

# Munich Cancer Registry



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## ICD-10 C91-C95: Leukaemias

### Incidence and Mortality

Year of diagnosis	1998-2019
Patients	11,121
Diseases	11,212
Creation date	01/26/2021
Database export	01/07/2021
Population	4.92 m



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

<https://www.tumorregister-muenchen.de/en/facts/base/bC9195E-ICD-10-C91-C95-Leukaemias-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, January 2021

<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.

### **Some remarks regarding this cancer type**

The results for leukemias should be interpreted with caution. As with other primarily non-surgically or non-radiologically treated cancer diseases, the MCR hardly manages to obtain even the simplest information on this cancer. The proportion of DCO cases indicates a situation that is far away from a satisfying cooperation. In the group of institutions that potentially participate in reporting are a few hospitals that refuse any contribution to MCR.

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

Code	Description
C91.-	Lymphoid leukaemia
C92.-	Myeloid leukaemia
C93.-	Monocytic leukaemia
C94.-	Other leukaemias of specified cell type
C95.-	Leukaemia of unspecified cell type

## INCIDENCE

Table 1

Cases 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	291	94	32.3	11.3	11.1	84.5	98.6
1999	296	87	29.4	12.1	11.1	77.4	98.6
2000	313	98	31.3	11.9	11.1	77.3	98.1
2001	355	135	38.0	12.2	11.0	81.1	96.9
2002	545	202	37.1	12.7	11.0	80.2	96.5 #
2003	549	188	34.2	13.3	10.8	77.8	97.4
2004	578	190	32.9	14.2	10.8	74.2	95.8
2005	561	172	30.7	15.0	10.7	74.2	95.7
2006	576	170	29.5	16.0	10.4	76.4	95.5
2007	623	158	25.4	16.4	10.0	70.5	94.4 #
2008	609	171	28.1	17.3	9.9	70.8	99.2
2009	636	147	23.1	17.8	9.4	67.8	98.0
2010	677	156	23.0	18.6	9.1	69.9	99.0
2011	621	135	21.7	19.4	8.8	65.4	98.4
2012	700	166	23.7	20.0	8.3	67.1	97.9
2013	650	161	24.8	20.6	7.7	66.6	97.1
2014	606	173	28.5	21.2	7.1	69.3	96.5
2015	585	148	25.3	21.6	6.2	69.2	96.6
2016	544	157	28.9	21.7	5.3	63.2	98.5
2017	520	160	30.8	22.1	4.4	62.5	99.2
2018	249	26	10.4	22.3	3.6	43.4	98.4
2019	128	12	9.4	22.4	1.6	43.0	83.6 ##
1998-2019	11212	3106	27.7	22.4	11.1	70.4	97.2

11,212 cases diagnosed 1998-2019 are related to a total of 11,121 patients. Currently, in 3,570 (32.1 %) of these 11,121 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 2,711 / 645 / 214 (24.4 % / 5.8 % / 1.9 %) 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 520 cases has been diagnosed, of which 22.1 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 4.4 % 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 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	159	54.6	52	32.7	11.9	13.0	83.6	97.5
1999	162	54.7	45	27.8	12.1	13.0	80.9	99.4
2000	173	55.3	50	28.9	11.3	13.0	78.6	97.1
2001	193	54.4	64	33.2	11.4	12.8	80.3	96.4
2002	296	54.3	91	30.7	12.1	12.8	77.7	95.9 #
2003	311	56.6	88	28.3	12.8	12.6	76.8	97.1
2004	315	54.5	90	28.6	13.6	12.5	74.3	94.9
2005	320	57.0	89	27.8	14.8	12.3	75.3	95.9
2006	348	60.4	92	26.4	16.3	12.0	76.1	94.8
2007	357	57.3	77	21.6	16.6	11.6	70.0	94.7 #
2008	347	57.0	90	25.9	17.6	11.3	67.4	99.1
2009	340	53.5	71	20.9	18.2	10.8	65.3	97.6
2010	367	54.2	89	24.3	18.8	10.2	72.5	98.6
2011	341	54.9	65	19.1	19.7	9.8	65.1	99.1
2012	380	54.3	81	21.3	20.3	9.1	65.0	97.6
2013	382	58.8	96	25.1	21.1	8.5	64.9	97.6
2014	353	58.3	87	24.6	21.7	7.8	65.7	96.6
2015	324	55.4	75	23.1	21.9	6.6	67.3	97.2
2016	309	56.8	81	26.2	22.1	5.2	59.9	99.4
2017	286	55.0	76	26.6	22.7	4.7	60.8	99.7
2018	132	53.0	15	11.4	23.0	3.2	47.0	99.2
2019	67	52.3	7	10.4	23.1	0.0	41.8	86.6 ##
1998–2019	6262	55.9	1571	25.1	23.1	13.0	69.5	97.2

6,262 cases diagnosed 1998-2019 are related to a total of 6,201 patients. Currently, in 2,116 (34.1 %) of these 6,201 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,572 / 394 / 150 (25.4 % / 6.4 % / 2.4 %) 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 286 cases has been diagnosed, of which 22.7 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 4.7 % 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 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	132	45.4	42	31.8	10.6	8.7	85.6	100.0
1999	134	45.3	42	31.3	12.0	8.8	73.1	97.8
2000	140	44.7	48	34.3	12.6	8.7	75.7	99.3
2001	162	45.6	71	43.8	13.2	8.7	82.1	97.5
2002	249	45.7	111	44.6	13.5	8.6	83.1	97.2 #
2003	238	43.4	100	42.0	13.9	8.6	79.0	97.9
2004	263	45.5	100	38.0	15.0	8.8	74.1	97.0
2005	241	43.0	83	34.4	15.2	8.7	72.6	95.4
2006	228	39.6	78	34.2	15.6	8.4	76.8	96.5
2007	266	42.7	81	30.5	16.1	8.0	71.1	94.0 #
2008	262	43.0	81	30.9	16.8	8.0	75.2	99.2
2009	296	46.5	76	25.7	17.3	7.8	70.6	98.3
2010	310	45.8	67	21.6	18.3	7.7	66.8	99.4
2011	280	45.1	70	25.0	19.0	7.5	65.7	97.5
2012	320	45.7	85	26.6	19.7	7.4	69.7	98.1
2013	268	41.2	65	24.3	20.0	6.6	69.0	96.3
2014	253	41.7	86	34.0	20.6	6.2	74.3	96.4
2015	261	44.6	73	28.0	21.2	5.7	71.6	95.8
2016	235	43.2	76	32.3	21.3	5.5	67.7	97.4
2017	234	45.0	84	35.9	21.4	4.0	64.5	98.7
2018	117	47.0	11	9.4	21.4	4.1	39.3	97.4
2019	61	47.7	5	8.2	21.6	3.4	44.3	80.3 ##
1998–2019	4950	44.1	1535	31.0	21.6	8.7	71.6	97.2

4,950 cases diagnosed 1998-2019 are related to a total of 4,920 patients. Currently, in 1,454 (29.6 %) of these 4,920 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,139 / 251 / 64 (23.2 % / 5.1 % / 1.3 %) 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 234 cases has been diagnosed, of which 21.4 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 4.0 % 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	159	132	14.4	11.2	9.8	6.1	13.5	8.0	16.8	9.6
1999	162	134	14.5	11.3	9.6	7.2	13.3	8.7	16.7	9.9
2000	173	140	15.2	11.7	11.3	6.7	14.4	8.5	17.1	10.0
2001	193	162	16.7	13.3	11.4	7.0	15.2	9.2	18.5	11.1
2002	296	249	15.9	12.7	10.6	6.1	14.0	8.3	17.4	10.3
2003	311	238	16.6	12.1	10.4	6.5	14.3	8.4	18.2	9.9
2004	315	263	16.7	13.3	10.8	7.4	14.3	9.4	17.6	11.2
2005	320	241	16.9	12.1	11.0	6.8	14.3	8.4	18.0	10.1
2006	348	228	18.2	11.3	11.6	5.9	15.3	7.4	18.7	9.1
2007	357	266	16.1	11.5	9.9	6.6	13.1	8.1	16.5	9.5
2008	347	262	15.6	11.3	10.3	5.8	12.7	7.5	15.5	9.1
2009	340	296	15.2	12.7	8.6	6.6	11.9	8.5	14.8	10.1
2010	367	310	16.3	13.2	9.5	6.7	12.8	8.7	16.0	10.4
2011	341	280	15.2	12.0	9.4	6.6	12.1	8.0	14.5	9.3
2012	380	320	16.7	13.6	9.7	7.8	12.6	9.5	16.1	10.9
2013	382	268	16.6	11.2	9.2	5.9	12.3	7.4	15.6	9.0
2014	353	253	15.1	10.5	7.5	4.4	10.8	6.2	13.9	7.9
2015	324	261	13.6	10.7	6.7	4.4	9.6	6.4	12.4	8.1
2016	309	235	12.9	9.6	6.3	4.2	9.1	5.7	11.7	7.1
2017	286	234	11.9	9.5	5.6	3.8	8.2	5.5	10.5	7.0
2018	132	117	5.4	4.7	2.7	2.3	3.7	3.2	4.9	3.8
2019	67	61	2.8	2.5	1.4	1.2	1.9	1.6	2.5	2.0
1998-2019	6262	4950	14.2	10.8	8.4	5.5	11.2	7.2	13.9	8.6

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.		Median						
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	291	64.7	20.4	0.9	95.8	38.2	55.3	68.6	78.9	86.5
1999	296	63.3	20.7	0.3	104	39.0	55.8	67.6	77.1	84.9
2000	313	62.4	20.8	0.4	97.6	34.4	53.7	66.5	77.0	85.9
2001	355	64.7	19.7	1.4	96.4	38.2	56.8	67.5	78.1	86.5
2002	545	66.1	19.5	1.0	99.3	39.6	59.0	69.5	79.0	86.5
2003	549	65.7	20.1	0.3	98.9	40.6	56.8	69.2	80.1	86.3
2004	578	64.9	20.2	0.4	98.6	37.9	57.3	68.6	79.1	85.4
2005	561	64.6	21.8	0.6	98.2	34.0	57.6	70.6	79.0	85.0
2006	576	66.0	20.9	0.6	95.4	37.3	60.3	71.3	79.5	85.9
2007	623	64.7	20.5	0.3	99.8	37.6	56.8	69.5	79.3	85.0
2008	609	65.3	21.6	0.4	98.1	31.4	60.2	70.9	79.3	85.5
2009	636	66.5	19.0	1.3	100	42.0	57.8	70.5	79.9	86.6
2010	677	67.2	20.3	0.3	101	42.8	59.3	71.8	80.8	87.8
2011	621	65.3	21.6	0.3	101	38.8	56.4	70.8	80.1	86.5
2012	700	65.7	21.7	0.0	102	33.9	57.6	71.9	80.5	86.4
2013	650	67.1	20.1	0.1	100	38.1	60.4	72.2	80.1	86.9
2014	606	70.3	17.2	0.5	98.3	47.1	63.9	74.2	81.5	87.8
2015	585	70.1	16.2	1.8	96.6	48.6	62.3	74.4	80.7	87.3
2016	544	69.5	17.3	3.2	97.5	44.1	60.3	74.2	82.0	87.9
2017	520	70.8	15.5	18.2	99.2	49.1	63.4	74.5	81.6	87.1
2018	249	67.9	15.6	18.5	92.9	46.2	59.7	71.8	79.4	85.7
2019	128	66.4	18.0	17.1	97.6	40.8	55.9	72.4	79.9	84.2
1998-2019	11212	66.5	19.8	0.0	104	40.3	58.5	71.3	79.9	86.4

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	159	63.6	20.7	0.9	95.8	37.1	55.0	67.3	78.2	86.4
1999	162	63.2	19.0	0.3	91.5	39.6	55.6	65.5	77.2	83.1
2000	173	60.5	21.1	0.4	97.6	24.2	52.9	65.3	74.1	83.5
2001	193	61.4	18.9	1.4	96.4	37.9	53.9	64.8	75.0	81.0
2002	296	62.8	20.3	1.0	98.3	32.3	55.2	67.6	76.1	82.4
2003	311	64.6	19.2	1.6	93.6	39.9	57.3	68.0	78.0	83.9
2004	315	63.9	20.2	0.4	96.1	36.6	57.6	67.3	77.6	84.7
2005	320	63.5	21.8	0.7	94.6	32.0	56.2	70.0	77.9	83.8
2006	348	64.2	20.5	1.0	95.4	36.0	58.6	69.2	77.0	84.1
2007	357	63.8	19.4	0.3	97.8	37.6	55.2	68.9	77.5	83.2
2008	347	63.3	22.5	0.4	98.1	25.9	58.0	70.0	77.7	83.4
2009	340	66.0	17.6	2.2	97.0	45.0	57.6	70.1	77.7	84.2
2010	367	66.3	20.0	0.3	101	42.6	59.3	71.3	79.2	86.4
2011	341	64.3	20.8	2.5	101	40.6	56.3	69.3	78.0	84.9
2012	380	66.0	21.1	2.4	95.2	32.1	60.3	71.7	80.1	84.8
2013	382	66.8	19.4	0.5	100	41.3	60.1	71.9	78.6	85.0
2014	353	69.8	17.1	0.5	95.9	48.2	63.5	73.6	81.3	86.3
2015	324	69.3	16.3	1.8	96.6	48.5	62.0	73.8	80.0	85.7
2016	309	68.8	16.1	17.5	97.5	46.0	60.6	72.9	79.8	86.2
2017	286	69.9	15.4	18.2	96.0	48.1	62.6	73.3	80.3	86.6
2018	132	68.6	15.8	18.5	91.6	46.8	61.3	73.6	79.2	84.1
2019	67	67.6	18.0	17.1	97.6	41.3	57.6	73.4	80.3	84.4
1998-2019	6262	65.5	19.5	0.3	101	39.9	57.8	70.2	78.5	84.7

Table 3b

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

Year of diagnosis	Cases n	Std.		Median						
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	132	66.0	19.9	1.3	93.9	39.8	57.1	71.4	80.5	86.7
1999	134	63.4	22.6	1.5	104	35.3	56.2	69.3	77.1	85.8
2000	140	64.7	20.3	2.1	95.1	36.5	55.2	69.7	77.7	86.8
2001	162	68.6	20.0	2.8	95.5	49.6	61.5	72.2	81.9	88.6
2002	249	70.1	17.6	2.9	99.3	47.5	61.6	73.2	82.6	89.1
2003	238	67.2	21.1	0.3	98.9	42.2	56.4	72.8	81.7	88.9
2004	263	66.0	20.1	0.7	98.6	40.4	57.1	69.7	80.2	85.8
2005	241	66.0	21.8	0.6	98.2	36.5	59.3	72.2	80.6	85.8
2006	228	68.7	21.2	0.6	95.1	38.0	63.9	74.6	82.5	88.4
2007	266	65.9	21.9	1.0	99.8	37.6	59.0	71.1	81.2	86.5
2008	262	68.1	20.1	1.4	97.4	41.4	61.0	72.4	82.4	87.3
2009	296	67.0	20.6	1.3	100	38.7	58.4	71.8	82.6	87.9
2010	310	68.3	20.7	0.8	98.7	43.3	59.3	73.0	82.7	88.9
2011	280	66.5	22.5	0.3	96.7	36.8	56.7	72.9	82.3	88.5
2012	320	65.3	22.6	0.0	102	34.1	56.4	72.0	80.9	87.6
2013	268	67.6	21.0	0.1	97.9	36.7	60.7	73.6	82.4	87.8
2014	253	71.0	17.3	2.7	98.3	47.1	64.5	74.9	82.2	88.9
2015	261	71.1	16.0	5.0	95.9	49.0	63.4	74.6	81.8	88.7
2016	235	70.3	18.7	3.2	96.4	41.4	58.8	75.6	84.4	89.0
2017	234	71.8	15.7	18.8	99.2	50.6	64.1	75.2	82.7	87.8
2018	117	67.2	15.4	26.6	92.9	46.2	56.7	70.0	79.6	86.7
2019	61	65.2	18.0	21.2	93.8	39.8	55.8	69.7	79.1	82.9
1998-2019	4950	67.8	20.1	0.0	104	41.0	59.3	72.8	81.9	88.0

Table 4

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

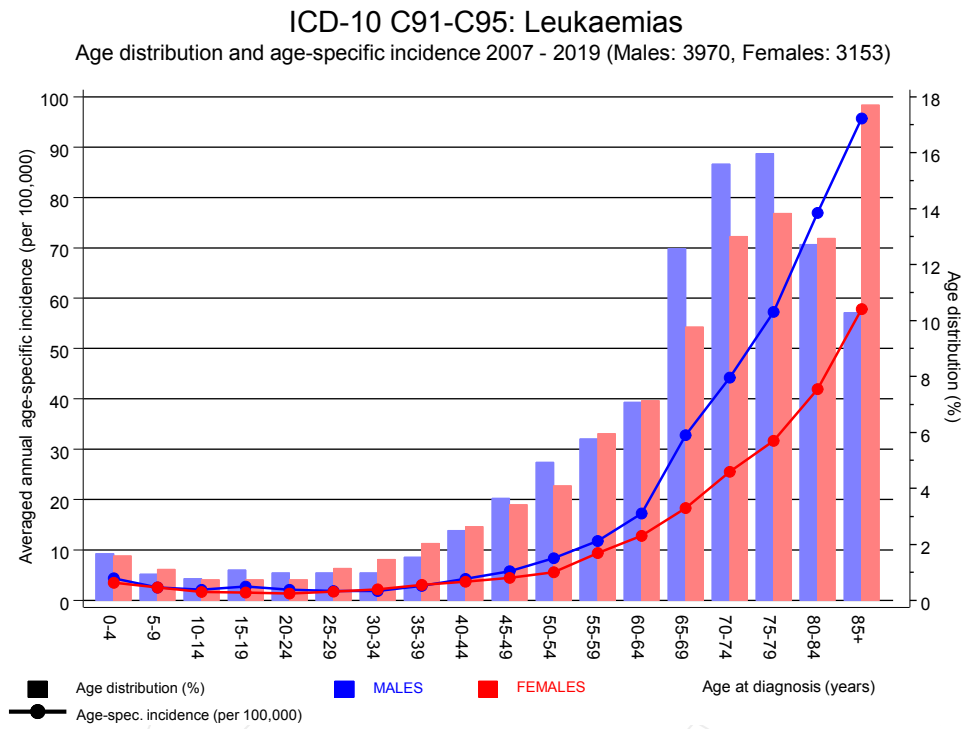
Age at diagnosis Years	Cases			Males			Females		
	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4	116	1.6	1.6	66	1.7	1.7	50	1.6	1.6
5-9	72	1.0	2.6	37	0.9	2.6	35	1.1	2.7
10-14	54	0.8	3.4	31	0.8	3.4	23	0.7	3.4
15-19	66	0.9	4.3	43	1.1	4.4	23	0.7	4.1
20-24	62	0.9	5.2	39	1.0	5.4	23	0.7	4.9
25-29	75	1.0	6.2	39	1.0	6.4	36	1.1	6.0
30-34	85	1.2	7.4	39	1.0	7.4	46	1.5	7.5
35-39	125	1.7	9.2	61	1.5	8.9	64	2.0	9.5
40-44	182	2.5	11.7	99	2.5	11.4	83	2.6	12.1
45-49	254	3.6	15.3	146	3.7	15.1	108	3.4	15.5
50-54	325	4.5	19.8	196	4.9	20.0	129	4.1	19.6
55-59	417	5.8	25.6	229	5.7	25.7	188	5.9	25.5
60-64	507	7.1	32.7	281	7.1	32.8	226	7.1	32.7
65-69	808	11.3	44.0	499	12.5	45.3	309	9.8	42.5
70-74	1036	14.5	58.5	626	15.7	61.0	410	13.0	55.4
75-79	1078	15.1	73.6	637	16.0	77.0	441	13.9	69.4
80-84	916	12.8	86.4	506	12.7	89.7	410	13.0	82.3
85+	970	13.6	100.0	411	10.3	100.0	559	17.7	100.0
All ages	7148	100.0		3985	100.0		3163	100.0	

Table 5

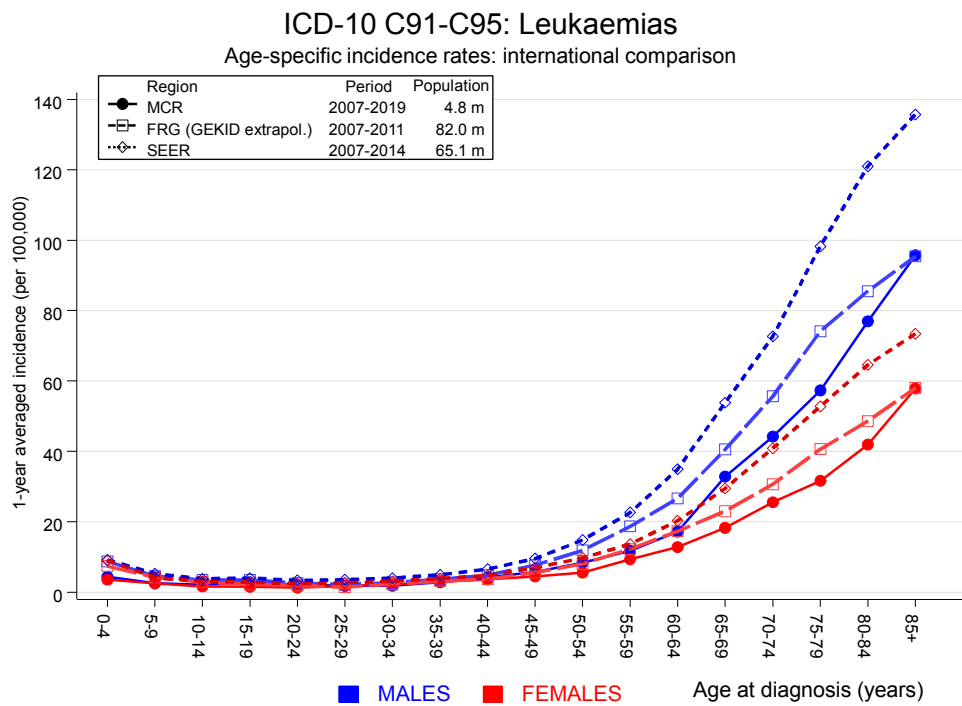
Age-specific incidence, DCO rate and proportion of all cancers  
for period 2007–2019

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid.	Females Age- spec. incid.	Males DCO rate n=906 %	Females DCO rate n=857 %	Males	Females
							Prop.all cancers n=143063 %	Prop.all cancers n=144724 %
0– 4	66	50	4.4	3.5	1.5	4.0	31.3	31.1
5– 9	37	35	2.6	2.5	2.7		32.5	37.6
10–14	31	23	2.1	1.6		4.3	23.3	19.7
15–19	43	23	2.7	1.5		4.3	14.4	9.3
20–24	39	23	2.1	1.3	5.1	4.3	6.6	4.9
25–29	39	36	1.9	1.7		2.8	4.4	3.2
30–34	39	46	1.8	2.2	5.1	4.3	3.3	2.3
35–39	61	64	2.9	3.0	4.9	4.7	3.6	2.0
40–44	99	83	4.2	3.7	4.0	3.6	3.8	1.4
45–49	145	108	5.8	4.4	5.5	8.3	3.0	1.2
50–54	196	129	8.4	5.6	6.1	4.7	2.5	1.1
55–59	229	188	11.8	9.4	10.0	8.0	1.9	1.5
60–64	281	225	17.2	12.8	10.7	10.7	1.7	1.5
65–69	499	308	32.8	18.3	15.2	17.2	2.2	1.7
70–74	619	410	44.2	25.5	18.7	18.3	2.4	2.2
75–79	634	436	57.3	31.7	24.9	28.4	2.9	2.4
80–84	505	408	76.9	41.9	41.2	41.7	3.6	2.9
85+	408	558	95.7	57.8	64.2	65.8	4.1	3.6
All ages	3970	3153			22.8	27.2	2.8	2.2
Incidence								
Raw			13.2	10.1				
WS			7.3	5.0				
ES			9.8	6.6				
BRD-S			12.3	7.9				

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



**Figure 6.** Age distribution (males: mean=66.7 yrs, median=71.5 yrs; females: mean=68.2 yrs, median=73.2 yrs) and age-specific incidence.



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

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2014. <http://www.gekid.de>. Last access: 02/11/2015  
 Surveillance, Epidemiology, and End Results (SEER) Program SEER\*Stat Database: Incidence - SEER 18 Regs Research Data, released April 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 %
C00 Lip	3	0.3	10.9	2.3	31.9 #	1.6	
C03–C06 Oral cavity	5	2.1	2.4	0.8	5.7	1.7	20.0
C07–C08 Salivary gland	6	0.6	10.5	3.9	22.9 #	3.2	
C09–C10 Oropharynx	5	2.5	2.0	0.6	4.6	1.4	
C12–C13 Hypopharynx	3	1.4	2.2	0.4	6.4	0.9	
C15 Oesophagus	12	4.8	2.5	1.3	4.3 #	4.2	8.3
C16 Stomach	22	9.8	2.3	1.4	3.4 #	7.1	
C17 Small intestine	5	1.5	3.4	1.1	7.9 #	2.1	
C18 Colon	54	23.9	2.3	1.7	3.0 #	17.6	1.9
C19–C20 Rectum	32	13.1	2.4	1.7	3.4 #	11.0	
C22 Liver	14	7.2	1.9	1.1	3.2 #	3.9	7.1
C23–C24 Bile	2	2.6	0.8	0.1	2.8	-0.4	
C25 Pancreas	21	9.7	2.2	1.3	3.3 #	6.6	
C32 Larynx	2	2.5	0.8	0.1	2.9	-0.3	50.0
C33–C34 Lung	75	29.4	2.6	2.0	3.2 #	26.6	6.7
C38,C45 Mesothelioma	3	1.7	1.7	0.4	5.0	0.7	33.3
C40–C41 Bone	2	0.2	9.4	1.1	34.1 #	1.0	
C43 Malign. melanoma	52	11.1	4.7	3.5	6.1 #	23.8	
C44 Skin others	2	0.1	29.7	3.6	107.1 #	1.1	
C46,C49 Soft tissue	9	1.4	6.4	2.9	12.2 #	4.4	
C50 Breast	4	0.7	5.9	1.6	15.2 #	1.9	
C60 Penis	3	0.6	4.8	1.0	14.1	1.4	
C61 Prostate	143	70.4	2.0	1.7	2.4 #	42.3	5.6
C62 Testis	4	0.8	4.8	1.3	12.4 #	1.8	
C64 Kidney	23	8.6	2.7	1.7	4.0 #	8.4	
C65 Renal pelvis	3	1.1	2.7	0.6	7.9	1.1	
C67 Bladder	24	11.5	2.1	1.3	3.1 #	7.3	
C70–C72 CNS cancer	14	3.2	4.4	2.4	7.3 #	6.3	7.1
C73 Thyroid	6	1.6	3.7	1.3	8.0 #	2.5	
C76–C79 CUP	10	4.2	2.4	1.1	4.4 #	3.4	
C81 Hodgkin lymphoma	10	0.6	16.0	7.7	29.5 #	5.5	
C82–C85 NHL	62	10.6	5.8	4.5	7.5 #	30.0	6.5
C90 Mult. myeloma	12	3.3	3.6	1.9	6.3 #	5.1	
C91–C96 Leukaemia	48	3.9	12.4	9.2	16.5 #	25.7	20.8
Others, specified	7	2.9	2.4	1.0	5.0	2.4	
Not observed	0	1.2	0.0	0.0	3.2	-0.7	
All further malignancies	702	251.0	2.8	2.6	3.0 #	262.9	4.8

Patients	4989
Median age at next malignancy (years)	72.5
Person-years	17152
Mean observation time (years)	3.4
Median observation time (years)	1.7

# The occurrence of further specified malignancy is statistically significant.

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



Table 7b

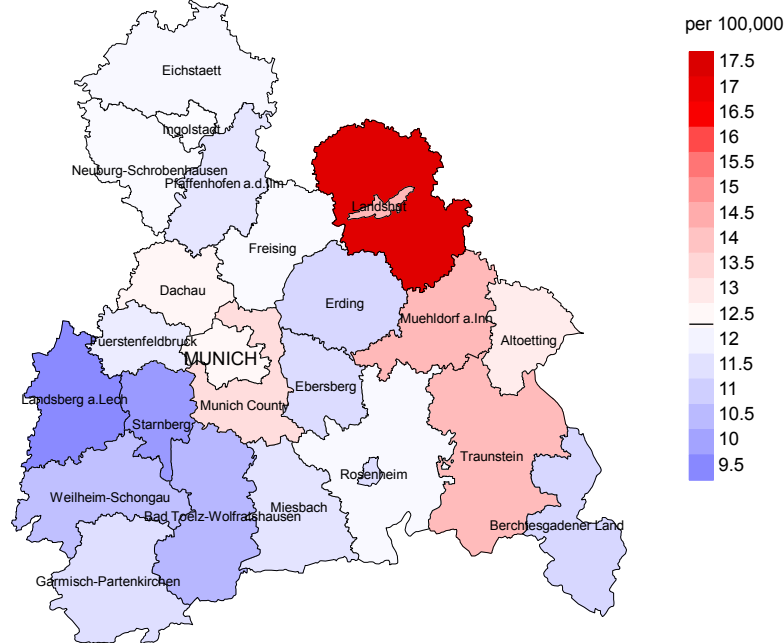
Standardized incidence ratio (SIR, with 95% confidence limits),  
excess absolute risk (EAR) and DCO rate of further malignancies  
for period 1998-2019

## FEMALES

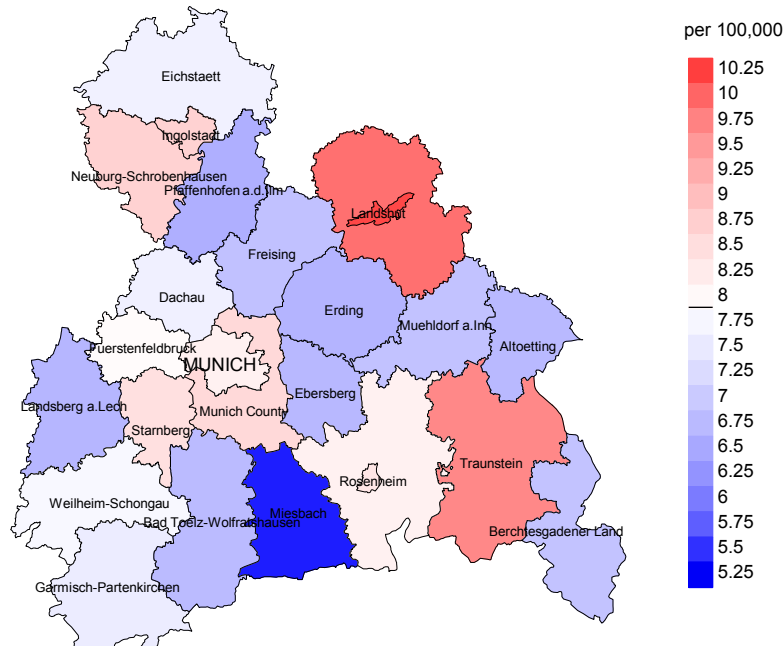
Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C00 Lip	1	0.1	12.6	0.3	70.1	0.8	
C03-C06 Oral cavity	4	0.6	6.2	1.7	15.8 #	2.9	
C07-C08 Salivary gland	2	0.2	10.8	1.3	38.9 #	1.6	
C09-C10 Oropharynx	4	0.5	8.7	2.4	22.3 #	3.1	
C14 ENT cancer	1	0.0	58.5	1.5	326.2 #	0.9	
C15 Oesophagus	4	0.7	5.5	1.5	14.1 #	2.9	
C16 Stomach	7	3.8	1.8	0.7	3.8	2.8	
C18 Colon	29	10.8	2.7	1.8	3.9 #	15.8	10.3
C19-C20 Rectum	8	4.5	1.8	0.8	3.5	3.1	12.5
C21 Anus/canal	5	0.6	8.1	2.6	18.9 #	3.8	20.0
C22 Liver	6	1.4	4.3	1.6	9.4 #	4.0	33.3
C23-C24 Bile	2	1.6	1.3	0.2	4.6	0.4	
C25 Pancreas	12	5.2	2.3	1.2	4.0 #	5.9	16.7
C33-C34 Lung	33	8.6	3.9	2.7	5.4 #	21.3	6.1
C43 Malign. melanoma	13	4.3	3.0	1.6	5.2 #	7.6	
C46,C49 Soft tissue	2	0.6	3.1	0.4	11.1	1.2	
C48 Peritoneal	1	0.5	2.2	0.1	12.0	0.5	
C50 Breast	89	34.5	2.6	2.1	3.2 #	47.4	1.1
C51 Vulva	3	1.2	2.5	0.5	7.4	1.6	
C53 Cervix uteri	5	1.5	3.4	1.1	7.9 #	3.1	40.0
C54 Corpus uteri	19	6.3	3.0	1.8	4.7 #	11.0	
C56 Ovary	9	4.6	2.0	0.9	3.7	3.9	
C64 Kidney	10	2.7	3.7	1.8	6.8 #	6.3	10.0
C67 Bladder	1	2.2	0.5	0.0	2.6	-1.0	
C69 Eye lymphoma	1	0.0	29.1	0.7	162.1	0.8	
C70-C72 CNS cancer	4	1.5	2.6	0.7	6.8	2.2	
C73 Thyroid	8	1.9	4.2	1.8	8.2 #	5.3	
C76-C79 CUP	6	2.0	3.0	1.1	6.5 #	3.5	
C81 Hodgkin lymphoma	2	0.2	8.6	1.0	31.0 #	1.5	
C82-C85 NHL	39	4.5	8.7	6.2	11.9 #	30.1	7.7
C90 Mult. myeloma	7	1.4	4.9	2.0	10.2 #	4.9	
C91-C96 Leukaemia	22	1.7	13.0	8.2	19.7 #	17.7	9.1
C96 Systemic	1	0.0	36.8	0.9	205.3	0.8	100.0
Not observed	0	3.3	0.0	0.0	1.1	-2.9	
All further malignancies	360	113.6	3.2	2.9	3.5 #	214.5	5.8
Patients		3690					
Median age at next malignancy (years)		72.8					
Person-years		11489					
Mean observation time (years)		3.1					
Median observation time (years)		1.2					

# The occurrence of further specified malignancy is statistically significant.

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



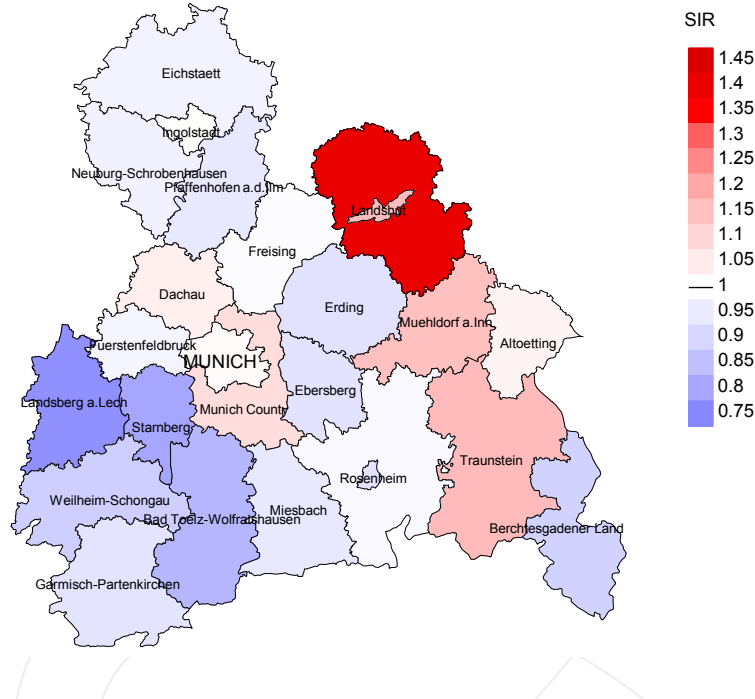
Average incidence (Germany 1987 standard population) 2007 - 2019: Females



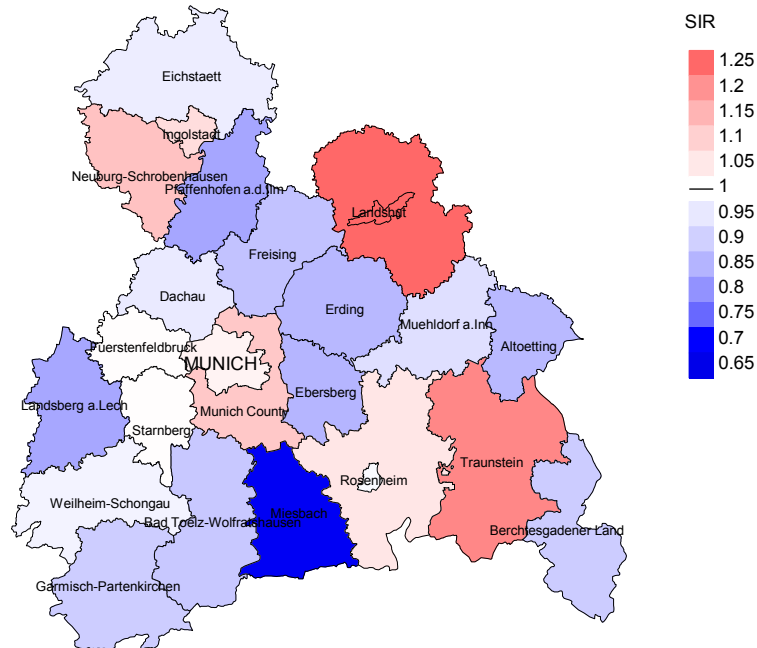
**Figure 8a.** Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 12.3/100,000 WS N=3,970, females 7.9/100,000 WS N=3,153).

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 73 women were identified with newly diagnosed leukaemias. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 6.7/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 4.8 and 9.1/100,000.

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=3,970, females N=3,153).

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 73 women were identified with newly diagnosed leukaemias. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.85. Though, the value of this parameter may vary with an underlying probability of 99% between 0.62 and 1.14, 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	291	98.6	32.3	246	84.5	98.4
1999	296	98.6	29.4	229	77.4	96.9
2000	313	98.1	31.3	242	77.3	97.5
2001	355	96.9	38.0	288	81.1	97.6
2002	545	96.5	37.1	437	80.2	96.8
2003	549	97.4	34.2	427	77.8	97.7
2004	578	95.8	32.9	429	74.2	97.4
2005	561	95.7	30.7	416	74.2	97.8
2006	576	95.5	29.5	440	76.4	97.0
2007	623	94.4	25.4	439	70.5	96.4
2008	609	99.2	28.1	431	70.8	96.5
2009	636	98.0	23.1	431	67.8	97.4
2010	677	99.0	23.0	473	69.9	96.8
2011	621	98.4	21.7	406	65.4	96.3
2012	700	97.9	23.7	470	67.1	96.2
2013	650	97.1	24.8	433	66.6	94.5
2014	606	96.5	28.5	420	69.3	94.3
2015	585	96.6	25.3	405	69.2	94.3
2016	544	98.5	28.9	344	63.2	92.4
2017	520	99.2	30.8	325	62.5	84.6
2018	249	98.4	10.4	108	43.4	49.1
2019	128	83.6	9.4	55	43.0	67.3
1998-2019	11212	97.2	27.7	7894	70.4	95.0

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	291	214	98.6	118	40.5
1999	296	193	96.9	93	31.4
2000	313	211	96.2	113	36.1
2001	355	260	97.3	137	38.6
2002	545	328	98.5	225	41.3
2003	549	315	98.4	224	40.8
2004	578	314	99.0	203	35.1
2005	561	375	99.7	213	38.0
2006	576	355	98.6	223	38.7
2007	623	383	98.7	209	33.5
2008	609	372	98.1	209	34.3
2009	636	365	98.6	211	33.2
2010	677	412	98.3	240	35.5
2011	621	418	98.6	209	33.7
2012	700	441	98.6	236	33.7
2013	650	468	98.3	243	37.4
2014	606	452	98.9	236	38.9
2015	585	453	98.7	240	41.0
2016	544	424	99.3	231	42.5
2017	520	444	97.1	240	46.2
2018	249	290	35.2	69	27.7
2019	128	225	51.1	41	32.0
1998–2019	11212	7712	94.7	4163	37.1

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	214	63.6	36.4	95.7
1999	193	69.4	30.6	95.7
2000	211	74.9	25.1	99.0
2001	260	71.2	28.8	96.4
2002	328	80.5	19.5	97.5
2003	315	84.1	15.9	97.1
2004	314	87.6	12.4	96.5
2005	375	86.7	13.3	98.1
2006	355	86.8	13.2	96.3
2007	383	84.9	15.1	95.2
2008	372	83.9	16.1	92.9
2009	365	85.8	14.2	94.2
2010	412	85.2	14.8	96.0
2011	418	83.3	16.7	93.0
2012	441	83.7	16.3	93.6
2013	468	78.2	21.8	91.3
2014	452	77.4	22.6	90.8
2015	453	79.2	20.8	90.6
2016	424	77.8	22.2	92.2
2017	444	76.4	23.6	90.0
2018	290	47.2	52.8	83.3
2019	225	50.2	49.8	83.5
1998–2019	7712	78.6	21.4	93.8

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	115	69.8	68.2	73.8	69.9
1999	111	71.9	68.6	80.9	71.7
2000	127	71.6	70.3	77.3	71.6
2001	126	72.3	71.9	74.7	72.0
2002	170	73.2	72.6	74.6	73.8
2003	173	72.3	72.0	76.1	72.4
2004	176	74.5	74.4	79.3	74.6
2005	208	74.3	72.9	78.8	74.1
2006	209	73.8	73.0	79.3	73.7
2007	205	74.9	73.4	80.5	73.8
2008	215	73.6	73.3	78.0	73.7
2009	195	75.2	74.8	79.3	75.4
2010	233	75.7	74.7	80.0	75.8
2011	231	75.3	74.8	78.9	75.3
2012	253	76.6	75.5	81.8	76.1
2013	275	75.7	75.1	78.7	75.7
2014	255	76.9	75.7	80.5	76.7
2015	247	76.5	76.2	80.3	76.4
2016	246	77.8	77.5	80.0	77.6
2017	238	77.5	77.2	79.1	76.9
2018	190	74.9	73.5	76.9	74.9
2019	142	78.9	78.3	79.4	78.9
1998-2019	4340	75.4	74.6	78.8	75.1

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 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	99	76.0	73.6	82.0	75.8
1999	82	76.9	75.6	82.3	76.6
2000	84	77.8	75.6	86.1	77.8
2001	134	76.5	75.3	81.9	76.3
2002	158	77.8	74.2	85.9	77.5
2003	142	77.8	75.7	84.5	77.5
2004	138	76.8	76.0	82.3	76.7
2005	167	77.8	76.0	85.6	77.9
2006	146	77.4	77.2	81.2	77.1
2007	178	76.1	73.8	85.8	76.1
2008	157	78.6	76.4	85.7	77.9
2009	170	77.9	77.5	82.5	77.9
2010	179	79.6	79.0	86.7	80.7
2011	187	76.5	73.8	83.4	75.6
2012	188	76.6	76.4	78.7	76.5
2013	193	78.8	77.4	82.9	77.8
2014	197	78.1	76.4	80.6	77.7
2015	206	77.2	75.8	80.5	76.7
2016	178	79.3	76.6	83.5	77.6
2017	206	79.2	78.3	83.4	78.6
2018	100	79.4	76.7	80.5	79.2
2019	83	77.0	78.7	74.1	77.8
1998-2019	3372	77.7	76.4	82.6	77.4

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	77	6.9	0.48	4.9	0.49	6.6	0.49	8.3	0.49
1999	73	6.5	0.45	4.4	0.46	6.0	0.45	7.6	0.46
2000	99	8.7	0.57	5.7	0.50	8.0	0.56	10.4	0.61
2001	95	8.2	0.49	4.8	0.42	7.2	0.48	10.0	0.54
2002	140	7.5	0.48	4.2	0.40	6.4	0.46	8.8	0.51
2003	150	8.0	0.48	4.4	0.43	6.7	0.47	9.0	0.50
2004	155	8.2	0.49	4.3	0.40	6.7	0.47	9.4	0.54
2005	175	9.2	0.55	4.9	0.44	7.3	0.51	10.1	0.56
2006	180	9.4	0.52	4.7	0.40	7.2	0.47	9.9	0.53
2007	181	8.2	0.51	4.3	0.43	6.3	0.48	8.7	0.53
2008	180	8.1	0.52	3.9	0.38	6.0	0.47	8.2	0.53
2009	167	7.5	0.49	3.5	0.41	5.4	0.46	7.6	0.51
2010	193	8.6	0.53	3.9	0.41	6.0	0.47	8.4	0.53
2011	198	8.8	0.58	4.1	0.44	6.3	0.52	8.7	0.60
2012	206	9.1	0.54	4.0	0.41	6.2	0.49	8.6	0.54
2013	212	9.2	0.56	3.9	0.42	6.0	0.49	8.5	0.55
2014	197	8.4	0.56	3.4	0.45	5.4	0.50	7.7	0.55
2015	201	8.4	0.62	3.7	0.56	5.6	0.58	7.7	0.62
2016	195	8.1	0.63	3.1	0.50	5.0	0.55	7.2	0.62
2017	182	7.5	0.64	3.0	0.54	4.7	0.58	6.6	0.64
2018	85	3.5	0.65	1.7	0.65	2.4	0.66	3.2	0.65
2019	73	3.0	1.09	1.2	0.87	1.9	1.00	2.6	1.04
1998-2019	3414	7.7	0.55	3.7	0.45	5.6	0.50	7.7	0.56

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	59	5.0	0.45	2.9	0.46	3.6	0.45	4.2	0.44
1999	61	5.1	0.46	2.2	0.31	3.2	0.37	4.3	0.43
2000	59	4.9	0.42	2.2	0.33	3.2	0.37	4.1	0.41
2001	90	7.4	0.56	3.2	0.46	4.7	0.51	6.3	0.57
2002	124	6.3	0.50	2.8	0.46	4.0	0.48	5.2	0.51
2003	115	5.8	0.48	2.4	0.36	3.6	0.43	4.8	0.48
2004	120	6.1	0.46	2.5	0.34	3.7	0.39	4.9	0.44
2005	150	7.5	0.62	3.1	0.46	4.5	0.54	5.8	0.57
2006	128	6.4	0.56	2.5	0.43	3.7	0.50	5.1	0.56
2007	144	6.2	0.54	2.7	0.41	3.8	0.47	4.9	0.52
2008	132	5.7	0.50	2.3	0.39	3.3	0.44	4.4	0.48
2009	146	6.3	0.49	2.5	0.37	3.7	0.43	4.9	0.48
2010	158	6.8	0.51	2.4	0.35	3.5	0.41	4.9	0.48
2011	150	6.4	0.54	2.6	0.39	3.8	0.47	4.9	0.53
2012	163	6.9	0.51	2.7	0.34	3.9	0.41	5.2	0.48
2013	154	6.5	0.57	2.4	0.41	3.5	0.48	4.8	0.53
2014	153	6.4	0.61	2.4	0.53	3.4	0.56	4.5	0.57
2015	158	6.5	0.61	2.4	0.54	3.6	0.56	4.9	0.60
2016	136	5.5	0.58	2.2	0.54	3.1	0.55	4.0	0.56
2017	157	6.4	0.67	2.2	0.58	3.3	0.61	4.5	0.64
2018	53	2.1	0.45	0.8	0.33	1.1	0.35	1.5	0.41
2019	42	1.7	0.70	0.6	0.52	0.9	0.56	1.2	0.62
1998-2019	2652	5.8	0.54	2.3	0.42	3.3	0.47	4.4	0.51

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	4	0.1	0.1	1	0.0	0.0	3	0.2	0.2
5-9	11	0.3	0.4	5	0.2	0.3	6	0.3	0.5
10-14	16	0.4	0.8	4	0.2	0.4	12	0.7	1.2
15-19	14	0.3	1.1	9	0.4	0.8	5	0.3	1.5
20-24	23	0.6	1.7	16	0.7	1.5	7	0.4	1.9
25-29	22	0.5	2.2	17	0.7	2.3	5	0.3	2.2
30-34	24	0.6	2.8	10	0.4	2.7	14	0.8	3.0
35-39	40	1.0	3.8	22	1.0	3.7	18	1.0	4.0
40-44	59	1.5	5.3	33	1.5	5.2	26	1.5	5.5
45-49	79	2.0	7.3	37	1.6	6.8	42	2.4	7.9
50-54	101	2.5	9.8	60	2.6	9.4	41	2.3	10.3
55-59	172	4.3	14.1	86	3.8	13.2	86	4.9	15.2
60-64	233	5.8	19.9	134	5.9	19.1	99	5.7	20.8
65-69	404	10.1	29.9	251	11.1	30.2	153	8.8	29.6
70-74	661	16.5	46.4	400	17.6	47.8	261	14.9	44.6
75-79	793	19.7	66.1	479	21.1	68.9	314	18.0	62.5
80-84	680	16.9	83.1	380	16.7	85.6	300	17.2	79.7
85+	680	16.9	100.0	326	14.4	100.0	354	20.3	100.0
All ages	4016	100.0		2270	100.0		1746	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		Females		Males		Females	
	n	n	Age- spec. mortal.	MI-index	Age- spec. mortal.	MI-index	Prop.all cancers %	Prop.all cancers %
0- 4	1	3	0.1	0.02	0.2	0.06	5.3	18.8
5- 9	5	6	0.3	0.14	0.4	0.17	20.0	26.1
10-14	4	12	0.3	0.13	0.9	0.52	14.8	52.2
15-19	9	5	0.6	0.21	0.3	0.22	19.1	20.0
20-24	16	7	0.9	0.41	0.4	0.30	23.9	17.9
25-29	17	5	0.8	0.44	0.2	0.14	20.0	5.4
30-34	10	14	0.5	0.26	0.7	0.30	7.8	8.8
35-39	22	18	1.0	0.36	0.9	0.28	9.1	4.9
40-44	33	26	1.4	0.33	1.1	0.31	5.8	3.2
45-49	37	42	1.5	0.26	1.7	0.39	2.8	2.7
50-54	60	41	2.6	0.31	1.8	0.32	2.4	1.7
55-59	86	86	4.4	0.38	4.3	0.46	2.1	2.4
60-64	134	99	8.2	0.48	5.6	0.44	2.2	2.1
65-69	251	153	16.5	0.50	9.1	0.50	2.9	2.4
70-74	400	261	28.5	0.65	16.3	0.64	3.6	3.2
75-79	479	314	43.3	0.76	22.8	0.72	4.2	3.5
80-84	380	300	57.9	0.75	30.8	0.74	4.0	3.5
85+	326	354	76.4	0.80	36.7	0.63	4.0	3.2
All ages	2270	1746					3.6	3.1
Mortality								
Raw			7.5	0.57	5.6	0.55		
WS			3.3	0.45	2.1	0.42		
ES			5.1	0.52	3.1	0.48		
BRD-S			7.1	0.57	4.1	0.52		
PYLL-70								
per 100,000			34.5		29.6			
ES			32.4		28.8			
AYLL-70			13.4		15.0			

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	16	0.9	6	37.5	2	12.5	8	50.0
C07-C08 Salivary gland	8	0.5	2	25.0	2	25.0	4	50.0
C09-C10 Oropharynx	8	0.5	3	37.5	1	12.5	4	50.0
C12-C13 Hypopharynx	4	0.2			1	25.0	3	75.0
C15 Oesophagus	19	1.1	5	26.3	1	5.3	13	68.4
C16 Stomach	37	2.1	14	37.8	5	13.5	18	48.6
C17 Small intestine	5	0.3	2	40.0	1	20.0	2	40.0
C18 Colon	116	6.7	60	51.7	11	9.5	45	38.8
C19-C20 Rectum	63	3.7	30	47.6	9	14.3	24	38.1
C22 Liver	15	0.9	3	20.0	2	13.3	10	66.7
C23-C24 Bile	3	0.2	1	33.3			2	66.7
C25 Pancreas	26	1.5	1	3.8	5	19.2	20	76.9
C30-C31 Sinuses	2	0.1	2	100.0				
C32 Larynx	13	0.8	10	76.9	2	15.4	1	7.7
C33-C34 Lung	126	7.3	28	22.2	26	20.6	72	57.1
C38,C45 Mesothelioma	4	0.2	1	25.0	1	25.0	2	50.0
C40-C41 Bone	4	0.2	2	50.0			2	50.0
C43 Malign. melanoma	69	4.0	36	52.2	5	7.2	28	40.6
C44 Skin others	329	19.1	59	17.9	24	7.3	246	74.8
C46,C49 Soft tissue	24	1.4	9	37.5	2	8.3	13	54.2
C48 Peritoneal	2	0.1	2	100.0				
C50 Breast	3	0.2	1	33.3			2	66.7
C60 Penis	2	0.1					2	100.0
C61 Prostate	303	17.6	205	67.7	24	7.9	74	24.4
C62 Testis	9	0.5	7	77.8			2	22.2
C64 Kidney	47	2.7	30	63.8	2	4.3	15	31.9
C65 Renal pelvis	3	0.2	1	33.3			2	66.7
C66 Ureter	2	0.1			1	50.0	1	50.0
C67 Bladder	50	2.9	26	52.0	6	12.0	18	36.0
C68 Urinary org.	2	0.1	1	50.0			1	50.0
C70-C72 CNS cancer	16	0.9	3	18.8	2	12.5	11	68.8
C73 Thyroid	6	0.3	5	83.3			1	16.7
C74-C80 Cancer others	2	0.1	1	50.0			1	50.0
C76-C79 CUP	15	0.9	2	13.3	3	20.0	10	66.7
C81 Hodgkin lymphoma	22	1.3	10	45.5	2	9.1	10	45.5
C82-C85 NHL	112	6.5	43	38.4	13	11.6	56	50.0
C90 Mult. myeloma	18	1.0	10	55.6	5	27.8	3	16.7
C91-C96 Leukaemia	215	12.5	1	0.5	64	29.8	150	69.8
C96 Systemic	3	0.2	1	33.3	1	33.3	1	33.3
Others, specified	3	0.2	1	33.3	2	66.7		

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 ←%
All further malignancies	1726	100.0	624	36.2	225	13.0	877	50.8

Further malignancies with number of cases 1 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 ←%
C00 Lip	2	0.2					2	100.0
C03-C06 Oral cavity	2	0.2					2	100.0
C07-C08 Salivary gland	5	0.5	3	60.0			2	40.0
C09-C10 Oropharynx	3	0.3	1	33.3			2	66.7
C12-C13 Hypopharynx	2	0.2	2	100.0				
C15 Oesophagus	4	0.4			1	25.0	3	75.0
C16 Stomach	15	1.5	6	40.0	4	26.7	5	33.3
C17 Small intestine	2	0.2			1	50.0	1	50.0
C18 Colon	56	5.4	31	55.4	7	12.5	18	32.1
C19-C20 Rectum	26	2.5	16	61.5	3	11.5	7	26.9
C21 Anus/canal	6	0.6	3	50.0			3	50.0
C22 Liver	8	0.8	1	12.5			7	87.5
C23-C24 Bile	6	0.6	4	66.7	1	16.7	1	16.7
C25 Pancreas	18	1.7	1	5.6	3	16.7	14	77.8
C33-C34 Lung	44	4.3	9	20.5	8	18.2	27	61.4
C43 Malign. melanoma	33	3.2	23	69.7	1	3.0	9	27.3
C44 Skin others	104	10.1	44	42.3	5	4.8	55	52.9
C46,C49 Soft tissue	6	0.6	3	50.0			3	50.0
C48 Peritoneal	5	0.5	4	80.0			1	20.0
C50 Breast	237	23.0	182	76.8	16	6.8	39	16.5
C51 Vulva	7	0.7	6	85.7			1	14.3
C52 Vagina	4	0.4	3	75.0			1	25.0
C53 Cervix uteri	18	1.7	14	77.8	2	11.1	2	11.1
C54 Corpus uteri	48	4.7	35	72.9	3	6.3	10	20.8
C55,C57 Fem. genitals un	2	0.2			1	50.0	1	50.0
C56 Ovary	22	2.1	9	40.9	4	18.2	9	40.9
C64 Kidney	20	1.9	8	40.0	5	25.0	7	35.0
C65 Renal pelvis	2	0.2					2	100.0
C67 Bladder	11	1.1	8	72.7	2	18.2	1	9.1
C69 Eye lymphoma	2	0.2	1	50.0			1	50.0
C70-C72 CNS cancer	16	1.6	5	31.3	3	18.8	8	50.0
C73 Thyroid	20	1.9	18	90.0	1	5.0	1	5.0
C76-C79 CUP	10	1.0	3	30.0	1	10.0	6	60.0
C81 Hodgkin lymphoma	8	0.8	7	87.5	1	12.5		
C82-C85 NHL	60	5.8	27	45.0	5	8.3	28	46.7
C90 Mult. myeloma	11	1.1	5	45.5	3	27.3	3	27.3
C91-C96 Leukaemia	175	17.0	1	0.6	46	26.3	128	73.1
C96 Systemic	2	0.2	1	50.0			1	50.0
Others, specified	8	0.8	7	87.5	1	12.5		

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 ←%
All further malignancies	1030	100.0	491	47.7	128	12.4	411	39.9

Further malignancies with number of cases 1 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		Males		Females		Females	
	n	n	Age- spec. mortal.	MI-index	Age- spec. mortal.	MI-index	Prop.all cancers %	Prop.all cancers %
0- 4	1	3	0.1	0.02	0.2	0.06	5.3	20.0
5- 9	5	6	0.3	0.14	0.4	0.18	20.8	26.1
10-14	4	10	0.3	0.13	0.7	0.45	14.8	52.6
15-19	9	4	0.6	0.22	0.3	0.19	20.0	17.4
20-24	14	6	0.8	0.38	0.3	0.26	23.3	16.2
25-29	15	5	0.7	0.39	0.2	0.16	19.5	5.8
30-34	10	13	0.5	0.28	0.6	0.30	8.1	9.4
35-39	19	18	0.9	0.32	0.9	0.30	8.4	5.5
40-44	30	21	1.3	0.33	0.9	0.30	5.7	3.0
45-49	31	32	1.2	0.24	1.3	0.37	2.5	2.4
50-54	48	33	2.0	0.27	1.4	0.32	2.2	1.6
55-59	74	62	3.8	0.38	3.1	0.45	2.1	2.1
60-64	95	72	5.8	0.46	4.1	0.42	1.9	1.9
65-69	168	108	11.0	0.47	6.4	0.50	2.4	2.1
70-74	278	167	19.8	0.70	10.4	0.60	3.3	2.6
75-79	325	208	29.4	0.85	15.1	0.73	3.9	3.0
80-84	263	215	40.1	0.83	22.1	0.77	3.9	3.3
85+	210	268	49.2	0.85	27.8	0.63	3.5	3.1
All ages	1599	1251					3.2	2.8
Mortality								
Raw			5.3	0.56	4.0	0.54		
WS			2.4	0.42	1.6	0.39		
ES			3.6	0.49	2.3	0.45		
BRD-S			5.0	0.56	3.0	0.50		
PYLL-70								
per 100,000			29.4		24.4			
ES			27.9		24.1			
AYLL-70			14.9		16.3			

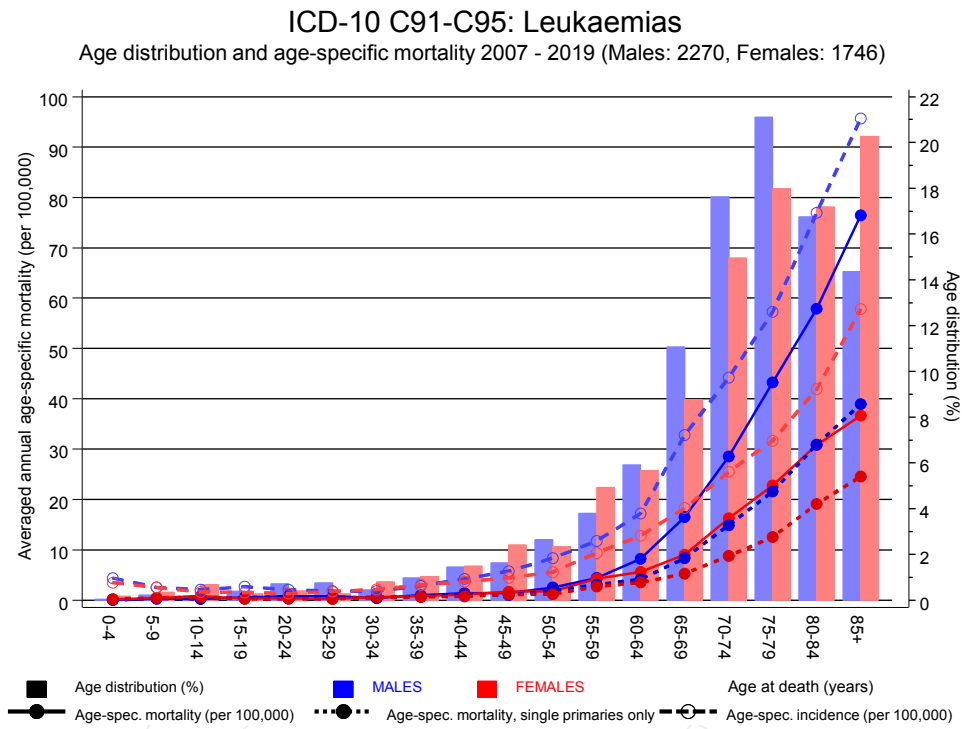
\* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers  
for period 2007-2019  
(**Single primaries only** \*)

Age at death Years	Males		Males		Females		Females	
	n	n	Age- spec. mortal.	MI-index	Age- spec. mortal.	MI-index	Prop.all cancers %	Prop.all cancers %
0- 4	1	3	0.1	0.02	0.2	0.06	5.3	20.0
5- 9	5	6	0.3	0.14	0.4	0.19	20.8	26.1
10-14	4	9	0.3	0.14	0.6	0.43	14.8	47.4
15-19	9	4	0.6	0.24	0.3	0.20	20.0	18.2
20-24	13	5	0.7	0.36	0.3	0.22	21.7	13.9
25-29	13	5	0.6	0.35	0.2	0.18	16.9	6.0
30-34	10	13	0.5	0.29	0.6	0.31	8.1	9.5
35-39	16	14	0.7	0.28	0.7	0.25	7.1	4.3
40-44	25	17	1.1	0.29	0.8	0.25	4.8	2.4
45-49	26	28	1.0	0.21	1.2	0.35	2.1	2.1
50-54	44	28	1.9	0.28	1.2	0.33	2.0	1.4
55-59	60	54	3.1	0.34	2.7	0.43	1.7	1.9
60-64	68	62	4.2	0.39	3.5	0.42	1.4	1.7
65-69	127	89	8.4	0.45	5.3	0.47	1.9	1.8
70-74	209	141	14.9	0.67	8.8	0.56	2.6	2.3
75-79	239	173	21.6	0.71	12.6	0.69	3.0	2.6
80-84	203	186	30.9	0.70	19.1	0.72	3.2	3.0
85+	166	237	38.9	0.71	24.6	0.58	3.1	2.8
All ages	1238	1074					2.6	2.5
Mortality								
Raw			4.1	0.49	3.5	0.50		
WS			1.9	0.37	1.4	0.37		
ES			2.8	0.44	2.0	0.42		
BRD-S			3.9	0.49	2.5	0.47		
PYLL-70								
per 100,000			25.5		21.6			
ES			24.6		21.5			
AYLL-70			16.1		16.8			

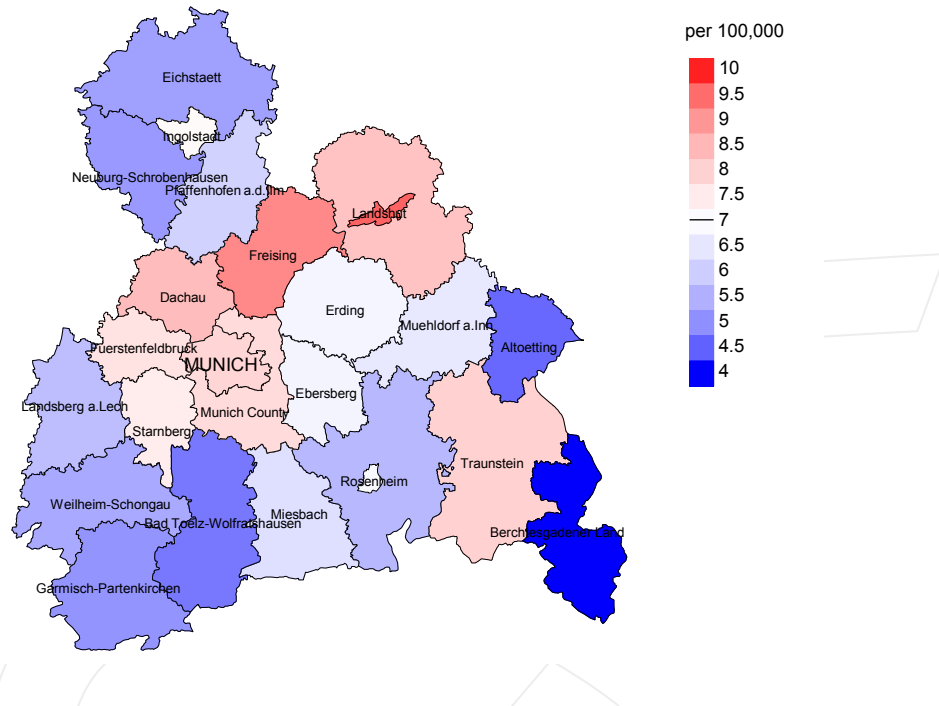
\* See corresponding tables with multiple malignancies.



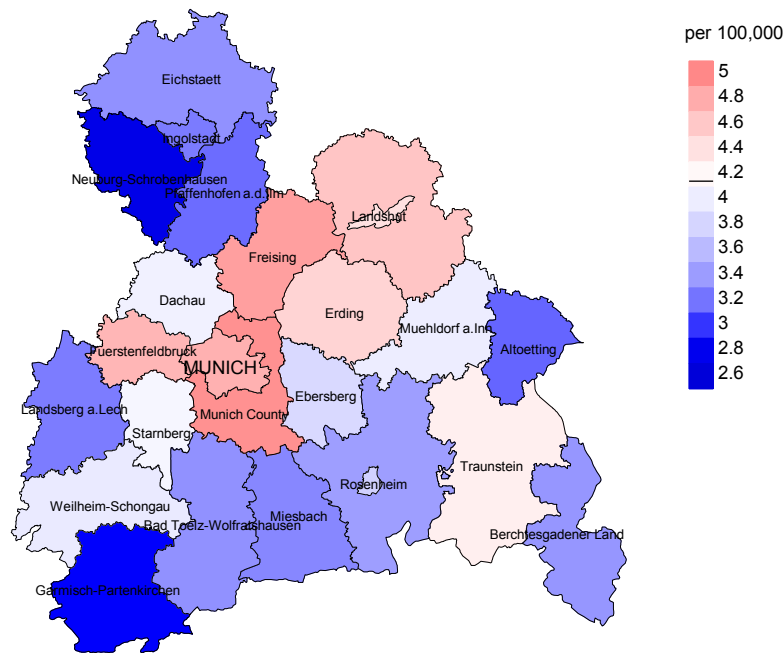
**Figure 17.** Distribution of age at death (bars; males: mean=68.9 yrs, median=71.6 yrs; females: mean=70.3 yrs, median=73.7 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



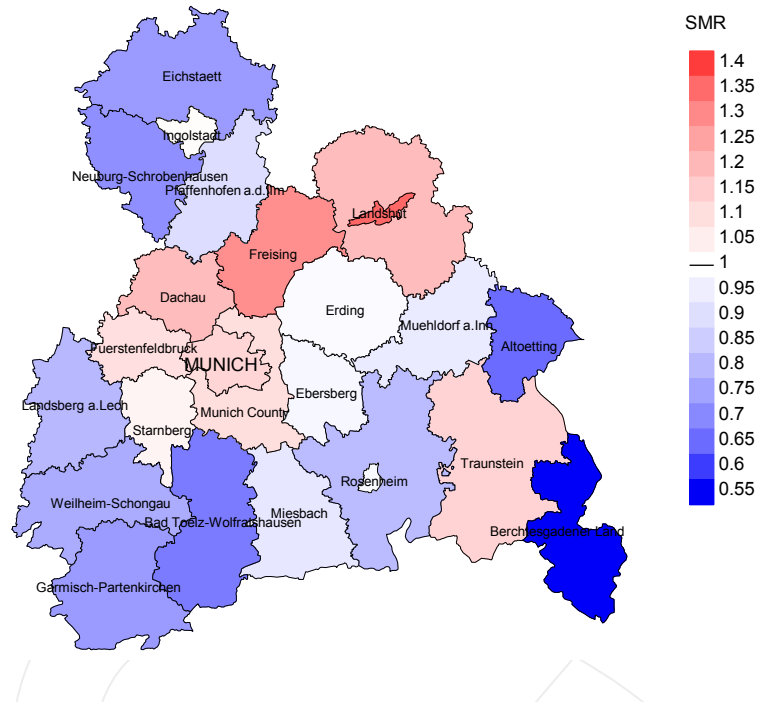
Average mortality (Germany 1987 standard population) 2007 - 2019: Females



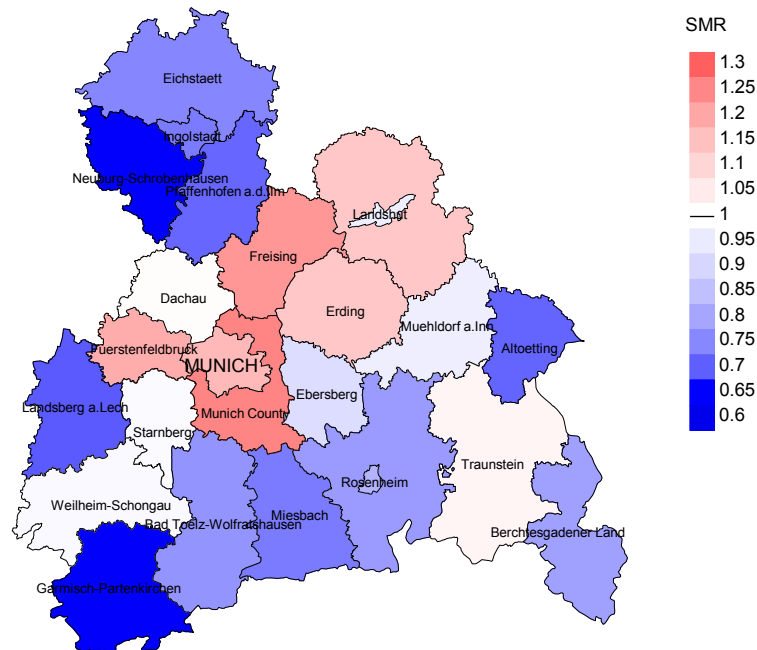
**Figure 18a.** Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 7.1/100,000 WS N=2,270, females 4.1/100,000 WS N=1,746).

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 43 women died from leukaemias. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 3.8/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 2.5 and 5.7/100,000.

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=2,270, females N=1,746).

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 43 women died from leukaemias. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.92. Though, the value of this parameter may vary with an underlying probability of 99% between 0.60 and 1.34, 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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