Munich Cancer Registry

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ICD-10 C03: Gum cancer

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	385
Diseases	386
Creation date	04/13/2016
Export date	12/23/2015
Population	4.64 m

Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

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

http://www.tumorregister-muenchen.de/en/facts/base/bC03__E-ICD-10-C03-Gum-cancer-incidence-and-mortality.pdf

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 4.64 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, April 2016

[#] 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 2.51 million to 3.96 in 2002, and to 4.52 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

As a general rule, these few results from the TRM form the basis of sophisticated analyses. For head and neck tumors this is not the case. Therefore the results for head and neck tumors should be interpreted with caution. In part this is due to problems of classification because of limited specific details of locality. Additionally, with advanced tumors in a close topographic location it is often not possible to determine the exact ICD localization of a tumor.

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

Code	Description
C03.-	Malignant neoplasm of gum
C03.0	Upper gum
C03.1	Lower gum
C03.9	Gum, unspecified

INCIDENCE

Table 1

All patients with invasive cancer by year of diagnosis, proportions of DCO, multiple primaries, deaths, and active follow-up (incl. DCO)

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	12			41.7	58.3	100.0	
1999	11			45.5	54.5	90.9	
2000	12			25.0	66.7	91.7	
2001	11			36.4	72.7	100.0	
2002	22			27.3	63.6	100.0	#
2003	26			30.8	61.5	96.2	
2004	32			43.8	62.5	90.6	
2005	26			30.8	61.5	96.2	
2006	39			35.9	66.7	92.3	
2007	30			26.7	56.7	73.3	#
2008	21			19.0	47.6	76.2	
2009	32			31.3	68.8	78.1	
2010	24			20.8	50.0	79.2	
2011	23			17.4	34.8	73.9	
2012	32			31.3	46.9	78.1	
2013	31			22.6	22.6	100.0	
2014	2			100.0		100.0	##
1998-2014	386			30.3	54.9	87.6	

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 found in the respective headings.

Table 1a

All patients with invasive cancer
by year of diagnosis and gender
(incl. DCO)

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	12	7	5	58.3
1999	11	7	4	63.6
2000	12	7	5	58.3
2001	11	6	5	54.5
2002	22	15	7	68.2
2003	26	18	8	69.2
2004	32	21	11	65.6
2005	26	12	14	46.2
2006	39	19	20	48.7
2007	30	16	14	53.3
2008	21	9	12	42.9
2009	32	22	10	68.8
2010	24	16	8	66.7
2011	23	11	12	47.8
2012	32	18	14	56.3
2013	31	19	12	61.3
2014	2	2		100.0
1998-2014	386	225	161	58.3

Table 2

Incidence measures by year of diagnosis including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 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	7	5	0.6	0.4	0.4	0.2	0.6	0.3	0.6	0.4
1999	7	4	0.6	0.3	0.4	0.2	0.5	0.3	0.6	0.3
2000	7	5	0.6	0.4	0.4	0.2	0.6	0.4	0.7	0.4
2001	6	5	0.5	0.4	0.3	0.1	0.4	0.2	0.5	0.3
2002	15	7	0.8	0.4	0.5	0.2	0.7	0.3	0.8	0.3
2003	18	8	1.0	0.4	0.6	0.2	0.9	0.3	1.0	0.4
2004	21	11	1.1	0.6	0.7	0.2	0.9	0.3	1.1	0.4
2005	12	14	0.6	0.7	0.4	0.3	0.5	0.5	0.6	0.6
2006	19	20	1.0	1.0	0.6	0.5	0.8	0.7	1.1	0.9
2007	16	14	0.7	0.6	0.5	0.3	0.7	0.4	0.7	0.5
2008	9	12	0.4	0.5	0.2	0.3	0.3	0.4	0.4	0.4
2009	22	10	1.0	0.4	0.5	0.2	0.8	0.3	1.0	0.3
2010	16	8	0.7	0.3	0.4	0.1	0.6	0.2	0.7	0.2
2011	11	12	0.5	0.5	0.3	0.3	0.4	0.4	0.5	0.5
2012	18	14	0.8	0.6	0.4	0.3	0.6	0.4	0.8	0.5
2013	19	12	0.8	0.5	0.5	0.2	0.7	0.3	0.7	0.4
2014	2		0.1		0.0		0.1		0.1	
1998-2014	225	161	0.7	0.5	0.4	0.2	0.6	0.3	0.7	0.4

The computation of the incidence measures includes all primaries, 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	12	59.9	10.7	46.0	76.3	50.5	50.7	57.8	67.9	76.3
1999	11	60.1	12.6	41.4	86.5	47.1	52.7	59.5	68.0	73.0
2000	12	61.2	10.4	47.5	77.0	49.3	51.2	60.9	69.6	75.1
2001	11	71.5	13.8	58.8	96.4	59.7	59.8	63.6	87.8	88.1
2002	22	63.3	10.3	44.8	85.8	50.0	58.5	62.4	69.8	77.3
2003	26	63.1	16.0	10.7	83.0	49.4	53.3	62.4	77.9	81.4
2004	32	66.6	14.0	34.2	85.9	44.9	59.2	67.0	77.9	82.5
2005	26	63.0	16.0	22.8	89.6	40.9	54.7	60.7	77.4	83.7
2006	39	66.8	14.1	23.9	87.7	48.2	57.1	66.4	78.2	86.0
2007	30	65.6	12.4	37.1	93.3	50.8	57.7	63.9	73.6	82.5
2008	21	67.0	8.4	53.4	82.8	55.7	61.7	67.8	72.1	78.8
2009	32	67.8	14.5	38.7	98.4	47.6	55.5	69.9	78.1	83.8
2010	24	69.2	14.3	35.2	91.8	50.7	58.0	72.1	78.8	85.2
2011	23	64.1	14.8	27.0	86.4	47.7	55.6	66.9	76.7	78.0
2012	32	68.4	10.7	49.2	89.1	55.5	60.0	68.5	75.5	82.4
2013	31	66.7	12.2	47.2	92.8	49.5	58.7	65.8	72.1	86.5
2014	2	74.0	16.3	62.5	85.5	62.5	62.5	74.0	85.5	85.5
1998-2014	386	65.8	13.2	10.7	98.4	49.5	56.8	65.5	76.1	83.0

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	7	57.1	9.9	46.0	76.3	46.0	50.6	57.6	60.1	76.3
1999	7	61.6	11.7	52.7	86.5	52.7	53.1	59.5	63.8	86.5
2000	7	61.7	10.6	47.5	75.1	47.5	49.3	62.2	72.7	75.1
2001	6	63.9	7.1	58.8	78.0	58.8	59.7	61.8	63.6	78.0
2002	15	63.0	11.1	44.8	85.8	49.3	56.6	62.9	69.8	80.8
2003	18	62.8	12.3	45.4	83.0	49.4	53.3	59.2	70.4	81.4
2004	21	61.8	13.8	34.2	81.9	44.1	53.3	62.0	74.4	77.5
2005	12	57.5	11.0	39.1	71.7	40.9	49.6	58.3	66.7	71.3
2006	19	64.6	16.2	23.9	87.7	46.6	51.9	65.7	78.2	86.3
2007	16	61.7	9.0	48.9	80.3	51.6	56.3	58.2	66.4	75.4
2008	9	69.0	10.0	53.5	82.8	53.5	61.7	68.3	78.8	82.8
2009	22	67.5	11.8	46.5	88.1	53.3	55.7	69.9	76.5	82.2
2010	16	65.2	13.6	35.2	91.5	48.7	56.6	68.4	74.1	76.1
2011	11	62.4	15.9	27.0	86.4	49.1	51.7	64.3	70.1	78.0
2012	18	65.6	10.4	49.2	84.4	51.2	56.0	65.3	74.7	82.4
2013	19	62.9	7.9	48.3	73.4	49.2	57.7	65.6	68.3	72.1
2014	2	74.0	16.3	62.5	85.5	62.5	62.5	74.0	85.5	85.5
1998-2014	225	63.5	11.9	23.9	91.5	49.2	55.5	62.8	72.1	79.3

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	5	63.9	11.6	50.5	76.3	50.5	57.5	59.2	75.8	76.3
1999	4	57.4	15.5	41.4	73.0	41.4	44.2	57.6	70.5	73.0
2000	5	60.5	11.2	50.9	77.0	50.9	51.4	56.7	66.6	77.0
2001	5	80.7	14.8	59.8	96.4	59.8	71.3	87.8	88.1	96.4
2002	7	63.7	9.0	51.2	77.3	51.2	58.5	62.0	72.5	77.3
2003	8	63.9	23.5	10.7	78.7	10.7	57.1	75.5	78.2	78.7
2004	11	75.7	9.3	61.5	85.9	62.3	63.0	78.2	84.3	84.9
2005	14	67.7	18.3	22.8	89.6	50.8	56.1	73.2	81.0	84.2
2006	20	68.8	11.7	48.2	87.0	54.1	58.8	69.0	78.6	84.6
2007	14	70.0	14.5	37.1	93.3	50.1	63.6	70.9	77.3	88.2
2008	12	65.5	7.1	53.4	75.8	55.7	59.9	66.7	71.3	72.5
2009	10	68.4	20.0	38.7	98.4	39.8	54.8	73.6	81.4	91.8
2010	8	77.3	12.8	50.7	91.8	50.7	71.5	82.0	84.5	91.8
2011	12	65.6	14.4	34.5	84.1	47.7	57.0	68.2	76.9	77.2
2012	14	71.9	10.4	55.7	89.1	59.4	63.9	70.5	80.9	87.4
2013	12	72.6	15.5	47.2	92.8	55.3	58.9	74.4	86.6	86.9
1998-2014	161	69.0	14.3	10.7	98.4	51.2	59.2	70.4	79.2	85.9

Table 4

Age distribution by 5-year age group and gender for period 2007-2014
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
25-29	1	0.5	0.5	1	0.9	0.9			0.0
30-34	1	0.5	1.0			0.9	1	1.2	1.2
35-39	3	1.5	2.6	1	0.9	1.8	2	2.4	3.7
40-44	1	0.5	3.1			1.8	1	1.2	4.9
45-49	11	5.6	8.7	9	8.0	9.7	2	2.4	7.3
50-54	12	6.2	14.9	8	7.1	16.8	4	4.9	12.2
55-59	31	15.9	30.8	21	18.6	35.4	10	12.2	24.4
60-64	23	11.8	42.6	15	13.3	48.7	8	9.8	34.1
65-69	31	15.9	58.5	19	16.8	65.5	12	14.6	48.8
70-74	29	14.9	73.3	17	15.0	80.5	12	14.6	63.4
75-79	19	9.7	83.1	12	10.6	91.2	7	8.5	72.0
80-84	17	8.7	91.8	6	5.3	96.5	11	13.4	85.4
85+	16	8.2	100.0	4	3.5	100.0	12	14.6	100.0
All ages	195	100.0		113	100.0		82	100.0	

Included in the statistics are 47.8% multiple primaries in males and 24.4% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 2007-2014

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=0 %	Females DCO rate n=0 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14			0.0	0.0				
15-19			0.0	0.0				
20-24			0.0	0.0				
25-29	1		0.1	0.0			0.2	
30-34		1	0.0	0.1				0.1
35-39	1	2	0.1	0.2			0.1	0.1
40-44		1	0.0	0.1				0.0
45-49	9	2	0.6	0.1			0.3	0.0
50-54	8	4	0.6	0.3			0.2	0.1
55-59	21	10	2.0	0.9			0.3	0.1
60-64	15	8	1.5	0.8			0.1	0.1
65-69	19	12	2.0	1.1			0.1	0.1
70-74	17	12	1.9	1.1			0.1	0.1
75-79	12	7	2.2	1.0			0.1	0.1
80-84	6	11	1.7	2.0			0.1	0.1
85+	4	12	1.7	2.1			0.1	0.1
All ages	113	82			0.0	0.0	0.1	0.1
Incidence								
Raw			0.6	0.4				
WS			0.4	0.2				
ES			0.5	0.3				
BRD-S			0.6	0.3				

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).

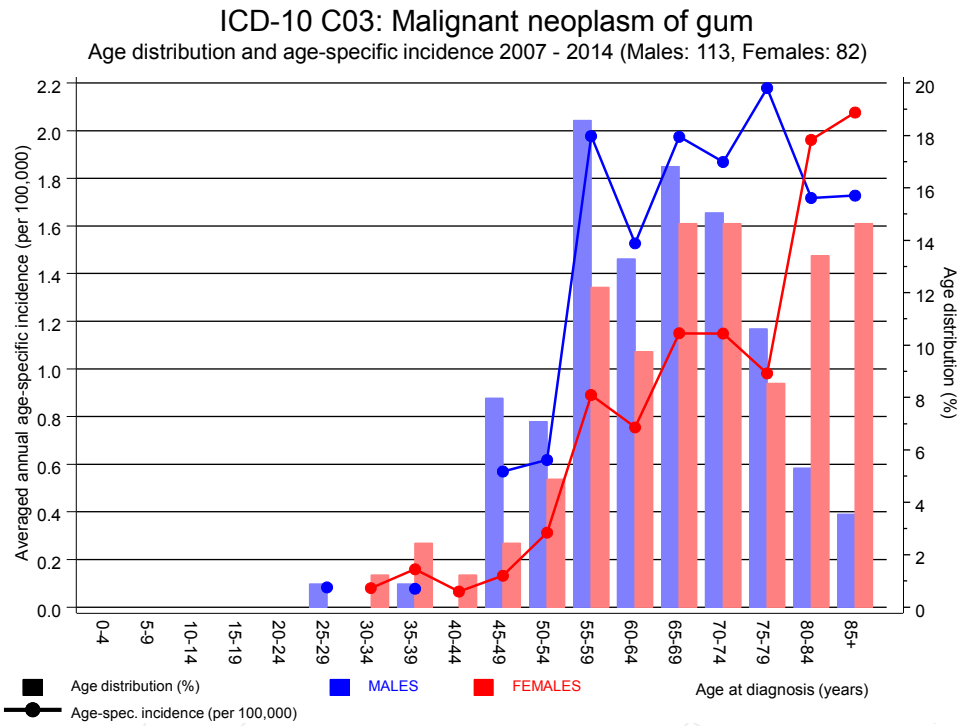


Figure 6. Age distribution and age-specific incidence

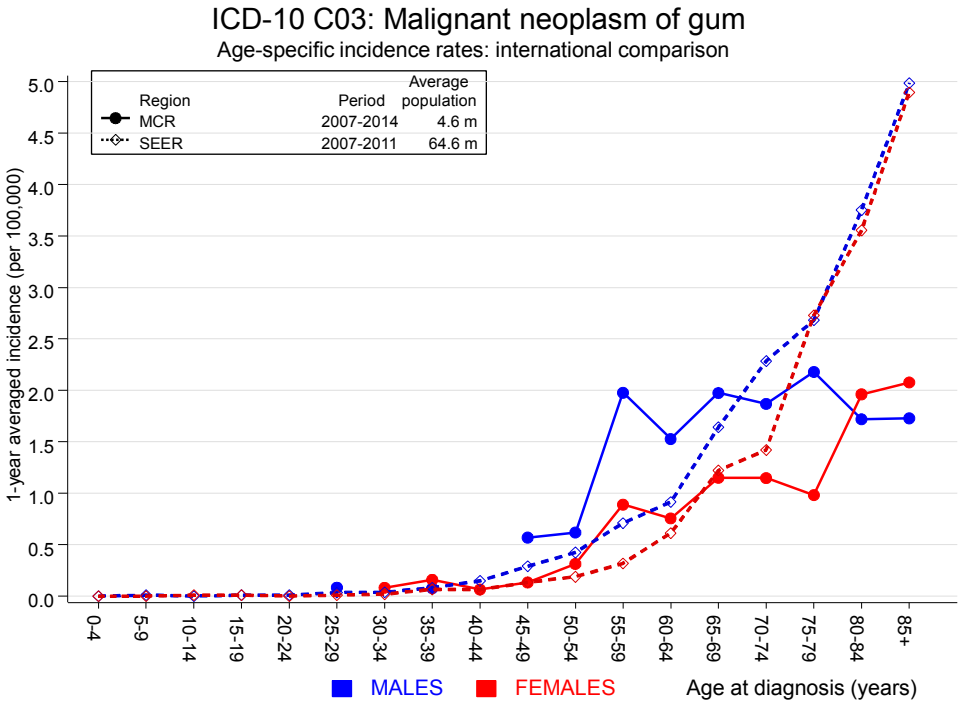


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

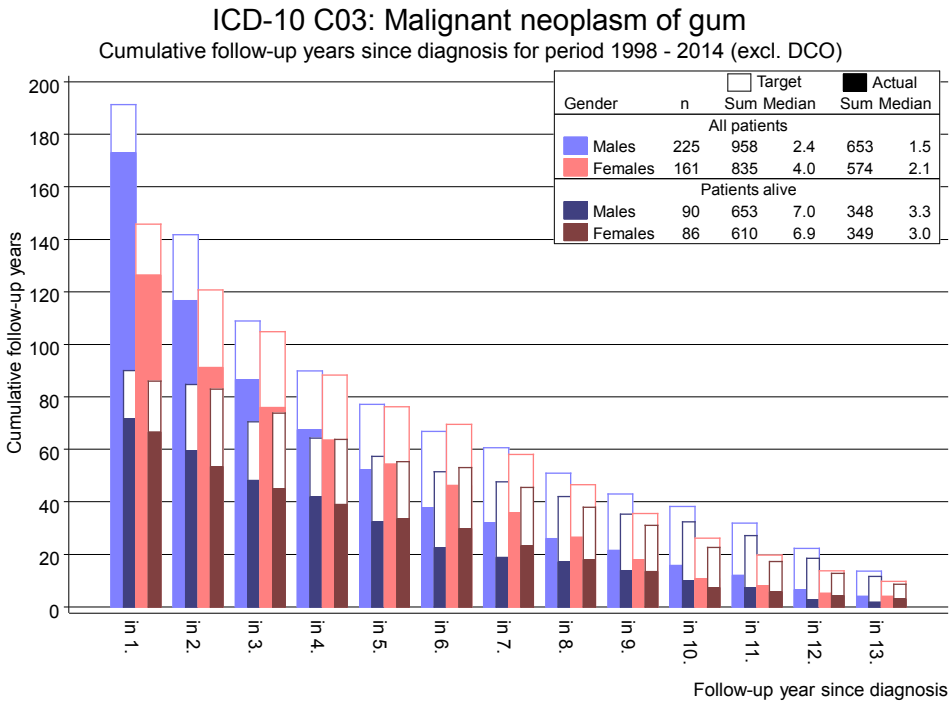


Figure 7. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Table 8a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998–2014
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C09–C10 Oropharynx	2	0.1	15.9	1.9	57.5	#	28.8	
C12–C13 Hypopharynx	4	0.1	57.2	15.6	146.5	#	60.3	
C15 Oesophagus	3	0.2	16.2	3.3	47.4	#	43.2	33.3
C19–C20 Rectum	2	0.5	3.8	0.5	13.7		22.6	
C22 Liver	2	0.3	7.9	1.0	28.5		26.8	
C30–C31 Sinuses	2	0.0	125.3	15.2	452.7	#	30.5	
C32 Larynx	2	0.1	18.3	2.2	66.0	#	29.0	
C33–C34 Lung	6	1.1	5.4	2.0	11.9	#	75.2	
C46,C49 Soft tissue	2	0.0	40.7	4.9	147.0	#	29.9	
C61 Prostate	3	2.7	1.1	0.2	3.2		4.3	33.3
Other primaries	12	3.0	3.9	2.0	6.9	#	137.4	
Not observed	0	1.2	0.0	0.0	3.2		-17.9	
All mult. primaries	40	9.4	4.3	3.0	5.8	#	470.1	5.0

Patients	223
Median age at second malignancy (years)	67.2
Person-years	651
Mean observation time (years)	2.9
Median observation time (years)	1.5

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Table 8b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998–2014
FEMALES

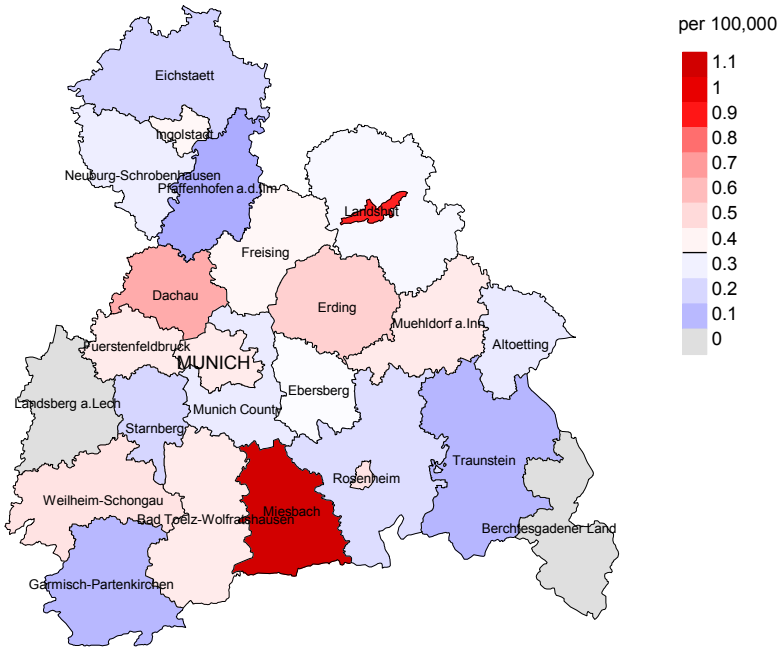
Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
C09–C10 Oropharynx	3	0.0	112.6	23.2	328.9 #	52.1	
C18 Colon	2	0.8	2.6	0.3	9.5	21.8	
C50 Breast	5	2.0	2.5	0.8	5.8	52.1	
Other primaries	8	0.8	9.8	4.2	19.3 #	125.8	12.5
Not observed	0	3.5	0.0	0.0	1.1	−61.0	
All mult. primaries	18	7.1	2.5	1.5	4.0 #	190.7	5.6

Patients	159
Median age at second malignancy (years)	72.5
Person-years	571
Mean observation time (years)	3.6
Median observation time (years)	2.1

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Average incidence (world standard population) 2007 - 2014: Males



Average incidence (world standard population) 2007 - 2014: Females

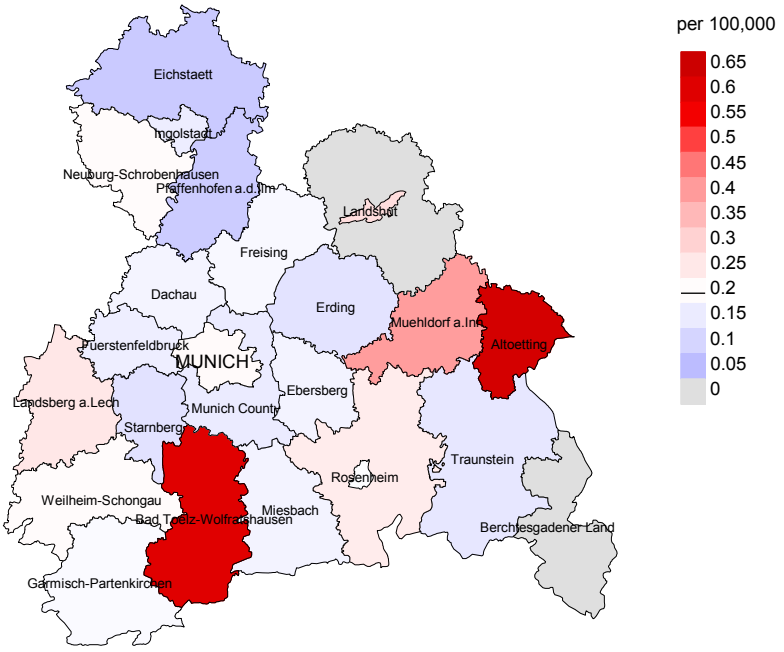
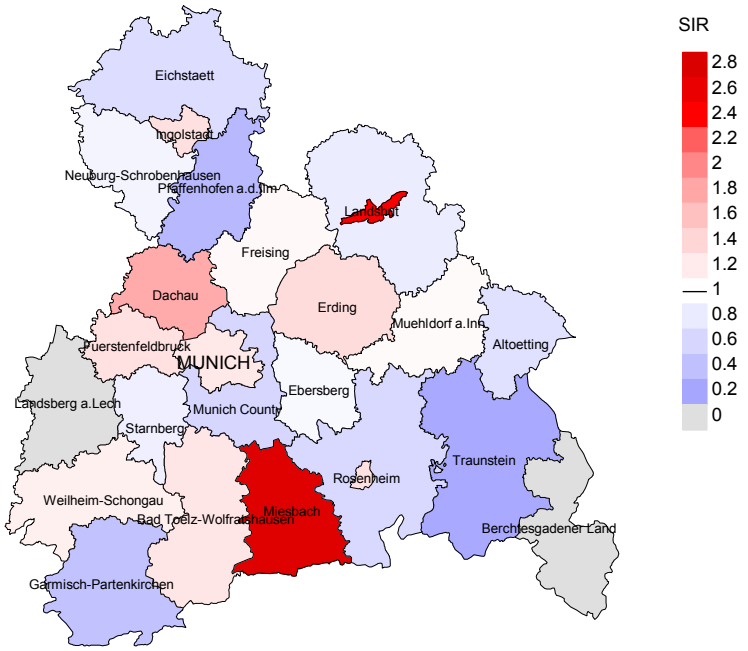


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.4/100,000 WS N=113, females 0.2/100,000 WS N=82).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 4 women were identified with newly diagnosed gum cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.6/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

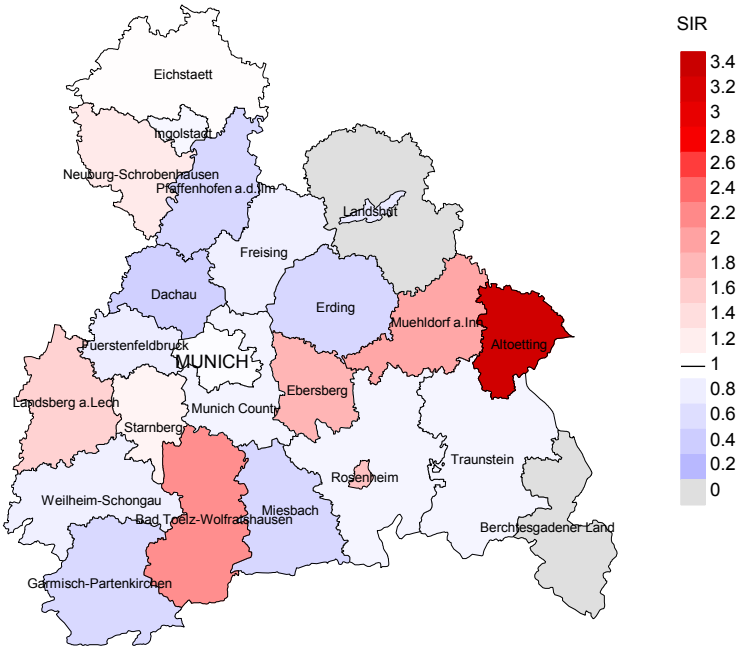


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=113, females N=82).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 4 women were identified with newly diagnosed gum cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.84. Though, the value of this parameter may vary with an underlying probability of 99% between 0.31 and 5.79, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 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	12	100.0		7	58.3	100.0
1999	11	90.9		6	54.5	66.7
2000	12	91.7		8	66.7	100.0
2001	11	100.0		8	72.7	75.0
2002	22	100.0		14	63.6	100.0
2003	26	96.2		16	61.5	93.8
2004	32	90.6		20	62.5	95.0
2005	26	96.2		16	61.5	100.0
2006	39	92.3		26	66.7	84.6
2007	30	73.3		17	56.7	100.0
2008	21	76.2		10	47.6	90.0
2009	32	78.1		22	68.8	100.0
2010	24	79.2		12	50.0	100.0
2011	23	73.9		8	34.8	100.0
2012	32	78.1		15	46.9	100.0
2013	31	100.0		7	22.6	100.0
2014	2	100.0				
1998-2014	386	87.6		212	54.9	94.8

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 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	12	1	100.0		
1999	11	7	100.0	1	9.1
2000	12	7	100.0	1	8.3
2001	11	13	100.0		
2002	22	16	100.0	1	4.5
2003	26	15	100.0	3	11.5
2004	32	18	100.0	5	15.6
2005	26	22	95.5	3	11.5
2006	39	21	85.7	10	25.6
2007	30	15	93.3	5	16.7
2008	21	19	100.0	2	9.5
2009	32	22	95.5	5	15.6
2010	24	26	96.2	6	25.0
2011	23	20	95.0	4	17.4
2012	32	19	100.0	6	18.8
2013	31	23	95.7	4	12.9
2014	2	16	93.8		
1998-2014	386	280	96.4	56	14.5

Table 10c

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 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	1		100.0	
1999	7	71.4	28.6	71.4
2000	7	85.7	14.3	85.7
2001	13	69.2	30.8	84.6
2002	16	31.3	68.8	56.3
2003	15	73.3	26.7	86.7
2004	18	77.8	22.2	83.3
2005	22	90.9	9.1	95.2
2006	21	71.4	28.6	88.9
2007	15	66.7	33.3	85.7
2008	19	73.7	26.3	78.9
2009	22	77.3	22.7	85.7
2010	26	88.5	11.5	96.0
2011	20	75.0	25.0	84.2
2012	19	78.9	21.1	84.2
2013	23	78.3	21.7	81.8
2014	16	56.3	43.8	66.7
1998-2014	280	73.6	26.4	83.0

Table 11a

Medians of age at death according to the grouping in Table 10
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	1	60.9		60.9	
1999	5	56.8	56.1	86.3	56.1
2000	6	70.0	70.0		70.0
2001	9	66.7	66.7	63.0	67.9
2002	8	65.4	60.6	74.6	62.0
2003	7	61.7	62.0	60.2	61.7
2004	14	72.0	72.0	69.3	71.9
2005	10	73.2	70.9	82.9	70.9
2006	15	62.4	62.4	61.6	60.8
2007	7	54.4	54.1	70.7	54.1
2008	13	67.9	62.5	71.8	66.9
2009	12	69.6	69.4	75.4	69.4
2010	16	71.8	72.9	64.5	72.1
2011	13	63.6	61.6	71.4	61.6
2012	14	63.8	65.3	50.8	65.3
2013	15	75.2	70.9	80.0	70.5
2014	9	73.3	73.3	72.9	73.4
1998-2014	174	67.9	66.9	72.1	66.7

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 11b

Medians of age at death according to the grouping in Table 10
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	2	66.7	49.4	84.0	49.4
2000	1	88.3		88.3	
2001	4	66.9	57.7	80.0	61.8
2002	8	82.9	61.8	87.6	79.0
2003	8	73.3	73.9	72.7	73.3
2004	4	74.5	78.4	64.9	78.4
2005	12	71.1	64.2	92.2	64.2
2006	6	81.2	83.4	76.7	83.4
2007	8	78.4	72.0	84.8	72.0
2008	6	80.8	77.4	83.9	77.4
2009	10	80.4	72.9	88.5	76.9
2010	10	85.0	84.0	94.7	84.0
2011	7	75.1	74.3	84.3	75.1
2012	5	85.7	84.0	85.7	82.7
2013	8	71.6	70.6	94.2	68.3
2014	7	85.6	78.9	90.6	78.9
1998-2014	106	79.4	74.3	85.9	75.3

By 2010, life expectancy at birth was 77.5 years for boys and 82.6 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 12a

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
1999	4	0.4	0.57	0.2	0.56	0.3	0.55	0.3	0.52
2000	6	0.5	0.86	0.3	0.70	0.5	0.83	0.6	0.85
2001	7	0.6	1.17	0.4	1.21	0.5	1.23	0.7	1.38
2002	3	0.2	0.20	0.1	0.20	0.1	0.19	0.1	0.17
2003	4	0.2	0.22	0.1	0.23	0.2	0.20	0.2	0.18
2004	12	0.6	0.57	0.3	0.51	0.5	0.57	0.7	0.64
2005	9	0.5	0.75	0.2	0.59	0.4	0.69	0.5	0.92
2006	11	0.6	0.58	0.4	0.66	0.5	0.63	0.6	0.61
2007	5	0.2	0.31	0.1	0.31	0.2	0.29	0.2	0.25
2008	10	0.4	1.11	0.3	1.26	0.4	1.18	0.4	1.01
2009	11	0.5	0.50	0.2	0.48	0.3	0.46	0.4	0.46
2010	14	0.6	0.88	0.3	0.73	0.4	0.78	0.6	0.91
2011	9	0.4	0.82	0.2	0.78	0.3	0.80	0.4	0.80
2012	13	0.6	0.72	0.3	0.74	0.4	0.71	0.5	0.70
2013	11	0.5	0.58	0.2	0.44	0.3	0.51	0.4	0.61
2014	5	0.2	2.50	0.1	2.24	0.2	2.17	0.2	2.19
1999-2014	134	0.4	0.62	0.2	0.58	0.3	0.60	0.4	0.62

Table 12b

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
1999	1	0.1	0.25	0.1	0.31	0.1	0.29	0.1	0.30
2000									
2001	2	0.2	0.40	0.1	0.77	0.1	0.62	0.1	0.53
2002	2	0.1	0.29	0.1	0.32	0.1	0.31	0.1	0.30
2003	7	0.4	0.88	0.2	0.64	0.2	0.77	0.3	0.83
2004	2	0.1	0.18	0.0	0.18	0.1	0.18	0.1	0.18
2005	11	0.6	0.79	0.3	0.74	0.4	0.78	0.5	0.74
2006	4	0.2	0.20	0.0	0.07	0.1	0.09	0.1	0.14
2007	5	0.2	0.36	0.1	0.34	0.1	0.35	0.2	0.32
2008	4	0.2	0.33	0.1	0.20	0.1	0.23	0.1	0.31
2009	6	0.3	0.60	0.1	0.57	0.2	0.56	0.2	0.55
2010	9	0.4	1.13	0.1	1.17	0.2	1.12	0.2	1.03
2011	6	0.3	0.50	0.1	0.39	0.1	0.41	0.2	0.40
2012	2	0.1	0.14	0.0	0.07	0.0	0.09	0.1	0.12
2013	7	0.3	0.58	0.1	0.61	0.2	0.59	0.2	0.56
2014	4	0.2		0.1		0.1		0.1	
1999-2014	72	0.2	0.46	0.1	0.40	0.1	0.41	0.2	0.42

Table 13

Age distribution of age at death (cancer-related) for period 2007-2014
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
35-39	1	0.8	0.8			0.0	1	2.3	2.3
40-44	2	1.7	2.5	1	1.3	1.3	1	2.3	4.7
45-49	6	5.0	7.4	5	6.4	7.7	1	2.3	7.0
50-54	8	6.6	14.0	8	10.3	17.9			7.0
55-59	8	6.6	20.7	5	6.4	24.4	3	7.0	14.0
60-64	13	10.7	31.4	10	12.8	37.2	3	7.0	20.9
65-69	24	19.8	51.2	18	23.1	60.3	6	14.0	34.9
70-74	19	15.7	66.9	13	16.7	76.9	6	14.0	48.8
75-79	13	10.7	77.7	9	11.5	88.5	4	9.3	58.1
80-84	10	8.3	86.0	6	7.7	96.2	4	9.3	67.4
85+	17	14.0	100.0	3	3.8	100.0	14	32.6	100.0
All ages	121	100.0		78	100.0		43	100.0	

Included in the statistics are 47.8% multiple primaries in males and 24.4% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**incl. multiple primaries**)

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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39		1	0.0		0.1	0.50		0.4
40-44	1	1	0.1	1.00	0.1	1.00	0.2	0.2
45-49	5	1	0.3	0.56	0.1	0.50	0.5	0.1
50-54	8		0.6	1.00	0.0		0.4	
55-59	5	3	0.5	0.24	0.3	0.30	0.2	0.1
60-64	10	3	1.0	0.67	0.3	0.38	0.2	0.1
65-69	18	6	1.9	0.95	0.6	0.50	0.3	0.1
70-74	13	6	1.4	0.76	0.6	0.50	0.1	0.1
75-79	9	4	1.6	0.75	0.6	0.57	0.1	0.1
80-84	6	4	1.7	1.00	0.7	0.36	0.1	0.1
85+	3	14	1.3	0.75	2.4	1.17	0.0	0.2
All ages	78	43					0.2	0.1
Mortality								
Raw			0.4	0.69	0.2	0.52		
WS			0.2	0.65	0.1	0.43		
ES			0.3	0.66	0.1	0.45		
BRD-S			0.4	0.68	0.2	0.46		
PYLL-70								
per 100,000			2.9		1.0			
ES			2.5		0.8			
AYLL-70			9.8		10.5			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1999-2014
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C00	Lip	1	1.3	1	100.0				
C03-C06	Oral cavity	6	7.5					6	100.0
C07-C08	Salivary gland	1	1.3			1	100.0		
C09-C10	Oropharynx	7	8.8	5	71.4	1	14.3	1	14.3
C12-C13	Hypopharynx	3	3.8	2	66.7			1	33.3
C15	Oesophagus	5	6.3			1	20.0	4	80.0
C16	Stomach	1	1.3					1	100.0
C18	Colon	2	2.5	1	50.0	1	50.0		
C19-C20	Rectum	5	6.3	3	60.0			2	40.0
C22	Liver	2	2.5			1	50.0	1	50.0
C25	Pancreas	1	1.3					1	100.0
C30-C31	Sinuses	4	5.0	1	25.0	1	25.0	2	50.0
C32	Larynx	4	5.0	2	50.0	1	25.0	1	25.0
C33-C34	Lung	12	15.0	2	16.7	1	8.3	9	75.0
C38,C45	Mesothelioma	1	1.3					1	100.0
C43	Malign. melanoma	2	2.5	1	50.0			1	50.0
C44	Skin others	3	3.8	1	33.3	1	33.3	1	33.3
C46,C49	Soft tissue	1	1.3	1	100.0				
C61	Prostate	5	6.3	3	60.0			2	40.0
C64	Kidney	1	1.3					1	100.0
C65	Renal pelvis	1	1.3	1	100.0				
C67	Bladder	7	8.8	6	85.7			1	14.3
C82-C85	NHL	3	3.8	3	100.0				
C91-C96	Leukaemia	2	2.5					2	100.0
All mult. primaries		80	100.0	33	41.3	9	11.3	38	47.5

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 multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1999-2014
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	5	14.3					5	100.0
C09-C10 Oropharynx	4	11.4	1	25.0			3	75.0
C15 Oesophagus	1	2.9					1	100.0
C16 Stomach	1	2.9	1	100.0				
C18 Colon	2	5.7					2	100.0
C22 Liver	1	2.9			1	100.0		
C33-C34 Lung	2	5.7					2	100.0
C44 Skin others	4	11.4	2	50.0	1	25.0	1	25.0
C50 Breast	7	20.0	4	57.1			3	42.9
C53 Cervix uteri	3	8.6	1	33.3			2	66.7
C54 Corpus uteri	2	5.7	1	50.0			1	50.0
C68 Urethra	1	2.9	1	100.0				
C70-C72 CNS cancer	1	2.9					1	100.0
C76-C79 CUP	1	2.9					1	100.0
All mult. primaries	35	100.0	11	31.4	2	5.7	22	62.9

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 multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39		1	0.0		0.1	0.44		0.4
40-44	1	1	0.1	1.00	0.1	0.88	0.2	0.2
45-49	5	1	0.3	0.54	0.1	0.44	0.5	0.1
50-54	7		0.5	1.01	0.0		0.4	
55-59	3	2	0.3	0.16	0.2	0.19	0.1	0.1
60-64	9	2	0.9	0.65	0.2	0.35	0.2	0.1
65-69	13	5	1.4	0.88	0.5	0.40	0.2	0.1
70-74	11	6	1.2	0.73	0.6	0.47	0.2	0.1
75-79	6	4	1.1	0.52	0.6	0.50	0.1	0.1
80-84	4	3	1.1	0.87	0.5	0.53	0.1	0.1
85+	2	10	0.9	0.87	1.7	0.79	0.0	0.1
All ages	61	35					0.2	0.1
Mortality								
Raw			0.3	0.62	0.2	0.45		
WS			0.2	0.59	0.1	0.37		
ES			0.3	0.59	0.1	0.38		
BRD-S			0.3	0.60	0.1	0.41		
PYLL-70								
per 100,000			2.5		0.9			
ES			2.1		0.7			
AYLL-70			10.5		11.3			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39		1	0.0		0.1	0.44		0.5
40-44	1	1	0.1	1.00	0.1	0.88	0.3	0.2
45-49	5	1	0.3	0.54	0.1	0.44	0.6	0.1
50-54	7		0.5	1.01	0.0		0.5	
55-59	2	2	0.2	0.12	0.2	0.19	0.1	0.1
60-64	4	2	0.4	0.32	0.2	0.35	0.1	0.1
65-69	9	3	0.9	0.72	0.3	0.27	0.2	0.1
70-74	7	5	0.8	0.47	0.5	0.43	0.1	0.1
75-79	6	4	1.1	0.52	0.6	0.50	0.1	0.1
80-84	2	3	0.6	0.58	0.5	0.53	0.0	0.1
85+	1	8	0.4	0.87	1.4	0.63	0.0	0.1
All ages	44	30					0.1	0.1
Mortality								
Raw			0.2	0.49	0.2	0.40		
WS			0.1	0.46	0.1	0.33		
ES			0.2	0.47	0.1	0.34		
BRD-S			0.2	0.47	0.1	0.37		
PYLL-70								
per 100,000			2.1		0.8			
ES			1.8		0.7			
AYLL-70			12.1		13.0			

* See corresponding tables with multiple primaries.

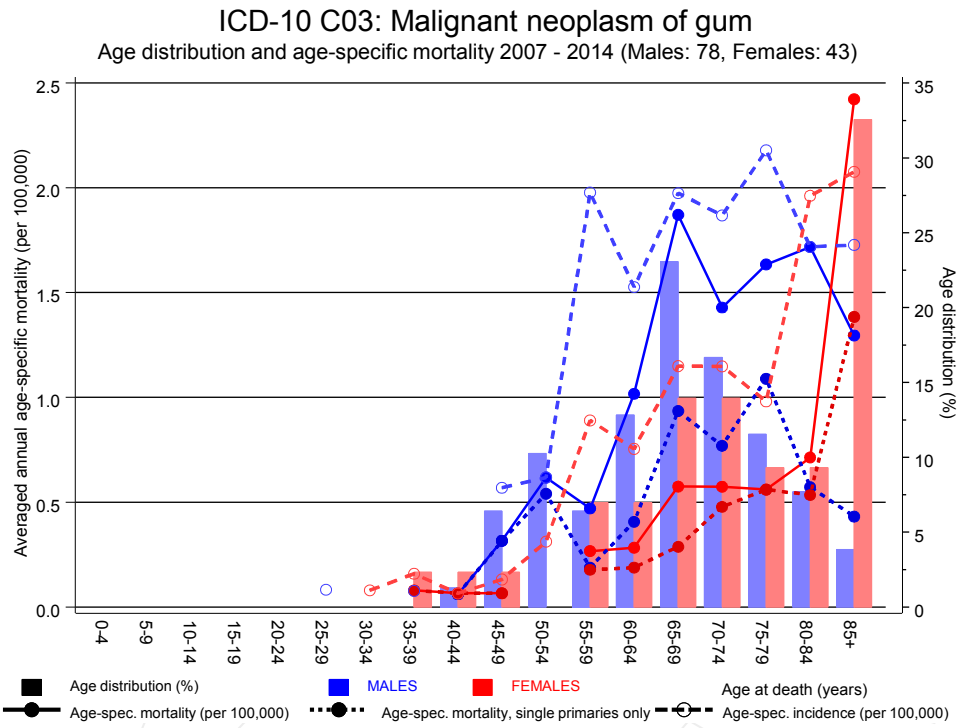
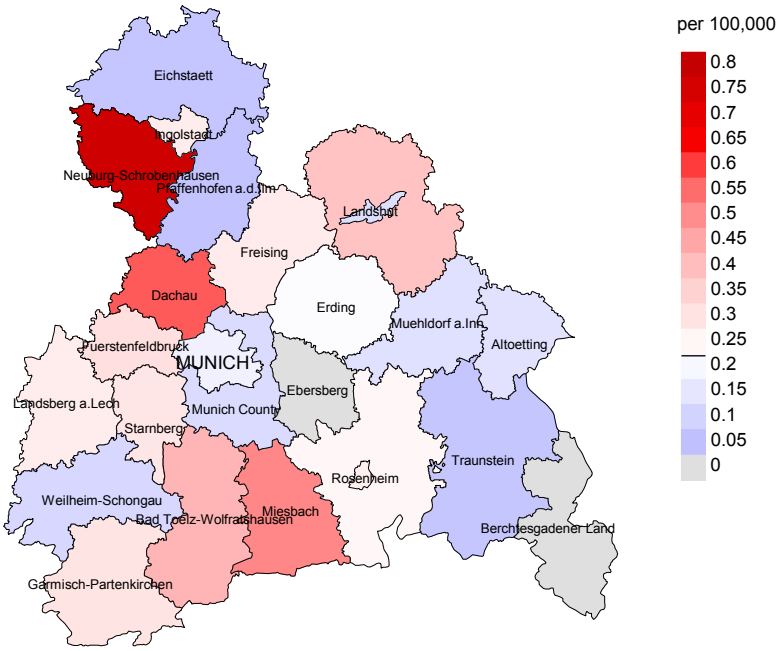


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2014: Males



Average mortality (world standard population) 2007 - 2014: Females

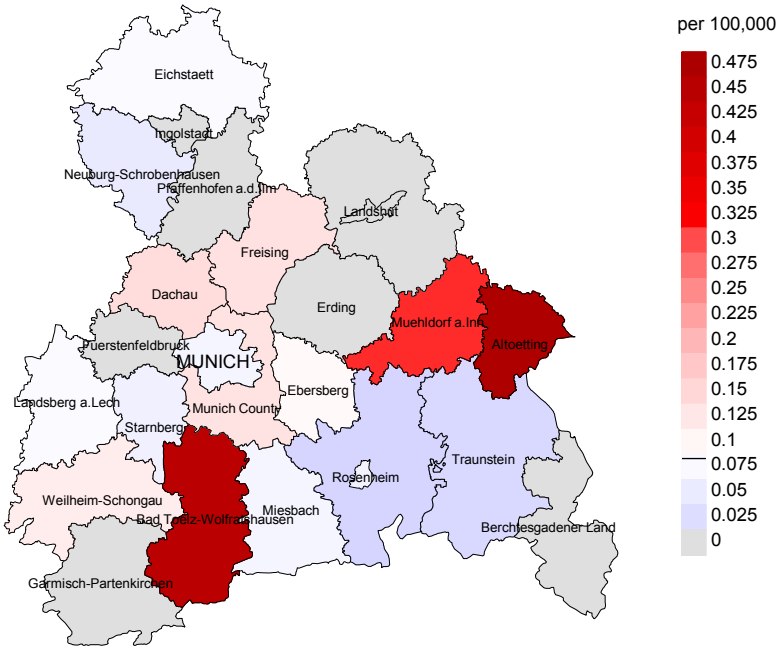


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.2/100,000 WS N=77, females 0.1/100,000 WS N=43).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 2 women died from gum cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.5/100,000.

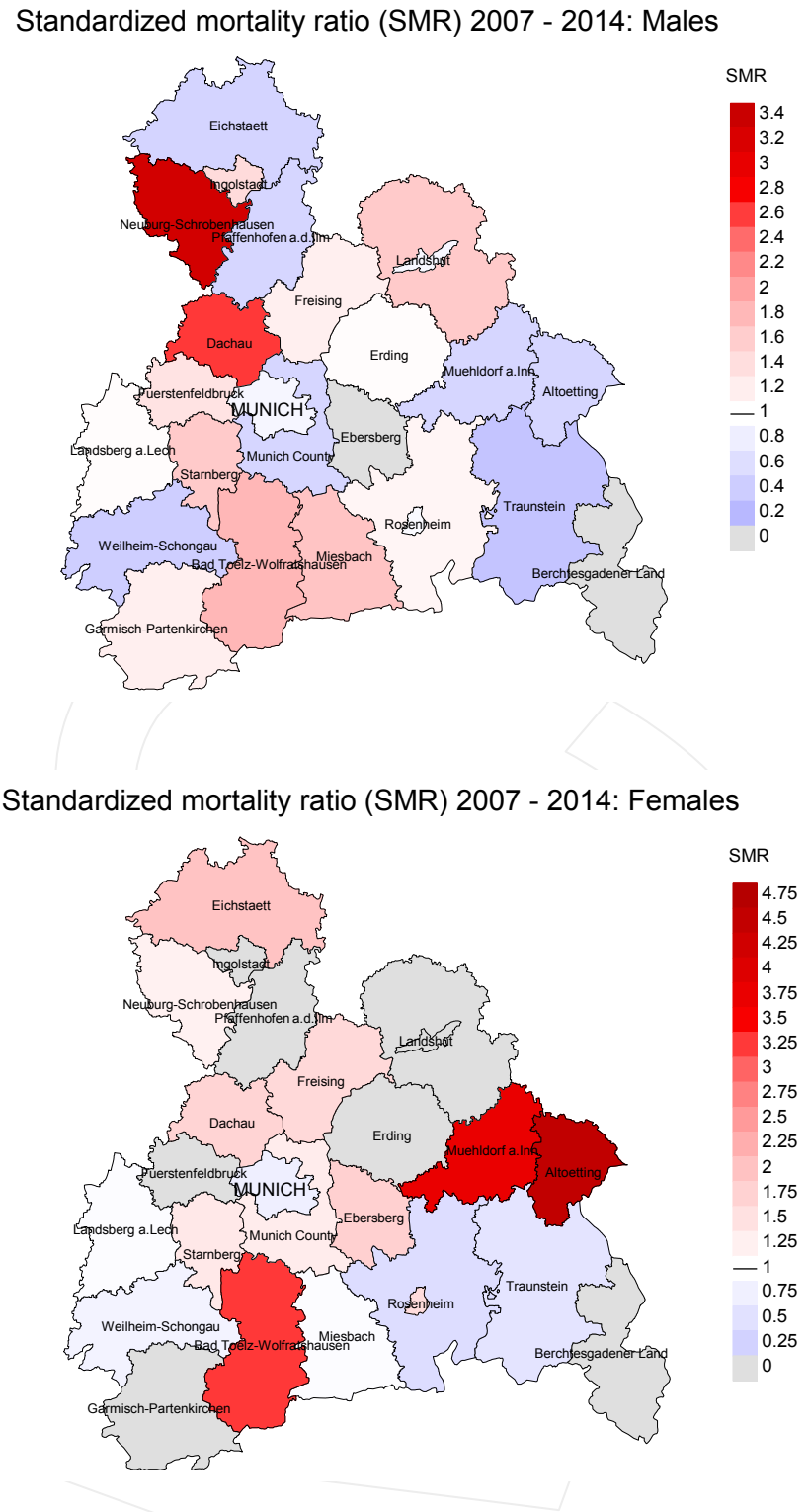


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=77, females N=43).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 2 women died from gum cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.79. Though, the value of this parameter may vary with an underlying probability of 99% between 0.09 and 8.32, 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 index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic 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 MI- index. 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

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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