Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

ICD-10 C40, C41: Bone cancer

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	735
Diseases	738
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

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

https://www.tumorregister-muenchen.de/en/facts/base/bC4041E-ICD-10-C40-C41-Bone-cancer-incidence-and-mortality.pdf

Index of figures and tables

Fig./Tbl.		Page
1	Annual cases, DCO, mult. malignancies, follow-up / yr	4
2	Incidence by year of diagnosis	7
3	Age distribution parameters by year of diagnosis	8
4	Age distribution by 5-year age group and sex	11
5	Age-specific incidence, DCO rate, proportion malignancies	12
6	Age distribution and age-specific incidence (chart)	13
6a	Age-specific incidence internationally (chart)	14
7	Standardized incidence ratio of further malignancies	15
8a	Map of cancer incidence (BRD-S) by county (chart)	17
8b	Standardized incidence ratio (SIR) by county (chart)	18
9a	Pts incident cohorts and mortality / yr	19
9b	Incidence and mortality by year of diagnosis	20
9c	Cancer-related deaths, death certification available / yr	21
10	Medians of age at death / yr	22
11	Mortality by year of death	24
12	Distribution of age at death	26
13	Age-specific mortality	27
14	Further malignancies in deaths	28
15	Age-specific mortality (first primaries)	30
16	Age-specific mortality (single primaries)	31
17	Age distribution and age-specific mortality (chart)	32
18a	Map of cancer mortality (BRD-S) by county (chart)	33
18b	Standardized mortality ratio (SMR) by county (chart)	34

Global Statements about the statistics on the Internet −
Baseline Statistics (grey button), **Survival** (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.69 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, December 2021

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.65 million to 4.10 in 2002, and to 4.69 million in 2007).

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate.

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

Code	Description
C40.-	Malignant neoplasm of bone and articular cartilage of limbs
C40.0	Scapula and long bones of upper limb
C40.1	Short bones of upper limb
C40.2	Long bones of lower limb
C40.3	Short bones of lower limb
C40.8	Overlapping lesion of bone and articular cartilage of limbs
C40.9	Bone and articular cartilage of limb, unspecified
C41.-	Malignant neoplasm of bone and articular cartilage of other and unspecified sites
C41.0	Bones of skull and face
C41.1	Mandible
C41.2	Vertebral column
C41.3	Ribs, sternum and clavicle
C41.4	Pelvic bones, sacrum and coccyx
C41.8	Overlapping lesion of bone and articular cartilage
C41.9	Bone and articular cartilage, unspecified

INCIDENCE

Table 1

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

Year of diagnosis	All cases n	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	24	1	4.2	12.5	8.9	41.7	95.8
1999	23	1	4.3	14.9	8.5	47.8	95.7
2000	19	2	10.5	15.2	8.3	47.4	94.7
2001	19	3	15.8	16.5	8.1	57.9	94.7
2002	30	2	6.7	16.5	8.0	50.0	93.3 #
2003	27	3	11.1	14.1	7.6	51.9	92.6
2004	38	8	21.1	13.3	7.8	68.4	97.4
2005	26	1	3.8	12.6	7.6	53.8	88.5
2006	25	1	4.0	12.6	7.6	40.0	84.0
2007	51	1	2.0	12.8	7.2	43.1	82.4 #
2008	38	3	7.9	12.5	6.6	55.3	94.7
2009	39	2	5.1	12.3	6.0	43.6	92.3
2010	45	3	6.7	13.4	6.1	51.1	100.0
2011	49	4	8.2	14.1	6.4	55.1	100.0
2012	49	2	4.1	14.1	4.6	32.7	100.0
2013	44			14.3	4.3	31.8	95.5
2014	26	3	11.5	14.5	3.7	73.1	100.0
2015	39	2	5.1	15.4	3.7	46.2	97.4
2016	37	5	13.5	15.6	3.2	56.8	100.0
2017	32	4	12.5	16.2	1.1	43.8	100.0
2018	19	2	10.5	16.2	1.8	31.6	94.7
2019	18			16.5	2.6	22.2	100.0
2020	21			16.5	0.0	14.3	100.0 ##
1998-2020	738	53	7.2	16.5	8.9	46.7	95.4

738 cases diagnosed 1998-2020 are related to a total of 735 patients. Currently, in 178 (24.2 %) of these 735 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 129 / 40 / 9 (17.6 % / 5.4 % / 1.2 %) patients exist having 2 / 3 / 4+ malignancies.

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

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

How to interpret:
In 2018, a subgroup of 19 cases has been diagnosed, of which 16.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 1.8 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

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

Year of diagnosis	Males n	Males %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	11	45.8	1	9.1	9.1	9.4	45.5	100.0
1999	8	34.8			21.1	9.2	62.5	100.0
2000	6	31.6			24.0	9.1	50.0	83.3
2001	10	52.6	1	10.0	20.0	9.0	60.0	90.0
2002	17	56.7	1	5.9	17.3	9.0	64.7	94.1 #
2003	14	51.9			13.6	8.8	50.0	92.9
2004	22	57.9	5	22.7	12.5	8.9	77.3	100.0
2005	16	61.5	1	6.3	10.6	8.2	56.3	81.3
2006	13	52.0			12.0	8.6	38.5	76.9
2007	32	62.7			13.4	8.3	56.3	90.6 #
2008	22	57.9	1	4.5	12.9	7.3	50.0	90.9
2009	27	69.2	2	7.4	12.1	6.3	51.9	92.6
2010	21	46.7			11.9	6.6	52.4	100.0
2011	39	79.6	1	2.6	12.8	6.8	53.8	100.0
2012	32	65.3	2	6.3	13.4	3.6	40.6	100.0
2013	20	45.5			13.5	2.9	35.0	100.0
2014	9	34.6			13.5	1.2	66.7	100.0
2015	19	48.7			14.2	1.3	36.8	100.0
2016	14	37.8	3	21.4	14.2	0.0	64.3	100.0
2017	14	43.8	2	14.3	15.0	0.0	42.9	100.0
2018	11	57.9			14.6	0.0	18.2	100.0
2019	5	27.8			14.7	0.0	20.0	100.0
2020	15	71.4			14.6	0.0	13.3	100.0 ##
1998-2020	397	53.8	20	5.0	14.6	9.4	49.4	95.7

397 cases diagnosed 1998-2020 are related to a total of 395 patients. Currently, in 92 (23.3 %) of these 395 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 70 / 17 / 5 (17.7 % / 4.3 % / 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 retreived from the respective headings.

How to interpret:
In 2018, a subgroup of 11 cases has been diagnosed, of which 14.6 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.0 % 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 1b

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

Year of diagnosis	Females n	Females %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	13	54.2			15.4	8.3	38.5	92.3
1999	15	65.2	1	6.7	10.7	7.7	40.0	93.3
2000	13	68.4	2	15.4	9.8	7.4	46.2	100.0
2001	9	47.4	2	22.2	14.0	7.0	55.6	100.0
2002	13	43.3	1	7.7	15.9	6.9	30.8	92.3 #
2003	13	48.1	3	23.1	14.5	6.2	53.8	92.3
2004	16	42.1	3	18.8	14.1	6.5	56.3	93.8
2005	10	38.5			14.7	6.9	50.0	100.0
2006	12	48.0	1	8.3	13.2	6.3	41.7	91.7
2007	19	37.3	1	5.3	12.0	5.8	21.1	68.4 #
2008	16	42.1	2	12.5	12.1	5.8	62.5	100.0
2009	12	30.8			12.4	5.8	25.0	91.7
2010	24	53.3	3	12.5	15.1	5.6	50.0	100.0
2011	10	20.4	3	30.0	15.9	5.8	60.0	100.0
2012	17	34.7			15.1	5.6	17.6	100.0
2013	24	54.5			15.3	5.5	29.2	91.7
2014	17	65.4	3	17.6	15.8	5.8	76.5	100.0
2015	20	51.3	2	10.0	16.8	5.8	55.0	95.0
2016	23	62.2	2	8.7	17.2	6.0	52.2	100.0
2017	18	56.3	2	11.1	17.5	2.3	44.4	100.0
2018	8	42.1	2	25.0	18.0	3.8	50.0	87.5
2019	13	72.2			18.5	5.6	23.1	100.0
2020	6	28.6			18.8	0.0	16.7	100.0 ##
1998-2020	341	46.2	33	9.7	18.8	8.3	43.7	95.0

341 cases diagnosed 1998-2020 are related to a total of 340 patients. Currently, in 86 (25.3 %) of these 340 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 59 / 23 / 4 (17.4 % / 6.8 % / 1.2 %) patients exist having 2 / 3 / 4+ malignancies.

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

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

How to interpret:
In 2018, a subgroup of 8 cases has been diagnosed, of which 18.0 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.8 % 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 4.94 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	11	13	1.0	1.1	1.0	0.8	1.0	1.0	1.1	1.0
1999	8	15	0.7	1.3	0.6	1.1	0.7	1.1	0.7	1.2
2000	6	13	0.5	1.1	0.3	1.1	0.4	1.1	0.4	1.1
2001	10	9	0.9	0.7	1.0	0.8	1.0	0.7	1.0	0.8
2002	17	13	0.9	0.7	0.7	0.7	0.8	0.7	1.0	0.7
2003	14	13	0.7	0.7	0.7	0.5	0.7	0.5	0.8	0.6
2004	22	16	1.2	0.8	0.9	0.7	1.0	0.7	1.2	0.9
2005	16	10	0.8	0.5	1.0	0.4	0.9	0.4	0.9	0.5
2006	13	12	0.7	0.6	0.6	0.5	0.7	0.5	0.7	0.5
2007	32	19	1.4	0.8	1.5	0.9	1.4	0.9	1.5	0.8
2008	22	16	1.0	0.7	1.0	0.6	1.0	0.6	1.1	0.6
2009	27	12	1.2	0.5	1.1	0.6	1.2	0.5	1.2	0.6
2010	21	24	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1
2011	39	10	1.7	0.4	1.3	0.2	1.6	0.3	1.6	0.4
2012	32	17	1.4	0.7	1.3	0.6	1.4	0.6	1.4	0.7
2013	20	24	0.9	1.0	0.7	1.1	0.8	1.0	0.8	1.0
2014	9	17	0.4	0.7	0.3	0.4	0.3	0.5	0.4	0.6
2015	19	20	0.8	0.8	0.6	0.6	0.7	0.7	0.8	0.8
2016	14	23	0.6	0.9	0.5	0.5	0.6	0.7	0.6	0.8
2017	14	18	0.6	0.7	0.5	0.6	0.5	0.6	0.6	0.7
2018	11	8	0.5	0.3	0.3	0.2	0.4	0.3	0.4	0.3
2019	5	13	0.2	0.5	0.2	0.4	0.2	0.4	0.2	0.4
2020	15	6	0.6	0.2	0.4	0.3	0.5	0.3	0.5	0.3
1998-2020	397	341	0.9	0.7	0.8	0.6	0.8	0.6	0.9	0.7

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.	10%	25%	Median 50%	75%	90%
1998	24	50.0	20.5	14.1	77.6	18.6	30.9	56.2	66.4	74.2
1999	23	49.1	25.1	5.5	87.5	15.6	32.8	47.5	72.5	84.1
2000	19	44.7	20.2	7.9	87.0	14.8	31.7	45.2	55.9	75.2
2001	19	44.1	29.7	6.5	89.9	11.4	19.5	32.9	75.4	85.5
2002	30	46.6	23.9	12.6	87.2	16.3	23.3	42.7	65.6	78.2
2003	27	49.7	24.9	10.0	89.2	13.0	27.7	50.9	69.4	86.0
2004	38	52.5	23.9	12.5	92.9	17.8	28.3	58.8	73.7	82.4
2005	26	43.0	26.5	8.7	91.8	12.2	16.6	42.2	63.6	76.3
2006	25	44.3	22.0	9.5	80.5	13.2	30.2	39.2	64.0	74.7
2007	51	40.7	24.3	6.7	85.6	12.3	16.6	39.0	63.4	70.6
2008	38	46.4	28.2	8.3	88.9	12.2	18.0	48.9	71.3	84.2
2009	39	41.0	21.2	11.4	81.0	15.2	21.2	41.6	56.4	76.5
2010	45	44.2	25.3	5.6	78.4	11.6	19.7	52.0	67.2	75.2
2011	49	56.3	21.3	5.2	91.8	16.0	47.6	58.4	71.4	82.0
2012	49	48.7	24.5	7.4	87.1	14.7	22.8	52.1	67.8	80.0
2013	44	44.9	25.1	3.6	86.7	12.0	23.9	43.5	69.6	79.0
2014	26	63.3	24.8	10.4	100	16.7	57.3	70.1	83.2	87.1
2015	39	52.3	20.8	12.6	79.4	21.6	30.5	57.3	70.4	76.5
2016	37	58.4	21.0	18.2	89.6	19.9	48.0	63.7	73.0	85.1
2017	32	51.9	25.9	12.8	95.6	17.0	27.8	52.8	78.2	80.5
2018	19	56.9	20.6	20.6	88.0	22.9	41.2	61.3	73.5	80.6
2019	18	51.0	24.8	5.7	86.3	12.2	36.3	49.7	73.9	83.7
2020	21	52.3	21.0	13.6	90.0	17.0	43.3	54.1	67.4	74.5
1998-2020	738	48.9	24.2	3.6	100	14.7	26.8	52.0	69.9	79.4

Table 3a

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	11	45.6	22.0	17.0	74.2	18.6	22.8	47.1	67.7	73.9
1999	8	44.7	21.6	5.5	77.4	5.5	31.9	49.7	55.8	77.4
2000	6	46.8	11.9	31.7	56.1	31.7	31.8	52.8	55.9	56.1
2001	10	42.9	27.1	11.4	85.5	14.7	19.5	38.0	73.0	79.8
2002	17	49.7	21.0	18.9	87.2	21.4	32.5	45.9	64.2	75.3
2003	14	42.7	21.9	10.0	76.4	11.2	25.2	44.4	58.4	70.2
2004	22	53.0	23.9	12.5	91.9	15.7	33.3	61.2	67.5	79.5
2005	16	37.1	25.7	8.7	91.8	9.9	13.4	28.6	56.8	68.7
2006	13	41.0	20.0	13.2	73.3	14.0	29.8	35.9	52.7	70.7
2007	32	41.0	23.1	9.8	81.9	13.4	19.2	37.6	63.9	69.7
2008	22	42.4	25.8	11.9	88.9	17.0	18.9	35.4	67.8	73.7
2009	27	43.0	19.6	13.3	78.2	16.2	26.2	43.9	56.4	72.6
2010	21	41.1	26.3	7.5	78.4	10.7	14.7	33.1	67.2	75.2
2011	39	52.4	21.4	5.2	91.8	15.3	40.8	53.4	69.2	78.2
2012	32	47.0	26.7	7.4	87.1	13.3	19.1	51.3	70.6	80.0
2013	20	49.3	22.1	11.4	86.7	18.1	36.4	46.9	66.5	79.5
2014	9	59.3	23.0	13.9	84.0	13.9	57.3	66.4	72.0	84.0
2015	19	51.7	20.1	15.2	76.5	19.3	30.5	57.8	68.0	76.3
2016	14	53.2	27.0	18.2	89.6	19.1	19.9	63.9	69.0	85.2
2017	14	50.2	26.6	12.8	83.2	14.7	21.7	54.5	72.6	80.5
2018	11	57.5	15.7	22.9	75.7	41.2	51.3	59.5	73.5	74.0
2019	5	42.0	26.3	12.2	73.9	12.2	21.0	40.6	62.4	73.9
2020	15	56.7	15.6	27.6	90.0	40.2	43.5	54.6	67.4	74.5
1998-2020	397	47.3	23.0	5.2	91.9	14.7	25.1	50.8	66.4	76.3

Table 3b

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	13	53.8	19.3	14.1	77.6	26.8	49.7	56.9	65.1	77.1
1999	15	51.4	27.2	8.2	87.5	15.6	32.8	46.8	83.2	87.1
2000	13	43.7	23.4	7.9	87.0	14.8	27.5	44.9	52.9	75.2
2001	9	45.5	34.0	6.5	89.9	6.5	20.7	25.7	78.6	89.9
2002	13	42.6	27.6	12.6	85.8	14.4	16.5	33.8	67.3	81.1
2003	13	57.1	26.6	13.0	89.2	21.8	39.4	67.1	83.0	86.9
2004	16	51.7	24.7	17.8	92.9	19.9	26.9	55.9	73.9	84.0
2005	10	52.2	26.4	12.2	88.2	14.4	35.3	54.3	74.1	82.3
2006	12	47.7	24.3	9.5	80.5	12.6	33.4	42.0	69.4	78.6
2007	19	40.2	26.9	6.7	85.6	10.7	14.6	39.1	62.9	83.1
2008	16	51.9	31.1	8.3	88.2	9.1	15.4	66.4	77.6	84.3
2009	12	36.4	24.7	11.4	81.0	12.7	15.3	27.7	52.5	77.0
2010	24	46.9	24.6	5.6	78.2	13.0	21.0	59.5	67.1	73.7
2011	10	71.7	12.3	51.5	84.4	53.4	59.1	75.0	82.3	84.2
2012	17	51.9	20.2	16.3	80.7	22.0	44.0	57.2	62.8	77.6
2013	24	41.2	27.2	3.6	83.5	11.3	16.5	37.4	71.7	79.0
2014	17	65.4	26.1	10.4	100	16.7	57.5	74.8	83.8	89.7
2015	20	52.8	21.9	12.6	79.4	23.3	33.8	53.1	75.1	77.9
2016	23	61.6	16.2	29.3	87.9	43.5	49.5	61.4	74.3	82.1
2017	18	53.2	26.0	13.8	95.6	17.0	29.6	48.7	78.8	84.1
2018	8	56.0	27.1	20.6	88.0	20.6	26.2	67.0	76.4	88.0
2019	13	54.4	24.3	5.7	86.3	31.9	39.7	55.8	78.6	83.7
2020	6	41.5	29.7	13.6	82.1	13.6	16.8	34.2	67.9	82.1
1998-2020	341	50.9	25.4	3.6	100	14.8	27.4	55.1	74.5	83.0

Table 4

Age distribution by 5-year age group and sex for period 2007-2020
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	1	0.2	0.2			0.0	1	0.4	0.4
5-9	12	2.4	2.6	6	2.1	2.1	6	2.6	3.1
10-14	39	7.7	10.3	22	7.9	10.0	17	7.5	10.6
15-19	38	7.5	17.8	23	8.2	18.2	15	6.6	17.2
20-24	28	5.5	23.3	19	6.8	25.0	9	4.0	21.1
25-29	31	6.1	29.4	13	4.6	29.6	18	7.9	29.1
30-34	11	2.2	31.6	8	2.9	32.5	3	1.3	30.4
35-39	17	3.4	34.9	7	2.5	35.0	10	4.4	34.8
40-44	33	6.5	41.4	21	7.5	42.5	12	5.3	40.1
45-49	22	4.3	45.8	14	5.0	47.5	8	3.5	43.6
50-54	33	6.5	52.3	23	8.2	55.7	10	4.4	48.0
55-59	42	8.3	60.6	20	7.1	62.9	22	9.7	57.7
60-64	28	5.5	66.1	20	7.1	70.0	8	3.5	61.2
65-69	40	7.9	74.0	24	8.6	78.6	16	7.0	68.3
70-74	44	8.7	82.6	25	8.9	87.5	19	8.4	76.7
75-79	42	8.3	90.9	19	6.8	94.3	23	10.1	86.8
80-84	26	5.1	96.1	7	2.5	96.8	19	8.4	95.2
85+	20	3.9	100.0	9	3.2	100.0	11	4.8	100.0
All ages	507	100.0		280	100.0		227	100.0	

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 2007-2020

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=11 %	Females DCO rate n=20 %	Males Prop.all cancers n=153686 %	Females Prop.all cancers n=155051 %
0- 4		1		0.1				0.6
5- 9	6	6	0.4	0.4			5.1	6.0
10-14	22	17	1.4	1.1			16.1	13.3
15-19	23	15	1.3	0.9			7.2	5.7
20-24	19	9	0.9	0.5			3.0	1.7
25-29	13	18	0.6	0.8			1.4	1.5
30-34	8	3	0.3	0.1			0.6	0.1
35-39	7	10	0.3	0.4			0.4	0.3
40-44	20	12	0.8	0.5			0.7	0.2
45-49	14	8	0.5	0.3			0.3	0.1
50-54	23	10	0.9	0.4	4.3	10.0	0.3	0.1
55-59	20	22	0.9	1.0		4.5	0.2	0.2
60-64	20	8	1.1	0.4	10.0	12.5	0.1	0.1
65-69	24	16	1.5	0.9		12.5	0.1	0.1
70-74	25	19	1.7	1.1	4.0	10.5	0.1	0.1
75-79	19	23	1.6	1.5	10.5	13.0	0.1	0.1
80-84	7	19	1.0	1.8	14.3	26.3	0.0	0.1
85+	9	11	1.9	1.1	44.4	45.5	0.1	0.1
All ages	279	227			3.9	8.8	0.2	0.1
Incidence								
Raw			0.9	0.7				
WS			0.8	0.6				
ES			0.8	0.6				
BRD-S			0.9	0.6				

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

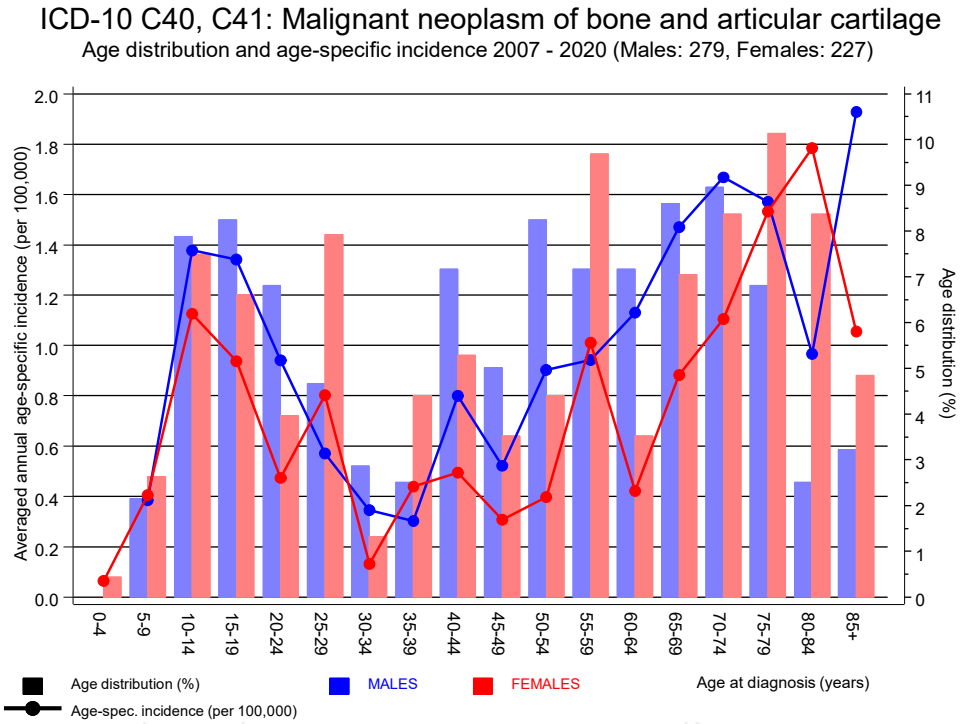


Figure 6. Age distribution (males: mean=48.1 yrs, median=51.8 yrs; females: mean=51.5 yrs, median=55.8 yrs) and age-specific incidence.

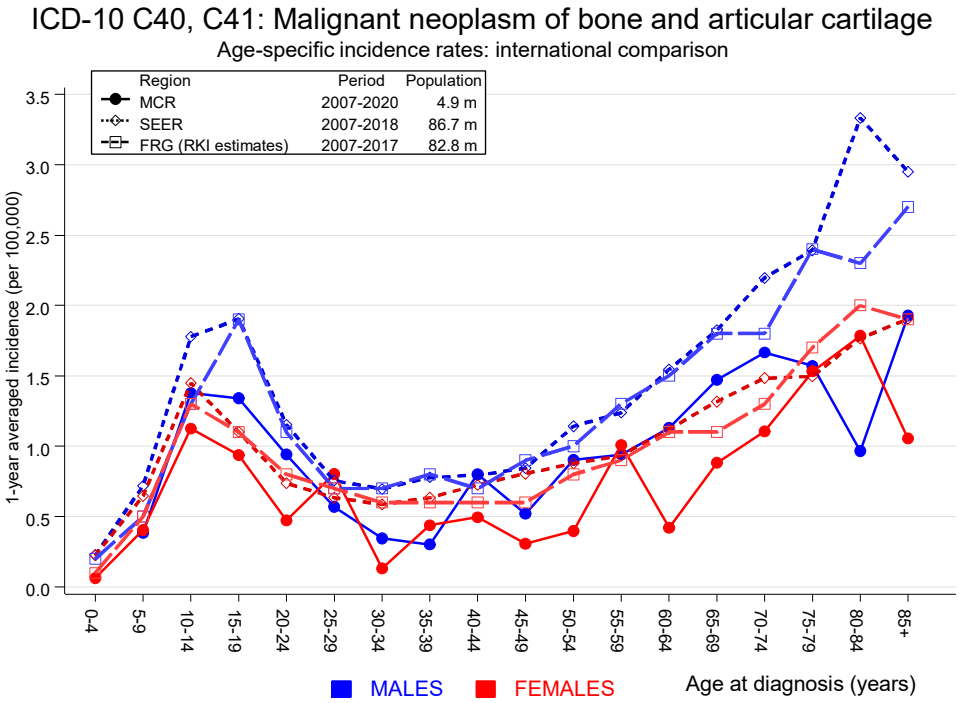


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, RKI estimates) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Estimated age-specific patient population of Germany, latest update: 16 March 2021. German Centre for Cancer Registry Data, Robert Koch Institute (RKI), based on data of the population based cancer registries. http://www.krebsdaten.de. Last access: 08/17/2021
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 21 Regs Research Data, released April 2021, based on the November 2020 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 1998-2020
MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C03-C06	Oral cavity	1	0.1	8.5	0.2	47.3		5.4	
C07-C08	Salivary gland	1	0.0	34.5	0.9	192.2		6.0	
C22	Liver	1	0.3	2.9	0.1	16.4		4.1	
C33-C34	Lung	7	1.4	5.1	2.1	10.5	#	34.7	57.1
C40-C41	Bone	2	0.0	108.8	13.2	392.9	#	12.2	
C43	Malign. melanoma	3	0.6	5.0	1.0	14.7	#	14.8	
C46,C49	Soft tissue	1	0.1	13.1	0.3	73.3		5.7	
C61	Prostate	7	3.2	2.2	0.9	4.5		23.2	
C62	Testis	1	0.1	7.0	0.2	39.2		5.3	
C64	Kidney	3	0.4	7.2	1.5	21.0	#	15.9	
C67	Bladder	1	0.5	1.9	0.0	10.7		3.0	
C70-C72	CNS cancer	2	0.2	11.5	1.4	41.4	#	11.3	
C76-C79	CUP	1	0.2	5.1	0.1	28.3		4.9	
C90	Mult. myeloma	1	0.2	6.6	0.2	36.8		5.2	
C91-C96	Leukaemia	3	0.2	15.9	3.3	46.5	#	17.3	
Not observed		0	4.5	0.0	0.0	0.8	#	-27.7	
All further malignancies		35	12.1	2.9	2.0	4.0	#	141.3	11.4

Patients	378
Median age at next malignancy (years)	68.3
Person-years	1622
Mean observation time (years)	4.3
Median observation time (years)	2.4

The occurrence of further specified malignancy is statistically significant.

Table 7b

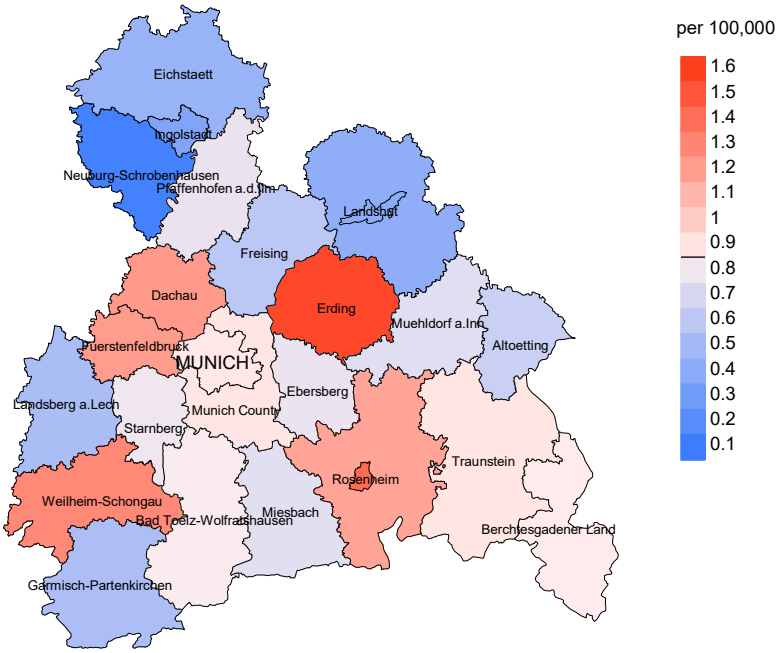
Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998-2020
FEMALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C16	Stomach	1	0.2	4.3	0.1	24.1	5.4	
C18	Colon	2	0.7	3.0	0.4	11.0	9.5	
C19-C20	Rectum	2	0.3	7.4	0.9	26.6	12.2	
C25	Pancreas	1	0.3	3.3	0.1	18.3	4.9	
C26	GI cancer	1	0.0	85.9	2.2	478.4 #	7.0	100.0
C33-C34	Lung	5	0.6	9.0	2.9	21.1 #	31.4	
C37	Thymus	1	0.0	193.2	4.9	1077 #	7.0	
C40-C41	Bone	1	0.0	79.8	2.0	444.7 #	7.0	
C43	Malign. melanoma	3	0.3	8.9	1.8	25.9 #	18.8	
C46,C49	Soft tissue	1	0.0	22.3	0.6	124.3	6.7	
C50	Breast	4	2.5	1.6	0.4	4.1	10.8	
C54	Corpus uteri	2	0.4	5.0	0.6	18.2	11.3	
C64	Kidney	2	0.2	12.8	1.5	46.1 #	13.0	
C67	Bladder	1	0.1	7.7	0.2	42.8	6.1	
C82-C85	NHL	1	0.3	3.7	0.1	20.6	5.1	
C91-C96	Leukaemia	1	0.1	9.3	0.2	52.0	6.3	
Not observed		0	1.6	0.0	0.0	2.3	-11.5	
All further malignancies		29	7.6	3.8	2.6	5.5 #	151.0	3.4

Patients	319
Median age at next malignancy (years)	64.5
Person-years	1418
Mean observation time (years)	4.4
Median observation time (years)	2.6

The occurrence of further specified malignancy is statistically significant.

Average incidence (Germany 1987 standard population) 2007 - 2020: Males



Average incidence (Germany 1987 standard population) 2007 - 2020: Females

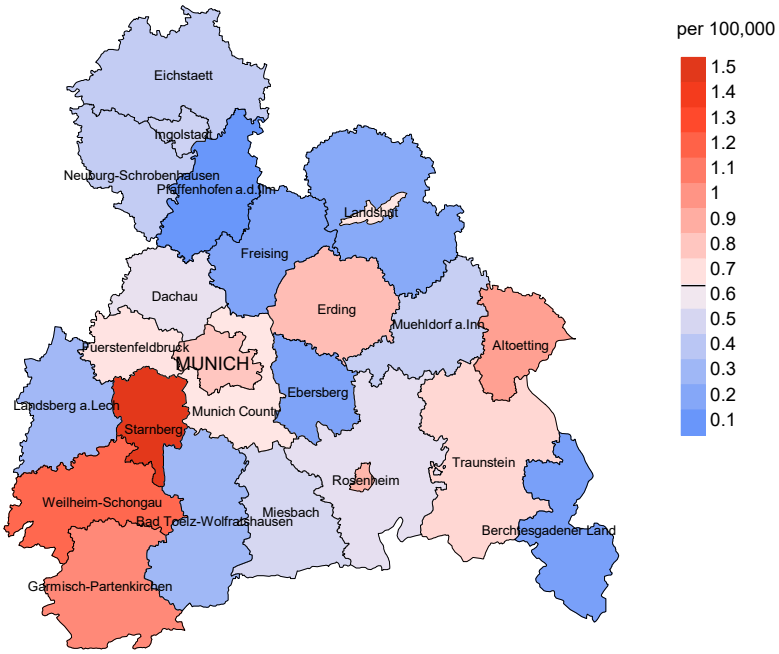
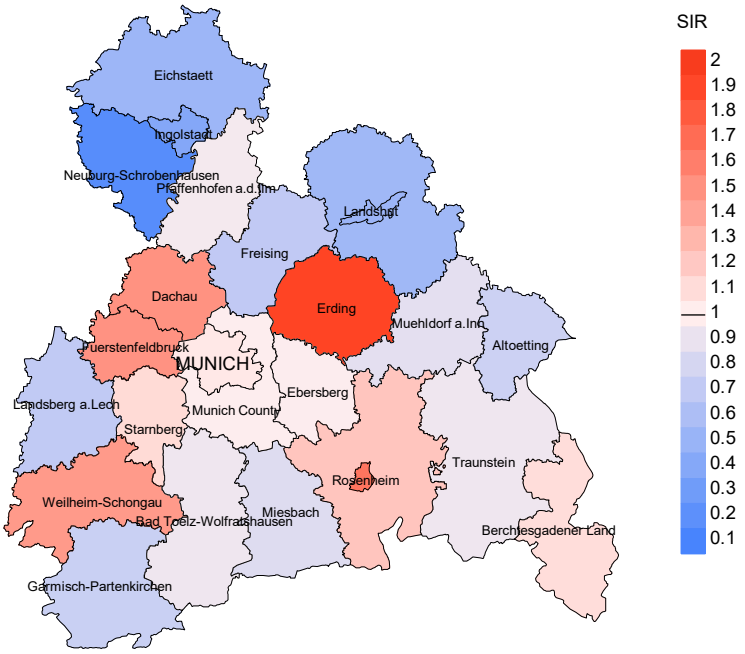


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.9/100,000 WS N=279, females 0.6/100,000 WS N=227).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,727 female residents (averaged) in the period from 2007 to 2020 a total of 2 women were identified with newly diagnosed bone cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.2/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.9/100,000.

Standardized incidence ratio (SIR) 2007 - 2020: Males



Standardized incidence ratio (SIR) 2007 - 2020: Females

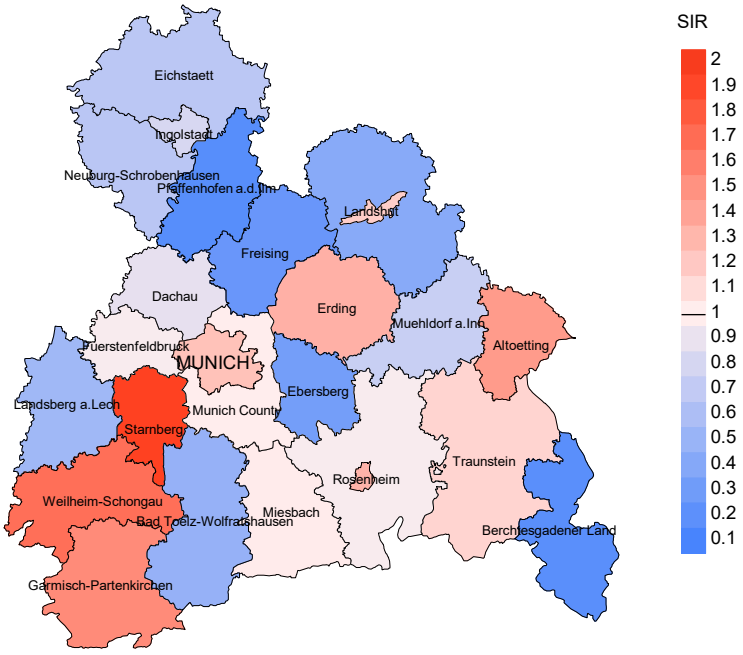


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=279, females N=227).

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 2020 a total of 2 women were identified with newly diagnosed bone cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.32. Though, the value of this parameter may vary with an underlying probability of 99% between 0.02 and 1.46, 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 4.94 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	24	95.8	4.2	10	41.7	80.0
1999	23	95.7	4.3	11	47.8	81.8
2000	19	94.7	10.5	9	47.4	100.0
2001	19	94.7	15.8	11	57.9	90.9
2002	30	93.3	6.7	15	50.0	86.7
2003	27	92.6	11.1	14	51.9	100.0
2004	38	97.4	21.1	26	68.4	96.2
2005	26	88.5	3.8	14	53.8	100.0
2006	25	84.0	4.0	10	40.0	100.0
2007	51	82.4	2.0	22	43.1	95.5
2008	38	94.7	7.9	21	55.3	95.2
2009	39	92.3	5.1	17	43.6	100.0
2010	45	100.0	6.7	23	51.1	95.7
2011	49	100.0	8.2	27	55.1	100.0
2012	49	100.0	4.1	16	32.7	100.0
2013	44	95.5		14	31.8	85.7
2014	26	100.0	11.5	19	73.1	89.5
2015	39	97.4	5.1	18	46.2	88.9
2016	37	100.0	13.5	21	56.8	81.0
2017	32	100.0	12.5	14	43.8	78.6
2018	19	94.7	10.5	6	31.6	66.7
2019	18	100.0		4	22.2	100.0
2020	21	100.0		3	14.3	100.0
1998-2020	738	95.4	7.2	345	46.7	92.5

Table 9b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased within the same year of being diagnosed with cancer (incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 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	24	16	93.8	6	25.0
1999	23	8	75.0	2	8.7
2000	19	8	87.5	2	10.5
2001	19	12	100.0	4	21.1
2002	30	16	93.8	2	6.7
2003	27	20	100.0	4	14.8
2004	38	16	87.5	10	26.3
2005	26	15	93.3	2	7.7
2006	25	15	93.3	1	4.0
2007	51	19	100.0	5	9.8
2008	38	29	96.6	11	28.9
2009	39	13	100.0	3	7.7
2010	45	23	100.0	7	15.6
2011	49	18	100.0	5	10.2
2012	49	25	100.0	7	14.3
2013	44	25	100.0	1	2.3
2014	26	29	96.6	8	30.8
2015	39	25	100.0	6	15.4
2016	37	24	100.0	8	21.6
2017	32	22	95.5	7	21.9
2018	19	18	72.2	3	15.8
2019	18	13	30.8		
2020	21	21	81.0		
1998-2020	738	430	93.0	104	14.1

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 4.94 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	16	75.0	25.0	80.0
1999	8	75.0	25.0	83.3
2000	8	87.5	12.5	85.7
2001	12	75.0	25.0	83.3
2002	16	81.3	18.8	93.3
2003	20	75.0	25.0	85.0
2004	16	81.3	18.8	92.9
2005	15	80.0	20.0	85.7
2006	15	93.3	6.7	100.0
2007	19	78.9	21.1	78.9
2008	29	93.1	6.9	92.9
2009	13	92.3	7.7	92.3
2010	23	95.7	4.3	95.7
2011	18	77.8	22.2	77.8
2012	25	96.0	4.0	96.0
2013	25	92.0	8.0	96.0
2014	29	89.7	10.3	92.9
2015	25	92.0	8.0	92.0
2016	24	91.7	8.3	95.8
2017	22	77.3	22.7	81.0
2018	18	66.7	33.3	76.9
2019	13	69.2	30.8	100.0
2020	21	47.6	52.4	64.7
1998-2020	430	83.0	17.0	88.5

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	10	59.9	57.9	70.8	60.4
1999	4	54.6	52.5	76.4	52.5
2000	4	49.3	30.2	68.4	30.2
2001	8	54.6	56.8	49.1	56.8
2002	9	50.6	49.2	74.6	50.6
2003	10	46.2	46.2	59.1	46.2
2004	9	73.8	73.8		74.6
2005	9	41.2	36.6	60.7	36.6
2006	8	63.7	63.7		69.0
2007	13	60.0	59.3	68.7	59.3
2008	15	53.7	49.2	86.5	53.7
2009	9	65.2	65.2		65.2
2010	11	56.6	56.6		56.6
2011	9	67.2	68.1	56.9	68.1
2012	19	68.3	68.3		68.3
2013	14	61.0	61.0		61.0
2014	11	63.3	63.3		63.3
2015	19	59.6	58.6	88.8	58.6
2016	11	64.4	64.1	77.3	64.4
2017	10	78.3	72.7	80.5	72.7
2018	12	73.5	73.4	73.5	73.7
2019	6	67.1	80.3	42.8	77.7
2020	12	77.1	69.6	80.4	71.8
1998-2020	242	64.1	61.7	76.4	63.0

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	6	71.7	67.4	71.7	77.7
1999	4	68.8	66.1	88.2	65.7
2000	4	72.4	72.4		75.2
2001	4	63.7	58.7	63.7	78.6
2002	7	79.4	75.1	82.9	79.4
2003	10	73.7	68.5	85.1	69.4
2004	7	84.0	71.9	88.7	74.7
2005	6	49.5	35.1	88.9	35.1
2006	7	70.0	60.6	84.1	70.0
2007	6	64.0	53.2	94.3	53.2
2008	14	71.4	69.2	89.0	69.2
2009	4	65.2	50.6	96.6	50.6
2010	12	67.5	67.1	93.3	67.1
2011	9	70.6	63.4	94.3	63.4
2012	6	65.4	57.9	80.1	57.9
2013	11	75.9	56.0	80.6	65.9
2014	18	77.6	76.4	89.0	78.8
2015	6	57.9	56.0	68.5	56.0
2016	13	71.3	69.1	79.1	69.1
2017	12	78.1	76.8	98.0	76.8
2018	6	71.0	69.1	78.7	60.1
2019	7	55.2	42.4	75.6	66.6
2020	9	77.4	62.5	80.8	62.5
1998-2020	188	71.4	67.0	84.1	69.3

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	8	0.7	0.73	0.5	0.50	0.6	0.62	0.8	0.67
1999	3	0.3	0.38	0.2	0.27	0.2	0.33	0.2	0.30
2000	3	0.3	0.50	0.2	0.64	0.2	0.52	0.3	0.60
2001	7	0.6	0.70	0.5	0.48	0.6	0.60	0.7	0.65
2002	7	0.4	0.41	0.3	0.40	0.3	0.41	0.4	0.37
2003	8	0.4	0.57	0.3	0.51	0.4	0.55	0.5	0.66
2004	9	0.5	0.41	0.4	0.43	0.5	0.44	0.6	0.47
2005	8	0.4	0.50	0.4	0.38	0.4	0.44	0.5	0.53
2006	8	0.4	0.62	0.2	0.38	0.4	0.52	0.4	0.65
2007	10	0.5	0.31	0.4	0.26	0.4	0.30	0.5	0.33
2008	14	0.6	0.64	0.5	0.53	0.6	0.57	0.6	0.59
2009	9	0.4	0.33	0.3	0.25	0.3	0.29	0.4	0.31
2010	11	0.5	0.52	0.3	0.34	0.4	0.44	0.5	0.51
2011	8	0.4	0.21	0.2	0.17	0.3	0.19	0.4	0.23
2012	19	0.8	0.59	0.6	0.43	0.7	0.50	0.8	0.57
2013	14	0.6	0.70	0.5	0.68	0.5	0.69	0.6	0.70
2014	11	0.5	1.22	0.3	1.06	0.4	1.18	0.5	1.23
2015	18	0.8	0.95	0.6	1.01	0.7	0.97	0.7	0.90
2016	10	0.4	0.71	0.3	0.47	0.3	0.57	0.4	0.64
2017	6	0.2	0.43	0.1	0.24	0.2	0.34	0.2	0.38
2018	7	0.3	0.64	0.2	0.56	0.2	0.57	0.3	0.67
2019	4	0.2	0.80	0.1	0.44	0.1	0.57	0.2	0.73
2020	5	0.2	0.33	0.1	0.26	0.2	0.29	0.2	0.33
1998-2020	207	0.4	0.52	0.3	0.42	0.4	0.47	0.4	0.52

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	4	0.3	0.31	0.1	0.18	0.2	0.22	0.3	0.24
1999	3	0.3	0.20	0.1	0.13	0.2	0.19	0.2	0.19
2000	4	0.3	0.31	0.1	0.14	0.2	0.20	0.3	0.27
2001	2	0.2	0.22	0.1	0.15	0.1	0.17	0.1	0.17
2002	6	0.3	0.46	0.2	0.23	0.2	0.32	0.3	0.42
2003	7	0.4	0.54	0.2	0.38	0.2	0.47	0.3	0.53
2004	4	0.2	0.25	0.1	0.14	0.1	0.19	0.2	0.19
2005	4	0.2	0.40	0.2	0.44	0.2	0.44	0.2	0.43
2006	6	0.3	0.50	0.2	0.36	0.2	0.45	0.3	0.48
2007	5	0.2	0.26	0.2	0.17	0.2	0.21	0.2	0.27
2008	13	0.6	0.81	0.3	0.52	0.4	0.67	0.5	0.80
2009	3	0.1	0.25	0.1	0.14	0.1	0.21	0.1	0.23
2010	11	0.5	0.46	0.3	0.31	0.4	0.36	0.4	0.39
2011	6	0.3	0.60	0.2	1.12	0.2	0.82	0.3	0.71
2012	5	0.2	0.29	0.1	0.24	0.2	0.26	0.2	0.26
2013	9	0.4	0.38	0.2	0.20	0.3	0.26	0.3	0.32
2014	15	0.6	0.88	0.5	1.12	0.5	0.94	0.5	0.93
2015	5	0.2	0.25	0.1	0.19	0.2	0.24	0.2	0.23
2016	12	0.5	0.52	0.2	0.43	0.3	0.45	0.4	0.49
2017	11	0.4	0.61	0.2	0.33	0.3	0.45	0.3	0.47
2018	5	0.2	0.63	0.1	0.50	0.2	0.64	0.2	0.57
2019	5	0.2	0.38	0.1	0.41	0.2	0.41	0.2	0.42
2020	5	0.2	0.83	0.1	0.33	0.1	0.52	0.2	0.59
1998-2020	150	0.3	0.44	0.2	0.30	0.2	0.36	0.3	0.40

Table 12

Age distribution of age at death (cancer-related) for period 2007-2020
(**incl. multiple malignancies**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	1	0.4	0.4			0.0	1	0.9	0.9
5-9	2	0.8	1.2	1	0.7	0.7	1	0.9	1.8
10-14	6	2.3	3.5	5	3.4	4.1	1	0.9	2.7
15-19	8	3.1	6.6	6	4.1	8.2	2	1.8	4.5
20-24	14	5.5	12.1	10	6.8	15.1	4	3.6	8.2
25-29	9	3.5	15.6	4	2.7	17.8	5	4.5	12.7
30-34	8	3.1	18.8	2	1.4	19.2	6	5.5	18.2
35-39	5	2.0	20.7	2	1.4	20.5	3	2.7	20.9
40-44	10	3.9	24.6	6	4.1	24.7	4	3.6	24.5
45-49	8	3.1	27.7	5	3.4	28.1	3	2.7	27.3
50-54	17	6.6	34.4	9	6.2	34.2	8	7.3	34.5
55-59	20	7.8	42.2	11	7.5	41.8	9	8.2	42.7
60-64	18	7.0	49.2	12	8.2	50.0	6	5.5	48.2
65-69	28	10.9	60.2	20	13.7	63.7	8	7.3	55.5
70-74	30	11.7	71.9	20	13.7	77.4	10	9.1	64.5
75-79	28	10.9	82.8	14	9.6	87.0	14	12.7	77.3
80-84	22	8.6	91.4	9	6.2	93.2	13	11.8	89.1
85+	22	8.6	100.0	10	6.8	100.0	12	10.9	100.0
All ages	256	100.0		146	100.0		110	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**incl. multiple malignancies**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4		1			0.1	1.00		6.3
5- 9	1	1	0.1	0.17	0.1	0.17	3.6	4.0
10-14	5	1	0.3	0.23	0.1	0.06	17.9	4.3
15-19	6	2	0.3	0.26	0.1	0.13	12.5	8.0
20-24	10	4	0.5	0.53	0.2	0.44	13.7	9.3
25-29	4	5	0.2	0.31	0.2	0.28	4.3	5.1
30-34	2	6	0.1	0.25	0.3	2.00	1.4	3.3
35-39	2	3	0.1	0.29	0.1	0.30	0.7	0.7
40-44	6	4	0.2	0.30	0.2	0.33	1.0	0.5
45-49	5	3	0.2	0.36	0.1	0.38	0.4	0.2
50-54	9	8	0.4	0.39	0.3	0.80	0.3	0.3
55-59	11	9	0.5	0.55	0.4	0.41	0.2	0.2
60-64	12	6	0.7	0.60	0.3	0.75	0.2	0.1
65-69	20	8	1.2	0.83	0.4	0.50	0.2	0.1
70-74	20	10	1.3	0.80	0.6	0.53	0.2	0.1
75-79	14	14	1.2	0.74	0.9	0.61	0.1	0.1
80-84	9	13	1.2	1.29	1.2	0.68	0.1	0.1
85+	10	12	2.1	1.11	1.2	1.09	0.1	0.1
All ages	146	110					0.2	0.2
Mortality								
Raw			0.4	0.52	0.3	0.48		
WS			0.3	0.41	0.2	0.35		
ES			0.4	0.47	0.2	0.40		
BRD-S			0.4	0.51	0.3	0.44		
PYLL-70								
per 100,000			7.5		5.4			
ES			7.9		5.5			
AYLL-70			23.3		24.8			

Table 14a

Further malignancies in deaths in period 1998-2020
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C07-C08	Salivary gland	1	1.2					1	100.0
C09-C10	Oropharynx	2	2.4	1	50.0			1	50.0
C16	Stomach	2	2.4	1	50.0			1	50.0
C18	Colon	2	2.4	2	100.0				
C19-C20	Rectum	4	4.7	2	50.0			2	50.0
C22	Liver	2	2.4			1	50.0	1	50.0
C32	Larynx	2	2.4	1	50.0			1	50.0
C33-C34	Lung	14	16.5	6	42.9	1	7.1	7	50.0
C43	Malign. melanoma	4	4.7	2	50.0			2	50.0
C44	Skin others	4	4.7	2	50.0			2	50.0
C46,C49	Soft tissue	5	5.9	3	60.0			2	40.0
C61	Prostate	16	18.8	12	75.0	2	12.5	2	12.5
C62	Testis	4	4.7	3	75.0	1	25.0		
C64	Kidney	4	4.7	1	25.0			3	75.0
C70-C72	CNS cancer	5	5.9	2	40.0	1	20.0	2	40.0
C73	Thyroid	1	1.2	1	100.0				
C76-C79	CUP	1	1.2					1	100.0
C81	Hodgkin lymphoma	1	1.2	1	100.0				
C82-C85	NHL	3	3.5					3	100.0
C90	Mult. myeloma	5	5.9	4	80.0	1	20.0		
C91-C96	Leukaemia	3	3.5	2	66.7			1	33.3
All further malignancies		85	100.0	46	54.1	7	8.2	32	37.6

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 1998-2020
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10	Oropharynx	1	1.6	1	100.0				
C16	Stomach	3	4.8					3	100.0
C18	Colon	2	3.2	1	50.0			1	50.0
C19-C20	Rectum	3	4.8	2	66.7			1	33.3
C22	Liver	1	1.6	1	100.0				
C25	Pancreas	2	3.2					2	100.0
C26	GI cancer	1	1.6					1	100.0
C33-C34	Lung	3	4.8	1	33.3			2	66.7
C40-C41	Bone	1	1.6					1	100.0
C43	Malign. melanoma	2	3.2	1	50.0			1	50.0
C44	Skin others	3	4.8	2	66.7			1	33.3
C46,C49	Soft tissue	3	4.8	2	66.7			1	33.3
C50	Breast	17	27.0	11	64.7	1	5.9	5	29.4
C53	Cervix uteri	6	9.5	5	83.3			1	16.7
C54	Corpus uteri	3	4.8	2	66.7			1	33.3
C56	Ovary	4	6.3	3	75.0			1	25.0
C64	Kidney	1	1.6					1	100.0
C67	Bladder	1	1.6					1	100.0
C70-C72	CNS cancer	1	1.6	1	100.0				
C73	Thyroid	2	3.2	2	100.0				
C81	Hodgkin lymphoma	1	1.6	1	100.0				
C82-C85	NHL	1	1.6	1	100.0				
C91-C96	Leukaemia	1	1.6					1	100.0
All further malignancies		63	100.0	37	58.7	1	1.6	25	39.7

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 2007-2020
(**First primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4		1			0.1	1.00		6.7
5- 9	1	1	0.1	0.17	0.1	0.17	3.7	4.0
10-14	5	1	0.3	0.23	0.1	0.06	17.9	5.3
15-19	5	2	0.3	0.23	0.1	0.13	10.9	8.7
20-24	9	4	0.4	0.50	0.2	0.67	13.6	9.8
25-29	3	5	0.1	0.23	0.2	0.28	3.5	5.5
30-34	2	6	0.1	0.25	0.3	2.00	1.4	3.8
35-39	2	2	0.1	0.29	0.1	0.22	0.8	0.5
40-44	6	2	0.2	0.32	0.1	0.25	1.1	0.3
45-49	5	2	0.2	0.38	0.1	0.25	0.4	0.1
50-54	7	7	0.3	0.33	0.3	0.88	0.3	0.3
55-59	9	8	0.4	0.53	0.4	0.47	0.2	0.3
60-64	10	4	0.6	0.77	0.2	1.00	0.2	0.1
65-69	13	7	0.8	0.72	0.4	0.70	0.2	0.1
70-74	12	6	0.8	0.75	0.3	0.55	0.1	0.1
75-79	9	8	0.7	0.75	0.5	0.57	0.1	0.1
80-84	5	11	0.7	1.67	1.0	0.85	0.1	0.2
85+	7	11	1.5	1.17	1.1	1.38	0.1	0.1
All ages	110	88					0.2	0.2
Mortality								
Raw			0.3	0.47	0.3	0.50		
WS			0.3	0.37	0.2	0.34		
ES			0.3	0.42	0.2	0.40		
BRD-S			0.3	0.46	0.2	0.44		
PYLL-70								
per 100,000			6.7		4.8			
ES			7.1		5.0			
AYLL-70			25.0		26.1			

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4		1			0.1	1.00		6.7
5- 9	1	1	0.1	0.17	0.1	0.17	3.7	4.0
10-14	5	1	0.3	0.24	0.1	0.06	17.9	5.3
15-19	5	2	0.3	0.24	0.1	0.13	10.9	9.1
20-24	9	4	0.4	0.53	0.2	0.67	13.6	10.0
25-29	3	5	0.1	0.25	0.2	0.28	3.5	5.7
30-34	2	5	0.1	0.29	0.2	1.67	1.5	3.2
35-39	1	1	0.0	0.14	0.0	0.11	0.4	0.3
40-44	6	2	0.2	0.32	0.1	0.25	1.1	0.3
45-49	5	2	0.2	0.38	0.1	0.29	0.4	0.1
50-54	5	7	0.2	0.28	0.3	1.00	0.2	0.3
55-59	6	7	0.3	0.40	0.3	0.41	0.2	0.2
60-64	6	4	0.3	0.55	0.2	1.33	0.1	0.1
65-69	8	5	0.5	0.62	0.3	0.50	0.1	0.1
70-74	9	3	0.6	0.60	0.2	0.33	0.1	0.0
75-79	8	7	0.7	0.67	0.5	0.58	0.1	0.1
80-84	3	8	0.4	3.00	0.8	0.62	0.0	0.1
85+	6	11	1.3	1.00	1.1	1.38	0.1	0.1
All ages	88	76					0.2	0.2
Mortality								
Raw			0.3	0.41	0.2	0.45		
WS			0.2	0.34	0.2	0.31		
ES			0.2	0.37	0.2	0.36		
BRD-S			0.3	0.41	0.2	0.40		
PYLL-70								
per 100,000			6.2		4.5			
ES			6.7		4.7			
AYLL-70			28.7		27.0			

* See corresponding tables with multiple malignancies.

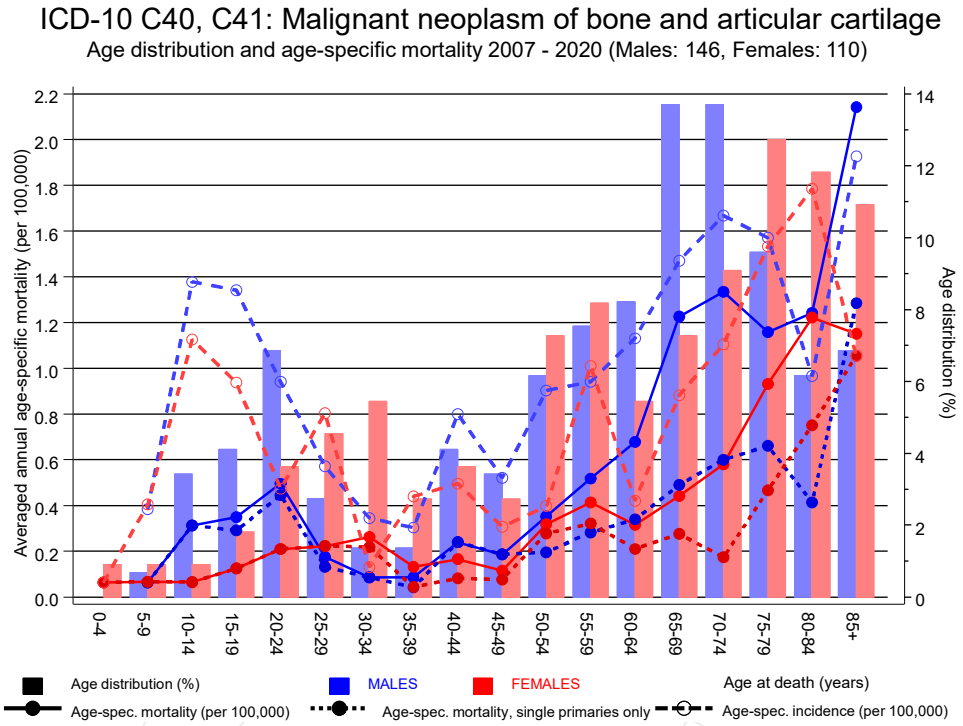
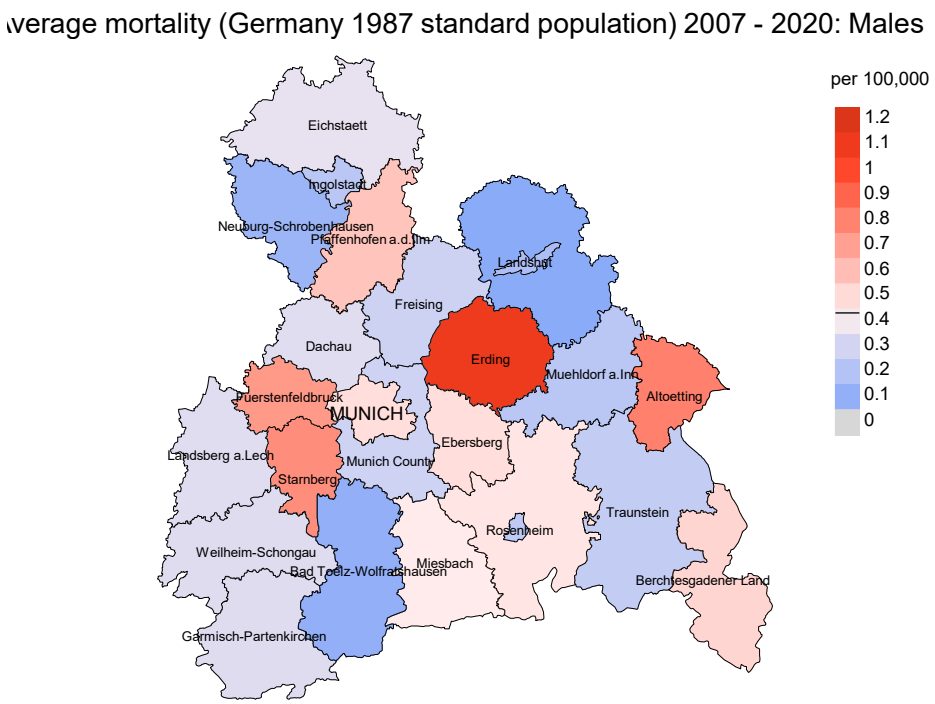


Figure 17. Distribution of age at death (bars; males: mean=53.5 yrs, median=59.6 yrs; females: mean=55.6 yrs, median=59.0 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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



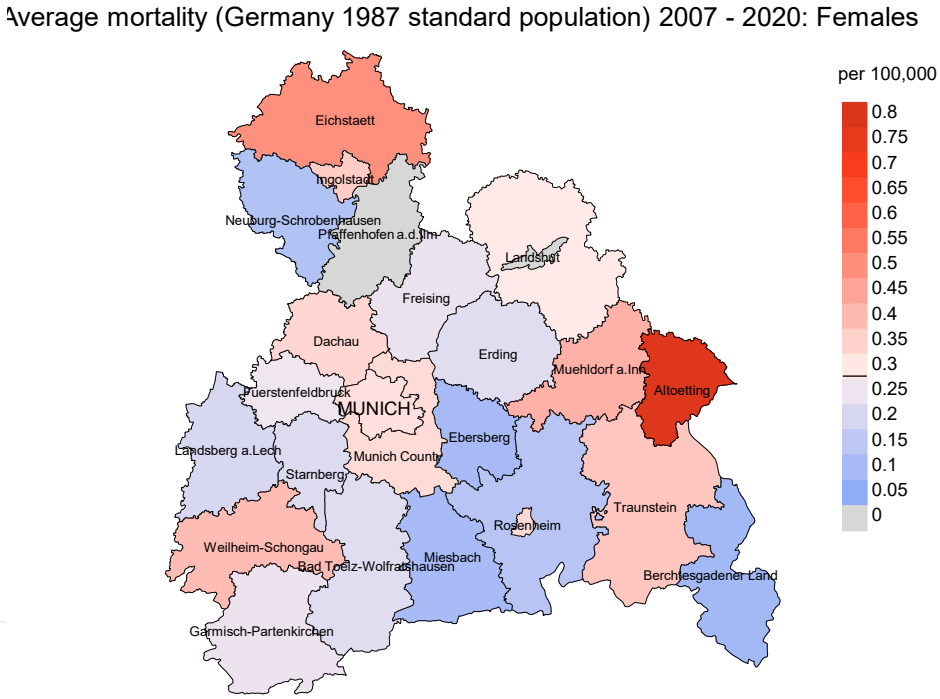
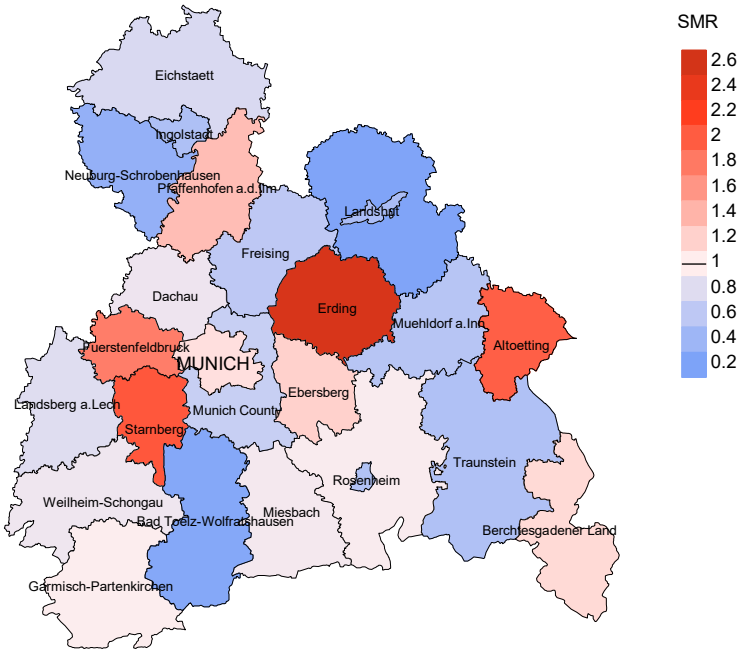


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.4/100,000 WS N=146, females 0.3/100,000 WS N=110).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,727 female residents (averaged) in the period from 2007 to 2020 a total of 1 women died from bone cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.1/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.8/100,000.

Standardized mortality ratio (SMR) 2007 - 2020: Males



Standardized mortality ratio (SMR) 2007 - 2020: Females

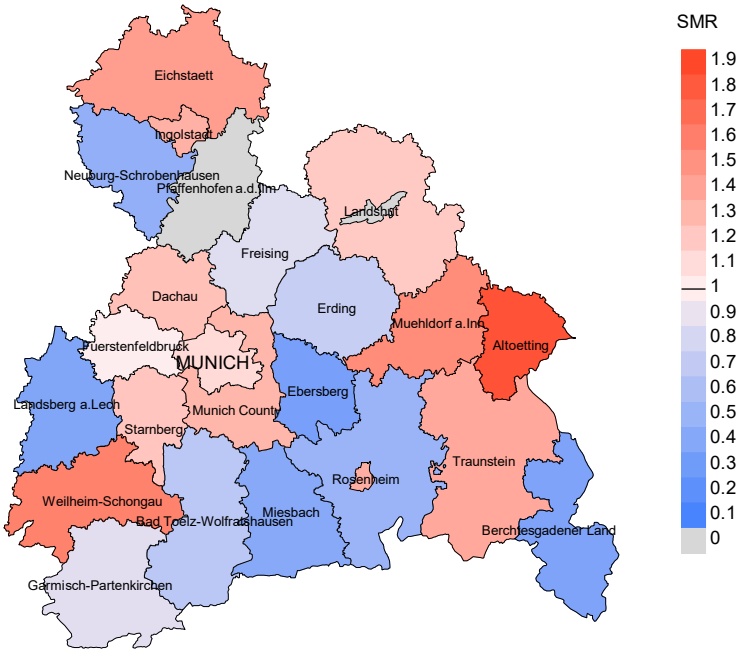


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=146, females N=110).

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 2020 a total of 1 women died from bone cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.34. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 2.49, 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

Recommended Citation

Munich Cancer Registry. ICD-10 C40, C41: Bone cancer - Incidence and Mortality [Internet]. 2021 [updated 2021 Dec 21; cited 2022 Feb 1]. Available from: https://www.tumorregister-muenchen.de/en/facts/base/bC4041E-ICD-10-C40-C41-Bone-cancer-incidence-and-mortality.pdf

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