Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

ICD-10 D05: Breast cancer i.s. (women)

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	7,303
Diseases	7,430
Creation date	12/21/2021
Database export	12/20/2021
Population (females)	2.50 m

Munich Cancer Registry
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https://www.tumorregister-muenchen.de/en

https://www.tumorregister-muenchen.de/en/facts/base/bD05f_E-ICD-10-D05-Breast-cancer-i.s.-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, December 2021

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

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

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

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

Code	Description
D05.-	Carcinoma in situ of breast
D05.0	Lobular carcinoma in situ
D05.1	Intraductal carcinoma in situ
D05.7	Other carcinoma in situ of breast
D05.9	Carcinoma in situ of breast, unspecified

Gender: Female

INCIDENCE

Table 1

Cases by year of diagnosis, proportions of further malignancies, deaths, and active follow-up

Year of diagnosis	All cases n	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	111	23.4	16.9	33.3	92.8
1999	127	20.2	16.7	35.4	92.9
2000	143	17.6	16.4	33.6	92.3
2001	163	18.6	16.0	27.6	94.5
2002	221	17.8	15.7	29.0	92.3 #
2003	226	18.0	15.0	21.2	91.6
2004	274	17.5	14.6	24.5	93.8
2005	315	17.5	13.9	21.3	94.9
2006	322	18.4	13.2	19.3	89.8
2007	351	18.7	12.5	17.9	90.9 #
2008	411	18.5	11.4	14.1	97.1
2009	408	18.7	10.7	16.9	95.1
2010	435	18.6	9.9	9.2	97.7
2011	417	18.6	9.2	10.6	96.4
2012	389	18.9	8.5	11.6	96.4
2013	386	19.1	7.7	7.5	95.1
2014	368	19.3	6.9	9.8	95.7
2015	413	19.6	6.1	8.0	94.2
2016	400	19.8	4.8	6.0	100.0
2017	396	20.1	3.9	3.0	98.7
2018	397	20.3	3.0	3.0	99.7
2019	405	20.4	1.5	2.5	99.3
2020	352	20.4	0.3	0.3	99.7 ##
1998–2020	7430	20.4	16.9	12.9	95.8

7,430 cases diagnosed 1998-2020 are related to a total of 7,303 patients. Currently, in 2,531 (34.7 %) of these 7,303 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 2,010 / 426 / 95 (27.5 % / 5.8 % / 1.3 %) patients exist having 2 / 3 / 4+ malignancies.

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

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

How to interpret:
In 2018, a subgroup of 397 cases has been diagnosed, of which 20.3 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.0 % 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
(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	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	111	9.4	6.3	8.3	8.8
1999	127	10.7	7.0	9.3	10.0
2000	143	11.9	7.4	10.0	11.0
2001	163	13.4	8.7	11.6	12.4
2002	221	11.3	7.5	10.0	10.8
2003	226	11.5	7.4	9.9	10.6
2004	274	13.9	8.5	11.4	12.4
2005	315	15.8	9.7	12.9	14.0
2006	322	16.0	10.1	13.5	14.6
2007	351	15.2	9.4	12.5	13.6
2008	411	17.7	11.0	14.7	15.6
2009	408	17.5	10.9	14.5	15.5
2010	435	18.6	11.7	15.7	16.7
2011	417	17.8	10.8	14.5	15.6
2012	389	16.5	10.0	13.5	14.5
2013	386	16.2	10.0	13.3	14.3
2014	368	15.3	9.3	12.4	13.3
2015	413	17.0	10.0	13.5	14.6
2016	400	16.3	9.7	13.0	14.1
2017	396	16.1	9.6	12.9	14.1
2018	397	16.0	9.6	12.9	14.0
2019	405	16.3	9.7	13.1	14.1
2020	352	14.2	8.6	11.6	12.5
1998–2020	7430	15.4	9.5	12.7	13.7

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

Table 3

Age distribution parameters by year of diagnosis

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	111	56.6	10.8	28.5	89.2	44.4	49.3	56.3	62.3	69.0
1999	127	58.5	10.3	40.9	88.2	45.9	50.6	57.9	63.3	72.4
2000	143	59.5	11.9	30.9	85.6	44.1	51.1	59.0	67.5	77.0
2001	163	58.0	11.7	26.0	93.0	42.6	49.9	58.2	65.5	72.6
2002	221	58.2	11.3	29.7	88.8	45.1	50.0	57.8	64.8	73.8
2003	226	58.9	11.3	33.3	91.7	43.5	50.2	58.6	67.4	73.5
2004	274	60.9	10.8	32.5	90.7	47.0	53.5	62.1	67.7	74.1
2005	315	59.9	11.6	30.0	91.4	43.2	52.2	61.5	66.8	73.6
2006	322	59.6	10.8	33.8	84.9	45.7	50.9	61.1	67.4	73.2
2007	351	59.9	11.8	26.3	90.8	43.8	51.4	61.0	67.8	73.9
2008	411	59.5	11.5	34.0	92.5	43.7	51.0	59.6	67.7	71.7
2009	408	59.8	11.2	26.2	89.6	44.7	51.9	60.7	67.3	73.1
2010	435	59.3	10.7	27.2	89.8	45.1	51.8	59.5	66.8	72.6
2011	417	60.2	11.0	30.8	92.5	45.4	51.0	60.6	68.5	73.9
2012	389	60.2	11.7	31.1	92.7	46.5	50.9	60.1	67.8	74.7
2013	386	58.9	12.0	23.4	88.7	44.5	50.4	57.5	68.3	74.5
2014	368	59.1	12.6	26.0	93.5	45.1	50.5	58.0	69.1	75.0
2015	413	60.6	12.3	28.3	92.8	45.3	51.7	60.5	68.4	78.1
2016	400	60.1	12.3	26.9	96.9	45.4	51.1	58.9	69.0	76.6
2017	396	59.3	12.0	20.1	95.6	44.5	50.6	58.6	68.8	76.3
2018	397	59.7	11.7	30.3	94.4	46.1	50.6	58.6	67.2	77.2
2019	405	59.9	11.7	28.6	98.5	46.2	51.1	58.7	68.0	75.9
2020	352	59.3	10.9	34.4	83.7	45.4	50.8	57.7	67.4	76.0
1998–2020	7430	59.6	11.6	20.1	98.5	45.0	50.9	59.4	67.6	74.8

Table 4

Age distribution by 5-year age group for period 2007-2020

Age at diagnosis Years	Cases n	%	Cum.%
0-4			
5-9			
10-14			
15-19			
20-24	2	0.0	0.0
25-29	16	0.3	0.3
30-34	58	1.0	1.4
35-39	137	2.5	3.9
40-44	330	6.0	9.8
45-49	542	9.8	19.6
50-54	988	17.9	37.5
55-59	783	14.2	51.7
60-64	798	14.4	66.1
65-69	863	15.6	81.7
70-74	457	8.3	90.0
75-79	314	5.7	95.7
80-84	149	2.7	98.4
85+	91	1.6	100.0
All ages	5528	100.0	

Table 5

Age-specific incidence
for period 2007-2020

Age at diagnosis Years	Cases n	Age-spec. incidence
0- 4		0.0
5- 9		0.0
10-14		0.0
15-19		0.0
20-24	2	0.1
25-29	16	0.7
30-34	58	2.5
35-39	137	6.0
40-44	324	13.4
45-49	534	20.5
50-54	983	39.1
55-59	779	35.8
60-64	794	41.8
65-69	860	47.4
70-74	452	26.3
75-79	311	20.7
80-84	147	13.8
85+	91	8.7
All ages	5488	
Incidence		
Raw		16.3
WS		9.9
ES		13.3
BRD-S		14.4

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).

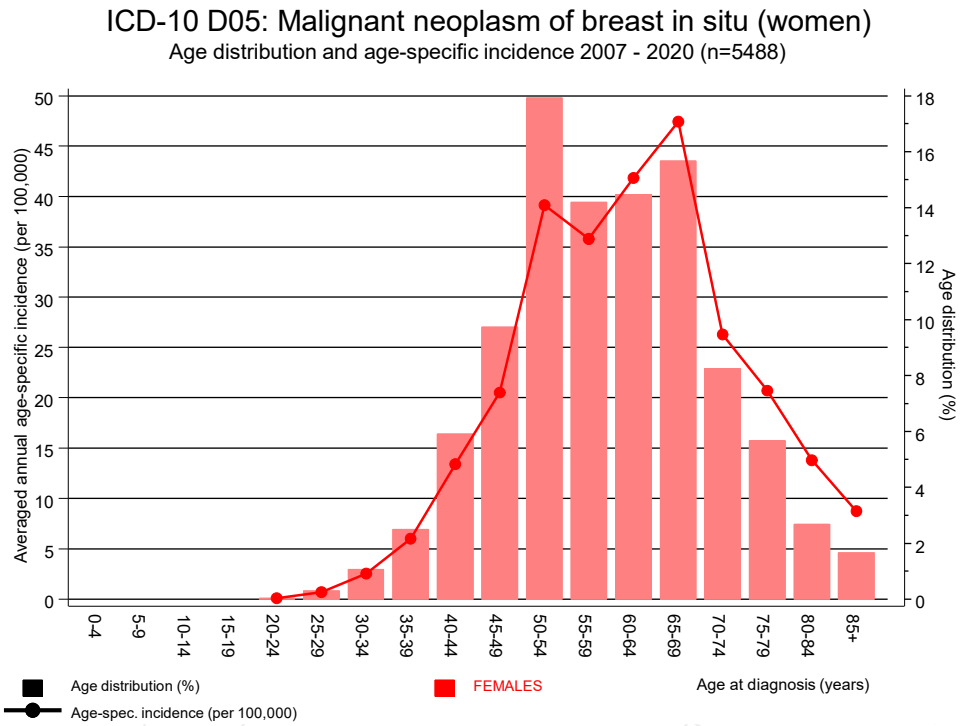

Figure 6. Age distribution (mean=59.7 yrs, median=59.4 yrs) and age-specific incidence.

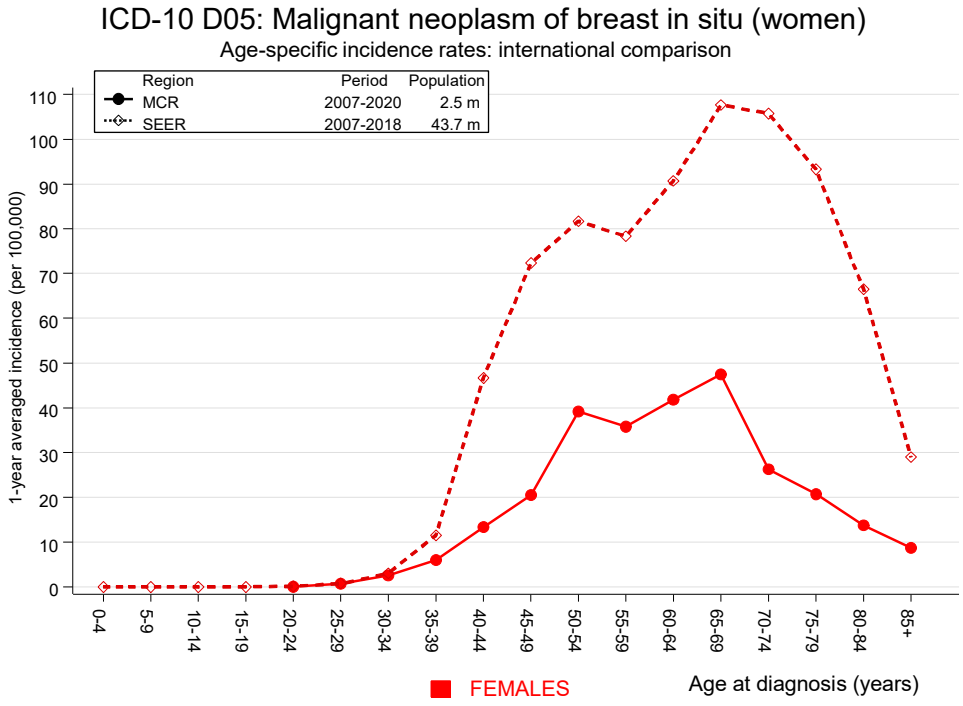

Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 21 Regs Research Data, released April 2021, based on the November 2020 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 1998–2020

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C03–C06	Oral cavity	3	2.1	1.5	0.3	4.2		0.3	
C15	Oesophagus	4	2.3	1.7	0.5	4.4		0.5	
C16	Stomach	12	8.9	1.3	0.7	2.4		0.9	8.3
C17	Small intestine	5	1.9	2.6	0.8	6.1		0.9	
C18	Colon	43	26.3	1.6	1.2	2.2	#	4.8	2.3
C19–C20	Rectum	20	11.7	1.7	1.0	2.7	#	2.4	5.0
C21	Anus/canal	7	2.0	3.6	1.4	7.3	#	1.4	
C22	Liver	7	3.7	1.9	0.8	3.9		0.9	42.9
C23–C24	Bile	11	3.8	2.9	1.5	5.2	#	2.1	9.1
C25	Pancreas	39	13.1	3.0	2.1	4.1	#	7.5	15.4
C32	Larynx	2	0.7	3.0	0.4	10.7		0.4	
C33–C34	Lung	61	26.5	2.3	1.8	3.0	#	9.9	3.3
C43	Malign. melanoma	33	13.7	2.4	1.7	3.4	#	5.5	
C46,C49	Soft tissue	8	1.8	4.4	1.9	8.8	#	1.8	
C48	Peritoneal	4	1.5	2.7	0.7	7.0		0.7	25.0
C50	Breast	918	111.1	8.3	7.7	8.8	#	232.2	
C51	Vulva	5	3.1	1.6	0.5	3.8		0.6	
C53	Cervix uteri	4	4.9	0.8	0.2	2.1		−0.3	
C54	Corpus uteri	46	19.0	2.4	1.8	3.2	#	7.8	2.2
C55,C57	Fem. genitals un	2	0.4	4.5	0.6	16.4		0.4	
C56	Ovary	29	13.0	2.2	1.5	3.2	#	4.6	
C64	Kidney	14	7.0	2.0	1.1	3.4	#	2.0	
C65	Renal pelvis	3	0.9	3.3	0.7	9.7		0.6	
C67	Bladder	6	5.2	1.1	0.4	2.5		0.2	
C69	Eye melanoma	2	0.4	4.9	0.6	17.9		0.5	
C70–C72	CNS cancer	8	4.2	1.9	0.8	3.8		1.1	25.0
C73	Thyroid	10	6.7	1.5	0.7	2.8		1.0	
C76–C79	CUP	8	4.8	1.7	0.7	3.3		0.9	12.5
C82–C85	NHL	30	11.8	2.5	1.7	3.6	#	5.2	3.3
C90	Mult. myeloma	6	3.6	1.7	0.6	3.7		0.7	16.7
C91–C96	Leukaemia	10	4.3	2.4	1.1	4.3	#	1.7	20.0
Others, specified		8	5.4	1.5	0.6	2.9		0.8	
Not observed		0	2.3	0.0	0.0	1.6		−0.7	
All further malignancies		1368	327.8	4.2	4.0	4.4	#	299.3	1.8

Patients	7246
Median age at next malignancy (years)	66.7
Person-years	34752
Mean observation time (years)	4.8
Median observation time (years)	3.0

The occurrence of further specified malignancy is statistically significant.

Further observed malignancies with count 1 are pooled in category “Others, specified”.

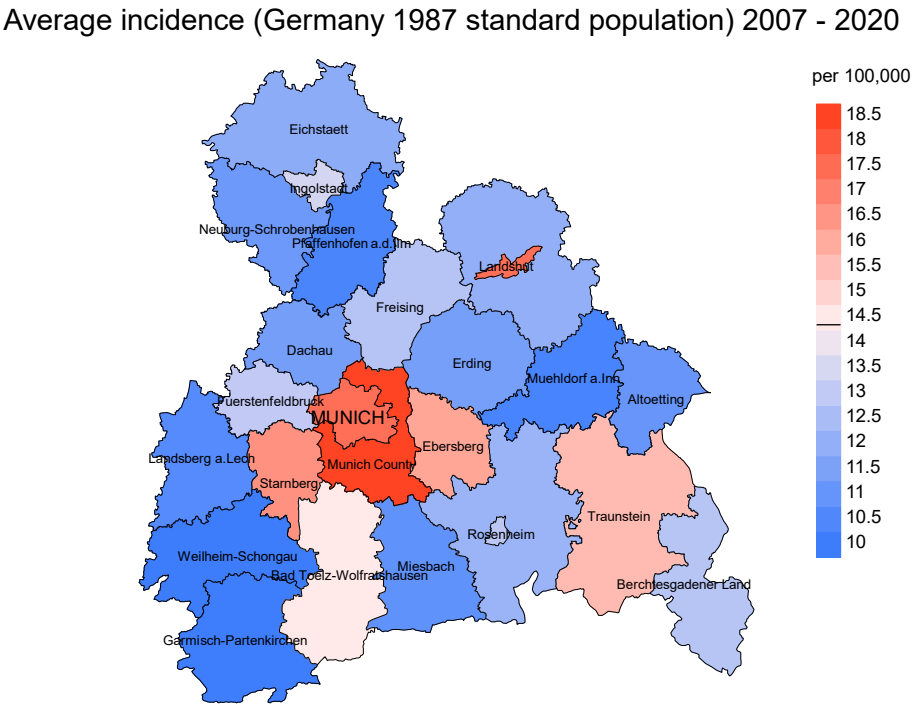

Figure 8a. Map of cancer incidence (german standard population) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (14.4/100,000 WS N=5,488).

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 175 women were identified with newly diagnosed breast cancer i.s. (women). Therefore, the mean incidence rate for this cancer type in this area can be calculated at 16.1/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 13.1 and 19.6/100,000.

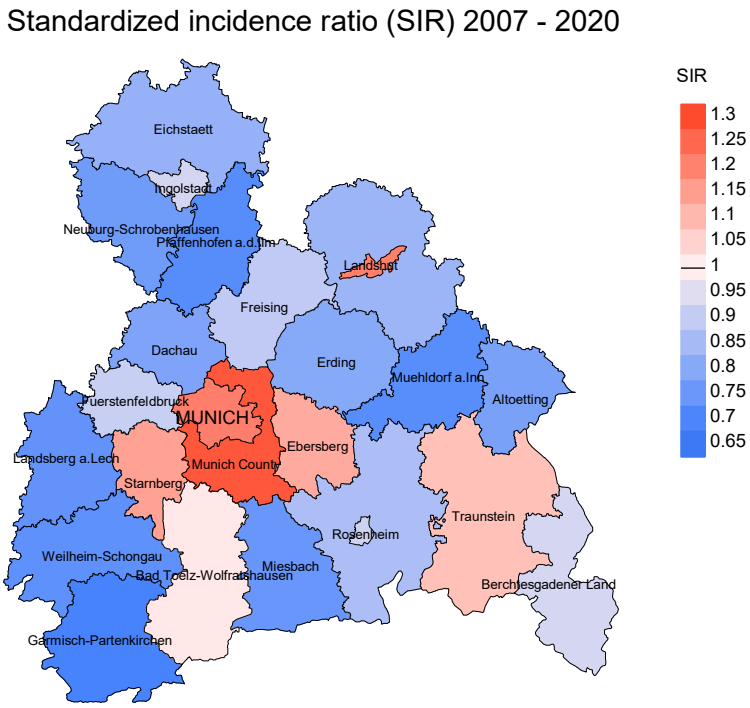

Figure 8b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=5,488).

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 175 women were identified with newly diagnosed breast cancer i.s. (women). Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.13. Though, the value of this parameter may vary with an underlying probability of 99% between 0.92 and 1.36, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status,
and deaths among the annual cohorts

(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 %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	111	92.8	37	33.3	97.3
1999	127	92.9	45	35.4	82.2
2000	143	92.3	48	33.6	93.8
2001	163	94.5	45	27.6	95.6
2002	221	92.3	64	29.0	92.2
2003	226	91.6	48	21.2	91.7
2004	274	93.8	67	24.5	91.0
2005	315	94.9	67	21.3	88.1
2006	322	89.8	62	19.3	90.3
2007	351	90.9	63	17.9	85.7
2008	411	97.1	58	14.1	86.2
2009	408	95.1	69	16.9	92.8
2010	435	97.7	40	9.2	87.5
2011	417	96.4	44	10.6	81.8
2012	389	96.4	45	11.6	80.0
2013	386	95.1	29	7.5	82.8
2014	368	95.7	36	9.8	77.8
2015	413	94.2	33	8.0	84.8
2016	400	100.0	24	6.0	75.0
2017	396	98.7	12	3.0	50.0
2018	397	99.7	12	3.0	41.7
2019	405	99.3	10	2.5	80.0
2020	352	99.7	1	0.3	100.0
1998–2020	7430	95.8	959	12.9	86.9

Table 9b

Annual cohorts of incident cancers and deaths,
and cases deceased within the same year of being diagnosed with cancer

(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	Deaths in same year n	Prop. deaths in same year %
1998	111	17		
1999	127	21		
2000	143	18	1	0.7
2001	163	15		
2002	221	25		
2003	226	39		
2004	274	42		
2005	315	40	2	0.6
2006	322	44	1	0.3
2007	351	33		
2008	411	44		
2009	408	56	2	0.5
2010	435	62	1	0.2
2011	417	67	2	0.5
2012	389	55	4	1.0
2013	386	93		
2014	368	62	1	0.3
2015	413	89		
2016	400	101	1	0.3
2017	396	108		
2018	397	94	1	0.3
2019	405	108		
2020	352	125	1	0.3
1998–2020	7430	1358	17	0.2

Table 9c

Annual cohorts of deaths, and proportion of cancer-related and non-cancer-related deaths

(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	17	58.8	41.2	50.0
1999	21	61.9	38.1	77.8
2000	18	44.4	55.6	60.0
2001	15	40.0	60.0	54.5
2002	25	44.0	56.0	66.7
2003	39	71.8	28.2	73.0
2004	42	57.1	42.9	65.9
2005	40	57.5	42.5	71.1
2006	44	68.2	31.8	85.0
2007	33	66.7	33.3	75.0
2008	44	52.3	47.7	66.7
2009	56	39.3	60.7	50.0
2010	62	53.2	46.8	73.3
2011	67	44.8	55.2	59.7
2012	55	56.4	43.6	75.9
2013	93	51.6	48.4	61.1
2014	62	56.5	43.5	65.6
2015	89	43.8	56.2	58.1
2016	101	42.6	57.4	59.6
2017	108	43.5	56.5	58.1
2018	94	28.7	71.3	57.6
2019	108	17.6	82.4	73.9
2020	125	19.2	80.8	53.8
1998-2020	1358	43.9	56.1	63.4

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	17	77.3	68.1	87.1	68.1
1999	21	72.5	66.7	73.2	73.7
2000	18	79.2	63.3	83.0	76.4
2001	15	75.8	63.1	82.2	63.1
2002	25	75.6	74.8	84.7	73.2
2003	39	69.7	64.4	83.6	64.5
2004	42	73.0	65.6	82.4	66.2
2005	40	79.4	74.2	82.5	78.6
2006	44	75.8	72.2	80.0	73.8
2007	33	72.9	72.5	79.0	71.8
2008	44	78.8	69.6	84.4	70.6
2009	56	79.3	64.8	85.2	70.4
2010	62	75.8	72.4	83.3	73.3
2011	67	76.7	71.4	83.0	72.8
2012	55	79.4	71.1	83.3	78.3
2013	93	76.1	71.4	83.1	71.1
2014	62	76.4	75.1	84.3	75.1
2015	89	78.9	71.7	83.1	75.4
2016	101	81.4	74.5	86.6	77.4
2017	108	80.2	77.0	85.2	78.1
2018	94	82.0	80.9	83.0	81.4
2019	108	79.7	79.2	79.8	79.1
2020	125	82.2	71.9	84.7	76.1
1998–2020	1358	78.8	72.1	83.5	74.8

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	10	0.9	0.09	0.4	0.07	0.6	0.08	0.7	0.08
1999	13	1.1	0.10	0.5	0.07	0.7	0.08	0.9	0.09
2000	8	0.7	0.06	0.3	0.04	0.5	0.05	0.6	0.05
2001	6	0.5	0.04	0.3	0.03	0.4	0.03	0.4	0.03
2002	11	0.6	0.05	0.3	0.04	0.4	0.04	0.5	0.05
2003	28	1.4	0.12	0.7	0.10	1.0	0.11	1.2	0.12
2004	24	1.2	0.09	0.6	0.07	0.9	0.08	1.0	0.08
2005	23	1.2	0.07	0.5	0.05	0.7	0.06	0.9	0.06
2006	30	1.5	0.10	0.7	0.07	1.0	0.08	1.3	0.09
2007	22	1.0	0.06	0.4	0.05	0.7	0.05	0.8	0.06
2008	23	1.0	0.06	0.5	0.04	0.6	0.04	0.8	0.05
2009	22	0.9	0.05	0.5	0.05	0.7	0.05	0.8	0.05
2010	33	1.4	0.08	0.6	0.05	0.9	0.06	1.1	0.07
2011	30	1.3	0.07	0.5	0.05	0.8	0.05	1.0	0.06
2012	31	1.3	0.08	0.6	0.06	0.8	0.06	1.0	0.07
2013	48	2.0	0.12	0.8	0.08	1.2	0.09	1.5	0.11
2014	35	1.5	0.10	0.5	0.06	0.8	0.06	1.1	0.08
2015	39	1.6	0.10	0.7	0.07	1.0	0.07	1.3	0.09
2016	43	1.8	0.11	0.6	0.07	1.0	0.08	1.2	0.09
2017	47	1.9	0.12	0.7	0.07	1.0	0.08	1.4	0.10
2018	27	1.1	0.07	0.4	0.04	0.6	0.04	0.7	0.05
2019	19	0.8	0.05	0.2	0.02	0.4	0.03	0.5	0.04
2020	24	1.0	0.07	0.5	0.05	0.6	0.05	0.7	0.06
1998-2020	596	1.2	0.08	0.5	0.06	0.8	0.06	1.0	0.07

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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