

# Munich Cancer Registry



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## ICD-10 C91.0, C92.0-C94.4: Acute leukaemias

### Incidence and Mortality

Year of diagnosis	1998-2019
Patients	4,477
Diseases	4,483
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/bC914aE-ICD-10-C91.0-C92.0-C94.4-Acute-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 2016) used for specifying cancer site**

Code	Description
C91.0	Acute lymphoblastic leukaemia [ALL]
C92.0	Acute myeloblastic leukaemia [AML]
C92.4	Acute promyelocytic leukaemia [PML]
C92.5	Acute myelomonocytic leukaemia
C92.6	Acute myeloid leukaemia with 11q23-abnormality
C92.8	Acute myeloid leukaemia with multilineage dysplasia
C93.0	Acute monoblastic/monocytic leukaemia
C94.0	Acute erythroid leukaemia
C94.2	Acute megakaryoblastic leukaemia
C94.4	Acute panmyelosis with myelofibrosis

## 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	67	4	6.0	10.4	4.4	79.1	100.0
1999	70	3	4.3	9.5	4.3	68.6	94.3
2000	104	22	21.2	9.5	4.2	72.1	99.0
2001	128	53	41.4	10.3	4.2	78.9	95.3
2002	160	48	30.0	11.7	4.2	76.9	94.4 #
2003	201	66	32.8	12.9	4.2	78.6	97.0
2004	212	74	34.9	14.6	4.1	73.1	95.8
2005	222	63	28.4	15.2	4.0	72.1	95.5
2006	246	89	36.2	16.7	3.9	80.5	95.9
2007	236	60	25.4	17.1	4.0	74.2	94.9 #
2008	241	59	24.5	18.0	3.8	70.5	99.2
2009	235	43	18.3	18.9	3.8	75.7	99.1
2010	300	57	19.0	19.9	3.7	72.7	100.0
2011	255	38	14.9	20.7	3.6	68.2	99.2
2012	321	63	19.6	21.5	3.4	71.0	97.8
2013	292	63	21.6	22.1	3.0	72.6	99.0
2014	272	74	27.2	23.0	2.5	79.0	96.0
2015	255	62	24.3	23.4	2.0	83.9	98.0
2016	253	65	25.7	23.8	1.1	78.3	100.0
2017	230	52	22.6	24.2	0.5	74.8	99.6
2018	118	14	11.9	24.4	0.6	61.0	100.0
2019	65	7	10.8	24.5	0.0	63.1	87.7 ##
1998-2019	4483	1079	24.1	24.5	4.4	74.5	97.6

4,483 cases diagnosed 1998-2019 are related to a total of 4,477 patients. Currently, in 1,291 (28.8 %) of these 4,477 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,028 / 220 / 43 (23.0 % / 4.9 % / 1.0 %) patients exist having 2 / 3 / 4+ malignancies.

# The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

## Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be retrieved from the respective headings.

How to interpret:

In 2017, a subgroup of 230 cases has been diagnosed, of which 24.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.5 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

Cases 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	35	52.2	4	11.4	8.6	4.9	80.0	100.0
1999	40	57.1	1	2.5	8.0	4.8	77.5	97.5
2000	51	49.0	12	23.5	7.9	4.7	72.5	98.0
2001	74	57.8	29	39.2	8.0	4.7	79.7	95.9
2002	89	55.6	24	27.0	9.3	4.8	71.9	94.4 #
2003	106	52.7	32	30.2	10.4	4.7	79.2	97.2
2004	108	50.9	32	29.6	11.9	4.7	75.0	95.4
2005	120	54.1	29	24.2	13.8	4.7	69.2	95.8
2006	149	60.6	52	34.9	16.1	4.6	79.9	96.0
2007	124	52.5	32	25.8	16.5	4.5	75.0	96.8 #
2008	129	53.5	28	21.7	17.7	4.3	59.7	99.2
2009	108	46.0	20	18.5	18.6	4.1	76.9	99.1
2010	154	51.3	33	21.4	19.5	4.1	75.3	100.0
2011	127	49.8	18	14.2	20.4	4.0	70.9	99.2
2012	157	48.9	28	17.8	20.9	4.0	67.5	97.5
2013	168	57.5	39	23.2	22.0	3.5	70.8	99.4
2014	142	52.2	36	25.4	23.2	2.5	76.1	95.1
2015	131	51.4	32	24.4	23.2	1.9	83.2	97.7
2016	137	54.2	29	21.2	23.6	0.9	73.0	100.0
2017	122	53.0	23	18.9	24.3	0.5	75.4	100.0
2018	60	50.8	8	13.3	24.5	1.2	63.3	100.0
2019	28	43.1	4	14.3	24.5	0.0	67.9	85.7 ##
1998-2019	2359	52.6	545	23.1	24.5	4.9	73.6	97.7

2,359 cases diagnosed 1998-2019 are related to a total of 2,353 patients. Currently, in 681 (28.9 %) of these 2,353 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 542 / 114 / 25 (23.0 % / 4.8 % / 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 122 cases has been diagnosed, of which 24.3 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.5 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 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	32	47.8			12.5	3.8	78.1	100.0
1999	30	42.9	2	6.7	11.3	3.7	56.7	90.0
2000	53	51.0	10	18.9	11.3	3.8	71.7	100.0
2001	54	42.2	24	44.4	13.0	3.7	77.8	94.4
2002	71	44.4	24	33.8	14.6	3.6	83.1	94.4 #
2003	95	47.3	34	35.8	15.8	3.6	77.9	96.8
2004	104	49.1	42	40.4	17.8	3.4	71.2	96.2
2005	102	45.9	34	33.3	16.8	3.3	75.5	95.1
2006	97	39.4	37	38.1	17.6	3.2	81.4	95.9
2007	112	47.5	28	25.0	17.7	3.3	73.2	92.9 #
2008	112	46.5	31	27.7	18.4	3.3	83.0	99.1
2009	127	54.0	23	18.1	19.1	3.5	74.8	99.2
2010	146	48.7	24	16.4	20.4	3.3	69.9	100.0
2011	128	50.2	20	15.6	21.1	3.3	65.6	99.2
2012	164	51.1	35	21.3	22.1	2.8	74.4	98.2
2013	124	42.5	24	19.4	22.1	2.5	75.0	98.4
2014	130	47.8	38	29.2	22.8	2.5	82.3	96.9
2015	124	48.6	30	24.2	23.7	2.1	84.7	98.4
2016	116	45.8	36	31.0	24.0	1.3	84.5	100.0
2017	108	47.0	29	26.9	24.2	0.5	74.1	99.1
2018	58	49.2	6	10.3	24.2	0.0	58.6	100.0
2019	37	56.9	3	8.1	24.6	0.0	59.5	89.2 ##
1998–2019	2124	47.4	534	25.1	24.6	3.8	75.4	97.5

2,124 cases diagnosed 1998-2019 are related to a total of 2,124 patients. Currently, in 610 (28.7 %) of these 2,124 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 486 / 106 / 18 (22.9 % / 5.0 % / 0.8 %) 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 108 cases has been diagnosed, of which 24.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.5 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 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	35	32	3.2	2.7	3.2	2.3	3.3	2.5	3.5	2.5
1999	40	30	3.6	2.5	3.0	3.1	3.4	2.7	3.6	2.5
2000	51	53	4.5	4.4	4.5	3.6	4.7	3.9	5.1	4.0
2001	74	54	6.4	4.4	4.9	3.3	6.0	3.7	6.9	4.1
2002	89	71	4.8	3.6	4.3	2.4	4.6	2.9	5.0	3.2
2003	106	95	5.7	4.8	4.3	3.6	5.2	4.0	6.2	4.2
2004	108	104	5.7	5.3	4.8	3.9	5.3	4.3	5.9	4.7
2005	120	102	6.3	5.1	5.5	4.0	5.9	4.2	6.6	4.6
2006	149	97	7.8	4.8	6.1	3.2	6.9	3.6	7.9	4.1
2007	124	112	5.6	4.9	4.4	3.9	5.0	4.1	5.7	4.4
2008	129	112	5.8	4.8	5.5	3.4	5.5	3.8	5.7	4.3
2009	108	127	4.8	5.5	3.4	3.8	4.0	4.3	4.7	4.7
2010	154	146	6.8	6.2	5.0	4.0	5.9	4.7	6.7	5.2
2011	127	128	5.7	5.5	4.5	4.3	5.0	4.5	5.4	4.7
2012	157	164	6.9	6.9	5.2	5.3	5.9	5.7	6.7	6.1
2013	168	124	7.3	5.2	4.9	3.4	5.8	3.8	7.0	4.4
2014	142	130	6.1	5.4	3.4	2.7	4.5	3.6	5.6	4.4
2015	131	124	5.5	5.1	3.0	2.4	4.1	3.3	5.0	4.1
2016	137	116	5.7	4.7	3.1	2.3	4.2	3.0	5.3	3.7
2017	122	108	5.1	4.4	2.5	2.1	3.6	2.9	4.5	3.5
2018	60	58	2.5	2.3	1.3	1.2	1.8	1.6	2.3	1.9
2019	28	37	1.2	1.5	0.6	0.8	0.8	1.0	1.0	1.2
1998-2019	2359	2124	5.4	4.6	3.9	3.1	4.6	3.6	5.3	4.0

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	Mean	Std. dev.	Min.	Max.	Median				
						10%	25%	50%	75%	90%
1998	67	49.2	27.7	0.9	88.3	4.6	29.0	53.7	73.3	83.2
1999	70	48.2	28.2	0.3	88.2	3.3	15.5	56.3	72.3	77.4
2000	104	50.5	24.9	0.4	94.3	8.4	35.0	56.9	70.3	77.7
2001	128	56.7	22.7	1.4	92.7	13.6	46.2	62.6	73.4	80.8
2002	160	54.5	25.3	1.0	94.9	12.7	36.8	61.3	74.1	82.5
2003	201	57.7	24.9	0.3	93.6	11.5	43.8	64.0	77.6	82.6
2004	212	56.3	25.7	0.4	92.3	10.3	39.6	64.6	77.1	83.1
2005	222	54.0	26.6	0.6	91.3	6.6	38.4	64.2	75.6	81.7
2006	246	59.6	26.1	1.0	95.1	8.0	47.8	69.3	78.6	84.4
2007	236	55.8	25.4	0.3	94.5	10.6	41.6	64.9	74.9	81.3
2008	241	54.4	27.0	0.4	94.8	8.5	35.3	65.3	75.1	82.7
2009	235	59.1	24.0	1.3	99.2	19.4	44.6	67.7	76.3	84.1
2010	300	60.8	24.3	0.3	94.2	17.7	50.9	68.4	77.8	85.6
2011	255	56.3	26.3	0.3	98.4	9.9	43.3	66.1	75.9	83.1
2012	321	57.8	25.5	0.0	92.6	11.0	44.4	67.6	76.8	83.1
2013	292	61.9	23.9	0.1	92.7	18.6	53.9	70.7	78.3	84.3
2014	272	66.2	19.8	0.5	95.9	32.4	59.2	72.9	79.0	85.0
2015	255	66.8	18.1	1.8	92.7	40.9	57.8	72.3	78.6	85.7
2016	253	66.2	18.5	9.1	94.5	36.6	55.2	71.7	80.1	85.7
2017	230	67.0	16.0	18.2	94.8	41.5	58.5	71.6	78.4	84.0
2018	118	66.5	17.0	18.5	91.6	41.3	57.7	69.7	78.9	85.7
2019	65	65.3	18.9	20.2	86.3	31.4	55.8	72.3	79.8	83.9
1998-2019	4483	59.5	24.1	0.0	99.2	17.0	47.1	67.5	77.2	83.6

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	35	45.9	29.1	0.9	88.3	4.3	8.7	52.9	72.9	78.4
1999	40	51.7	24.4	0.3	86.9	5.8	39.6	57.6	71.2	77.4
2000	51	47.7	26.2	0.4	86.5	8.4	20.3	52.9	70.7	77.7
2001	74	56.1	21.7	1.4	92.7	16.5	45.0	61.9	70.9	79.8
2002	89	50.2	27.4	1.0	94.9	5.2	31.0	58.6	72.8	81.2
2003	106	58.2	25.0	1.6	93.6	14.4	44.6	64.8	78.0	82.6
2004	108	54.3	26.4	0.4	89.2	7.5	35.2	63.7	75.6	82.9
2005	120	52.6	26.9	0.7	91.3	4.7	34.2	64.4	74.2	79.5
2006	149	57.3	25.7	1.0	93.6	7.3	42.2	67.5	75.3	81.2
2007	124	55.5	24.2	0.3	94.5	13.5	41.0	63.9	73.3	80.6
2008	129	49.7	28.5	0.4	93.8	4.2	25.9	62.3	73.6	80.6
2009	108	59.3	23.2	2.2	88.1	19.4	48.9	69.0	75.3	82.0
2010	154	59.2	24.3	0.3	92.8	15.9	50.9	67.7	75.8	82.7
2011	127	56.2	25.8	2.5	98.4	7.5	43.7	64.3	74.3	82.2
2012	157	58.5	25.6	2.4	92.6	9.9	47.9	68.0	77.6	84.4
2013	168	62.0	23.4	0.5	92.7	17.8	56.9	70.6	77.5	83.6
2014	142	66.5	20.9	0.5	95.9	31.7	57.4	73.4	80.3	85.6
2015	131	66.6	18.8	1.8	92.5	41.1	57.8	71.9	78.7	85.6
2016	137	65.2	17.8	17.5	92.2	35.8	54.9	70.7	76.7	84.0
2017	122	66.8	15.4	18.2	91.2	43.0	58.5	71.6	77.6	81.9
2018	60	67.9	17.6	18.5	91.6	41.8	60.6	73.0	79.8	85.7
2019	28	66.7	19.2	20.2	86.0	26.0	58.5	74.2	80.3	83.9
1998-2019	2359	58.7	24.4	0.3	98.4	15.4	46.8	67.0	76.4	82.6

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	32	52.8	26.1	1.3	87.5	12.1	38.3	54.1	74.9	83.2
1999	30	43.5	32.5	1.5	88.2	3.2	4.4	54.6	73.4	78.1
2000	53	53.3	23.4	2.1	94.3	16.5	38.5	59.7	69.8	77.5
2001	54	57.6	24.2	2.8	89.5	13.6	49.8	64.0	75.1	81.4
2002	71	59.8	21.4	2.9	89.0	26.1	45.4	62.1	77.5	83.1
2003	95	57.2	25.0	0.3	89.1	6.4	43.2	63.8	77.6	82.6
2004	104	58.5	24.8	0.7	92.3	12.5	45.1	65.4	77.5	83.3
2005	102	55.6	26.2	0.6	90.8	11.1	40.3	64.2	78.1	83.4
2006	97	63.1	26.5	1.8	95.1	8.0	56.4	72.9	80.9	86.6
2007	112	56.0	26.7	1.0	94.3	6.5	42.1	65.3	76.0	81.9
2008	112	59.9	24.0	1.4	94.8	18.9	47.6	67.9	78.0	83.9
2009	127	58.9	24.7	1.3	99.2	19.0	43.0	66.4	77.6	86.7
2010	146	62.4	24.3	0.8	94.2	21.9	51.3	69.1	80.9	86.9
2011	128	56.4	26.8	0.3	90.0	9.9	41.6	69.5	76.0	85.0
2012	164	57.1	25.5	0.0	92.4	11.0	43.8	65.3	76.4	82.6
2013	124	61.7	24.6	0.1	91.4	20.8	50.7	71.0	79.6	86.1
2014	130	66.0	18.6	2.7	93.2	33.3	60.0	72.5	78.1	83.9
2015	124	67.0	17.5	5.0	92.7	36.4	57.4	72.6	78.6	86.0
2016	116	67.3	19.4	9.1	94.5	38.6	55.8	73.9	82.2	87.5
2017	108	67.1	16.6	18.8	94.8	39.4	58.7	71.1	78.8	85.2
2018	58	65.2	16.3	26.6	91.3	41.3	56.0	68.8	76.3	84.7
2019	37	64.3	18.8	21.2	86.3	31.4	53.1	69.8	79.3	84.2
1998-2019	2124	60.4	23.9	0.0	99.2	19.2	47.3	67.9	78.3	84.5

Table 4

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

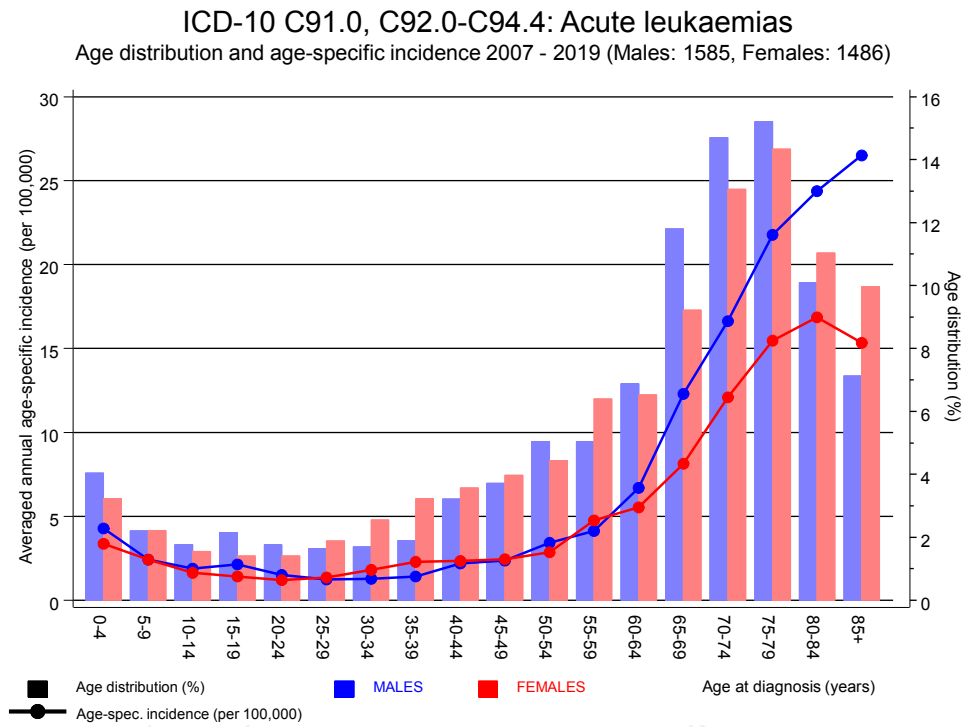
Age at diagnosis Years	Cases			Males			Females		
	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0–4	112	3.6	3.6	64	4.0	4.0	48	3.2	3.2
5–9	68	2.2	5.9	35	2.2	6.2	33	2.2	5.5
10–14	51	1.7	7.5	28	1.8	8.0	23	1.5	7.0
15–19	55	1.8	9.3	34	2.1	10.1	21	1.4	8.4
20–24	49	1.6	10.9	28	1.8	11.9	21	1.4	9.8
25–29	54	1.8	12.7	26	1.6	13.5	28	1.9	11.7
30–34	65	2.1	14.8	27	1.7	15.2	38	2.6	14.3
35–39	78	2.5	17.3	30	1.9	17.1	48	3.2	17.5
40–44	104	3.4	20.7	51	3.2	20.4	53	3.6	21.1
45–49	118	3.8	24.5	59	3.7	24.1	59	4.0	25.0
50–54	146	4.8	29.3	80	5.0	29.1	66	4.4	29.5
55–59	175	5.7	35.0	80	5.0	34.2	95	6.4	35.9
60–64	206	6.7	41.7	109	6.9	41.0	97	6.5	42.4
65–69	324	10.5	52.2	187	11.8	52.8	137	9.2	51.6
70–74	429	14.0	66.2	235	14.8	67.6	194	13.1	64.7
75–79	454	14.8	81.0	241	15.2	82.8	213	14.3	79.0
80–84	324	10.5	91.5	160	10.1	92.9	164	11.0	90.0
85+	261	8.5	100.0	113	7.1	100.0	148	10.0	100.0
All ages	3073	100.0		1587	100.0		1486	100.0	

Table 5

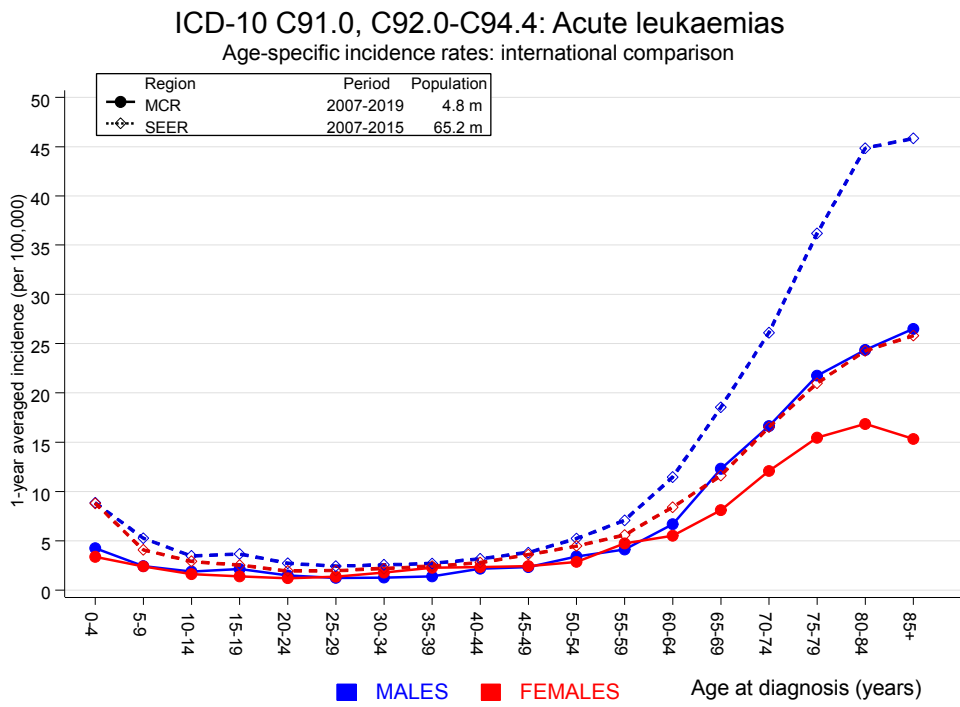
Age-specific incidence, DCO rate and proportion of all cancers  
for period 2007–2019

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid.	Females Age- spec. incid.	Males DCO rate n=330 %	Females DCO rate n=327 %	Males	Females
							Prop.all cancers n=143063 %	Prop.all cancers n=144724 %
0– 4	64	48	4.3	3.4	1.6	2.1	30.3	29.8
5– 9	35	33	2.4	2.4	2.9		30.7	35.5
10–14	28	23	1.9	1.6		4.3	21.1	19.7
15–19	34	21	2.1	1.4		4.8	11.4	8.5
20–24	28	21	1.5	1.2	3.6	4.8	4.8	4.4
25–29	26	28	1.2	1.4			3.0	2.5
30–34	27	38	1.3	1.8		5.3	2.3	1.9
35–39	30	48	1.4	2.3	10.0	4.2	1.8	1.5
40–44	51	53	2.2	2.3	5.9	5.7	2.0	0.9
45–49	59	59	2.4	2.4	10.2	13.6	1.2	0.7
50–54	80	66	3.4	2.9	10.0	9.1	1.0	0.6
55–59	80	95	4.1	4.8	13.8	11.6	0.7	0.8
60–64	109	97	6.7	5.5	17.4	18.6	0.7	0.7
65–69	187	137	12.3	8.1	21.9	24.8	0.8	0.8
70–74	233	194	16.6	12.1	23.2	23.7	0.9	1.0
75–79	241	213	21.8	15.5	27.4	31.5	1.1	1.2
80–84	160	164	24.4	16.8	40.0	33.5	1.1	1.2
85+	113	148	26.5	15.3	46.0	48.0	1.1	1.0
All ages	1585	1486			20.8	22.0	1.1	1.0
Incidence								
Raw			5.3	4.8				
WS			3.5	3.0				
ES			4.2	3.5				
BRD-S			5.0	4.0				

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=61.0 yrs, median=68.9 yrs; females: mean=61.8 yrs, median=69.1 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	2	0.3	6.2	0.8	22.4	4.1	
C09-C10 Oropharynx	1	0.4	2.5	0.1	14.0	1.5	
C12-C13 Hypopharynx	1	0.2	4.6	0.1	25.9	1.9	
C15 Oesophagus	2	0.7	2.9	0.4	10.5	3.2	50.0
C16 Stomach	2	1.2	1.6	0.2	6.0	1.9	
C18 Colon	8	3.0	2.7	1.2	5.3 #	12.3	
C19-C20 Rectum	4	1.7	2.3	0.6	5.9	5.5	
C23-C24 Bile	1	0.3	3.1	0.1	17.0	1.6	
C25 Pancreas	3	1.2	2.4	0.5	7.1	4.3	
C32 Larynx	1	0.3	2.9	0.1	16.1	1.6	100.0
C33-C34 Lung	11	3.9	2.8	1.4	5.0 #	17.4	9.1
C38,C45 Mesothelioma	1	0.2	4.7	0.1	26.0	1.9	
C40-C41 Bone	1	0.0	24.5	0.6	136.6	2.3	
C43 Malign. melanoma	2	1.6	1.3	0.2	4.6	1.1	
C46,C49 Soft tissue	4	0.2	20.1	5.5	51.4 #	9.3	
C50 Breast	2	0.1	22.5	2.7	81.4 #	4.7	
C61 Prostate	15	9.0	1.7	0.9	2.7	14.6	13.3
C62 Testis	2	0.3	7.3	0.9	26.4	4.2	
C64 Kidney	1	1.2	0.8	0.0	4.7	-0.4	
C67 Bladder	1	1.4	0.7	0.0	4.1	-0.9	
C70-C72 CNS cancer	4	0.5	8.4	2.3	21.5 #	8.6	
C73 Thyroid	6	0.3	21.4	7.9	46.6 #	14.0	
C81 Hodgkin lymphoma	2	0.1	16.3	2.0	58.9 #	4.6	
C82-C85 NHL	14	1.4	10.0	5.5	16.9 #	30.8	
C90 Mult. myeloma	4	0.4	9.7	2.6	24.8 #	8.8	
C91-C96 Leukaemia	12	0.5	22.7	11.7	39.6 #	28.1	33.3
Not observed	0	2.6	0.0	0.0	1.4	-6.3	
All further malignancies	107	33.1	3.2	2.6	3.9 #	180.8	8.4
Patients		1994					
Median age at next malignancy (years)		66.4					
Person-years		4087					
Mean observation time (years)		2.0					
Median observation time (years)		0.7					

# The occurrence of further specified malignancy is statistically significant.



Table 7b

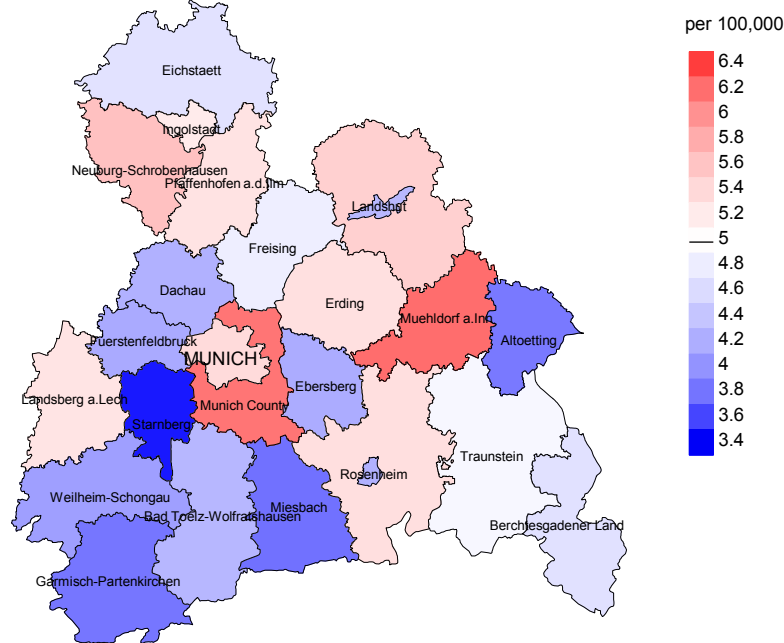
Standardized incidence ratio (SIR, with 95% confidence limits),  
excess absolute risk (EAR) and DCO rate of further malignancies  
for period 1998-2019

## FEMALES

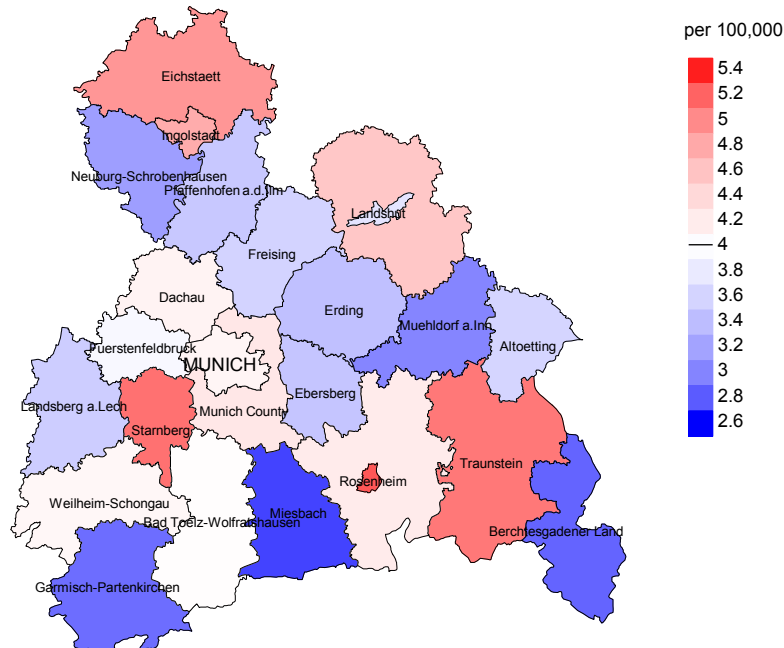
Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C03-C06 Oral cavity	2	0.1	16.6	2.0	59.8 #	5.3	
C07-C08 Salivary gland	1	0.0	31.6	0.8	176.1	2.7	
C09-C10 Oropharynx	1	0.1	10.3	0.3	57.3	2.6	
C15 Oesophagus	3	0.1	23.6	4.9	69.1 #	8.2	
C18 Colon	3	1.6	1.9	0.4	5.5	4.0	
C19-C20 Rectum	2	0.7	2.8	0.3	10.1	3.7	
C22 Liver	2	0.2	9.2	1.1	33.3 #	5.1	
C25 Pancreas	1	0.8	1.3	0.0	7.2	0.7	
C33-C34 Lung	6	1.5	4.0	1.5	8.6 #	12.7	
C43 Malign. melanoma	2	0.9	2.3	0.3	8.4	3.2	
C46,C49 Soft tissue	1	0.1	8.7	0.2	48.5	2.5	
C50 Breast	13	6.7	2.0	1.0	3.3 #	18.0	7.7
C51 Vulva	1	0.2	5.5	0.1	30.4	2.3	
C53 Cervix uteri	4	0.4	11.2	3.0	28.6 #	10.3	50.0
C54 Corpus uteri	4	1.1	3.6	1.0	9.2	8.2	
C56 Ovary	1	0.8	1.3	0.0	7.0	0.6	
C64 Kidney	1	0.4	2.3	0.1	12.8	1.6	
C70-C72 CNS cancer	1	0.3	3.5	0.1	19.8	2.0	
C73 Thyroid	3	0.5	6.1	1.3	17.9 #	7.1	
C76-C79 CUP	1	0.3	3.5	0.1	19.4	2.0	
C82-C85 NHL	6	0.7	8.4	3.1	18.2 #	15.0	
C90 Mult. myeloma	1	0.2	4.6	0.1	25.8	2.2	
C91-C96 Leukaemia	1	0.3	3.4	0.1	18.8	2.0	
C96 Systemic	1	0.0	300.4	7.6	1674 #	2.8	100.0
Not observed	0	1.9	0.0	0.0	1.9	-5.4	
All further malignancies	62	19.9	3.1	2.4	4.0 #	119.5	6.5
Patients		1760					
Median age at next malignancy (years)		64.7					
Person-years		3523					
Mean observation time (years)		2.0					
Median observation time (years)		0.6					

# The occurrence of further specified malignancy is statistically significant.

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



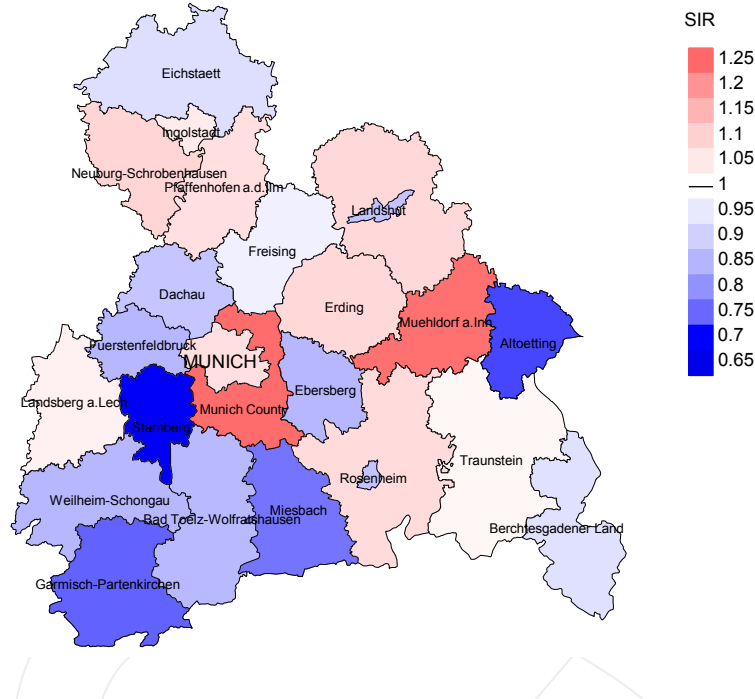
Average incidence (Germany 1987 standard population) 2007 - 2019: Females



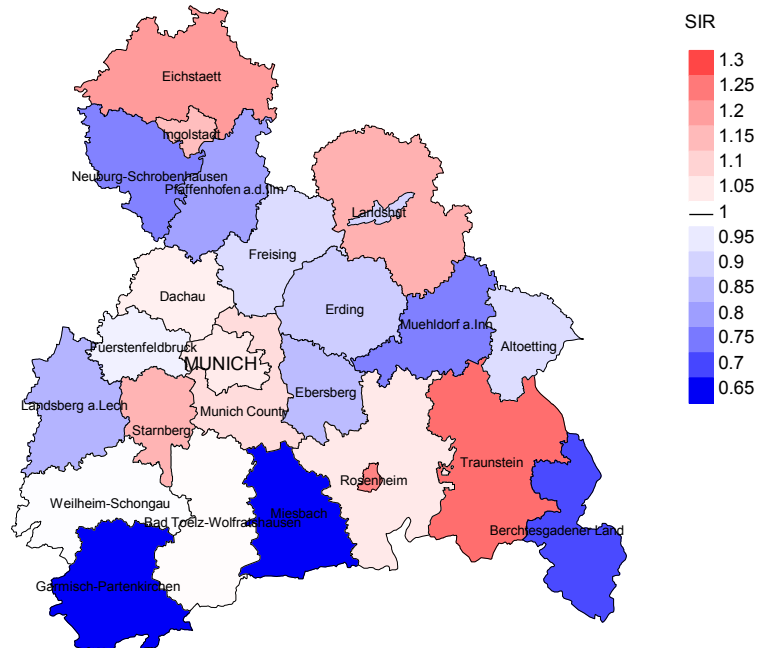
**Figure 8a.** Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 5.0/100,000 WS N=1,585, females 4.0/100,000 WS N=1,486).

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 35 women were identified with newly diagnosed acute leukaemias. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 3.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 2.1 and 5.3/100,000.

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=1,585, females N=1,486).

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 35 women were identified with newly diagnosed acute 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 0.53 and 1.30, 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	67	100.0	6.0	53	79.1	98.1
1999	70	94.3	4.3	48	68.6	95.8
2000	104	99.0	21.2	75	72.1	94.7
2001	128	95.3	41.4	101	78.9	99.0
2002	160	94.4	30.0	123	76.9	96.7
2003	201	97.0	32.8	158	78.6	98.7
2004	212	95.8	34.9	155	73.1	99.4
2005	222	95.5	28.4	160	72.1	98.1
2006	246	95.9	36.2	198	80.5	97.0
2007	236	94.9	25.4	175	74.2	97.1
2008	241	99.2	24.5	170	70.5	98.2
2009	235	99.1	18.3	178	75.7	98.3
2010	300	100.0	19.0	218	72.7	97.2
2011	255	99.2	14.9	174	68.2	97.1
2012	321	97.8	19.6	228	71.0	96.9
2013	292	99.0	21.6	212	72.6	96.2
2014	272	96.0	27.2	215	79.0	96.7
2015	255	98.0	24.3	214	83.9	97.2
2016	253	100.0	25.7	198	78.3	93.4
2017	230	99.6	22.6	172	74.8	80.2
2018	118	100.0	11.9	72	61.0	41.7
2019	65	87.7	10.8	41	63.1	63.4
1998-2019	4483	97.6	24.1	3338	74.5	94.7

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	67	54	98.1	26	38.8
1999	70	37	97.3	12	17.1
2000	104	64	98.4	38	36.5
2001	128	103	98.1	57	44.5
2002	160	100	98.0	63	39.4
2003	201	129	98.4	89	44.3
2004	212	121	99.2	86	40.6
2005	222	153	99.3	94	42.3
2006	246	150	98.7	124	50.4
2007	236	165	97.0	96	40.7
2008	241	160	98.1	97	40.2
2009	235	151	97.4	93	39.6
2010	300	195	97.9	129	43.0
2011	255	184	97.3	91	35.7
2012	321	199	99.0	119	37.1
2013	292	212	97.6	125	42.8
2014	272	198	98.0	124	45.6
2015	255	203	98.5	127	49.8
2016	253	191	99.5	130	51.4
2017	230	194	97.9	115	50.0
2018	118	120	36.7	48	40.7
2019	65	91	48.4	30	46.2
1998–2019	4483	3174	94.5	1913	42.7

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	54	81.5	18.5	96.2
1999	37	78.4	21.6	97.2
2000	64	92.2	7.8	100.0
2001	103	86.4	13.6	99.0
2002	100	93.0	7.0	100.0
2003	129	93.0	7.0	99.2
2004	121	96.7	3.3	98.3
2005	153	96.1	3.9	100.0
2006	150	95.3	4.7	98.6
2007	165	93.9	6.1	98.8
2008	160	92.5	7.5	96.2
2009	151	93.4	6.6	95.9
2010	195	94.4	5.6	99.0
2011	184	91.8	8.2	97.2
2012	199	94.0	6.0	99.5
2013	212	87.7	12.3	99.0
2014	198	87.9	12.1	96.4
2015	203	90.6	9.4	97.0
2016	191	89.5	10.5	97.4
2017	194	89.7	10.3	97.4
2018	120	53.3	46.7	95.5
2019	91	56.0	44.0	93.2
1998–2019	3174	89.1	10.9	98.0

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	30	56.4	58.0	55.0	57.0
1999	21	59.6	59.6	65.6	59.8
2000	41	61.8	61.8	60.7	61.8
2001	54	69.2	71.5	61.1	69.7
2002	52	67.3	67.3	65.8	67.9
2003	74	68.9	68.5	75.2	68.7
2004	61	70.5	70.9	64.7	70.7
2005	77	69.9	69.9	70.9	69.9
2006	88	70.8	70.8	71.0	70.7
2007	88	68.9	69.0	3.4	69.0
2008	84	70.1	70.8	68.1	70.3
2009	73	71.9	72.0	67.6	72.4
2010	94	72.1	72.1	56.5	72.1
2011	86	72.0	72.9	66.4	72.4
2012	97	72.5	72.5	81.2	72.5
2013	117	75.0	75.0	76.3	75.0
2014	101	75.3	75.3	73.7	75.4
2015	108	74.1	74.5	59.0	73.9
2016	103	75.4	75.4	75.7	75.5
2017	98	74.1	73.7	74.4	74.0
2018	69	71.9	68.4	73.5	70.7
2019	44	74.8	74.3	79.8	75.1
1998-2019	1660	72.0	72.1	71.8	72.0

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	24	61.7	57.4	83.7	59.5
1999	16	74.2	74.7	68.5	74.3
2000	23	63.2	63.9	29.9	63.2
2001	49	67.8	69.5	61.7	69.5
2002	48	70.1	69.9	81.1	69.9
2003	55	66.3	67.2	52.5	66.3
2004	60	73.4	73.4	76.9	74.3
2005	76	69.7	70.4	29.8	69.7
2006	62	75.5	75.4	76.7	75.5
2007	77	69.8	70.3	60.4	70.3
2008	76	72.9	72.8	84.3	72.8
2009	78	72.8	73.0	61.6	72.8
2010	101	76.8	77.7	68.0	77.3
2011	98	72.4	72.4	78.2	72.5
2012	102	72.1	72.1	72.1	72.0
2013	95	74.4	72.7	79.4	73.6
2014	97	74.4	74.7	63.3	74.7
2015	95	74.8	74.7	77.7	74.8
2016	88	75.1	74.9	78.1	74.8
2017	96	74.0	73.1	74.9	73.2
2018	51	75.2	75.2	74.6	75.8
2019	47	69.6	76.0	68.8	72.4
1998-2019	1514	72.8	72.9	71.9	72.9

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	24	2.2	0.69	2.1	0.65	2.2	0.68	2.5	0.71
1999	17	1.5	0.43	1.3	0.43	1.4	0.42	1.6	0.44
2000	37	3.2	0.73	2.5	0.55	3.0	0.65	3.6	0.70
2001	46	4.0	0.62	2.4	0.49	3.5	0.59	4.8	0.70
2002	48	2.6	0.54	1.7	0.39	2.3	0.49	2.9	0.58
2003	68	3.6	0.64	2.2	0.50	3.1	0.59	4.0	0.65
2004	59	3.1	0.55	1.8	0.38	2.6	0.49	3.6	0.61
2005	73	3.9	0.61	2.3	0.42	3.2	0.54	4.1	0.62
2006	82	4.3	0.55	2.3	0.38	3.3	0.48	4.4	0.56
2007	85	3.8	0.69	2.3	0.53	3.1	0.62	4.0	0.70
2008	77	3.5	0.60	1.9	0.34	2.6	0.48	3.4	0.60
2009	69	3.1	0.64	1.6	0.46	2.3	0.56	3.0	0.65
2010	89	3.9	0.58	2.0	0.39	2.9	0.50	3.8	0.56
2011	78	3.5	0.61	1.8	0.40	2.5	0.51	3.4	0.63
2012	91	4.0	0.58	2.0	0.38	2.9	0.50	3.7	0.56
2013	104	4.5	0.62	1.9	0.40	3.0	0.52	4.2	0.60
2014	88	3.8	0.62	1.6	0.47	2.5	0.55	3.4	0.61
2015	96	4.0	0.74	2.1	0.70	2.8	0.71	3.7	0.74
2016	91	3.8	0.66	1.7	0.54	2.5	0.60	3.4	0.65
2017	87	3.6	0.71	1.7	0.67	2.5	0.69	3.3	0.72
2018	35	1.4	0.58	0.8	0.62	1.1	0.61	1.4	0.60
2019	29	1.2	1.04	0.6	0.99	0.8	1.08	1.1	1.00
1998-2019	1473	3.3	0.63	1.8	0.46	2.5	0.56	3.3	0.63

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	20	1.7	0.63	1.4	0.61	1.5	0.62	1.6	0.66
1999	12	1.0	0.40	0.5	0.18	0.7	0.26	0.8	0.34
2000	22	1.8	0.42	1.1	0.31	1.3	0.34	1.5	0.38
2001	43	3.5	0.80	1.9	0.59	2.6	0.69	3.2	0.77
2002	45	2.3	0.63	1.3	0.55	1.7	0.58	2.1	0.64
2003	52	2.6	0.55	1.3	0.35	1.8	0.45	2.2	0.53
2004	58	2.9	0.56	1.5	0.39	2.0	0.46	2.4	0.52
2005	74	3.7	0.73	1.8	0.45	2.4	0.57	3.0	0.65
2006	61	3.0	0.63	1.4	0.44	2.0	0.55	2.6	0.64
2007	70	3.0	0.63	1.6	0.41	2.1	0.51	2.6	0.59
2008	71	3.1	0.63	1.4	0.41	1.9	0.51	2.4	0.56
2009	72	3.1	0.57	1.5	0.40	2.1	0.49	2.6	0.56
2010	95	4.1	0.65	1.7	0.41	2.3	0.50	3.1	0.60
2011	91	3.9	0.71	1.8	0.41	2.5	0.55	3.1	0.65
2012	96	4.1	0.59	1.9	0.36	2.6	0.45	3.2	0.53
2013	82	3.4	0.66	1.6	0.48	2.2	0.57	2.7	0.62
2014	86	3.6	0.66	1.6	0.58	2.2	0.61	2.7	0.61
2015	88	3.6	0.71	1.5	0.63	2.2	0.66	2.8	0.69
2016	80	3.3	0.69	1.5	0.67	2.0	0.67	2.5	0.66
2017	87	3.5	0.81	1.5	0.74	2.2	0.76	2.7	0.79
2018	29	1.2	0.50	0.5	0.41	0.7	0.42	0.9	0.47
2019	22	0.9	0.59	0.4	0.48	0.5	0.52	0.7	0.54
1998-2019	1356	3.0	0.64	1.4	0.46	1.9	0.54	2.4	0.60

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	0.2	0.2	1	0.1	0.1	3	0.3	0.3
5-9	10	0.5	0.7	4	0.4	0.5	6	0.6	0.9
10-14	16	0.8	1.5	4	0.4	0.9	12	1.2	2.2
15-19	12	0.6	2.1	7	0.7	1.6	5	0.5	2.7
20-24	20	1.0	3.1	14	1.4	2.9	6	0.6	3.3
25-29	20	1.0	4.1	15	1.5	4.4	5	0.5	3.8
30-34	22	1.1	5.2	8	0.8	5.2	14	1.4	5.3
35-39	35	1.8	7.0	19	1.9	7.1	16	1.7	6.9
40-44	46	2.3	9.3	22	2.2	9.2	24	2.5	9.4
45-49	63	3.2	12.5	29	2.8	12.1	34	3.5	12.9
50-54	71	3.6	16.0	39	3.8	15.9	32	3.3	16.2
55-59	105	5.3	21.3	44	4.3	20.2	61	6.3	22.5
60-64	131	6.6	27.9	65	6.4	26.6	66	6.8	29.3
65-69	219	11.0	38.9	128	12.6	39.2	91	9.4	38.7
70-74	351	17.7	56.6	188	18.4	57.6	163	16.8	55.5
75-79	391	19.7	76.3	217	21.3	78.9	174	18.0	73.5
80-84	256	12.9	89.1	123	12.1	91.0	133	13.7	87.2
85+	216	10.9	100.0	92	9.0	100.0	124	12.8	100.0
All ages	1988	100.0		1019	100.0		969	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	4	6	0.3	0.11	0.4	0.18	16.0	26.1
10-14	4	12	0.3	0.14	0.9	0.52	14.8	52.2
15-19	7	5	0.4	0.21	0.3	0.24	14.9	20.0
20-24	14	6	0.8	0.50	0.3	0.29	20.9	15.4
25-29	15	5	0.7	0.58	0.2	0.18	17.6	5.4
30-34	8	14	0.4	0.30	0.7	0.37	6.3	8.8
35-39	19	16	0.9	0.63	0.8	0.33	7.8	4.4
40-44	22	24	0.9	0.43	1.1	0.45	3.8	3.0
45-49	29	34	1.2	0.49	1.4	0.58	2.2	2.2
50-54	39	32	1.7	0.49	1.4	0.48	1.6	1.3
55-59	44	61	2.3	0.55	3.1	0.64	1.1	1.7
60-64	65	66	4.0	0.60	3.8	0.68	1.1	1.4
65-69	128	91	8.4	0.68	5.4	0.66	1.5	1.4
70-74	188	163	13.4	0.81	10.1	0.84	1.7	2.0
75-79	217	174	19.6	0.90	12.6	0.82	1.9	1.9
80-84	123	133	18.7	0.77	13.7	0.81	1.3	1.6
85+	92	124	21.6	0.81	12.8	0.84	1.1	1.1
All ages	1019	969					1.6	1.7
Mortality								
Raw			3.4	0.64	3.1	0.65		
WS			1.7	0.47	1.4	0.47		
ES			2.4	0.57	1.9	0.55		
BRD-S			3.2	0.64	2.5	0.61		
PYLL-70								
per 100,000			24.2		25.0			
ES			23.2		25.0			
AYLL-70			16.1		17.4			

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	3	0.5	2	66.7			1	33.3
C07-C08 Salivary gland	1	0.2	1	100.0				
C09-C10 Oropharynx	3	0.5	1	33.3	1	33.3	1	33.3
C12-C13 Hypopharynx	2	0.3					2	100.0
C15 Oesophagus	5	0.8	2	40.0			3	60.0
C16 Stomach	6	1.0	4	66.7	1	16.7	1	16.7
C17 Small intestine	2	0.3	2	100.0				
C18 Colon	38	6.4	30	78.9	3	7.9	5	13.2
C19-C20 Rectum	18	3.0	14	77.8	1	5.6	3	16.7
C22 Liver	1	0.2	1	100.0				
C23-C24 Bile	1	0.2					1	100.0
C25 Pancreas	6	1.0			2	33.3	4	66.7
C30-C31 Sinuses	1	0.2	1	100.0				
C32 Larynx	4	0.7	3	75.0	1	25.0		
C33-C34 Lung	22	3.7	9	40.9	5	22.7	8	36.4
C38,C45 Mesothelioma	2	0.3	1	50.0	1	50.0		
C40-C41 Bone	2	0.3	1	50.0			1	50.0
C43 Malign. melanoma	15	2.5	14	93.3			1	6.7
C44 Skin others	30	5.0	17	56.7	4	13.3	9	30.0
C46,C49 Soft tissue	11	1.8	4	36.4	1	9.1	6	54.5
C48 Peritoneal	2	0.3	2	100.0				
C61 Prostate	113	18.9	104	92.0	3	2.7	6	5.3
C62 Testis	4	0.7	3	75.0			1	25.0
C64 Kidney	12	2.0	11	91.7			1	8.3
C67 Bladder	14	2.3	11	78.6	2	14.3	1	7.1
C68 Urinary org.	2	0.3	1	50.0			1	50.0
C70-C72 CNS cancer	7	1.2	3	42.9	1	14.3	3	42.9
C73 Thyroid	4	0.7	3	75.0			1	25.0
C74-C80 Cancer others	1	0.2	1	100.0				
C76-C79 CUP	1	0.2	1	100.0				
C81 Hodgkin lymphoma	9	1.5	7	77.8			2	22.2
C82-C85 NHL	59	9.9	40	67.8	9	15.3	10	16.9
C90 Mult. myeloma	6	1.0	4	66.7	2	33.3		
C91-C96 Leukaemia	188	31.5			51	27.1	137	72.9
C96 Systemic	2	0.3	1	50.0	1	50.0		
All further malignancies	597	100.0	299	50.1	89	14.9	209	35.0

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	1	0.2					1	100.0
C07-C08 Salivary gland	2	0.4	2	100.0				
C09-C10 Oropharynx	1	0.2	1	100.0				
C12-C13 Hypopharynx	1	0.2	1	100.0				
C15 Oesophagus	3	0.6					3	100.0
C16 Stomach	5	1.0	5	100.0				
C18 Colon	15	3.0	13	86.7	1	6.7	1	6.7
C19-C20 Rectum	8	1.6	5	62.5	1	12.5	2	25.0
C21 Anus/canal	2	0.4	2	100.0				
C22 Liver	3	0.6					3	100.0
C23-C24 Bile	1	0.2	1	100.0				
C25 Pancreas	2	0.4					2	100.0
C26 GI cancer	1	0.2	1	100.0				
C30-C31 Sinuses	1	0.2	1	100.0				
C33-C34 Lung	11	2.2	6	54.5	2	18.2	3	27.3
C40-C41 Bone	1	0.2	1	100.0				
C43 Malign. melanoma	10	2.0	9	90.0	1	10.0		
C44 Skin others	16	3.2	11	68.8	1	6.3	4	25.0
C46,C49 Soft tissue	4	0.8	2	50.0			2	50.0
C48 Peritoneal	3	0.6	3	100.0				
C50 Breast	128	25.5	117	91.4	7	5.5	4	3.1
C51 Vulva	2	0.4	2	100.0				
C52 Vagina	1	0.2					1	100.0
C53 Cervix uteri	11	2.2	8	72.7	1	9.1	2	18.2
C54 Corpus uteri	26	5.2	21	80.8	2	7.7	3	11.5
C56 Ovary	8	1.6	7	87.5			1	12.5
C64 Kidney	6	1.2	4	66.7	2	33.3		
C65 Renal pelvis	1	0.2					1	100.0
C66 Ureter	1	0.2	1	100.0				
C67 Bladder	5	1.0	4	80.0	1	20.0		
C69 Eye lymphoma	1	0.2	1	100.0				
C70-C72 CNS cancer	7	1.4	2	28.6			5	71.4
C73 Thyroid	14	2.8	13	92.9	1	7.1		
C76-C79 CUP	5	1.0	1	20.0	1	20.0	3	60.0
C81 Hodgkin lymphoma	5	1.0	5	100.0				
C82-C85 NHL	28	5.6	22	78.6	3	10.7	3	10.7
C90 Mult. myeloma	7	1.4	5	71.4	2	28.6		
C91-C96 Leukaemia	153	30.5			41	26.8	112	73.2
C96 Systemic	2	0.4	1	50.0			1	50.0
All further malignancies	502	100.0	278	55.4	67	13.3	157	31.3

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		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	20.0
5- 9	4	6	0.3	0.12	0.4	0.19	16.7	26.1
10-14	4	10	0.3	0.15	0.7	0.45	14.8	52.6
15-19	7	4	0.4	0.22	0.3	0.21	15.6	17.4
20-24	12	5	0.6	0.46	0.3	0.24	20.0	13.5
25-29	13	5	0.6	0.52	0.2	0.22	16.9	5.8
30-34	8	13	0.4	0.33	0.6	0.36	6.5	9.4
35-39	17	16	0.8	0.59	0.8	0.35	7.5	4.8
40-44	20	19	0.9	0.43	0.8	0.45	3.8	2.7
45-49	24	25	1.0	0.50	1.0	0.57	2.0	1.9
50-54	31	26	1.3	0.44	1.1	0.54	1.4	1.3
55-59	37	39	1.9	0.57	2.0	0.57	1.0	1.3
60-64	43	48	2.6	0.53	2.7	0.73	0.9	1.3
65-69	75	62	4.9	0.64	3.7	0.70	1.1	1.2
70-74	105	90	7.5	0.77	5.6	0.72	1.2	1.4
75-79	129	109	11.7	0.94	7.9	0.81	1.5	1.6
80-84	75	93	11.4	0.78	9.6	0.85	1.1	1.4
85+	49	75	11.5	0.83	7.8	0.82	0.8	0.9
All ages	654	648					1.3	1.4
Mortality								
Raw			2.2	0.59	2.1	0.61		
WS			1.2	0.41	1.0	0.42		
ES			1.6	0.50	1.4	0.50		
BRD-S			2.0	0.58	1.7	0.57		
PYLL-70								
per 100,000			20.7		20.5			
ES			20.1		20.8			
AYLL-70			18.6		19.1			

\* See corresponding tables with multiple malignancies.

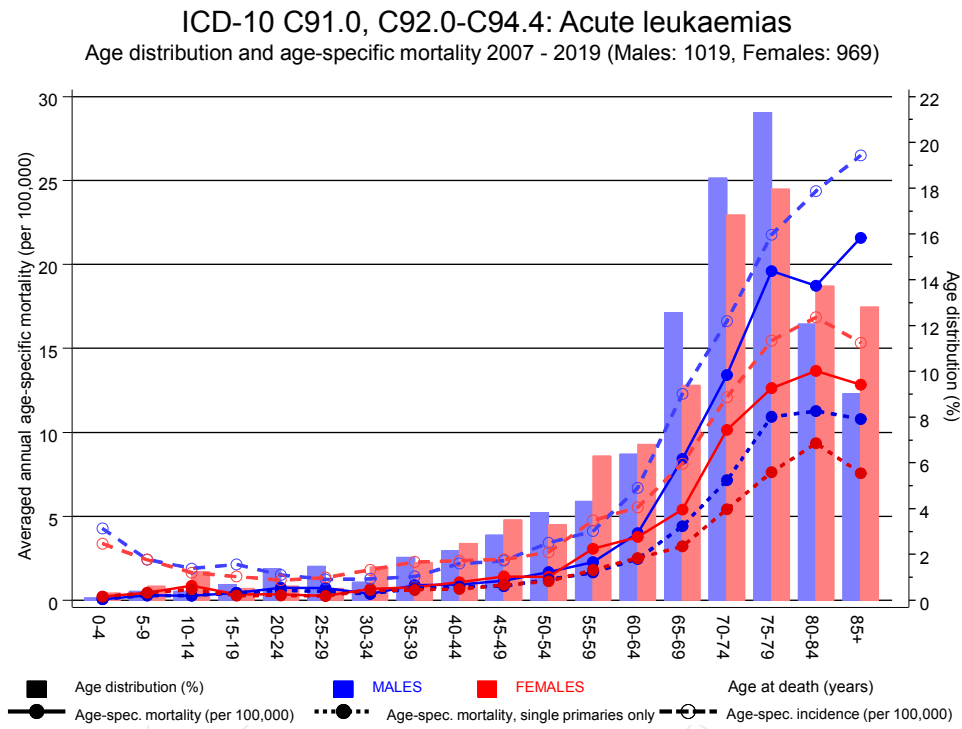
Table 16

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	4	6	0.3	0.12	0.4	0.20	16.7	26.1
10-14	4	9	0.3	0.15	0.6	0.43	14.8	47.4
15-19	7	4	0.4	0.24	0.3	0.21	15.6	18.2
20-24	11	5	0.6	0.42	0.3	0.24	18.3	13.9
25-29	11	5	0.5	0.44	0.2	0.25	14.3	6.0
30-34	8	13	0.4	0.35	0.6	0.37	6.5	9.5
35-39	15	13	0.7	0.52	0.6	0.31	6.7	4.0
40-44	19	15	0.8	0.42	0.7	0.38	3.6	2.2
45-49	21	22	0.8	0.46	0.9	0.50	1.7	1.6
50-54	29	26	1.2	0.45	1.1	0.62	1.3	1.3
55-59	32	36	1.6	0.55	1.8	0.55	0.9	1.2
60-64	40	44	2.5	0.53	2.5	0.73	0.8	1.2
65-69	67	54	4.4	0.62	3.2	0.64	1.0	1.1
70-74	100	87	7.1	0.78	5.4	0.73	1.2	1.4
75-79	121	105	10.9	0.91	7.6	0.79	1.5	1.6
80-84	74	91	11.3	0.78	9.3	0.85	1.2	1.4
85+	46	73	10.8	0.82	7.6	0.80	0.8	0.9
All ages	610	611					1.3	1.4
Mortality								
Raw			2.0	0.57	2.0	0.60		
WS			1.1	0.39	1.0	0.41		
ES			1.5	0.49	1.3	0.49		
BRD-S			1.9	0.56	1.6	0.55		
PYLL-70								
per 100,000			19.1		18.9			
ES			18.7		19.3			
AYLL-70			18.8		19.4			

\* See corresponding tables with multiple malignancies.

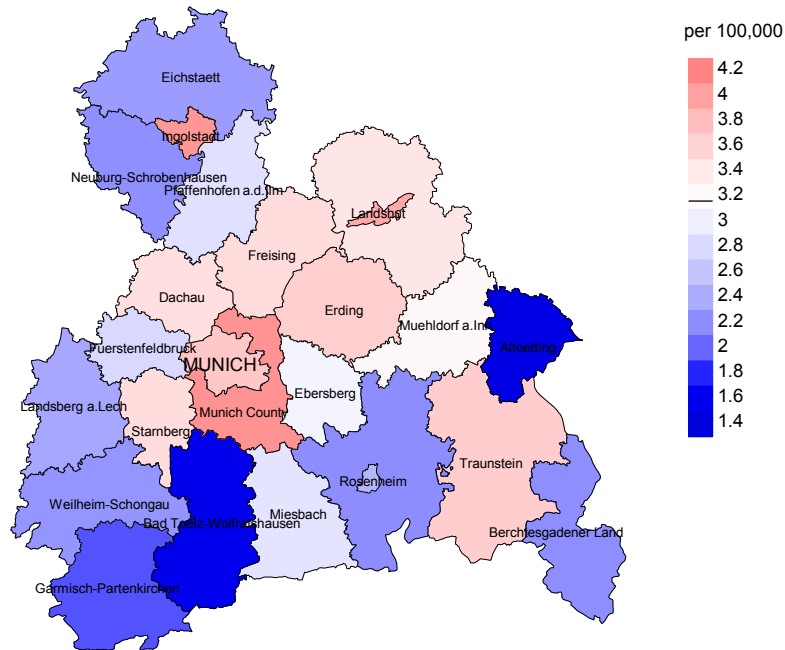




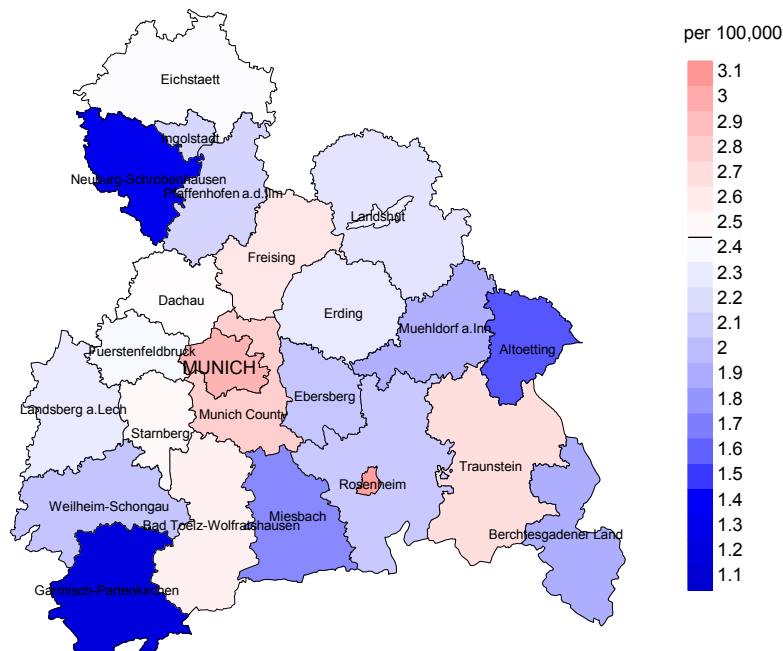
**Figure 17.** Distribution of age at death (bars; males: mean=67.6 yrs, median=72.1 yrs; females: mean=67.9 yrs, median=72.3 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



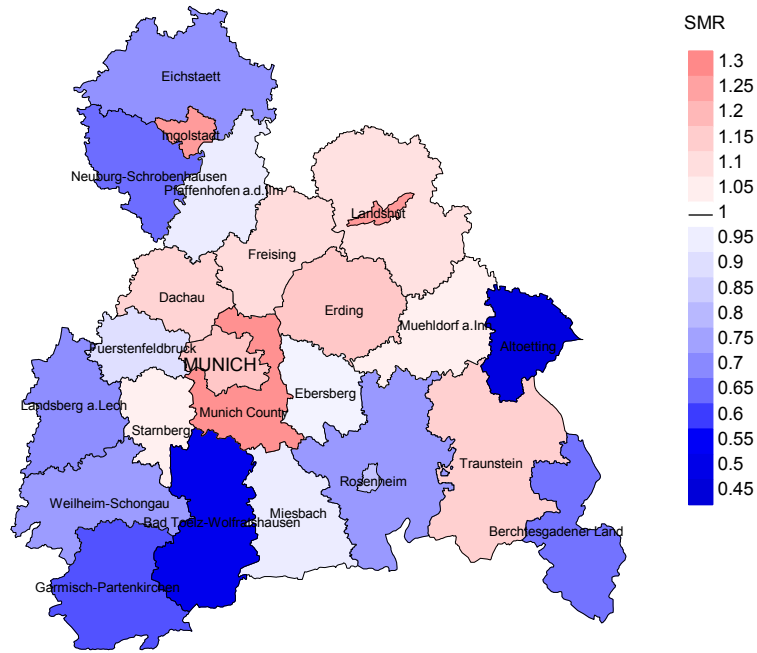
Average mortality (Germany 1987 standard population) 2007 - 2019: Females



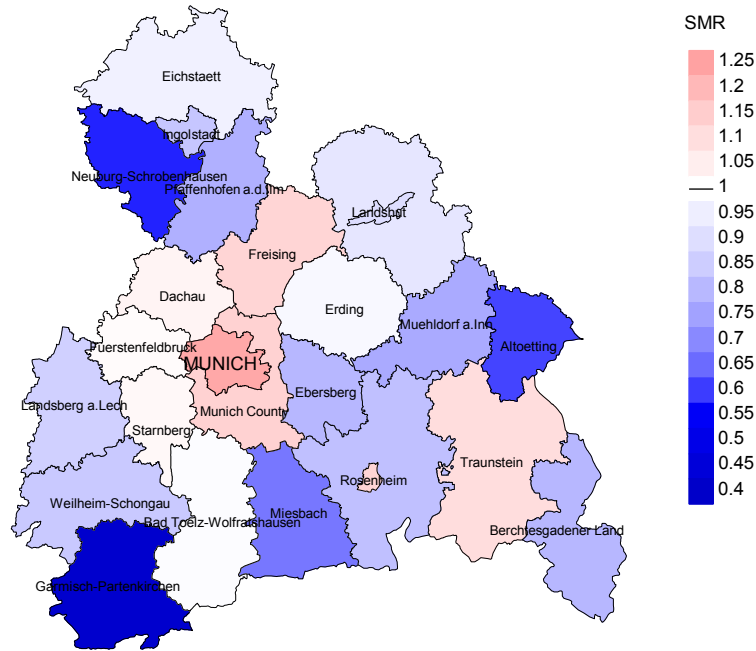
**Figure 18a.** Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 3.2/100,000 WS N=1,019, females 2.5/100,000 WS N=969).

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 21 women died from acute leukaemias. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.1/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.1 and 3.6/100,000.

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=1,019, females N=969).

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 21 women died from acute leukaemias. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.79. Though, the value of this parameter may vary with an underlying probability of 99% between 0.42 and 1.36, 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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