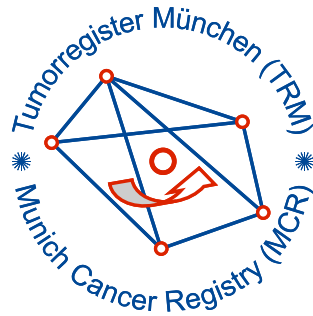


Munich Cancer Registry



- ▶ Survival
- ▶ Selection Matrix
- ▶ Homepage
- ▶ *Deutsch*

ICD-10 C50: Breast cancer (women)

Incidence and Mortality

Year of diagnosis	1998-2019
Patients	70,316
Diseases	73,922
Creation date	01/25/2021
Database export	01/07/2021
Population (females)	2.48 m





Munich Cancer Registry
Cancer Registry Bavaria - Upper Bavaria Regional Center
at Klinikum Grosshadern/IBE
Marchioninstr. 15
Munich, 81377
Germany

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

https://www.tumorregister-muenchen.de/en/facts/base/bC50f_E-ICD-10-C50-Breast-cancer-women-incidence-and-mortality.pdf

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

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], 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, January 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
C50.-	Malignant neoplasm of breast
C50.0	Nipple and areola
C50.1	Central portion of breast
C50.2	Upper-inner quadrant of breast
C50.3	Lower-inner quadrant of breast
C50.4	Upper-outer quadrant of breast
C50.5	Lower-outer quadrant of breast
C50.6	Axillary tail of breast
C50.8	Overlapping lesion of breast
C50.9	Breast, unspecified

Sex: Female

INCIDENCE

Table 1

Cases with invasive cancer by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (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	1921	114	5.9	13.5	10.0	61.1	95.6
1999	1956	94	4.8	12.7	9.7	56.2	94.5
2000	1970	83	4.2	13.0	9.5	55.0	96.2
2001	1997	97	4.9	13.2	9.2	51.6	94.7
2002	3383	268	7.9	13.1	8.9	56.0	95.9 #
2003	3159	244	7.7	13.1	8.6	54.8	95.0
2004	3267	197	6.0	13.2	8.2	49.7	94.8
2005	3377	195	5.8	13.3	7.8	48.3	95.2
2006	3328	135	4.1	13.5	7.5	43.4	93.2
2007	3674	189	5.1	13.6	7.1	43.7	93.7 #
2008	4057	172	4.2	13.8	6.6	39.3	96.7
2009	4119	190	4.6	14.0	6.1	38.6	97.3
2010	4027	173	4.3	14.2	5.6	36.0	97.0
2011	3930	168	4.3	14.4	5.1	33.4	96.8
2012	3965	134	3.4	14.6	4.7	31.1	96.5
2013	3905	157	4.0	14.9	4.3	29.0	97.1
2014	3784	148	3.9	15.1	3.7	26.2	96.3
2015	3818	153	4.0	15.4	3.2	23.4	95.2
2016	3667	166	4.5	15.5	2.7	20.4	99.4
2017	3656	147	4.0	15.8	2.3	15.5	99.3
2018	3475	39	1.1	16.0	1.9	8.6	99.4
2019	3487	10	0.3	16.2	1.5	4.8	73.1 ##
1998-2019	73922	3273	4.4	16.2	10.0	35.6	95.2

73,922 cases diagnosed 1998-2019 are related to a total of 70,316 patients. Currently, in 16,772 (23.9 %) of these 70,316 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 13,883 / 2,381 / 508 (19.7 % / 3.4 % / 0.7 %) patients exist having 2 / 3 / 4+ malignancies.

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

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

How to interpret:

In 2017, a subgroup of 3,656 cases has been diagnosed, of which 15.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 2.3 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 2

Incidence measures by year of diagnosis including DCO cases
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.92 m as of 2007, respectively)

Year of diagnosis	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	1921	163.3	93.1	128.2	145.4
1999	1956	164.8	94.3	129.1	146.6
2000	1970	164.0	92.2	127.2	144.9
2001	1997	164.2	94.2	129.3	147.1
2002	3383	172.8	95.6	131.8	151.8
2003	3159	160.4	86.7	119.8	138.5
2004	3267	165.3	91.1	124.6	143.1
2005	3377	169.7	92.4	127.1	145.6
2006	3328	165.7	90.7	123.9	141.3
2007	3674	159.1	86.2	118.5	135.5
2008	4057	174.8	94.4	129.5	148.9
2009	4119	177.1	96.0	131.7	150.4
2010	4027	172.1	91.0	125.6	143.7
2011	3930	168.1	88.6	121.9	140.0
2012	3965	168.0	88.0	121.2	139.8
2013	3905	163.8	86.0	117.8	135.7
2014	3784	157.2	81.3	112.1	129.4
2015	3818	156.9	80.7	111.3	129.1
2016	3667	149.4	75.1	104.0	122.0
2017	3656	148.3	74.8	103.7	120.9
2018	3475	140.0	71.1	98.2	114.6
2019	3487	140.5	72.5	99.9	115.7
1998-2019	73922	161.4	86.2	118.6	136.5

The computation of the incidence measures includes all cancers, irrespective of first or subsequent malignancy.

Table 3

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

Year of diagnosis	Cases n	Std.		Min.	Max.	Median				
		Mean	dev.			10%	25%	50%	75%	90%
1998	1921	62.6	13.9	28.4	97.5	45.4	52.9	60.9	72.9	82.7
1999	1956	62.3	14.1	23.9	99.3	43.9	52.5	61.3	73.1	81.4
2000	1970	63.0	14.0	20.4	100	44.8	53.2	61.9	74.0	81.8
2001	1997	62.5	13.9	24.3	97.7	44.4	52.7	61.5	72.9	81.2
2002	3383	64.0	14.3	21.5	99.4	45.3	53.8	63.4	74.9	82.6
2003	3159	64.3	14.5	24.4	105	44.2	54.2	64.0	75.6	82.9
2004	3267	63.7	14.5	18.8	98.9	44.6	53.5	63.9	74.3	83.3
2005	3377	64.2	14.1	21.7	102	45.2	54.8	64.1	74.1	83.2
2006	3328	63.6	14.2	23.3	102	44.0	53.5	64.6	73.0	82.7
2007	3674	64.1	14.4	20.7	103	44.7	53.3	64.8	73.9	83.9
2008	4057	64.0	14.0	21.6	109	44.8	53.6	64.9	73.5	82.6
2009	4119	63.9	14.0	25.0	109	45.3	53.4	64.5	73.5	83.0
2010	4027	64.5	14.1	25.2	105	45.9	53.3	65.2	74.3	83.9
2011	3930	64.4	14.3	21.7	102	45.6	52.8	64.9	74.5	84.0
2012	3965	64.4	14.2	23.9	101	45.6	52.8	64.9	74.9	82.9
2013	3905	64.3	14.5	23.8	108	45.6	52.6	64.8	75.1	83.8
2014	3784	64.7	14.2	21.5	106	46.2	52.8	65.3	75.4	83.1
2015	3818	64.7	14.3	22.7	101	46.2	52.7	65.7	75.9	82.9
2016	3667	65.3	14.5	23.4	103	46.5	53.6	66.7	76.6	82.8
2017	3656	65.3	14.3	17.2	104	46.6	53.6	66.3	76.9	82.9
2018	3475	65.0	14.3	23.4	100	45.9	53.6	66.1	77.1	82.7
2019	3487	64.7	13.9	21.2	98.8	46.7	53.8	65.4	75.8	82.6
1998-2019	73922	64.2	14.2	17.2	109	45.4	53.3	64.5	75.0	83.0

Table 4

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

Age at diagnosis Years	Cases		Cum.%
	n	%	
0-4			
5-9			
10-14			
15-19	1	0.0	0.0
20-24	21	0.0	0.0
25-29	175	0.4	0.4
30-34	487	1.0	1.4
35-39	1173	2.4	3.7
40-44	2525	5.1	8.8
45-49	4320	8.7	17.6
50-54	5398	10.9	28.4
55-59	4772	9.6	38.1
60-64	5576	11.3	49.3
65-69	6584	13.3	62.6
70-74	5717	11.5	74.1
75-79	5375	10.8	85.0
80-84	3676	7.4	92.4
85+	3764	7.6	100.0
All ages	49564	100.0	

Table 5

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

Age at diagnosis Years	Cases n	Age-spec. incidence	DCO rate n=1846 %	Prop. all cancers n=144724 %
0– 4		0.0		
5– 9		0.0		
10–14		0.0		
15–19	1	0.1		0.4
20–24	21	1.2		4.4
25–29	173	8.3	0.6	15.6
30–34	480	22.8		24.2
35–39	1164	55.3	0.5	35.5
40–44	2489	110.0	0.4	43.2
45–49	4229	173.9	0.6	48.1
50–54	5274	228.2	0.4	45.5
55–59	4659	233.0	0.8	37.7
60–64	5441	310.0	0.8	37.5
65–69	6405	380.2	1.2	36.0
70–74	5534	344.6	1.9	29.7
75–79	5157	374.5	3.5	28.5
80–84	3538	363.5	8.9	24.9
85+	3652	378.3	28.1	23.6
All ages	48217		3.8	33.3
Incidence				
Raw		155.0		
WS		81.4		
ES		111.9		
BRD–S		129.0		

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).

ICD-10 C50: Malignant neoplasm of breast (women)

Age distribution and age-specific incidence 2007 - 2019 (n=48217)

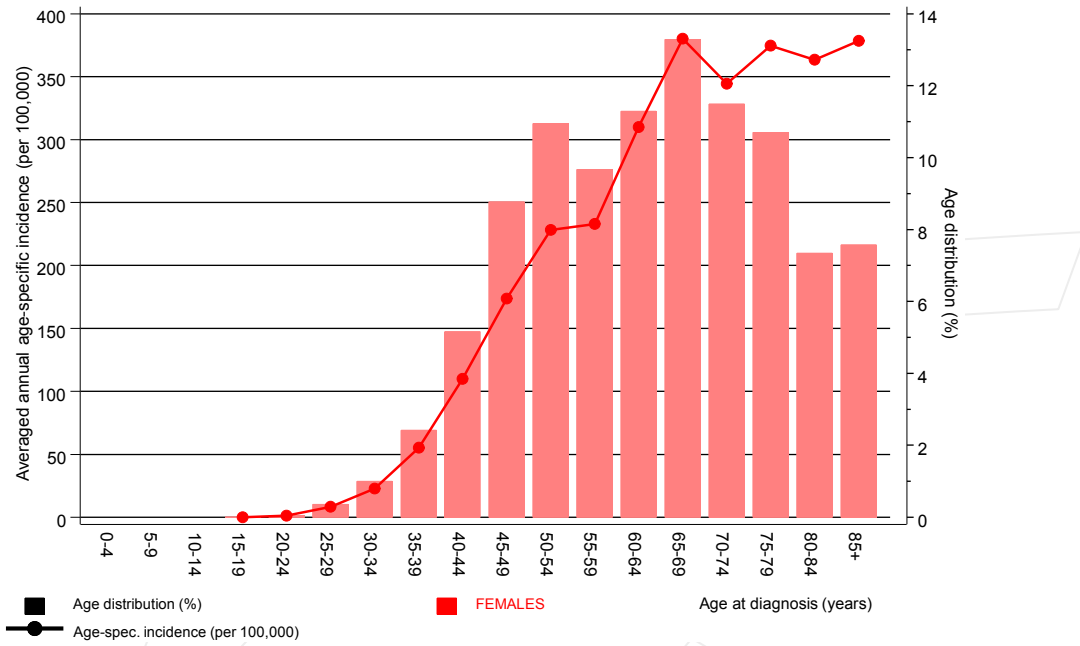


Figure 6. Age distribution (mean=64.5 yrs, median=65.2 yrs) and age-specific incidence.

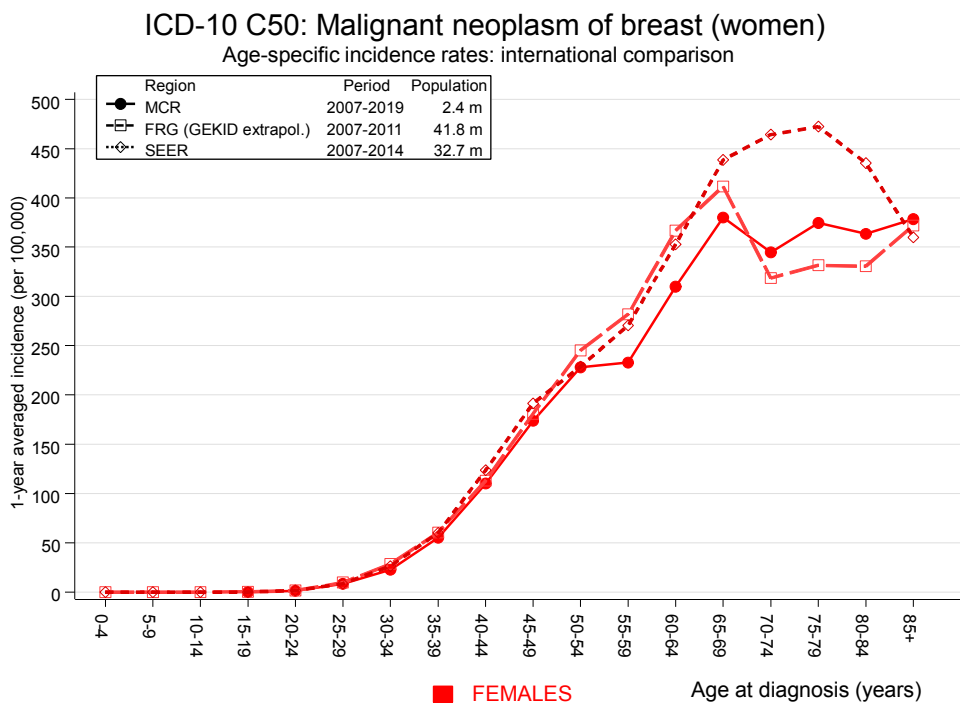


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2014. <http://www.gekid.de>. Last access: 02/11/2015
 Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2019, based on the November 2018 submission. <http://www.seer.cancer.gov>.

Table 7

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

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C03–C06 Oral cavity	36	18.7	1.9	1.3	2.7 #	0.6	2.8
C07–C08 Salivary gland	15	4.9	3.1	1.7	5.1 #	0.3	6.7
C09–C10 Oropharynx	32	14.2	2.3	1.5	3.2 #	0.6	
C15 Oesophagus	54	20.6	2.6	2.0	3.4 #	1.1	11.1
C16 Stomach	223	99.4	2.2	2.0	2.6 #	4.0	9.0
C17 Small intestine	38	17.0	2.2	1.6	3.1 #	0.7	
C18 Colon	543	284.4	1.9	1.8	2.1 #	8.4	7.7
C19–C20 Rectum	189	120.7	1.6	1.4	1.8 #	2.2	6.3
C21 Anus/canal	37	17.6	2.1	1.5	2.9 #	0.6	2.7
C22 Liver	69	37.1	1.9	1.4	2.4 #	1.0	24.6
C23–C24 Bile	76	41.3	1.8	1.5	2.3 #	1.1	14.5
C25 Pancreas	302	136.9	2.2	2.0	2.5 #	5.4	23.2
C26 GI cancer	12	4.8	2.5	1.3	4.4 #	0.2	50.0
C33–C34 Lung	568	240.2	2.4	2.2	2.6 #	10.7	10.7
C43 Malign. melanoma	263	122.5	2.1	1.9	2.4 #	4.6	3.0
C46,C49 Soft tissue	58	17.5	3.3	2.5	4.3 #	1.3	3.4
C48 Peritoneal	36	12.8	2.8	2.0	3.9 #	0.8	5.6
C50 Breast	3604	1003.6	3.6	3.5	3.7 #	84.9	
C51 Vulva	70	31.5	2.2	1.7	2.8 #	1.3	1.4
C52 Vagina	11	5.6	2.0	1.0	3.5	0.2	9.1
C53 Cervix uteri	78	44.4	1.8	1.4	2.2 #	1.1	11.5
C54 Corpus uteri	403	176.3	2.3	2.1	2.5 #	7.4	1.7
C55,C57 Fem. genitals un	13	6.0	2.2	1.2	3.7 #	0.2	46.2
C56 Ovary	287	125.7	2.3	2.0	2.6 #	5.3	8.7
C64 Kidney	160	71.4	2.2	1.9	2.6 #	2.9	6.9
C65 Renal pelvis	19	9.3	2.0	1.2	3.2 #	0.3	
C66 Ureter	12	4.8	2.5	1.3	4.4 #	0.2	
C67 Bladder	98	56.8	1.7	1.4	2.1 #	1.3	6.1
C69 Eye melanoma	11	4.0	2.8	1.4	5.0 #	0.2	
C70–C72 CNS cancer	60	40.7	1.5	1.1	1.9 #	0.6	15.0
C73 Thyroid	102	57.8	1.8	1.4	2.1 #	1.4	2.9
C76–C79 CUP	64	53.6	1.2	0.9	1.5	0.3	3.1
C81 Hodgkin lymphoma	13	5.7	2.3	1.2	3.9 #	0.2	7.7
C82–C85 NHL	238	119.0	2.0	1.8	2.3 #	3.9	3.8
C90 Mult. myeloma	60	37.0	1.6	1.2	2.1 #	0.8	20.0
C91–C96 Leukaemia	131	43.8	3.0	2.5	3.5 #	2.8	12.2
Others, specified	71	40.9	1.7	1.4	2.2 #	1.0	9.9
Not observed	0	1.7	0.0	0.0	2.2	-0.1	
All further malignancies	8056	3150.0	2.6	2.5	2.6 #	160.3	4.8
Patients		65385					
Median age at next malignancy (years)		70.5					
Person-years		306144					
Mean observation time (years)		4.7					
Median observation time (years)		3.1					

The occurrence of further specified malignancy is statistically significant.

Further observed malignancies with count 1 to 9 are pooled in category "Others, specified".

Average incidence (Germany 1987 standard population) 2007 - 2019

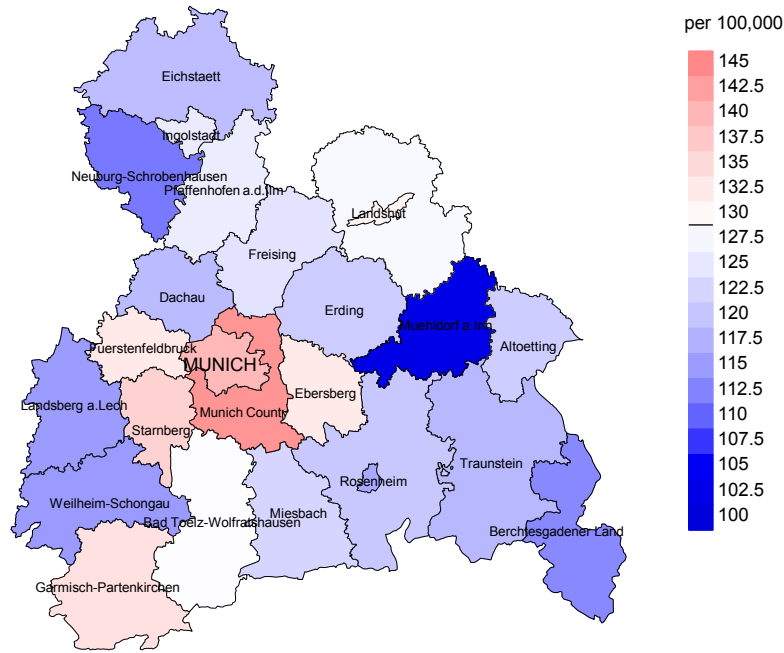


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (129.0/100,000 WS N=48,217).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 1,379 women were identified with newly diagnosed breast cancer (women). Therefore, the mean incidence rate for this cancer type in this area can be calculated at 132.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 123.4 and 142.1/100,000.

Standardized incidence ratio (SIR) 2007 - 2019

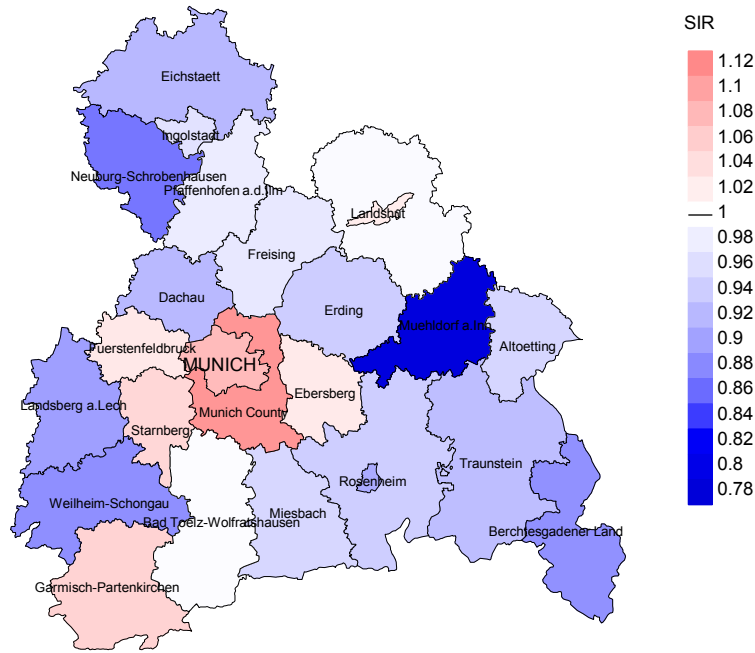


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=48,217).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2019 a total of 1,379 women were identified with newly diagnosed breast cancer (women). Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.03. Though, the value of this parameter may vary with an underlying probability of 99% between 0.96 and 1.10, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.92 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	1921	95.6	5.9	1173	61.1	93.6
1999	1956	94.5	4.8	1099	56.2	93.5
2000	1970	96.2	4.2	1084	55.0	95.8
2001	1997	94.7	4.9	1031	51.6	95.7
2002	3383	95.9	7.9	1896	56.0	94.7
2003	3159	95.0	7.7	1732	54.8	94.7
2004	3267	94.8	6.0	1625	49.7	94.5
2005	3377	95.2	5.8	1632	48.3	93.7
2006	3328	93.2	4.1	1443	43.4	94.5
2007	3674	93.7	5.1	1606	43.7	93.5
2008	4057	96.7	4.2	1595	39.3	92.8
2009	4119	97.3	4.6	1590	38.6	92.9
2010	4027	97.0	4.3	1451	36.0	92.6
2011	3930	96.8	4.3	1314	33.4	92.1
2012	3965	96.5	3.4	1234	31.1	89.4
2013	3905	97.1	4.0	1133	29.0	90.6
2014	3784	96.3	3.9	992	26.2	87.1
2015	3818	95.2	4.0	893	23.4	81.5
2016	3667	99.4	4.5	747	20.4	79.5
2017	3656	99.3	4.0	568	15.5	73.9
2018	3475	99.4	1.1	299	8.6	59.9
2019	3487	73.1	0.3	169	4.8	81.1
1998-2019	73922	95.2	4.4	26306	35.6	91.5

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 4.92 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	1921	818	87.2	156	8.1
1999	1956	813	87.8	120	6.1
2000	1970	838	90.5	123	6.2
2001	1997	828	90.8	122	6.1
2002	3383	1246	96.9	334	9.9
2003	3159	1376	97.3	304	9.6
2004	3267	1412	97.7	265	8.1
2005	3377	1450	97.0	274	8.1
2006	3328	1412	97.3	227	6.8
2007	3674	1578	98.0	266	7.2
2008	4057	1660	98.4	301	7.4
2009	4119	1653	98.4	250	6.1
2010	4027	1736	98.4	265	6.6
2011	3930	1830	99.0	273	6.9
2012	3965	1824	98.2	239	6.0
2013	3905	1922	98.6	266	6.8
2014	3784	1857	98.3	252	6.7
2015	3818	1997	98.6	252	6.6
2016	3667	2004	98.7	281	7.7
2017	3656	2121	96.6	246	6.7
2018	3475	1585	34.1	102	2.9
2019	3487	1384	53.5	83	2.4
1998–2019	73922	33344	92.2	5001	6.8

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 4.92 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer- related %	Prop. non-cancer- related %	Prop. cancer recorded on death certificate %
1998	818	69.4	30.6	84.4
1999	813	71.3	28.7	86.7
2000	838	70.9	29.1	83.1
2001	828	67.3	32.7	83.2
2002	1246	72.1	27.9	86.4
2003	1376	70.1	29.9	84.6
2004	1412	75.8	24.2	85.9
2005	1450	69.7	30.3	81.5
2006	1412	72.2	27.8	83.7
2007	1578	69.6	30.4	81.4
2008	1660	69.2	30.8	80.4
2009	1653	68.1	31.9	79.2
2010	1736	68.7	31.3	80.1
2011	1830	67.8	32.2	80.3
2012	1824	66.9	33.1	78.8
2013	1922	63.6	36.4	76.0
2014	1857	64.7	35.3	77.1
2015	1997	63.4	36.6	75.6
2016	2004	64.7	35.3	77.1
2017	2121	60.0	40.0	72.7
2018	1585	51.2	48.8	69.7
2019	1384	50.4	49.6	69.7
1998–2019	33344	66.1	33.9	79.6

Table 10

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

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	818	76.4	72.9	83.5	76.0
1999	813	75.5	71.1	84.3	75.1
2000	838	76.3	71.1	85.2	74.9
2001	828	75.9	69.6	83.6	73.6
2002	1246	76.9	71.0	85.6	75.5
2003	1376	75.7	69.7	84.6	72.8
2004	1412	76.7	71.7	84.7	74.2
2005	1450	76.9	70.6	85.0	74.0
2006	1412	77.2	71.5	85.5	74.2
2007	1578	77.6	71.0	85.7	73.1
2008	1660	78.7	72.6	86.1	75.2
2009	1653	78.8	72.6	85.9	74.8
2010	1736	78.6	73.4	86.0	75.5
2011	1830	79.0	73.9	86.4	75.6
2012	1824	78.2	73.3	87.0	75.0
2013	1922	79.1	74.4	86.2	76.4
2014	1857	80.0	75.0	87.3	77.2
2015	1997	79.7	76.1	86.2	77.3
2016	2004	79.5	75.7	86.9	77.3
2017	2121	80.7	77.2	86.4	78.3
2018	1585	79.1	73.6	83.1	78.2
2019	1384	79.2	74.3	83.5	76.9
1998-2019	33344	78.4	73.5	85.7	75.9

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

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

Table 11

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

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	569	48.4	0.30	21.9	0.24	32.3	0.26	40.7	0.29
1999	581	49.0	0.30	22.9	0.25	33.4	0.27	41.4	0.29
2000	595	49.5	0.31	22.9	0.25	33.5	0.27	41.6	0.29
2001	558	45.9	0.29	21.7	0.23	31.5	0.25	38.8	0.27
2002	898	45.9	0.27	20.7	0.22	30.3	0.24	37.6	0.25
2003	967	49.1	0.31	23.0	0.27	33.4	0.28	40.9	0.30
2004	1070	54.1	0.34	23.9	0.27	35.2	0.29	44.0	0.32
2005	1011	50.8	0.31	22.9	0.26	33.4	0.27	41.3	0.29
2006	1020	50.8	0.32	22.2	0.25	32.6	0.27	41.0	0.30
2007	1103	47.8	0.31	20.9	0.25	30.6	0.26	38.1	0.29
2008	1151	49.6	0.29	20.5	0.22	30.4	0.24	38.5	0.27
2009	1128	48.5	0.28	20.5	0.22	30.2	0.24	37.8	0.26
2010	1193	51.0	0.31	20.6	0.23	30.6	0.25	39.1	0.28
2011	1241	53.1	0.33	21.1	0.25	31.4	0.27	39.7	0.29
2012	1221	51.7	0.32	20.7	0.24	30.8	0.26	38.9	0.28
2013	1223	51.3	0.32	19.8	0.24	29.7	0.26	38.2	0.29
2014	1202	49.9	0.33	18.6	0.24	28.1	0.26	36.4	0.29
2015	1268	52.1	0.34	18.6	0.24	28.5	0.26	37.7	0.30
2016	1298	52.9	0.36	20.0	0.27	29.9	0.30	38.6	0.33
2017	1274	51.7	0.36	18.4	0.25	27.9	0.28	36.8	0.31
2018	817	32.9	0.24	13.4	0.19	19.5	0.20	24.6	0.22
2019	698	28.1	0.21	11.0	0.16	16.4	0.17	20.8	0.18
1998-2019	22086	48.2	0.31	19.9	0.24	29.5	0.25	37.3	0.28

Table 12

Age distribution of age at death (cancer-related) for period 2007-2019
(incl. multiple malignancies)

Age at death Years	Cases		Cum.%
	n	%	
0-4			
5-9			
10-14			
15-19			
20-24			
25-29	17	0.1	0.1
30-34	46	0.3	0.4
35-39	130	0.9	1.3
40-44	277	1.9	3.2
45-49	536	3.6	6.8
50-54	771	5.2	12.0
55-59	1010	6.8	18.8
60-64	1216	8.2	27.0
65-69	1655	11.2	38.2
70-74	2048	13.8	52.0
75-79	2203	14.9	66.9
80-84	2103	14.2	81.1
85+	2805	18.9	100.0
All ages	14817	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2019
(incl. multiple malignancies)

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	17	0.8	0.10	18.3
30-34	46	2.2	0.10	28.8
35-39	130	6.2	0.11	35.6
40-44	277	12.2	0.11	34.6
45-49	536	22.0	0.13	33.9
50-54	771	33.4	0.15	31.5
55-59	1010	50.5	0.22	28.6
60-64	1216	69.3	0.22	26.4
65-69	1655	98.2	0.26	25.5
70-74	2048	127.5	0.37	25.0
75-79	2203	160.0	0.43	24.5
80-84	2103	216.0	0.59	24.8
85+	2805	290.6	0.77	25.5
All ages	14817			26.0
Mortality				
Raw		47.6	0.31	
WS		18.7	0.23	
ES		27.9	0.25	
BRD-S		35.6	0.28	
PYLL-70				
per 100,000		251.0		
ES		209.7		
AYLL-70		11.6		

Table 14

Further malignancies in deaths in period 1998–2019

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	44	0.5	16	36.4	4	9.1	24	54.5
C09–C10 Oropharynx	35	0.4	10	28.6	2	5.7	23	65.7
C15 Oesophagus	83	0.9	6	7.2	5	6.0	72	86.7
C16 Stomach	347	3.8	69	19.9	21	6.1	257	74.1
C17 Small intestine	32	0.4	6	18.8	2	6.3	24	75.0
C18 Colon	686	7.6	187	27.3	44	6.4	455	66.3
C19–C20 Rectum	291	3.2	86	29.6	24	8.2	181	62.2
C21 Anus/canal	32	0.4	7	21.9	4	12.5	21	65.6
C22 Liver	84	0.9	5	6.0	5	6.0	74	88.1
C23–C24 Bile	95	1.1	3	3.2	3	3.2	89	93.7
C25 Pancreas	430	4.8	21	4.9	23	5.3	386	89.8
C32 Larynx	21	0.2	8	38.1	1	4.8	12	57.1
C33–C34 Lung	776	8.6	68	8.8	55	7.1	653	84.1
C43 Malign. melanoma	270	3.0	126	46.7	12	4.4	132	48.9
C44 Skin others	402	4.4	126	31.3	37	9.2	239	59.5
C46,C49 Soft tissue	79	0.9	17	21.5			62	78.5
C48 Peritoneal	39	0.4	4	10.3	6	15.4	29	74.4
C50 Breast	2559	28.3	1	0.0	827	32.3	1731	67.6
C51 Vulva	55	0.6	13	23.6	2	3.6	40	72.7
C53 Cervix uteri	158	1.7	94	59.5	12	7.6	52	32.9
C54 Corpus uteri	505	5.6	194	38.4	45	8.9	266	52.7
C55,C57 Fem. genitals un	30	0.3	10	33.3	3	10.0	17	56.7
C56 Ovary	498	5.5	111	22.3	42	8.4	345	69.3
C64 Kidney	192	2.1	77	40.1	19	9.9	96	50.0
C65 Renal pelvis	29	0.3	7	24.1			22	75.9
C67 Bladder	157	1.7	38	24.2	8	5.1	111	70.7
C69 Eye melanoma	22	0.2	7	31.8	3	13.6	12	54.5
C70–C72 CNS cancer	114	1.3	12	10.5	9	7.9	93	81.6
C73 Thyroid	126	1.4	65	51.6	2	1.6	59	46.8
C76–C79 CUP	141	1.6	42	29.8	9	6.4	90	63.8
C81 Hodgkin lymphoma	36	0.4	25	69.4	1	2.8	10	27.8
C82–C85 NHL	277	3.1	83	30.0	28	10.1	166	59.9
C90 Mult. myeloma	94	1.0	11	11.7	5	5.3	78	83.0
C91–C96 Leukaemia	158	1.7	15	9.5	7	4.4	136	86.1
Others, specified	146	1.6	27	18.5	9	6.2	110	75.3
All further malignancies	9043	100.0	1597	17.7	1279	14.1	6167	68.2

Further malignancies with number of cases 1 to 19 are pooled in category “Others, specified”.

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a further malignancy.

Table 15

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	16	0.8	0.10	18.6
30-34	36	1.7	0.08	25.9
35-39	118	5.6	0.11	35.8
40-44	229	10.1	0.10	32.5
45-49	450	18.5	0.12	33.3
50-54	627	27.1	0.14	30.1
55-59	808	40.4	0.20	27.3
60-64	985	56.1	0.22	26.1
65-69	1320	78.4	0.26	25.7
70-74	1577	98.2	0.38	24.9
75-79	1711	124.3	0.46	24.8
80-84	1603	164.7	0.61	24.4
85+	2151	222.8	0.77	24.7
All ages	11631			25.7
Mortality				
Raw		37.4	0.30	
WS		14.9	0.22	
ES		22.1	0.24	
BRD-S		28.1	0.27	
PYLL-70				
per 100,000		206.4		
ES		172.7		
AYLL-70		11.8		

* See corresponding tables with multiple malignancies.

Table 16

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	16	0.8	0.10	19.0
30-34	33	1.6	0.08	24.1
35-39	114	5.4	0.11	35.0
40-44	226	10.0	0.11	32.4
45-49	427	17.6	0.12	32.0
50-54	568	24.6	0.13	27.8
55-59	720	36.0	0.20	24.7
60-64	806	45.9	0.19	21.8
65-69	1012	60.1	0.22	20.2
70-74	1153	71.8	0.31	18.8
75-79	1241	90.1	0.36	18.6
80-84	1172	120.4	0.48	18.6
85+	1670	173.0	0.62	20.1
All ages	9158			20.9
Mortality				
Raw		29.4	0.25	
WS		12.2	0.19	
ES		17.9	0.21	
BRD-S		22.4	0.23	
PYLL-70				
per 100,000		187.0		
ES		156.9		
AYLL-70		12.5		

* See corresponding tables with multiple malignancies.

ICD-10 C50: Malignant neoplasm of breast (women)
Age distribution and age-specific mortality 2007 - 2019 (n=14817)

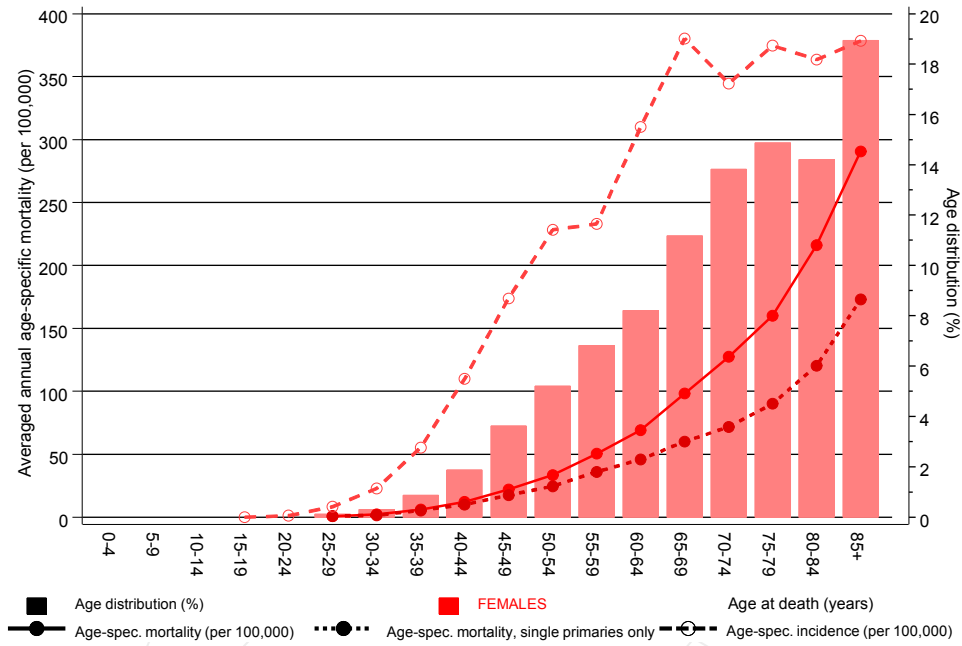


Figure 17. Distribution of age at death (bars; n=mean=65.2 yrs, median=65.7 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (Germany 1987 standard population) 2007 - 2019

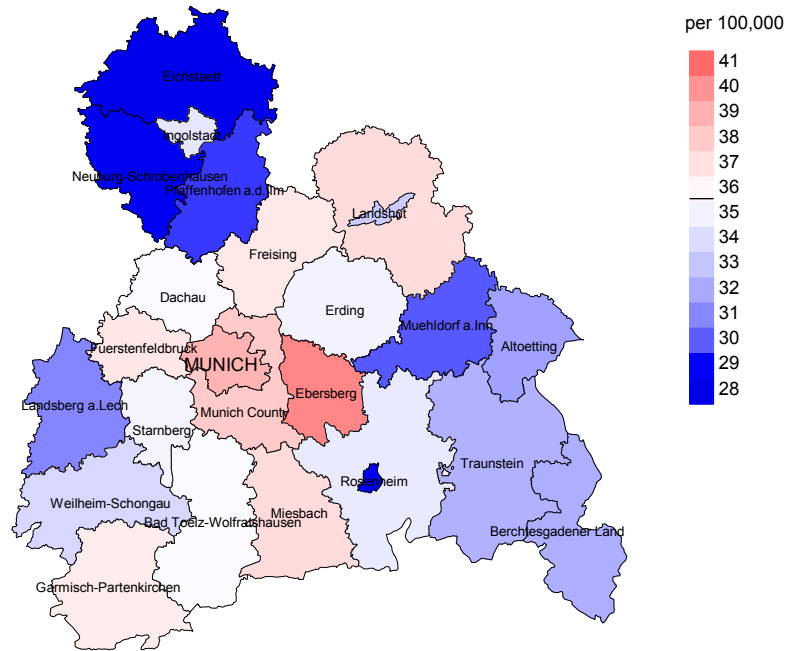


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (35.6/100,000 WS N=14,817).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 451 women died from breast cancer (women). Therefore, the mean mortality rate for this cancer type in this area can be calculated at 40.3/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 35.5 and 45.6/100,000.

Standardized mortality ratio (SMR) 2007 - 2019

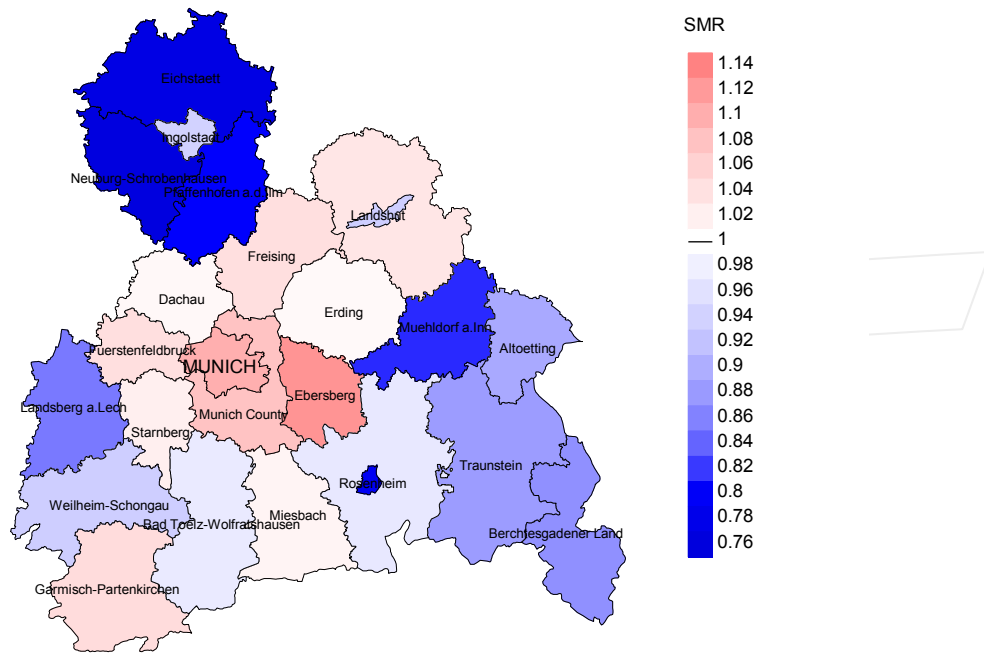


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=14,817).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2019 a total of 451 women died from breast cancer (women). Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.12. Though, the value of this parameter may vary with an underlying probability of 99% between 0.99 and 1.27, 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 C50: Breast cancer (women) - Incidence and Mortality [Internet]. 2021 [updated 2021 Jan 25; cited 2021 Mar 1]. Available from: https://www.tumorregister-muenchen.de/en/facts/base/bC50f_E-ICD-10-C50-Breast-cancer-women-incidence-and-mortality.pdf

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