Munich Cancer Registry

- Survival
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ICD-10 C46: Kaposi sarcoma

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	107
Diseases	107
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

Munich Cancer Registry
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Marchioninistr. 15
Munich, 81377
Germany

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

https://www.tumorregister-muenchen.de/en/facts/base/bC46__E-ICD-10-C46-Kaposi-sarcoma-incidence-and-mortality.pdf

Index of figures and tables

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.

Some remarks regarding this cancer type

Kaposi's sarcoma was once a rare disease. With an increased occurrence of HIV and AIDS the incidence of Kaposi's sarcoma also increased particularly in men. Incidence and prognosis of Kaposi's sarcoma as an HIV-associated disease are highly dependent on the therapeutic success of the infection itself. Progress in this field is reflected in a change of global epidemiological parameters such as incidence, mortality or survival.

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

Code	Description
C46.-	Kaposi sarcoma
C46.0	Skin
C46.1	Soft tissue
C46.2	Palate
C46.3	Lymph nodes
C46.7	Other sites
C46.8	Multiple organs
C46.9	Kaposi sarcoma, 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	8	4	50.0	12.5	17.3	87.5	100.0	
1999	1			22.2	17.7	100.0	100.0	
2000	11	2	18.2	15.0	17.9	54.5	81.8	
2001	3	1	33.3	13.0	16.7	33.3	33.3	
2002	4	2	50.0	18.5	17.3	100.0	100.0	#
2003	2			17.2	15.6	100.0	100.0	
2004	3	1	33.3	18.8	16.0	33.3	100.0	
2005	5			16.2	16.4	40.0	100.0	
2006	7			15.9	17.4	42.9	85.7	
2007	6	2	33.3	14.0	16.1	50.0	100.0	#
2008	7	1	14.3	14.0	16.1	85.7	100.0	
2009	6			14.3	14.3	33.3	100.0	
2010	4			13.4	13.6		50.0	
2011	7			12.2	15.0	57.1	85.7	
2012	7			11.1	15.2	42.9	100.0	
2013	4			10.6	15.4		100.0	
2014	7	1	14.3	12.0	13.6	42.9	85.7	
2015	5			11.3	20.0	20.0	100.0	
2016	1			11.2	20.0		100.0	
2017	4			12.7	11.1	25.0	100.0	
2018	1			12.6	0.0	100.0	100.0	
2019	2			12.4	0.0		100.0	
2020	2			12.1	0.0		100.0	##
1998-2020	107	14	13.1	12.1	17.3	47.7	91.6	

107 cases diagnosed 1998-2020 are related to a total of 107 patients. Currently, in 32 (29.9 %) of these 107 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 24 / 5 / 3 (22.4 % / 4.7 % / 2.8 %) 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 retreived from the respective headings.

How to interpret:
In 2018, a subgroup of 1 cases has been diagnosed, of which 12.6 % 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 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	8	100.0	4	50.0	12.5	18.9	87.5	100.0	
1999	1	100.0			22.2	19.5	100.0	100.0	
2000	9	81.8	1	11.1	11.1	19.8	55.6	77.8	
2001	3	100.0	1	33.3	9.5	18.1	33.3	33.3	
2002	3	75.0	2	66.7	12.5	18.8	100.0	100.0	#
2003	2	100.0			11.5	18.2	100.0	100.0	
2004	2	66.7	1	50.0	10.7	18.8	50.0	100.0	
2005	5	100.0			9.1	19.0	40.0	100.0	
2006	5	71.4			10.5	20.3	40.0	100.0	
2007	5	83.3	1	20.0	9.3	18.5	40.0	100.0	#
2008	7	100.0	1	14.3	10.0	18.4	85.7	100.0	
2009	6	100.0			10.7	16.7	33.3	100.0	
2010	3	75.0			10.2	16.2		66.7	
2011	5	71.4			9.4	17.6	60.0	100.0	
2012	6	85.7			8.6	17.2	33.3	100.0	
2013	4	100.0			8.1	17.4		100.0	
2014	7	100.0	1	14.3	9.9	15.8	42.9	85.7	
2015	4	80.0			9.4	25.0	25.0	100.0	
2016	1	100.0			9.3	25.0		100.0	
2017	3	75.0			10.1	14.3	33.3	100.0	
2018	1	100.0			10.0	0.0	100.0	100.0	
2019	2	100.0			9.8	0.0		100.0	
2020	1	50.0			9.7	0.0		100.0	##
1998-2020	93	86.9	12	12.9	9.7	18.9	48.4	93.5	

93 cases diagnosed 1998-2020 are related to a total of 93 patients. Currently, in 28 (30.1 %) of these 93 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 21 / 4 / 3 (22.6 % / 4.3 % / 3.2 %) 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 1 cases has been diagnosed, of which 10.0 % 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	0								
1999	0								
2000	2	18.2	1	50.0	50.0	7.1	50.0	100.0	
2001	0								
2002	1	25.0			66.7	8.3	100.0	100.0	#
2003	0								
2004	1	33.3			75.0	0.0		100.0	
2005	0								
2006	2	28.6			50.0	0.0	50.0	50.0	
2007	1	16.7	1	100.0	42.9	0.0	100.0	100.0	#
2008	0								
2009	0								
2010	1	25.0			37.5	0.0			
2011	2	28.6			30.0	0.0	50.0	50.0	
2012	1	14.3			27.3	0.0	100.0	100.0	
2013	0								
2014	0								
2015	1	20.0			25.0	0.0		100.0	
2016	0								
2017	1	25.0			30.8	0.0		100.0	
2018	0								
2019	0								
2020	1	50.0			28.6	0.0		100.0	##
1998-2020	14	13.1	2	14.3	28.6	7.1	42.9	78.6	

14 cases diagnosed 1998-2020 are related to a total of 14 patients. Currently, in 4 (28.6 %) of these 14 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 3 / 1 / 0 (21.4 % / 7.1 % / 0.0 %) 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 retreived from the respective headings.

How to interpret:
In 2018, a subgroup of 0 cases has been diagnosed, of which 30.8 % 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 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	8		0.7		0.5		0.6		0.6	
1999	1		0.1		0.1		0.1		0.1	
2000	9	2	0.8	0.2	0.5	0.1	0.7	0.1	0.7	0.1
2001	3		0.3		0.2		0.2		0.2	
2002	3	1	0.2	0.1	0.1	0.0	0.2	0.0	0.1	0.0
2003	2		0.1		0.1		0.1		0.1	
2004	2	1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0
2005	5		0.3		0.2		0.2		0.2	
2006	5	2	0.3	0.1	0.2	0.1	0.2	0.1	0.2	0.1
2007	5	1	0.2	0.0	0.1	0.0	0.2	0.0	0.2	0.0
2008	7		0.3		0.2		0.3		0.3	
2009	6		0.3		0.2		0.2		0.3	
2010	3	1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
2011	5	2	0.2	0.1	0.1	0.0	0.2	0.1	0.2	0.1
2012	6	1	0.3	0.0	0.1	0.0	0.2	0.0	0.2	0.0
2013	4		0.2		0.1		0.1		0.2	
2014	7		0.3		0.2		0.2		0.3	
2015	4	1	0.2	0.0	0.1	0.0	0.1	0.0	0.2	0.0
2016	1		0.0		0.0		0.0		0.0	
2017	3	1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
2018	1		0.0		0.0		0.0		0.0	
2019	2		0.1		0.1		0.1		0.1	
2020	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1998–2020	93	14	0.2	0.0	0.1	0.0	0.2	0.0	0.2	0.0

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.	10%	25%	Median 50%	75%	90%
1998	8	49.5	10.7	36.2	60.4	36.2	37.4	53.1	59.2	60.4
1999	1	70.2		70.2	70.2	70.2	70.2	70.2	70.2	70.2
2000	11	58.3	22.1	31.2	92.9	37.4	37.8	53.4	85.3	91.6
2001	3	52.8	20.1	31.6	71.5	31.6	31.6	55.1	71.5	71.5
2002	4	57.3	11.1	44.5	71.4	44.5	49.6	56.7	65.0	71.4
2003	2	57.9	35.7	32.6	83.1	32.6	32.6	57.9	83.1	83.1
2004	3	61.4	23.6	47.1	88.6	47.1	47.1	48.3	88.6	88.6
2005	5	43.0	10.3	35.1	58.9	35.1	36.5	36.6	47.9	58.9
2006	7	50.6	19.4	29.8	84.6	29.8	32.5	44.1	65.8	84.6
2007	6	46.6	12.1	36.1	70.3	36.1	41.5	43.1	45.4	70.3
2008	7	68.8	17.2	37.8	88.1	37.8	60.4	73.2	85.1	88.1
2009	6	59.3	20.2	35.8	83.7	35.8	42.1	55.8	82.7	83.7
2010	4	58.8	12.3	46.1	70.8	46.1	48.3	59.1	69.2	70.8
2011	7	66.1	21.8	29.6	95.3	29.6	47.6	68.6	80.7	95.3
2012	7	69.5	18.3	43.0	87.7	43.0	44.8	74.8	85.3	87.7
2013	4	51.0	19.2	28.2	75.1	28.2	38.6	50.4	63.4	75.1
2014	7	62.0	19.9	37.5	87.8	37.5	38.0	69.1	77.0	87.8
2015	5	52.4	18.5	25.5	73.8	25.5	45.6	52.5	64.5	73.8
2016	1	69.5		69.5	69.5	69.5	69.5	69.5	69.5	69.5
2017	4	62.8	23.4	28.6	79.3	28.6	47.8	71.7	77.9	79.3
2018	1	86.2		86.2	86.2	86.2	86.2	86.2	86.2	86.2
2019	2	46.8	6.6	42.1	51.5	42.1	42.1	46.8	51.5	51.5
2020	2	69.2	24.7	51.8	86.7	51.8	51.8	69.2	86.7	86.7
1998-2020	107	58.0	18.5	25.5	95.3	35.8	43.0	54.2	73.8	85.3

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	8	49.5	10.7	36.2	60.4	36.2	37.4	53.1	59.2	60.4
1999	1	70.2		70.2	70.2	70.2	70.2	70.2	70.2	70.2
2000	9	56.9	20.5	31.2	92.9	31.2	44.4	53.4	60.6	92.9
2001	3	52.8	20.1	31.6	71.5	31.6	31.6	55.1	71.5	71.5
2002	3	52.6	7.3	44.5	58.6	44.5	44.5	54.8	58.6	58.6
2003	2	57.9	35.7	32.6	83.1	32.6	32.6	57.9	83.1	83.1
2004	2	47.7	0.8	47.1	48.3	47.1	47.1	47.7	48.3	48.3
2005	5	43.0	10.3	35.1	58.9	35.1	36.5	36.6	47.9	58.9
2006	5	47.5	13.4	29.8	65.8	29.8	43.9	44.1	53.9	65.8
2007	5	47.5	13.3	36.1	70.3	36.1	41.5	44.1	45.4	70.3
2008	7	68.8	17.2	37.8	88.1	37.8	60.4	73.2	85.1	88.1
2009	6	59.3	20.2	35.8	83.7	35.8	42.1	55.8	82.7	83.7
2010	3	54.7	11.4	46.1	67.6	46.1	46.1	50.5	67.6	67.6
2011	5	63.5	25.5	29.6	95.3	29.6	47.6	68.6	76.2	95.3
2012	6	66.5	17.9	43.0	85.3	43.0	44.8	74.6	76.5	85.3
2013	4	51.0	19.2	28.2	75.1	28.2	38.6	50.4	63.4	75.1
2014	7	62.0	19.9	37.5	87.8	37.5	38.0	69.1	77.0	87.8
2015	4	59.1	12.5	45.6	73.8	45.6	49.1	58.5	69.1	73.8
2016	1	69.5		69.5	69.5	69.5	69.5	69.5	69.5	69.5
2017	3	61.4	28.5	28.6	79.3	28.6	28.6	76.4	79.3	79.3
2018	1	86.2		86.2	86.2	86.2	86.2	86.2	86.2	86.2
2019	2	46.8	6.6	42.1	51.5	42.1	42.1	46.8	51.5	51.5
2020	1	51.8		51.8	51.8	51.8	51.8	51.8	51.8	51.8
1998-2020	93	56.7	17.5	28.2	95.3	36.1	43.9	53.4	71.5	83.1

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%
2000	2	64.7	38.0	37.8	91.6	37.8	37.8	64.7	91.6	91.6
2002	1	71.4		71.4	71.4	71.4	71.4	71.4	71.4	71.4
2004	1	88.6		88.6	88.6	88.6	88.6	88.6	88.6	88.6
2006	2	58.6	36.9	32.5	84.6	32.5	32.5	58.6	84.6	84.6
2007	1	42.1		42.1	42.1	42.1	42.1	42.1	42.1	42.1
2010	1	70.8		70.8	70.8	70.8	70.8	70.8	70.8	70.8
2011	2	72.7	11.3	64.7	80.7	64.7	64.7	72.7	80.7	80.7
2012	1	87.7		87.7	87.7	87.7	87.7	87.7	87.7	87.7
2015	1	25.5		25.5	25.5	25.5	25.5	25.5	25.5	25.5
2017	1	67.0		67.0	67.0	67.0	67.0	67.0	67.0	67.0
2020	1	86.7		86.7	86.7	86.7	86.7	86.7	86.7	86.7
1998–2020	14	66.6	22.9	25.5	91.6	32.5	42.1	71.1	86.7	88.6

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									
5–9									
10–14									
15–19									
20–24									
25–29	4	6.3	6.3	3	5.5	5.5	1	12.5	12.5
30–34	0	0.0	6.3			5.5			12.5
35–39	5	7.9	14.3	5	9.1	14.5			12.5
40–44	7	11.1	25.4	6	10.9	25.5	1	12.5	25.0
45–49	5	7.9	33.3	5	9.1	34.5			25.0
50–54	7	11.1	44.4	7	12.7	47.3			25.0
55–59	1	1.6	46.0	1	1.8	49.1			25.0
60–64	4	6.3	52.4	3	5.5	54.5	1	12.5	37.5
65–69	5	7.9	60.3	4	7.3	61.8	1	12.5	50.0
70–74	8	12.7	73.0	7	12.7	74.5	1	12.5	62.5
75–79	6	9.5	82.5	6	10.9	85.5			62.5
80–84	3	4.8	87.3	2	3.6	89.1	1	12.5	75.0
85+	8	12.7	100.0	6	10.9	100.0	2	25.0	100.0
All ages	63	100.0		55	100.0		8	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=3 %	Females DCO rate n=1 %	Males Prop.all cancers n=153686 %	Females Prop.all cancers n=155051 %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29	3	1	0.1	0.0			0.3	0.1
30-34								
35-39	5		0.2		20.0		0.3	
40-44	6	1	0.2	0.0		100.0	0.2	0.0
45-49	5		0.2		20.0		0.1	
50-54	7		0.3				0.1	
55-59	1		0.0				0.0	
60-64	3	1	0.2	0.1			0.0	0.0
65-69	4	1	0.2	0.1			0.0	0.0
70-74	7	1	0.5	0.1			0.0	0.0
75-79	6		0.5				0.0	
80-84	2	1	0.3	0.1			0.0	0.0
85+	6	2	1.3	0.2	16.7		0.1	0.0
All ages	55	8			5.5	12.5	0.0	0.0
Incidence								
Raw			0.2	0.0				
WS			0.1	0.0				
ES			0.1	0.0				
BRD-S			0.2	0.0				

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).

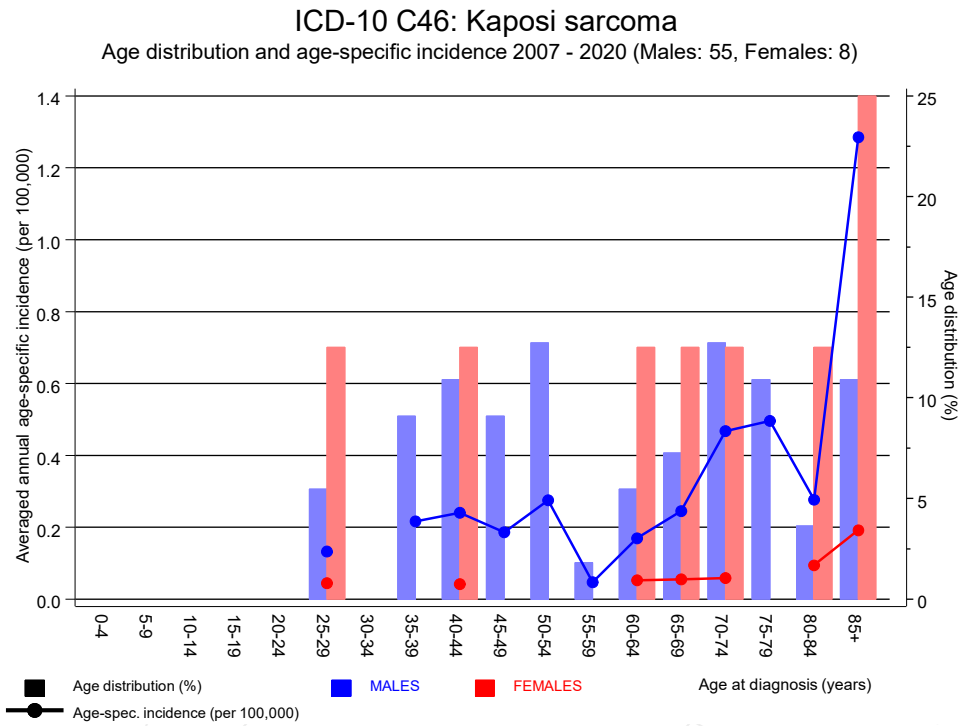


Figure 6. Age distribution (males: mean=60.3 yrs, median=60.4 yrs; females: mean=65.7 yrs, median=68.9 yrs) and age-specific incidence.

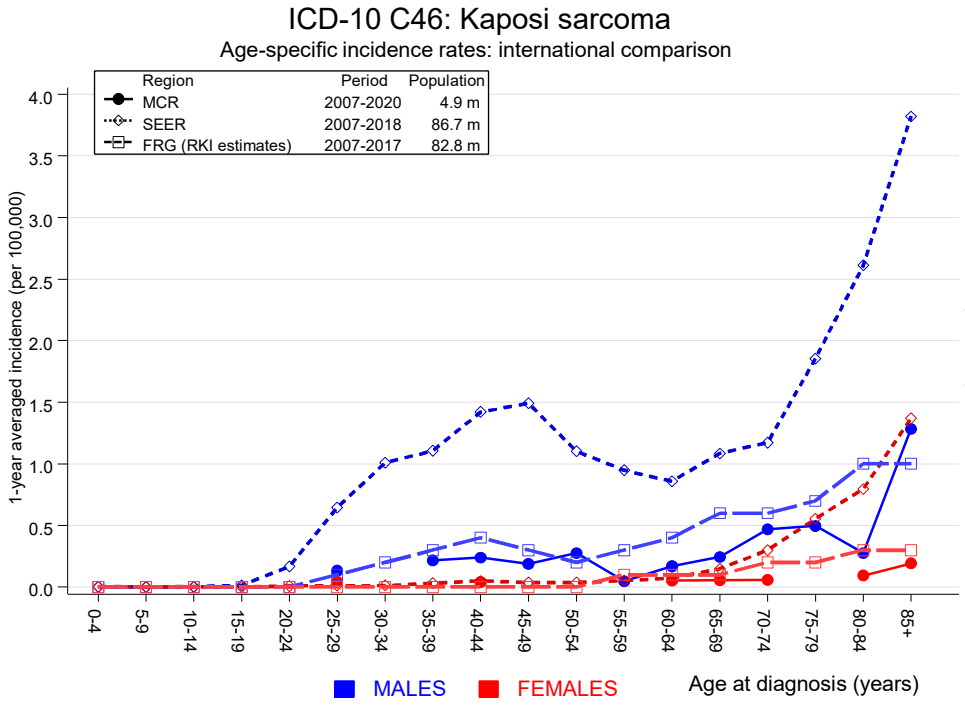


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, RKI estimates) and SEER (Surveillance, Epidemiology, and End Results, USA).

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	0.0	24.2	0.6	134.9		22.7	
C16	Stomach	1	0.2	5.2	0.1	28.8		19.1	
C18	Colon	1	0.5	2.2	0.1	12.0		12.7	
C19–C20	Rectum	1	0.2	4.2	0.1	23.3		18.0	
C21	Anus/canal	1	0.0	78.5	2.0	437.6	#	23.3	
C33–C34	Lung	2	0.5	3.8	0.5	13.9		35.0	
C43	Malign. melanoma	1	0.2	4.2	0.1	23.5		18.0	
C60	Penis	1	0.0	77.3	2.0	430.8	#	23.3	
C61	Prostate	2	1.2	1.6	0.2	5.9		18.6	
C73	Thyroid	1	0.0	27.3	0.7	152.1		22.8	
C81	Hodgkin lymphoma	1	0.0	71.3	1.8	397.0	#	23.3	
C82–C85	NHL	2	0.2	9.5	1.2	34.4	#	42.3	
Not observed		0	1.5	0.0	0.0	2.4		−36.6	
All further malignancies		15	4.7	3.2	1.8	5.2	#	242.5	

Patients	74
Median age at next malignancy (years)	66.6
Person-years	423
Mean observation time (years)	5.7
Median observation time (years)	4.1

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 %
Not observed	0	0.4	0.0	0.0	9.4	−103	
All further malignancies	0	0.4	0.0	0.0	9.4	−103	

Patients	11
Person-years	38
Mean observation time (years)	3.5
Median observation time (years)	1.8

The occurrence of further specified malignancy is statistically significant.

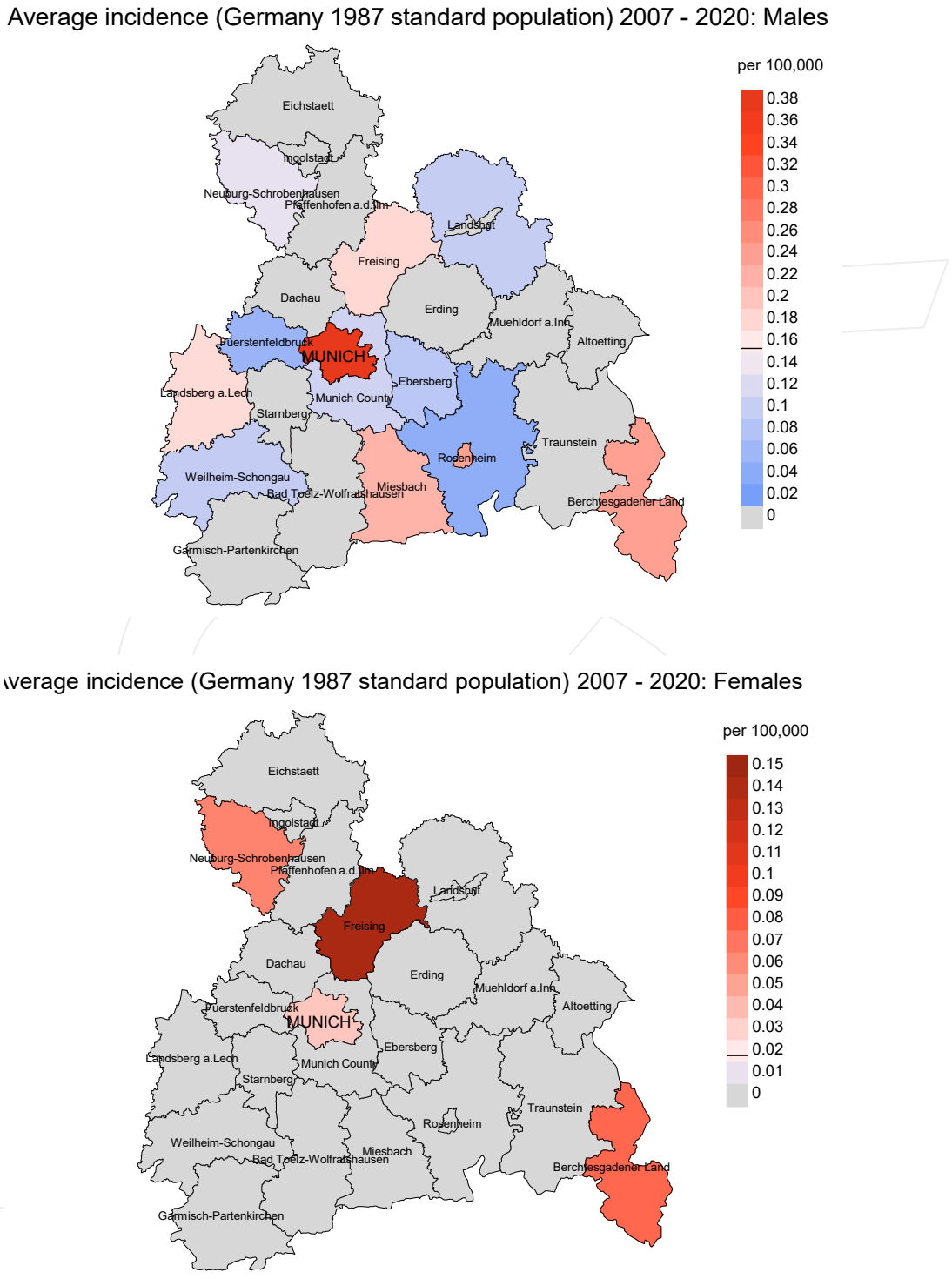
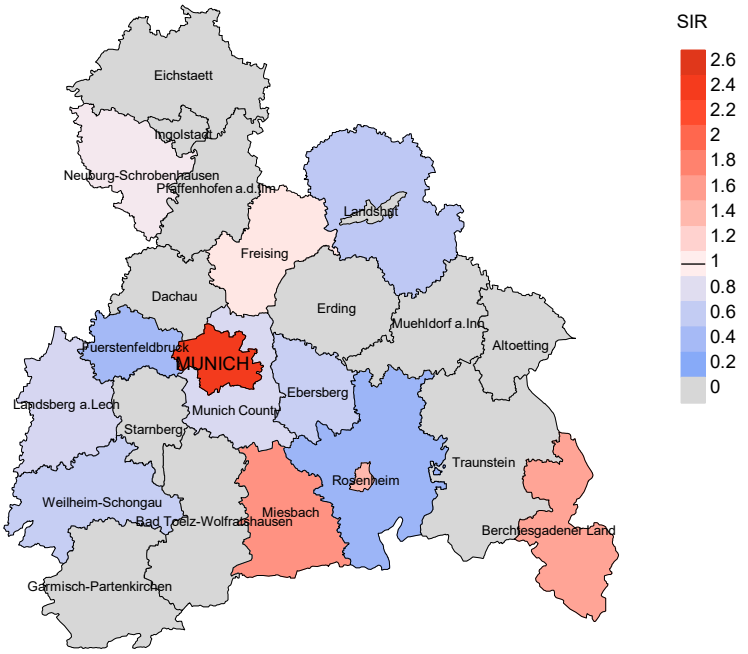


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.2/100,000 WS N=55, females 0.0/100,000 WS N=8).

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 0 women were identified with newly diagnosed kaposi sarcoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.0/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.0/100,000.

Standardized incidence ratio (SIR) 2007 - 2020: Males



Standardized incidence ratio (SIR) 2007 - 2020: Females

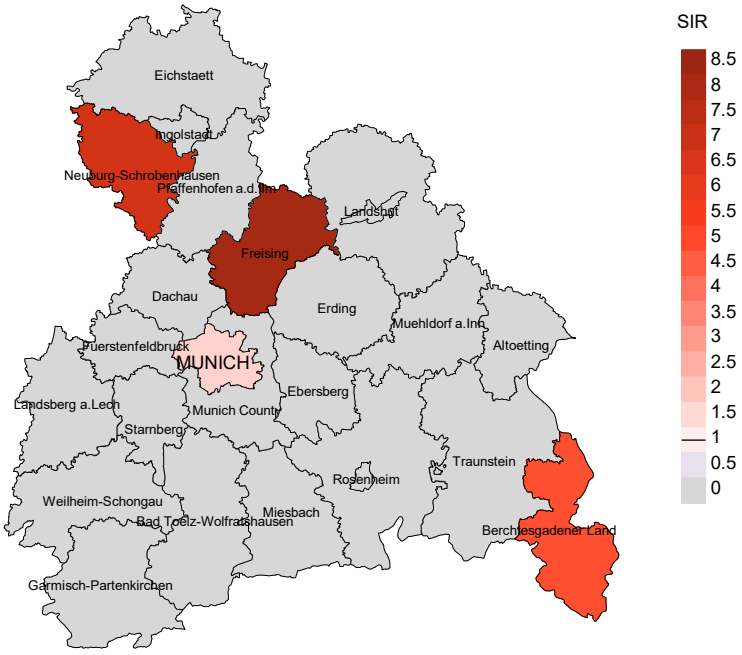


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=55, females N=8).

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 0 women were identified with newly diagnosed kaposi sarcoma. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 25.25, 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	8	100.0	50.0	7	87.5	100.0
1999	1	100.0		1	100.0	
2000	11	81.8	18.2	6	54.5	83.3
2001	3	33.3	33.3	1	33.3	100.0
2002	4	100.0	50.0	4	100.0	100.0
2003	2	100.0		2	100.0	100.0
2004	3	100.0	33.3	1	33.3	100.0
2005	5	100.0		2	40.0	100.0
2006	7	85.7		3	42.9	66.7
2007	6	100.0	33.3	3	50.0	100.0
2008	7	100.0	14.3	6	85.7	100.0
2009	6	100.0		2	33.3	100.0
2010	4	50.0				
2011	7	85.7		4	57.1	75.0
2012	7	100.0		3	42.9	66.7
2013	4	100.0				
2014	7	85.7	14.3	3	42.9	100.0
2015	5	100.0		1	20.0	100.0
2016	1	100.0				
2017	4	100.0		1	25.0	100.0
2018	1	100.0		1	100.0	100.0
2019	2	100.0				
2020	2	100.0				
1998-2020	107	91.6	13.1	51	47.7	90.2

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	8	5	100.0	4	50.0
1999	1	2	50.0	1	100.0
2000	11	3	100.0	2	18.2
2001	3	1	100.0		
2002	4	4	100.0	3	75.0
2003	2	1	100.0		
2004	3	3	100.0	1	33.3
2005	5				
2006	7				
2007	6	5	80.0	2	33.3
2008	7	2	100.0	1	14.3
2009	6	3	100.0	1	16.7
2010	4	2	100.0		
2011	7	2	100.0		
2012	7	4	75.0		
2013	4	4	100.0		
2014	7	4	100.0	2	28.6
2015	5	1	100.0		
2016	1	2	100.0		
2017	4				
2018	1	2	100.0	1	100.0
2019	2	1			
2020	2	5	100.0		
1998-2020	107	56	92.9	18	16.8

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	5	40.0	60.0	100.0
1999	2	100.0		100.0
2000	3	66.7	33.3	100.0
2001	1	100.0		100.0
2002	4	50.0	50.0	100.0
2003	1		100.0	
2004	3	100.0		66.7
2005				
2006				
2007	5	40.0	60.0	75.0
2008	2		100.0	50.0
2009	3	66.7	33.3	66.7
2010	2		100.0	
2011	2	100.0		100.0
2012	4		100.0	33.3
2013	4	100.0		100.0
2014	4	50.0	50.0	75.0
2015	1	100.0		100.0
2016	2	50.0	50.0	50.0
2017				
2018	2	50.0	50.0	50.0
2019	1		100.0	
2020	5	40.0	60.0	60.0
1998-2020	56	51.8	48.2	73.1

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	5	53.2	52.7	54.2	53.2
1999	2	53.3	53.3		36.1
2000	2	57.9	61.8	54.1	57.9
2001	1	93.6	93.6		93.6
2002	4	56.8	63.3	51.6	56.8
2003	1	88.3		88.3	
2004	2	68.8	68.8		47.1
2005					
2006					
2007	4	45.4	47.5	41.0	47.5
2008	2	54.2		54.2	37.8
2009	3	68.8	71.8	52.6	71.8
2010	1	89.7		89.7	
2011	2	56.0	56.0		56.0
2012	4	63.9		63.9	91.4
2013	2	86.4	86.4		86.4
2014	4	77.0	58.1	89.7	65.1
2015	1	59.3	59.3		59.3
2016	2	61.4	47.2	75.5	47.2
2017					
2018	2	78.4	70.5	86.2	70.5
2019	1	92.1		92.1	
2020	5	82.4	86.8	82.4	82.4
1998-2020	50	63.3	64.8	58.7	58.7

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

Table 10b

Medians of age at death according to the grouping in Table 9
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998					
1999					
2000	1	91.6	91.6		91.6
2001					
2002					
2003					
2004	1	73.0	73.0		73.0
2005					
2006					
2007	1	42.1		42.1	42.1
2008					
2009					
2010	1	89.5		89.5	
2011					
2012					
2013	2	85.5	85.5		85.5
2014					
2015					
2016					
2017					
2018					
2019					
2020					
1998–2020	6	85.5	85.5	65.8	82.4

By 2018, Bavarians' life expectancy at birth is estimated at 79.3 years for boys and 83.8 years for girls.

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

Table 11a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	2	0.2	0.25	0.1	0.28	0.2	0.30	0.2	0.29
1999	2	0.2	2.00	0.1	2.03	0.1	1.80	0.2	1.62
2000	1	0.1	0.11	0.1	0.10	0.1	0.09	0.1	0.09
2001	1	0.1	0.33	0.0	0.29	0.1	0.41	0.1	0.48
2002	2	0.1	0.67	0.1	0.63	0.1	0.67	0.1	0.78
2003									
2004	2	0.1	1.00	0.1	0.81	0.1	1.04	0.1	1.09
2005									
2006									
2007	2	0.1	0.40	0.1	0.46	0.1	0.44	0.1	0.49
2008									
2009	2	0.1	0.33	0.0	0.27	0.1	0.27	0.1	0.26
2010									
2011	2	0.1	0.40	0.1	0.44	0.1	0.41	0.1	0.37
2012									
2013	2	0.1	0.50	0.0	0.23	0.1	0.39	0.1	0.49
2014	2	0.1	0.29	0.1	0.31	0.1	0.31	0.1	0.28
2015	1	0.0	0.25	0.0	0.24	0.0	0.27	0.0	0.24
2016	1	0.0	1.00	0.0	1.17	0.0	1.02	0.0	1.08
2017									
2018	1	0.0	1.00	0.0	1.66	0.0	1.24	0.0	1.24
2019									
2020	2	0.1	2.00	0.0	0.81	0.0	1.16	0.1	1.99
1998-2020	25	0.1	0.27	0.0	0.24	0.0	0.26	0.1	0.27

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									
1999									
2000	1	0.1	0.50	0.0	0.21	0.0	0.31	0.0	0.37
2001									
2002									
2003									
2004	1	0.1	1.00	0.0	2.47	0.0	1.85	0.0	1.85
2005									
2006									
2007									
2008									
2009									
2010									
2011									
2012									
2013	2	0.1		0.0		0.0		0.1	
2014									
2015									
2016									
2017									
2018									
2019									
2020									
1998-2020	4	0.0	0.29	0.0	0.14	0.0	0.18	0.0	0.23

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									
5-9									
10-14									
15-19									
20-24									
25-29									
30-34									
35-39									
40-44									
45-49	4	23.5	23.5	4	26.7	26.7			0.0
50-54	1	5.9	29.4	1	6.7	33.3			0.0
55-59	1	5.9	35.3	1	6.7	40.0			0.0
60-64	1	5.9	41.2	1	6.7	46.7			0.0
65-69	2	11.8	52.9	2	13.3	60.0			0.0
70-74	2	11.8	64.7	2	13.3	73.3			0.0
75-79	1	5.9	70.6	1	6.7	80.0			0.0
80-84	2	11.8	82.4	1	6.7	86.7	1	50.0	50.0
85+	3	17.6	100.0	2	13.3	100.0	1	50.0	100.0
All ages	17	100.0		15	100.0		2	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.	Males MI-index	Females Age-spec. mortal.	Females MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39								
40-44								
45-49	4		0.1	0.80			0.3	
50-54	1		0.0	0.14			0.0	
55-59	1		0.0	1.00			0.0	
60-64	1		0.1	0.33			0.0	
65-69	2		0.1	0.50			0.0	
70-74	2		0.1	0.29			0.0	
75-79	1		0.1	0.17			0.0	
80-84	1	1	0.1	0.50	0.1	1.00	0.0	0.0
85+	2	1	0.4	0.33	0.1	0.50	0.0	0.0
All ages	15	2					0.0	0.0
Mortality								
Raw			0.0	0.27	0.0	0.25		
WS			0.0	0.25	0.0	0.08		
ES			0.0	0.26	0.0	0.12		
BRD-S			0.0	0.27	0.0	0.18		
PYLL-70								
per 100,000			0.5					
ES			0.4					
AYLL-70			14.7					

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 ←%
C16	Stomach	1	5.9					1	100.0
C18	Colon	1	5.9					1	100.0
C19–C20	Rectum	1	5.9					1	100.0
C25	Pancreas	1	5.9			1	100.0		
C33–C34	Lung	2	11.8					2	100.0
C44	Skin others	2	11.8	1	50.0	1	50.0		
C64	Kidney	1	5.9	1	100.0				
C82–C85	NHL	6	35.3	2	33.3	1	16.7	3	50.0
C91–C96	Leukaemia	2	11.8	1	50.0			1	50.0
All further malignancies		17	100.0	5	29.4	3	17.6	9	52.9

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

N=3 further malignancies in deaths were registered. Therefore, the table was not created.

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								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39								
40-44								
45-49	4		0.1	0.80			0.3	
50-54								
55-59	1		0.0	1.00			0.0	
60-64								
65-69	2		0.1	0.50			0.0	
70-74	2		0.1	0.29			0.0	
75-79	1		0.1	0.20			0.0	
80-84	1	1	0.1	1.00	0.1	1.00	0.0	0.0
85+	1	1	0.2	0.17	0.1	0.50	0.0	0.0
All ages	12	2					0.0	0.0
Mortality								
Raw			0.0	0.24	0.0	0.29		
WS			0.0	0.22	0.0	0.09		
ES			0.0	0.22	0.0	0.14		
BRD-S			0.0	0.24	0.0	0.21		
PYLL-70								
per 100,000			0.4					
ES			0.3					
AYLL-70			15.4					

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39								
40-44								
45-49	3		0.2	1.02			0.2	
50-54								
55-59								
60-64								
65-69								
70-74	1		0.1	0.27			0.0	
75-79	1		0.1	0.38			0.0	
80-84		1			0.1	1.50		0.0
85+		1			0.1	0.71		0.0
All ages	5	2					0.0	0.0
Mortality								
Raw			0.0	0.18	0.0	0.41		
WS			0.0	0.16	0.0	0.13		
ES			0.0	0.16	0.0	0.21		
BRD-S			0.0	0.18	0.0	0.31		
PYLL-70								
per 100,000			0.3					
ES			0.3					
AYLL-70			22.5					

* See corresponding tables with multiple malignancies.

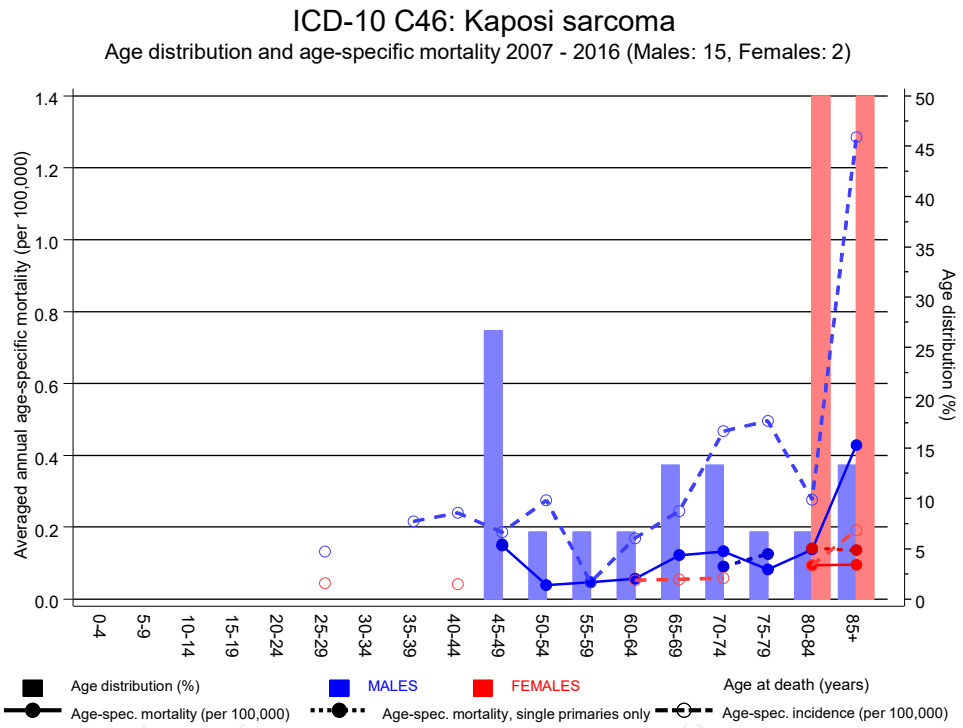


Figure 17. Distribution of age at death (bars; males: mean=58.2 yrs, median=54.3 yrs; females: mean=84.2 yrs, median=84.2 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

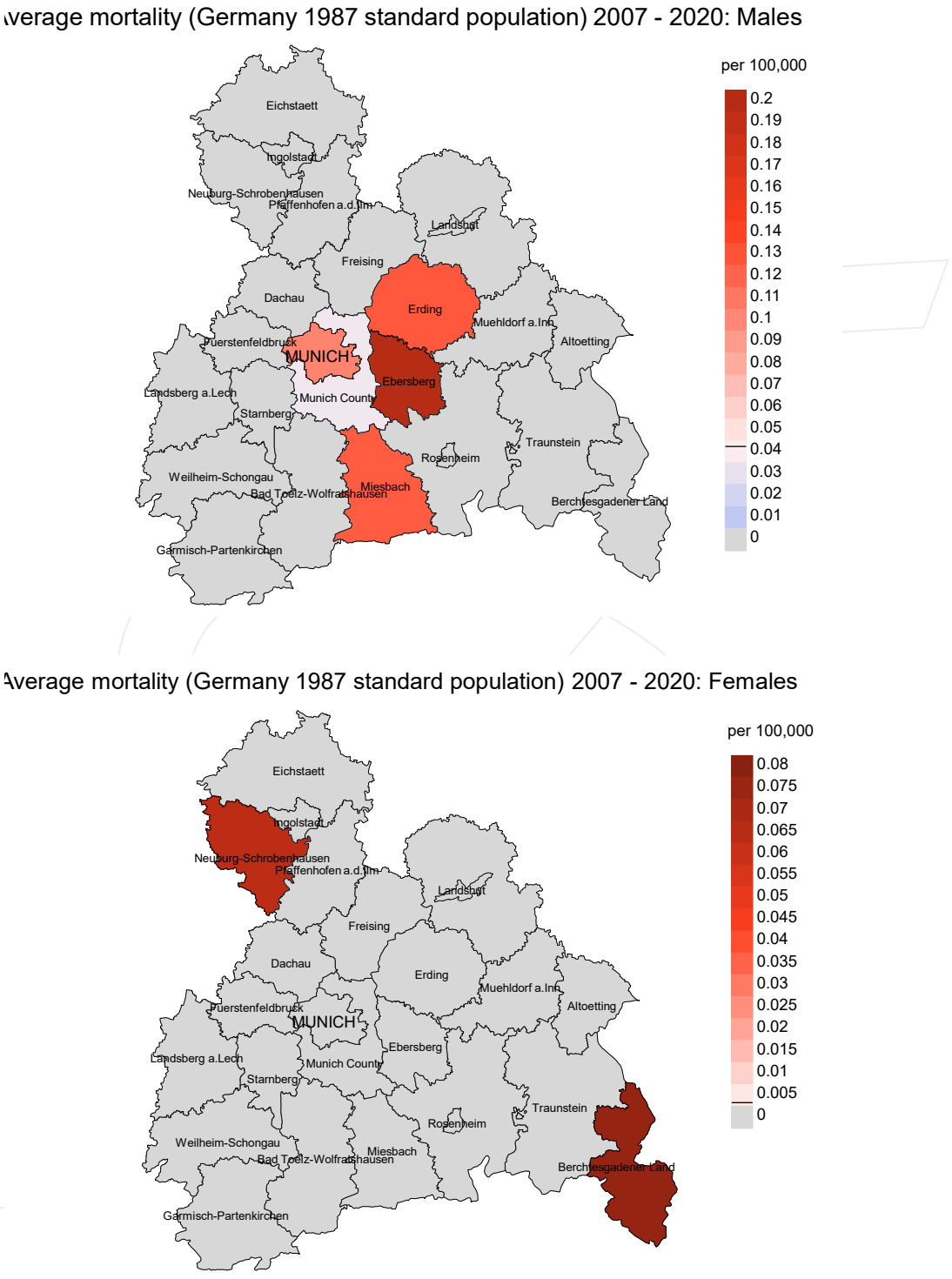


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.0/100,000 WS N=15, females 0.0/100,000 WS N=2).

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 0 women died from kaposi sarcoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.0/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.0/100,000.

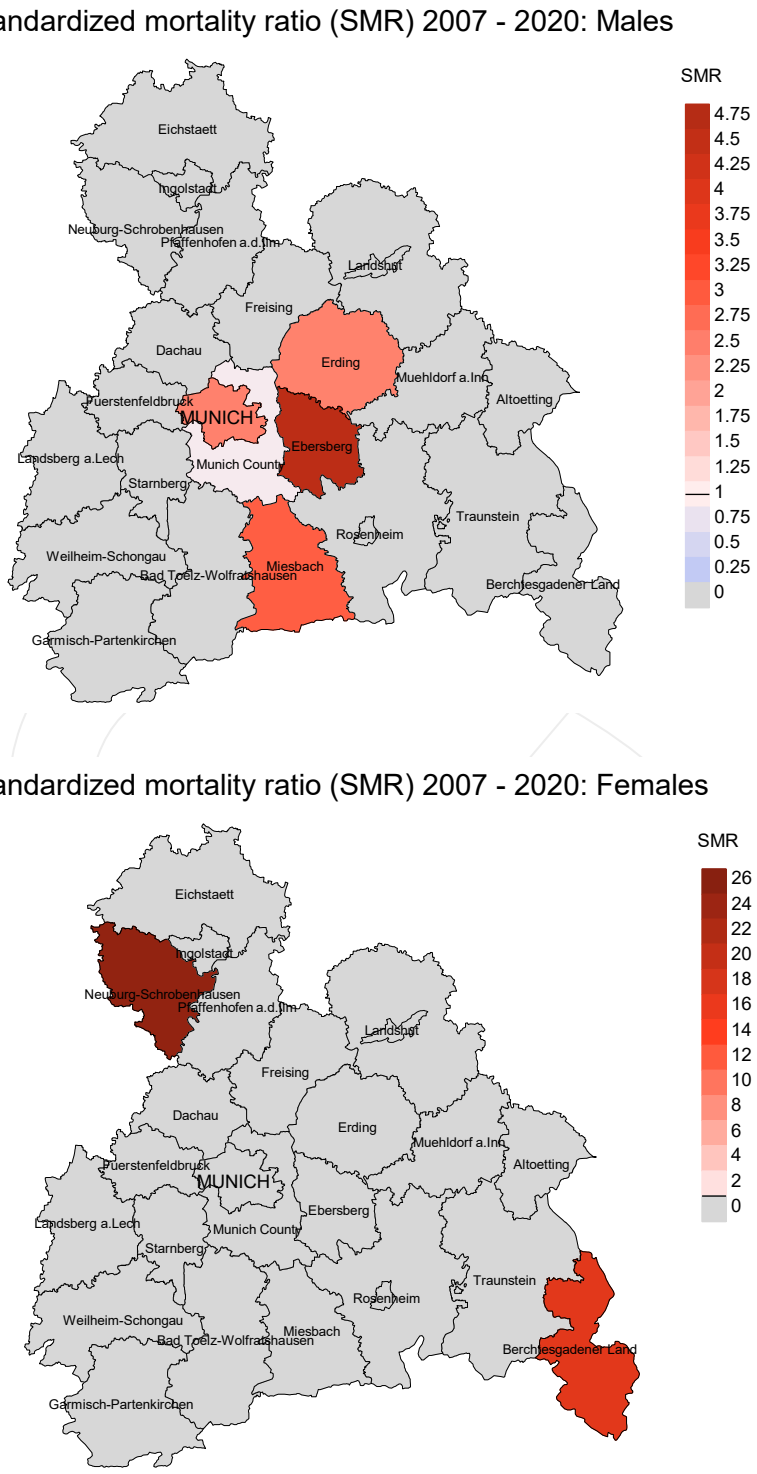


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=15, females N=2).

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 0 women died from kaposi sarcoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 103.95, 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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