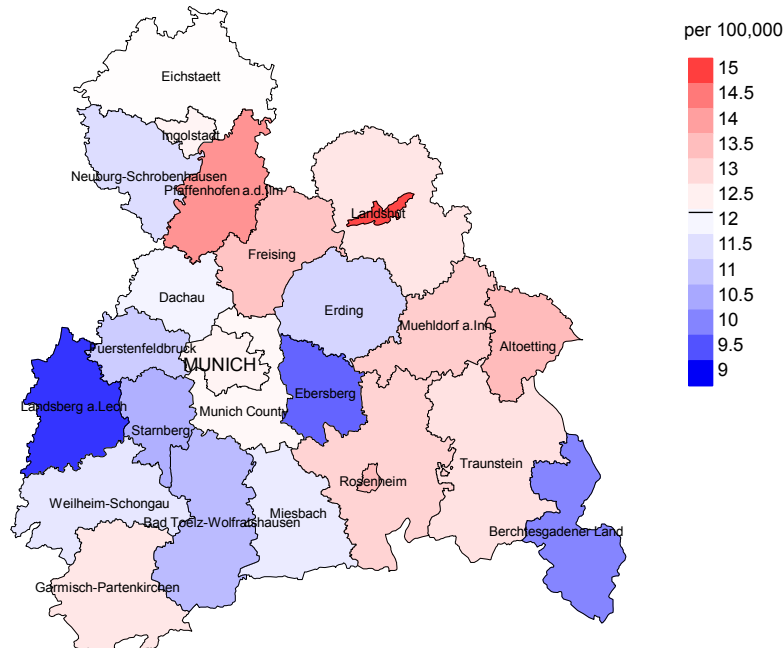
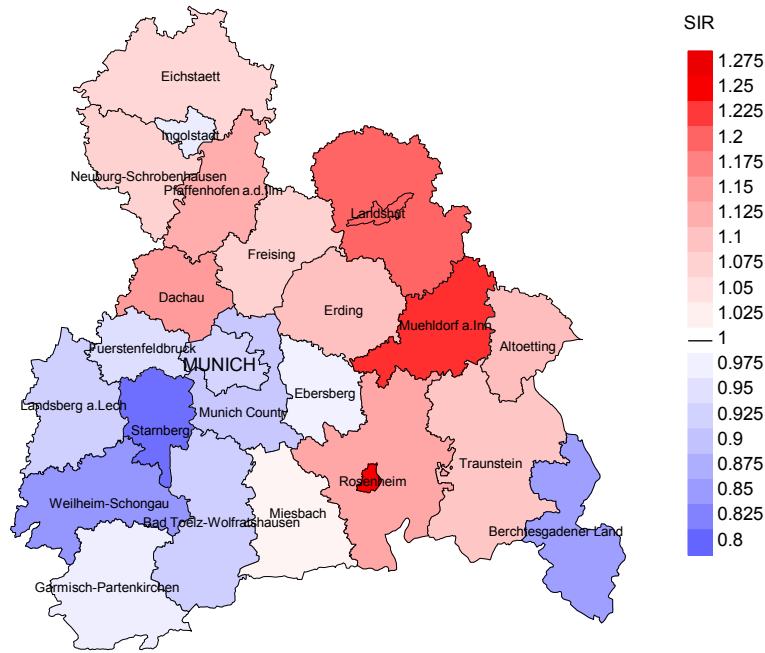


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 24.1/100,000 WS N=7,887, females 12.2/100,000 WS N=4,901).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 104 women were identified with newly diagnosed rectal cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 9.7/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 7.4 and 12.5/100,000.

Standardized incidence ratio (SIR) 2007 - 2019: Males



Standardized incidence ratio (SIR) 2007 - 2019: Females

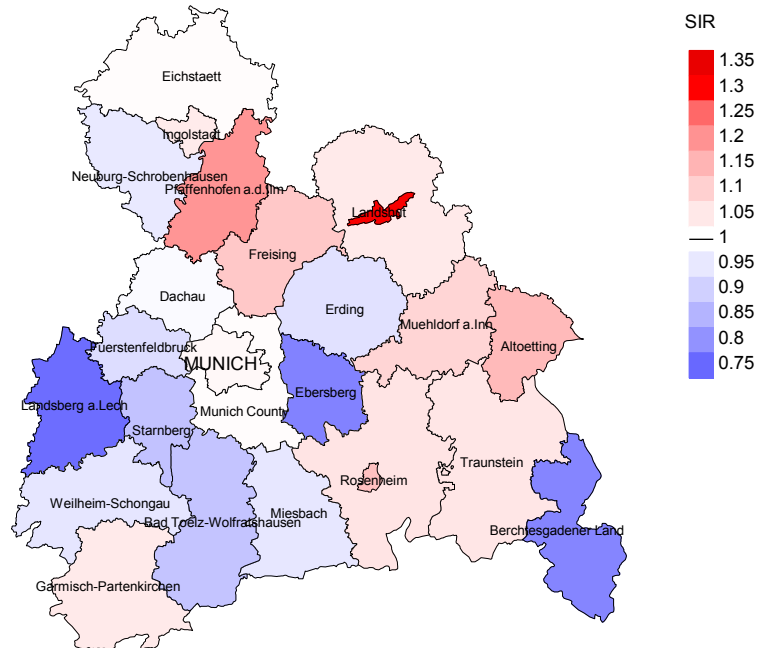


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=7,887, females N=4,901).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2019 a total of 104 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 0.60 and 1.00, 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 4.92 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	536	96.3	3.4	419	78.2	92.1
1999	623	96.6	4.0	467	75.0	93.1
2000	603	97.2	4.6	452	75.0	94.9
2001	621	95.0	4.0	416	67.0	95.7
2002	1111	97.4	7.3	843	75.9	94.9
2003	1095	96.7	6.0	778	71.1	95.1
2004	997	96.5	4.6	704	70.6	95.9
2005	1045	97.3	4.5	721	69.0	96.9
2006	1089	95.7	3.1	719	66.0	95.3
2007	1246	94.9	3.7	827	66.4	95.2
2008	1155	97.8	4.2	720	62.3	94.3
2009	1122	98.6	4.8	713	63.5	94.5
2010	1107	98.3	3.9	658	59.4	94.1
2011	1100	98.3	2.9	648	58.9	94.6
2012	1067	97.8	3.9	580	54.4	91.4
2013	1019	97.7	3.8	521	51.1	91.2
2014	1009	97.0	3.2	467	46.3	90.1
2015	939	96.6	3.2	405	43.1	83.5
2016	914	99.6	3.6	359	39.3	85.8
2017	788	99.6	3.7	243	30.8	72.0
2018	719	99.9	0.6	157	21.8	53.5
2019	607	78.9	0.5	87	14.3	85.1
1998-2019	20512	96.8	3.9	11904	58.0	92.6

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 4.92 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	536	334	88.6	61	11.4
1999	623	353	89.2	83	13.3
2000	603	341	93.3	80	13.3
2001	621	375	95.5	77	12.4
2002	1111	552	97.3	188	16.9
2003	1095	574	97.7	145	13.2
2004	997	587	98.1	122	12.2
2005	1045	605	96.0	140	13.4
2006	1089	699	97.3	162	14.9
2007	1246	712	97.9	170	13.6
2008	1155	772	99.0	157	13.6
2009	1122	791	99.5	158	14.1
2010	1107	818	99.0	173	15.6
2011	1100	826	97.1	150	13.6
2012	1067	804	98.4	157	14.7
2013	1019	792	96.8	125	12.3
2014	1009	754	97.6	143	14.2
2015	939	858	98.1	121	12.9
2016	914	761	99.2	141	15.4
2017	788	788	98.2	98	12.4
2018	719	632	34.5	54	7.5
2019	607	511	56.4	48	7.9
1998–2019	20512	14239	93.1	2753	13.4

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 4.92 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer- related %	Prop. non-cancer- related %	Prop. cancer recorded on death certificate %
1998	334	71.0	29.0	87.5
1999	353	75.6	24.4	89.5
2000	341	75.7	24.3	87.7
2001	375	70.1	29.9	86.6
2002	552	77.9	22.1	88.3
2003	574	77.0	23.0	89.5
2004	587	75.3	24.7	88.0
2005	605	73.9	26.1	86.1
2006	699	77.0	23.0	85.9
2007	712	75.0	25.0	85.8
2008	772	74.1	25.9	83.2
2009	791	73.7	26.3	85.4
2010	818	70.2	29.8	81.6
2011	826	72.0	28.0	84.0
2012	804	70.4	29.6	81.0
2013	792	66.4	33.6	79.1
2014	754	68.7	31.3	80.8
2015	858	66.0	34.0	78.1
2016	761	61.4	38.6	76.6
2017	788	60.5	39.5	72.0
2018	632	46.5	53.5	66.5
2019	511	51.3	48.7	70.5
1998–2019	14239	69.2	30.8	82.4

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	178	72.3	70.0	78.1	72.1
1999	212	70.7	70.3	74.8	70.4
2000	193	72.6	69.9	80.0	71.6
2001	207	73.3	69.9	79.8	71.8
2002	317	72.7	71.0	80.1	71.8
2003	308	70.9	68.9	81.4	70.4
2004	333	75.0	72.6	80.3	73.6
2005	349	73.7	71.2	80.6	71.9
2006	425	74.9	72.4	80.4	73.9
2007	422	73.2	71.7	78.4	72.4
2008	456	75.4	73.3	80.5	74.0
2009	458	73.0	70.5	79.3	71.9
2010	484	75.2	73.4	81.9	74.0
2011	503	75.5	73.0	82.0	74.2
2012	493	76.0	74.5	81.6	75.0
2013	454	76.6	73.5	81.7	75.1
2014	454	75.5	74.3	79.8	74.7
2015	525	77.3	74.5	83.7	75.8
2016	495	78.0	75.7	82.4	76.7
2017	489	78.1	75.4	83.9	76.5
2018	410	77.3	72.4	80.6	75.3
2019	335	78.5	72.1	81.8	74.5
1998-2019	8500	75.4	72.7	81.2	73.9

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	156	79.9	76.5	85.7	79.3
1999	141	78.4	76.7	80.6	77.7
2000	148	79.3	78.5	83.2	78.9
2001	168	79.0	75.2	86.9	77.0
2002	235	80.2	79.5	84.6	79.5
2003	266	80.4	78.2	83.9	79.2
2004	254	81.4	79.7	84.7	80.5
2005	256	81.2	80.4	83.8	80.6
2006	274	80.8	79.3	85.6	80.0
2007	290	80.7	78.6	85.1	80.0
2008	316	81.1	79.3	86.0	79.8
2009	333	81.6	77.6	87.1	79.1
2010	334	82.2	78.7	86.4	79.8
2011	323	82.0	78.2	86.5	80.0
2012	311	82.7	79.1	88.7	80.7
2013	338	82.7	78.3	87.2	80.2
2014	300	82.2	77.2	88.7	80.3
2015	333	81.2	77.4	87.4	78.2
2016	266	83.2	78.4	87.8	79.8
2017	299	82.3	78.1	88.7	79.7
2018	222	81.0	75.2	84.8	80.3
2019	176	83.3	78.6	84.3	80.2
1998-2019	5739	81.2	78.3	86.5	79.7

By 2018, Bavarians' life expectancy at birth is estimated at 79.3 years for boys and 83.8 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	123	11.1	0.41	6.4	0.39	10.0	0.41	13.2	0.44
1999	166	14.8	0.47	8.6	0.45	13.2	0.47	18.0	0.52
2000	144	12.6	0.42	7.3	0.40	11.2	0.42	14.7	0.44
2001	145	12.5	0.41	7.2	0.40	11.0	0.42	14.4	0.43
2002	238	12.8	0.37	7.0	0.35	10.7	0.37	14.0	0.39
2003	240	12.8	0.38	7.0	0.37	10.6	0.38	13.7	0.39
2004	254	13.5	0.44	6.8	0.40	10.7	0.43	15.0	0.49
2005	262	13.8	0.44	7.0	0.40	10.8	0.42	14.4	0.46
2006	331	17.3	0.51	8.6	0.47	13.6	0.51	18.3	0.55
2007	325	14.7	0.43	7.1	0.39	11.0	0.42	14.9	0.45
2008	346	15.5	0.50	7.3	0.45	11.5	0.48	15.8	0.53
2009	347	15.5	0.50	7.6	0.47	11.5	0.49	14.9	0.51
2010	348	15.4	0.51	6.9	0.44	10.9	0.47	15.0	0.52
2011	374	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	0.51	14.6	0.56
2013	312	13.6	0.49	6.0	0.43	9.3	0.46	12.6	0.50
2014	323	13.9	0.52	6.1	0.45	9.4	0.48	12.6	0.52
2015	346	14.5	0.56	6.4	0.50	9.8	0.53	13.2	0.56
2016	310	12.9	0.53	5.3	0.43	8.3	0.47	11.5	0.52
2017	297	12.3	0.62	5.1	0.52	8.0	0.56	10.8	0.61
2018	199	8.2	0.44	3.6	0.40	5.5	0.41	7.2	0.43
2019	181	7.4	0.48	3.3	0.42	5.0	0.44	6.5	0.47
1998-2019	5960	13.5	0.48	6.4	0.43	9.9	0.46	13.2	0.50

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	114	9.7	0.49	3.8	0.42	5.9	0.44	8.2	0.48
1999	101	8.5	0.37	3.3	0.32	5.1	0.33	6.9	0.35
2000	114	9.5	0.44	3.6	0.40	5.5	0.41	7.2	0.41
2001	118	9.7	0.44	4.0	0.38	6.1	0.40	8.0	0.43
2002	192	9.8	0.41	3.3	0.31	5.3	0.34	7.4	0.38
2003	202	10.3	0.43	3.7	0.35	5.8	0.37	7.8	0.40
2004	188	9.5	0.45	3.3	0.34	5.2	0.37	7.2	0.41
2005	185	9.3	0.41	3.0	0.31	4.8	0.34	6.9	0.38
2006	207	10.3	0.47	3.3	0.35	5.4	0.39	7.8	0.44
2007	209	9.1	0.42	3.3	0.36	5.1	0.38	6.9	0.40
2008	226	9.7	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	226	9.7	0.54	3.1	0.44	5.0	0.46	6.9	0.49
2011	221	9.5	0.51	3.0	0.38	4.8	0.42	6.6	0.47
2012	217	9.2	0.51	3.0	0.40	4.7	0.42	6.4	0.46
2013	214	9.0	0.56	3.0	0.42	4.7	0.46	6.3	0.50
2014	195	8.1	0.50	2.7	0.41	4.3	0.43	5.7	0.47
2015	220	9.0	0.68	3.2	0.58	4.9	0.61	6.3	0.63
2016	157	6.4	0.47	2.1	0.37	3.3	0.40	4.4	0.43
2017	180	7.3	0.58	2.3	0.42	3.7	0.46	5.1	0.52
2018	95	3.8	0.36	1.4	0.28	2.1	0.30	2.8	0.32
2019	81	3.3	0.35	1.1	0.26	1.7	0.28	2.3	0.31
1998-2019	3898	8.5	0.48	2.9	0.38	4.6	0.41	6.2	0.44

Table 12

Age distribution of age at death (cancer-related) for period 2007-2019
(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	0.0	1	0.0	0.0			0.1
30-34	10	0.2	0.2	6	0.1	0.2	4	0.2	0.2
35-39	16	0.2	0.4	12	0.3	0.5	4	0.2	0.4
40-44	52	0.8	1.2	33	0.8	1.3	19	0.8	1.2
45-49	117	1.8	3.0	63	1.6	2.8	54	2.2	3.4
50-54	226	3.5	6.5	151	3.7	6.6	75	3.0	6.4
55-59	382	5.8	12.3	254	6.3	12.8	128	5.2	11.5
60-64	564	8.6	21.0	397	9.8	22.6	167	6.7	18.3
65-69	824	12.6	33.6	586	14.4	37.0	238	9.6	27.9
70-74	1105	16.9	50.5	758	18.7	55.7	347	14.0	41.9
75-79	1113	17.0	67.5	750	18.5	74.2	363	14.7	56.6
80-84	1037	15.9	83.4	588	14.5	88.7	449	18.1	74.7
85+	1085	16.6	100.0	458	11.3	100.0	627	25.3	100.0
All ages	6534	100.0		4057	100.0		2477	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2019
(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		5.1
25-29	1		0.0	0.13	1.2	
30-34	6	4	0.3	0.15	4.7	2.5
35-39	12	4	0.6	0.21	4.9	1.1
40-44	33	19	1.4	0.27	5.8	2.4
45-49	63	54	2.5	0.22	4.7	3.4
50-54	151	75	6.4	0.27	6.0	3.1
55-59	254	128	13.1	0.32	6.2	3.6
60-64	397	167	24.3	0.39	6.7	3.6
65-69	586	238	38.5	0.46	6.8	3.7
70-74	758	347	54.1	0.54	6.8	4.2
75-79	750	363	67.7	0.66	6.6	4.0
80-84	588	449	89.6	0.80	6.2	5.3
85+	458	627	107.4	1.03	5.6	5.7
All ages	4057	2477			6.3	4.4
Mortality						
Raw			13.5	0.51		
WS			6.0	0.45		
ES			9.3	0.48		
BRD-S			12.5	0.52		
PYLL-70						
per 100,000			49.9			26.2
ES			42.5			21.7
AYLL-70			8.8			9.9

Table 14a

Further malignancies in deaths in period 1998–2019
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	37	1.6	27	73.0	1	2.7	9	24.3
C07–C08 Salivary gland	5	0.2	3	60.0			2	40.0
C09–C10 Oropharynx	13	0.6	7	53.8	1	7.7	5	38.5
C11 Nasopharynx	5	0.2	2	40.0	1	20.0	2	40.0
C12–C13 Hypopharynx	9	0.4	3	33.3	2	22.2	4	44.4
C15 Oesophagus	39	1.7	5	12.8	6	15.4	28	71.8
C16 Stomach	100	4.4	28	28.0	17	17.0	55	55.0
C17 Small intestine	20	0.9	4	20.0	3	15.0	13	65.0
C18 Colon	380	16.7	84	22.1	186	48.9	110	28.9
C19–C20 Rectum	15	0.7			4	26.7	11	73.3
C21 Anus/canal	7	0.3	4	57.1	3	42.9		
C22 Liver	64	2.8	1	1.6	10	15.6	53	82.8
C23–C24 Bile	21	0.9	1	4.8	1	4.8	19	90.5
C25 Pancreas	72	3.2	3	4.2	11	15.3	58	80.6
C32 Larynx	36	1.6	26	72.2	1	2.8	9	25.0
C33–C34 Lung	234	10.3	33	14.1	32	13.7	169	72.2
C38,C45 Mesothelioma	12	0.5			2	16.7	10	83.3
C43 Malign. melanoma	86	3.8	56	65.1			30	34.9
C44 Skin others	149	6.5	69	46.3	10	6.7	70	47.0
C46,C49 Soft tissue	9	0.4	3	33.3			6	66.7
C60 Penis	6	0.3	4	66.7			2	33.3
C61 Prostate	519	22.8	283	54.5	45	8.7	191	36.8
C62 Testis	16	0.7	15	93.8			1	6.3
C64 Kidney	75	3.3	37	49.3	21	28.0	17	22.7
C65 Renal pelvis	10	0.4	1	10.0			9	90.0
C66 Ureter	7	0.3	2	28.6	1	14.3	4	57.1
C67 Bladder	113	5.0	40	35.4	9	8.0	64	56.6
C70–C72 CNS cancer	20	0.9	2	10.0	1	5.0	17	85.0
C73 Thyroid	11	0.5	8	72.7			3	27.3
C76–C79 CUP	19	0.8	3	15.8	3	15.8	13	68.4
C81 Hodgkin lymphoma	7	0.3	5	71.4			2	28.6
C82–C85 NHL	87	3.8	38	43.7	11	12.6	38	43.7
C90 Mult. myeloma	20	0.9	7	35.0			13	65.0
C91–C96 Leukaemia	30	1.3	6	20.0	3	10.0	21	70.0
Others, specified	27	1.2	13	48.1	1	3.7	13	48.1
All further malignancies	2280	100.0	823	36.1	386	16.9	1071	47.0

Further malignancies with number of cases 1 to 4 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 1998-2019
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	3	0.2	2	66.7			1	33.3
C09-C10 Oropharynx	5	0.4	3	60.0			2	40.0
C15 Oesophagus	6	0.5			1	16.7	5	83.3
C16 Stomach	49	3.7	21	42.9	4	8.2	24	49.0
C17 Small intestine	16	1.2	1	6.3	7	43.8	8	50.0
C18 Colon	219	16.7	59	26.9	99	45.2	61	27.9
C19-C20 Rectum	11	0.8			2	18.2	9	81.8
C21 Anus/canal	8	0.6	2	25.0	5	62.5	1	12.5
C22 Liver	11	0.8			1	9.1	10	90.9
C23-C24 Bile	16	1.2	2	12.5	2	12.5	12	75.0
C25 Pancreas	57	4.3	4	7.0	5	8.8	48	84.2
C33-C34 Lung	77	5.9	9	11.7	7	9.1	61	79.2
C40-C41 Bone	4	0.3	1	25.0			3	75.0
C43 Malign. melanoma	25	1.9	15	60.0	1	4.0	9	36.0
C44 Skin others	44	3.4	25	56.8	2	4.5	17	38.6
C46,C49 Soft tissue	6	0.5	2	33.3	2	33.3	2	33.3
C50 Breast	329	25.1	202	61.4	27	8.2	100	30.4
C51 Vulva	10	0.8	2	20.0	1	10.0	7	70.0
C52 Vagina	7	0.5	2	28.6			5	71.4
C53 Cervix uteri	59	4.5	45	76.3	1	1.7	13	22.0
C54 Corpus uteri	87	6.6	57	65.5			30	34.5
C55,C57 Fem. genitals un	10	0.8	7	70.0	1	10.0	2	20.0
C56 Ovary	63	4.8	19	30.2	15	23.8	29	46.0
C64 Kidney	29	2.2	15	51.7	4	13.8	10	34.5
C65 Renal pelvis	3	0.2	1	33.3			2	66.7
C66 Ureter	4	0.3	1	25.0			3	75.0
C67 Bladder	37	2.8	17	45.9	1	2.7	19	51.4
C70-C72 CNS cancer	6	0.5	2	33.3	2	33.3	2	33.3
C73 Thyroid	17	1.3	12	70.6	1	5.9	4	23.5
C76-C79 CUP	11	0.8	1	9.1	4	36.4	6	54.5
C81 Hodgkin lymphoma	5	0.4	3	60.0			2	40.0
C82-C85 NHL	33	2.5	11	33.3	7	21.2	15	45.5
C90 Mult. myeloma	19	1.4	5	26.3	1	5.3	13	68.4
C91-C96 Leukaemia	14	1.1	3	21.4	1	7.1	10	71.4
Others, specified	13	1.0	6	46.2			7	53.8
All further malignancies	1313	100.0	557	42.4	204	15.5	552	42.0

Further malignancies with number of cases 1 to 2 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 2007-2019
(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		5.4
25-29	1		0.0	0.14	1.3	
30-34	6	4	0.3	0.15	4.8	2.9
35-39	11	3	0.5	0.20	4.8	0.9
40-44	32	17	1.4	0.26	6.1	2.4
45-49	60	49	2.4	0.23	4.9	3.6
50-54	138	69	5.9	0.27	6.2	3.3
55-59	226	112	11.6	0.32	6.3	3.8
60-64	346	141	21.2	0.38	6.9	3.7
65-69	479	198	31.5	0.47	7.0	3.8
70-74	600	262	42.8	0.56	7.1	4.1
75-79	566	280	51.1	0.67	6.8	4.1
80-84	436	377	66.4	0.83	6.4	5.7
85+	349	486	81.8	1.06	5.9	5.6
All ages	3250	2000			6.6	4.4
Mortality						
Raw			10.8	0.51	6.4	0.49
WS			4.9	0.44	2.2	0.39
ES			7.5	0.47	3.4	0.42
BRD-S			10.0	0.51	4.6	0.45
PYLL-70						
per 100,000			44.8		23.2	
ES			38.2		19.2	
AYLL-70			9.2		10.2	

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2019
(**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								
5- 9								
10-14								
15-19								
20-24		2			0.1	0.67		5.6
25-29	1		0.0	0.14			1.3	
30-34	6	4	0.3	0.15	0.2	0.15	4.9	2.9
35-39	11	3	0.5	0.21	0.1	0.08	4.9	0.9
40-44	30	16	1.3	0.26	0.7	0.18	5.7	2.3
45-49	59	48	2.4	0.24	2.0	0.23	4.9	3.6
50-54	134	65	5.7	0.27	2.8	0.24	6.1	3.2
55-59	206	103	10.6	0.30	5.2	0.32	5.8	3.5
60-64	320	120	19.6	0.38	6.8	0.36	6.5	3.2
65-69	411	156	27.0	0.45	9.3	0.38	6.1	3.1
70-74	469	225	33.5	0.49	14.0	0.41	5.7	3.7
75-79	444	237	40.1	0.58	17.2	0.46	5.6	3.5
80-84	312	308	47.5	0.65	31.6	0.61	4.9	4.9
85+	255	411	59.8	0.83	42.6	0.74	4.7	4.9
All ages	2658	1698					5.6	3.9
Mortality								
Raw			8.8	0.45	5.5	0.44		
WS			4.2	0.41	1.9	0.36		
ES			6.3	0.42	2.9	0.38		
BRD-S			8.1	0.45	3.9	0.41		
PYLL-70								
per 100,000			41.9		21.3			
ES			35.7		17.7			
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 - 2019 (Males: 4057, Females: 2477)

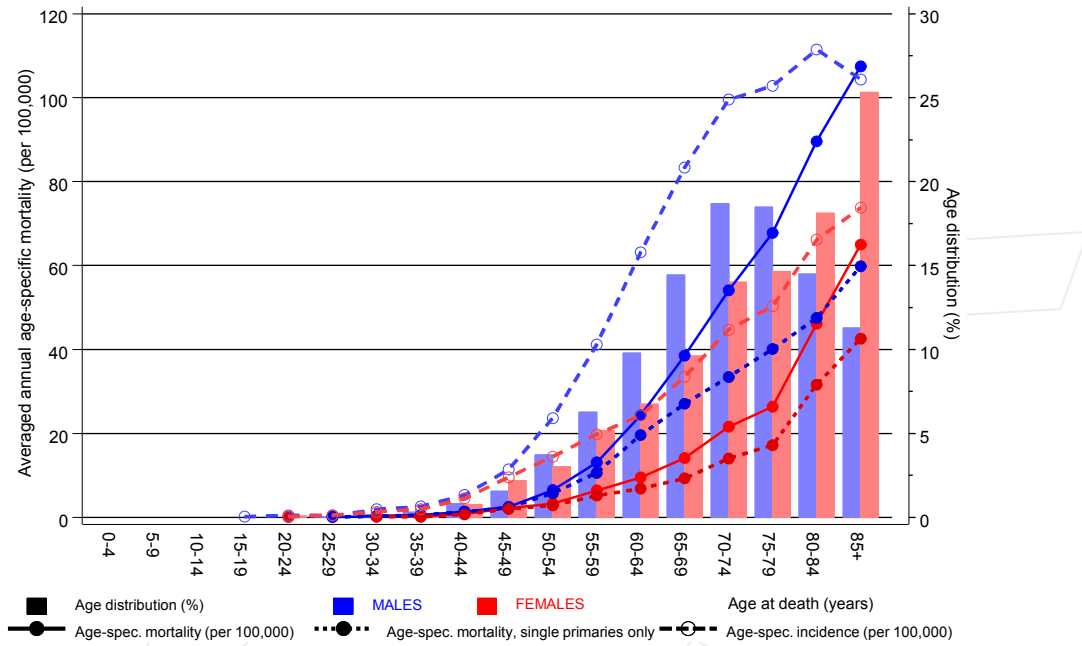
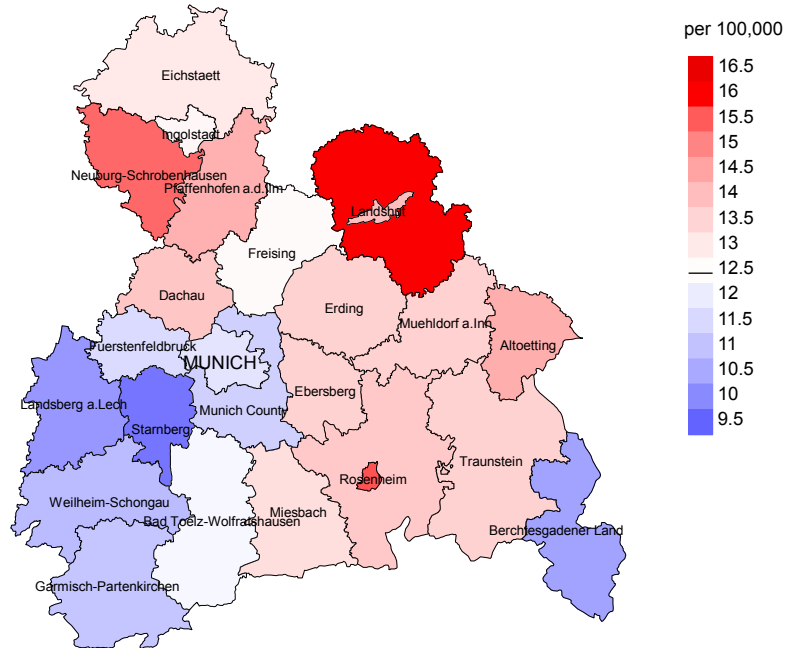


Figure 17. Distribution of age at death (bars; males: mean=68.1 yrs, median=68.6 yrs; females: mean=71.9 yrs, median=73.4 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (Germany 1987 standard population) 2007 - 2019: Males



Average mortality (Germany 1987 standard population) 2007 - 2019: Females

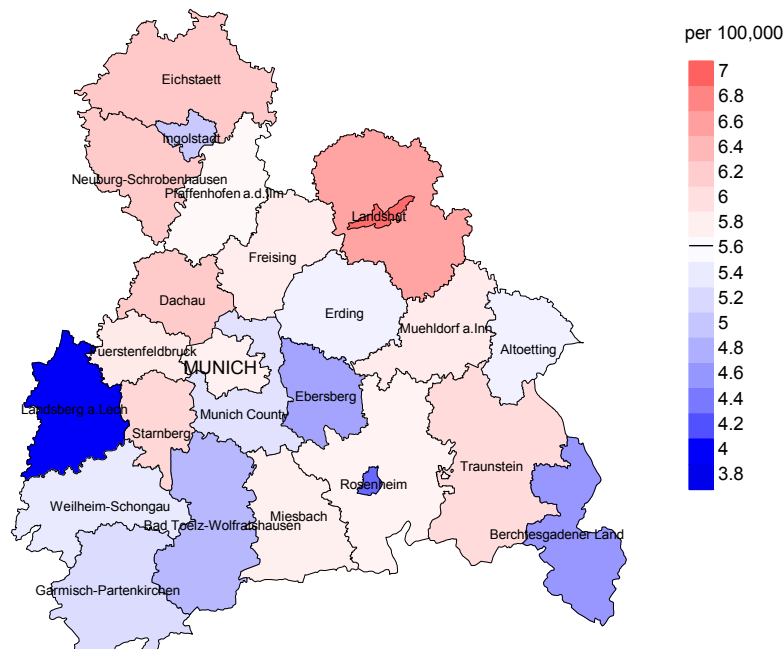
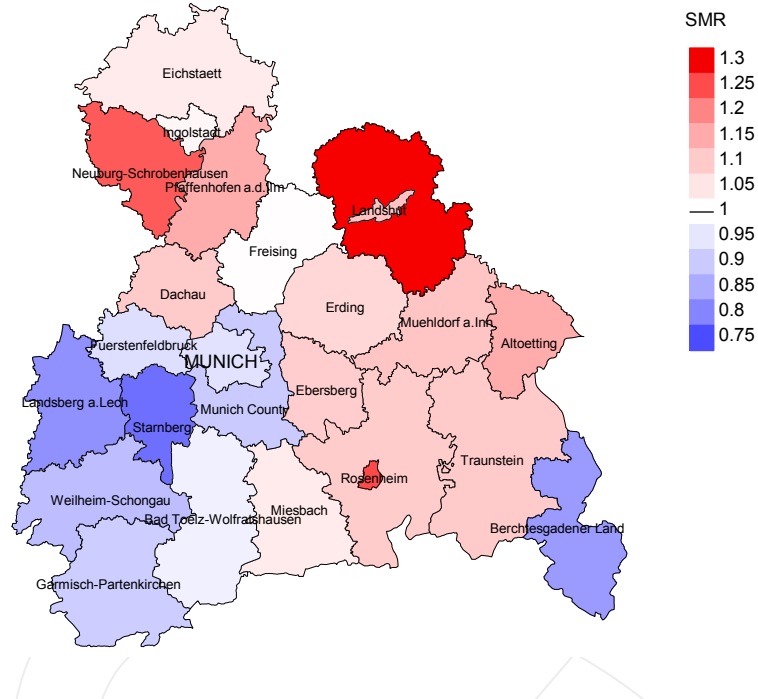


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 12.5/100,000 WS N=4,057, females 5.6/100,000 WS N=2,477).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 57 women died from rectal cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 4.7/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.2 and 6.7/100,000.

Standardized mortality ratio (SMR) 2007 - 2019: Males



Standardized mortality ratio (SMR) 2007 - 2019: Females

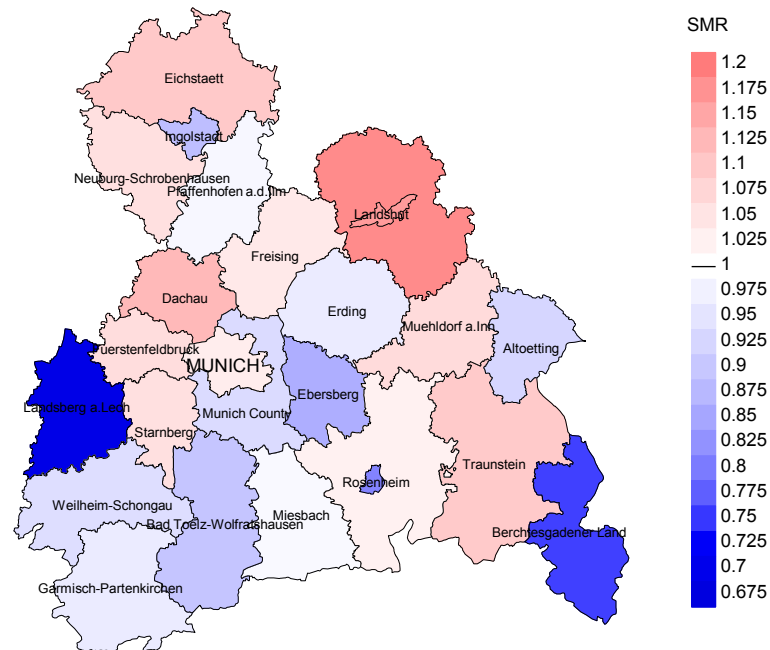


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=4,057, females N=2,477).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2019 a total of 57 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 0.60 and 1.20, 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 ratio of mortality and incidence (mortality-to-incidence ratio, **MIR, MI-Index**) is a statistical index 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 MIR. 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 (FRG) 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 of mortality to incidence, MIR
FRG	Federal Republic of Germany

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