Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

ICD-10 C51-C58: Fem. genitale cancer

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	29,325
Diseases	29,952
Creation date	12/21/2021
Database export	12/20/2021
Population (females)	2.50 m

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

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

https://www.tumorregister-muenchen.de/en/facts/base/bC5158E-ICD-10-C51-C58-Fem.-genitale-cancer-incidence-and-mortality.pdf

Index of figures and tables

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

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

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

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

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

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

Munich Cancer Registry, December 2021

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

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

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

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

Code	Description
C51.-	Malignant neoplasm of vulva
C52	Malignant neoplasm of vagina
C53.-	Malignant neoplasm of cervix uteri
C54.-	Malignant neoplasm of corpus uteri
C55	Malignant neoplasm of uterus, part unspecified
C56	Malignant neoplasm of ovary
C57.-	Malignant neoplasm of other and unspecified female genital organs
C58	Malignant neoplasm of placenta

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	847	77	9.1	10.4	9.1	69.9	95.0
1999	838	69	8.2	11.1	8.9	67.8	95.1
2000	821	75	9.1	11.9	8.7	66.6	96.3
2001	812	77	9.5	11.8	8.5	64.9	94.3
2002	1337	161	12.0	12.4	8.4	68.6	97.1 #
2003	1337	139	10.4	12.1	8.2	66.9	96.0
2004	1280	129	10.1	12.3	7.8	67.2	96.3
2005	1306	102	7.8	12.3	7.6	63.2	94.5
2006	1304	82	6.3	12.2	7.3	60.4	93.9
2007	1554	132	8.5	12.4	7.1	61.8	92.5 #
2008	1570	116	7.4	12.5	6.8	57.3	98.2
2009	1452	91	6.3	12.6	6.4	55.9	97.1
2010	1504	115	7.6	12.8	6.1	57.4	97.7
2011	1495	91	6.1	13.0	5.7	53.1	97.5
2012	1472	90	6.1	13.3	5.3	51.9	97.6
2013	1526	99	6.5	13.5	4.8	50.5	97.6
2014	1522	97	6.4	13.8	4.5	47.9	96.8
2015	1424	92	6.5	13.9	4.0	45.8	95.2
2016	1439	78	5.4	14.2	3.9	41.8	99.3
2017	1438	75	5.2	14.3	3.4	34.2	99.0
2018	1394	51	3.7	14.5	3.3	29.8	99.4
2019	1169	4	0.3	14.5	2.3	22.3	99.5
2020	1111	5	0.5	14.7	1.7	15.0	99.5 ##
1998-2020	29952	2047	6.8	14.7	9.1	52.4	96.9

29,952 cases diagnosed 1998-2020 are related to a total of 29,325 patients. Currently, in 6,804 (23.2 %) of these 29,325 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 5,474 / 1,086 / 244 (18.7 % / 3.7 % / 0.8 %) patients exist having 2 / 3 / 4+ malignancies.

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

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

How to interpret:
In 2018, a subgroup of 1,394 cases has been diagnosed, of which 14.5 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.3 % 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 4.94 m as of 2007, respectively)

Year of diagnosis	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	847	72.0	38.9	53.8	63.9
1999	838	70.6	36.8	51.2	61.2
2000	821	68.3	36.0	50.2	60.0
2001	812	66.8	35.6	49.0	58.1
2002	1337	68.3	34.8	48.6	58.3
2003	1337	67.9	34.5	48.3	57.7
2004	1280	64.8	33.2	46.3	54.9
2005	1306	65.6	33.3	46.1	54.9
2006	1304	64.9	32.6	45.5	54.1
2007	1554	67.3	33.8	47.4	56.3
2008	1570	67.7	34.4	47.7	56.5
2009	1452	62.4	31.7	44.0	52.2
2010	1504	64.3	31.5	44.2	52.9
2011	1495	64.0	31.8	44.3	52.7
2012	1472	62.4	30.6	42.5	50.7
2013	1526	64.0	32.2	44.5	52.7
2014	1522	63.2	31.4	43.4	51.5
2015	1424	58.5	29.4	40.6	47.8
2016	1439	58.6	29.3	40.5	47.5
2017	1438	58.3	29.6	40.8	47.8
2018	1394	56.2	28.5	39.2	45.8
2019	1169	47.1	23.3	32.3	38.3
2020	1111	44.8	23.4	31.9	36.8
1998-2020	29952	62.0	31.4	43.5	51.5

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	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	847	64.6	15.3	14.6	97.0	43.5	54.6	65.7	76.4	84.5
1999	838	65.3	15.7	0.7	99.9	42.4	55.9	65.9	77.3	85.2
2000	821	64.9	14.9	19.9	98.0	42.8	55.1	65.3	76.8	83.1
2001	812	64.7	15.4	14.7	98.8	41.5	55.0	65.3	76.2	83.8
2002	1337	66.1	15.1	13.2	99.4	44.3	57.8	67.0	77.7	83.9
2003	1337	66.4	15.0	7.6	99.4	45.6	56.8	66.8	78.3	84.2
2004	1280	66.0	15.2	1.2	99.8	44.7	56.1	66.7	77.7	84.3
2005	1306	66.1	15.3	1.7	103	43.2	56.9	67.3	77.5	84.9
2006	1304	66.3	15.1	22.9	99.4	44.3	56.2	67.4	77.8	85.1
2007	1554	66.2	14.9	18.3	100	44.3	56.8	67.7	77.1	85.0
2008	1570	65.8	14.9	11.1	102	44.7	56.4	67.6	77.1	84.7
2009	1452	65.9	15.1	11.2	102	44.3	55.4	67.7	77.2	84.5
2010	1504	66.7	14.8	17.0	98.7	45.9	57.0	68.6	77.3	85.3
2011	1495	66.0	14.8	4.1	98.5	45.2	56.0	68.7	76.9	84.2
2012	1472	66.6	15.1	0.3	101	45.4	57.2	68.9	77.4	84.9
2013	1526	65.9	15.3	0.7	105	45.6	55.8	67.4	77.1	84.6
2014	1522	65.8	15.7	13.3	100	43.4	55.0	68.0	77.3	84.4
2015	1424	65.9	14.7	16.5	102	45.5	55.3	67.1	76.7	84.1
2016	1439	65.8	15.2	4.9	99.1	44.6	55.1	66.9	77.6	84.3
2017	1438	65.4	14.4	26.2	96.6	45.9	55.9	66.8	76.7	82.8
2018	1394	65.3	14.8	19.6	99.9	44.9	55.0	66.1	77.1	83.5
2019	1169	65.6	14.3	14.6	95.6	45.3	56.2	67.0	77.3	82.3
2020	1111	64.4	14.9	17.3	101	43.6	54.6	65.6	76.1	82.6
1998–2020	29952	65.8	15.0	0.3	105	44.6	56.0	67.2	77.2	84.3

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%
0-4	4	0.0	0.0
5-9	2	0.0	0.0
10-14	9	0.0	0.1
15-19	23	0.1	0.2
20-24	35	0.2	0.4
25-29	162	0.8	1.2
30-34	368	1.8	3.0
35-39	557	2.8	5.8
40-44	869	4.3	10.1
45-49	1104	5.5	15.6
50-54	1586	7.9	23.5
55-59	2015	10.0	33.6
60-64	2130	10.6	44.2
65-69	2464	12.3	56.4
70-74	2627	13.1	69.5
75-79	2525	12.6	82.1
80-84	1856	9.2	91.4
85+	1734	8.6	100.0
All ages	20070	100.0	

Table 5

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

Age at diagnosis Years	Cases n	Age-spec. incidence	DCO rate n=1119 %	Prop. all cancers n=155051 %
0- 4	4	0.3	25.0	2.3
5- 9	2	0.1		2.0
10-14	9	0.6		7.0
15-19	23	1.4		8.7
20-24	34	1.8		6.6
25-29	160	7.1	0.6	13.5
30-34	365	16.0	0.3	17.0
35-39	549	24.1	0.2	15.6
40-44	854	35.3	0.7	13.9
45-49	1077	41.4	1.0	11.5
50-54	1548	61.6	0.8	12.4
55-59	1980	90.9	1.7	14.9
60-64	2094	110.3	1.6	13.4
65-69	2420	133.5	2.7	12.8
70-74	2600	151.2	3.5	13.1
75-79	2490	165.8	5.6	12.8
80-84	1835	172.4	11.8	11.9
85+	1721	165.1	29.5	10.5
All ages	19765		5.7	12.7
Incidence				
Raw		58.8		
WS		29.5		
ES		40.8		
BRD-S		48.2		

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).

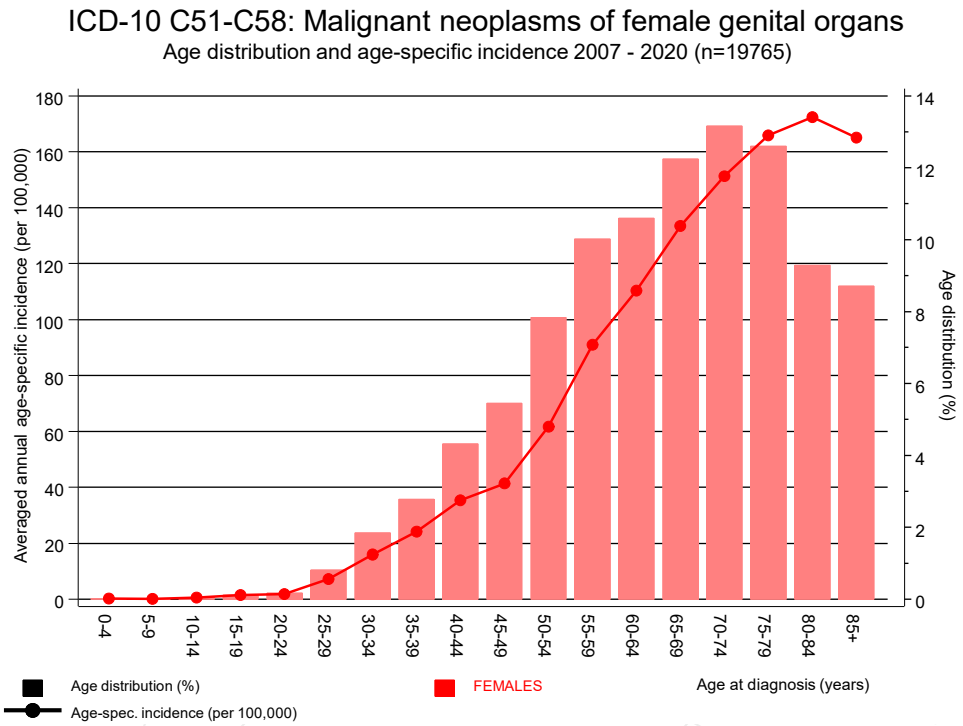

Figure 6. Age distribution (mean=65.9 yrs, median=67.6 yrs) and age-specific incidence.

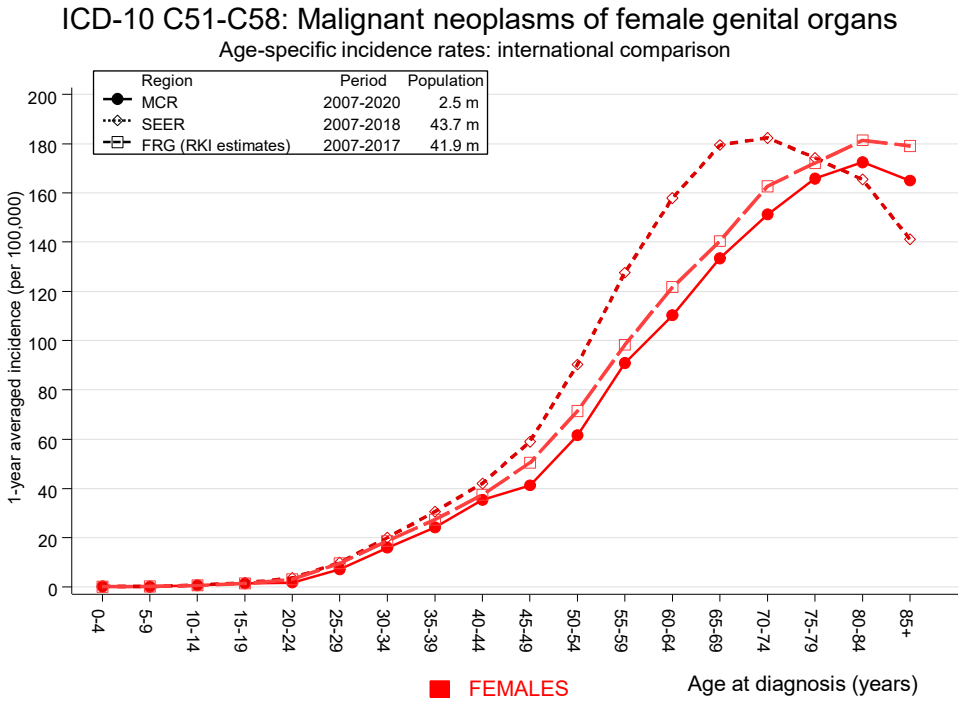

Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, RKI estimates) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

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

Table 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	11	6.1	1.8	0.9	3.2		0.5	
C09–C10	Oropharynx	11	4.5	2.5	1.2	4.4	#	0.6	
C15	Oesophagus	17	7.0	2.4	1.4	3.9	#	1.0	11.8
C16	Stomach	77	35.4	2.2	1.7	2.7	#	4.1	11.7
C17	Small intestine	28	5.7	4.9	3.3	7.1	#	2.2	3.6
C18	Colon	281	101.3	2.8	2.5	3.1	#	17.7	12.8
C19–C20	Rectum	88	41.7	2.1	1.7	2.6	#	4.6	10.2
C21	Anus/canal	23	5.9	3.9	2.5	5.8	#	1.7	4.3
C22	Liver	25	13.0	1.9	1.2	2.8	#	1.2	8.0
C23–C24	Bile	39	14.7	2.6	1.9	3.6	#	2.4	15.4
C25	Pancreas	95	48.5	2.0	1.6	2.4	#	4.6	28.4
C26	GI cancer	5	1.7	2.9	1.0	6.9		0.3	40.0
C33–C34	Lung	258	80.1	3.2	2.8	3.6	#	17.5	12.0
C40–C41	Bone	5	1.0	5.0	1.6	11.6	#	0.4	
C43	Malign. melanoma	72	41.4	1.7	1.4	2.2	#	3.0	6.9
C46,C49	Soft tissue	21	6.1	3.5	2.1	5.3	#	1.5	
C48	Peritoneal	42	4.4	9.6	6.9	13.0	#	3.7	
C50	Breast	829	329.6	2.5	2.3	2.7	#	49.1	4.0
C51	Vulva	37	11.1	3.3	2.3	4.6	#	2.5	5.4
C52	Vagina	15	2.0	7.6	4.2	12.5	#	1.3	
C53	Cervix uteri	54	14.5	3.7	2.8	4.9	#	3.9	29.6
C54	Corpus uteri	211	59.0	3.6	3.1	4.1	#	14.9	12.3
C55,C57	Fem. genitals un	18	2.2	8.2	4.8	12.9	#	1.6	83.3
C56	Ovary	273	42.5	6.4	5.7	7.2	#	22.7	15.4
C64	Kidney	55	24.6	2.2	1.7	2.9	#	3.0	7.3
C65	Renal pelvis	13	3.3	3.9	2.1	6.8	#	1.0	7.7
C66	Ureter	9	1.8	5.1	2.3	9.7	#	0.7	11.1
C67	Bladder	61	20.4	3.0	2.3	3.8	#	4.0	6.6
C70–C72	CNS cancer	25	13.8	1.8	1.2	2.7	#	1.1	24.0
C73	Thyroid	44	17.9	2.5	1.8	3.3	#	2.6	2.3
C76–C79	CUP	46	18.8	2.4	1.8	3.3	#	2.7	8.7
C81	Hodgkin lymphoma	7	2.0	3.5	1.4	7.3	#	0.5	
C82–C85	NHL	88	41.1	2.1	1.7	2.6	#	4.6	3.4
C90	Mult. myeloma	19	12.9	1.5	0.9	2.3		0.6	10.5
C91–C96	Leukaemia	45	15.4	2.9	2.1	3.9	#	2.9	20.0
Others, specified		30	15.2	2.0	1.3	2.8	#	1.5	6.7
Not observed		0	1.6	0.0	0.0	2.3		-0.2	
All further malignancies		2977	1068.2	2.8	2.7	2.9	#	187.8	10.1

Patients	27703
Median age at next malignancy (years)	71.2
Person-years	101661
Mean observation time (years)	3.7
Median observation time (years)	1.9

The occurrence of further specified malignancy is statistically significant.

Further observed malignancies with count 1 to 4 are pooled in category “Others, specified”.

Average incidence (Germany 1987 standard population) 2007 - 2020

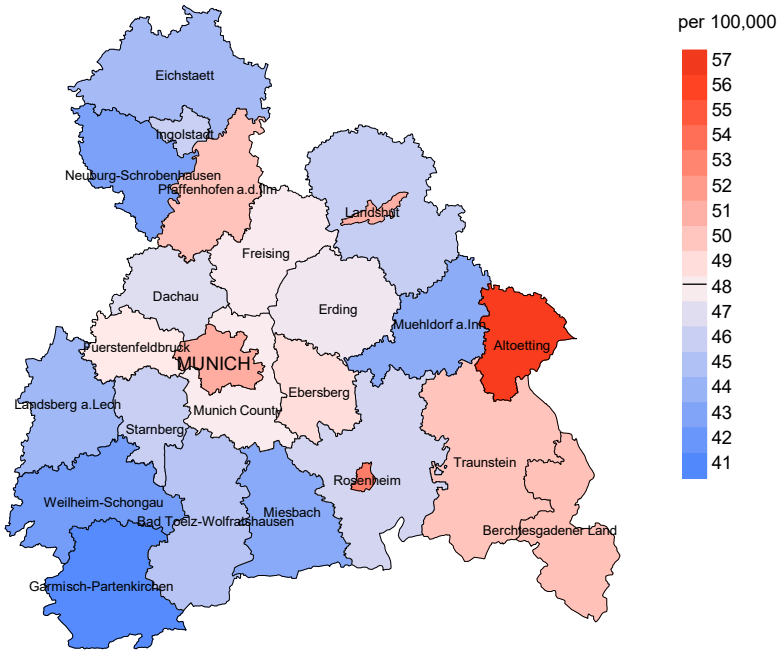

Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (48.2/100,000 WS N=19,765).

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 561 women were identified with newly diagnosed fem. genitale cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 49.0/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 43.8 and 54.7/100,000.

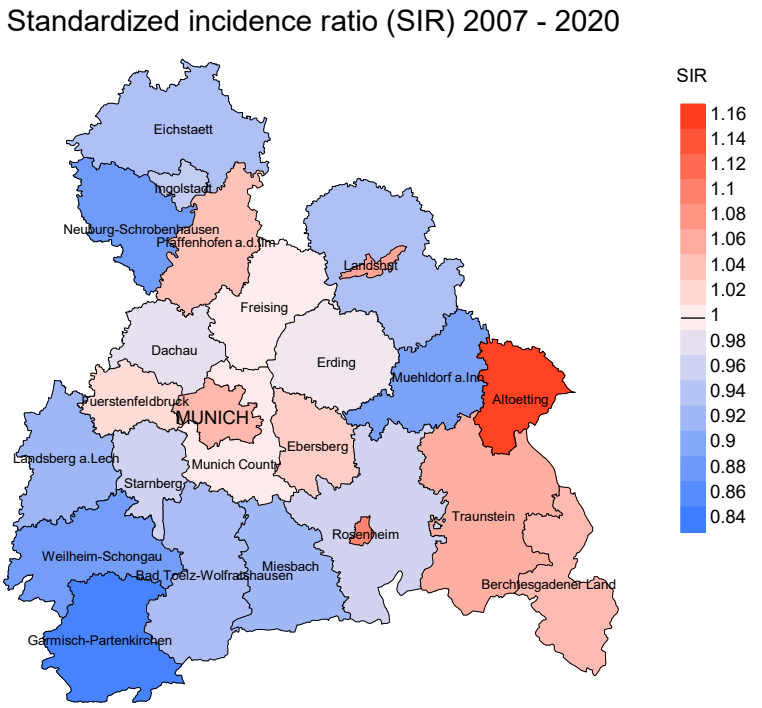

Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=19,765).

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 561 women were identified with newly diagnosed fem. genitale cancer. 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 0.92 and 1.15, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	847	95.0	9.1	592	69.9	88.7
1999	838	95.1	8.2	568	67.8	92.1
2000	821	96.3	9.1	547	66.6	93.1
2001	812	94.3	9.5	527	64.9	95.8
2002	1337	97.1	12.0	917	68.6	95.1
2003	1337	96.0	10.4	895	66.9	95.6
2004	1280	96.3	10.1	860	67.2	96.0
2005	1306	94.5	7.8	826	63.2	95.4
2006	1304	93.9	6.3	788	60.4	96.2
2007	1554	92.5	8.5	961	61.8	95.4
2008	1570	98.2	7.4	900	57.3	95.1
2009	1452	97.1	6.3	812	55.9	95.8
2010	1504	97.7	7.6	864	57.4	94.3
2011	1495	97.5	6.1	794	53.1	95.6
2012	1472	97.6	6.1	764	51.9	94.8
2013	1526	97.6	6.5	771	50.5	92.5
2014	1522	96.8	6.4	729	47.9	93.0
2015	1424	95.2	6.5	652	45.8	90.5
2016	1439	99.3	5.4	601	41.8	84.0
2017	1438	99.0	5.2	492	34.2	80.7
2018	1394	99.4	3.7	415	29.8	71.8
2019	1169	99.5	0.3	261	22.3	82.4
2020	1111	99.5	0.5	167	15.0	92.8
1998-2020	29952	96.9	6.8	15703	52.4	92.7

Table 9b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased within the same year of being diagnosed with cancer (incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	847	464	88.6	130	15.3
1999	838	495	88.9	128	15.3
2000	821	481	92.3	127	15.5
2001	812	481	92.5	116	14.3
2002	1337	777	95.6	266	19.9
2003	1337	806	97.3	227	17.0
2004	1280	792	97.6	217	17.0
2005	1306	819	96.6	189	14.5
2006	1304	774	96.6	180	13.8
2007	1554	912	97.7	248	16.0
2008	1570	924	99.4	218	13.9
2009	1452	938	99.1	179	12.3
2010	1504	957	98.6	227	15.1
2011	1495	1008	97.6	210	14.0
2012	1472	934	97.8	211	14.3
2013	1526	1060	97.8	208	13.6
2014	1522	976	98.2	210	13.8
2015	1424	1015	98.0	186	13.1
2016	1439	1036	98.6	196	13.6
2017	1438	1035	97.0	180	12.5
2018	1394	881	66.3	144	10.3
2019	1169	789	45.0	85	7.3
2020	1111	955	86.0	94	8.5
1998–2020	29952	19309	92.9	4176	13.9

Table 9c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	464	67.7	32.3	84.7
1999	495	69.7	30.3	83.9
2000	481	70.7	29.3	80.9
2001	481	68.2	31.8	82.9
2002	777	73.2	26.8	84.3
2003	806	73.7	26.3	82.9
2004	792	74.9	25.1	82.7
2005	819	75.3	24.7	82.8
2006	774	70.3	29.7	80.7
2007	912	73.4	26.6	80.5
2008	924	74.7	25.3	79.8
2009	938	70.8	29.2	78.0
2010	957	75.2	24.8	81.3
2011	1008	70.6	29.4	78.2
2012	934	69.2	30.8	77.8
2013	1060	70.3	29.7	77.1
2014	976	70.7	29.3	78.5
2015	1015	67.8	32.2	73.5
2016	1036	71.6	28.4	78.0
2017	1035	65.3	34.7	71.3
2018	881	59.0	41.0	68.2
2019	789	49.6	50.4	75.5
2020	955	50.5	49.5	70.2
1998-2020	19309	68.8	31.2	78.5

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	464	76.5	73.1	81.8	75.8
1999	495	78.2	74.4	83.8	77.8
2000	481	78.1	75.8	82.9	77.3
2001	481	77.9	73.0	82.7	76.0
2002	777	77.5	73.9	84.7	75.4
2003	806	77.2	74.1	84.4	75.1
2004	792	77.6	74.1	84.2	75.2
2005	819	78.2	74.0	84.4	75.4
2006	774	78.2	74.5	85.1	75.8
2007	912	79.1	75.2	85.9	77.0
2008	924	78.1	73.8	85.9	74.7
2009	938	77.5	72.9	85.2	74.4
2010	957	78.2	74.8	85.4	75.7
2011	1008	77.5	73.5	85.4	74.9
2012	934	79.6	76.3	87.0	76.8
2013	1060	78.3	74.5	86.8	76.0
2014	976	77.5	74.9	85.4	75.3
2015	1015	78.6	75.3	86.4	75.9
2016	1036	77.8	75.0	85.5	75.8
2017	1035	79.9	76.4	86.9	77.2
2018	881	78.9	75.0	83.9	76.3
2019	789	79.0	74.7	82.6	76.8
2020	955	80.3	75.9	83.8	77.5
1998–2020	19309	78.4	74.7	85.0	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	314	26.7	0.38	11.7	0.31	17.5	0.33	22.3	0.36
1999	345	29.1	0.42	12.1	0.33	18.4	0.36	24.5	0.40
2000	341	28.4	0.42	11.4	0.32	17.5	0.35	23.3	0.39
2001	328	27.0	0.41	11.6	0.33	17.3	0.36	22.3	0.39
2002	569	29.1	0.43	12.3	0.36	18.4	0.38	23.8	0.41
2003	594	30.2	0.45	12.6	0.37	18.9	0.40	24.7	0.43
2004	593	30.0	0.47	12.3	0.38	18.4	0.40	23.8	0.44
2005	617	31.0	0.48	12.5	0.38	18.8	0.41	24.2	0.45
2006	544	27.1	0.42	10.8	0.34	16.2	0.36	21.4	0.40
2007	669	29.0	0.44	11.2	0.34	16.9	0.36	22.2	0.40
2008	690	29.7	0.45	11.8	0.35	17.7	0.38	22.9	0.41
2009	665	28.6	0.46	11.6	0.37	17.3	0.40	22.1	0.43
2010	720	30.8	0.48	11.9	0.38	17.8	0.41	23.2	0.44
2011	713	30.5	0.48	11.9	0.38	17.9	0.41	23.1	0.44
2012	647	27.4	0.45	9.9	0.33	15.3	0.36	20.4	0.41
2013	747	31.3	0.50	12.0	0.38	18.0	0.41	23.4	0.45
2014	691	28.7	0.46	10.7	0.35	16.2	0.38	21.3	0.42
2015	688	28.3	0.49	10.5	0.36	15.9	0.40	20.8	0.44
2016	742	30.2	0.52	11.8	0.41	17.5	0.44	22.5	0.48
2017	678	27.5	0.48	9.8	0.34	15.0	0.37	19.9	0.42
2018	523	21.1	0.38	8.1	0.29	12.0	0.31	15.5	0.34
2019	393	15.8	0.34	6.2	0.27	9.2	0.29	11.7	0.31
2020	485	19.5	0.45	7.5	0.33	11.0	0.35	14.2	0.40
1998-2020	13296	27.5	0.45	10.8	0.35	16.2	0.38	21.1	0.42

Table 12

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

Age at death Years	Cases n	%	Cum.%
0-4			
5-9	1	0.0	0.0
10-14	0	0.0	0.0
15-19	2	0.0	0.0
20-24	4	0.0	0.1
25-29	13	0.1	0.2
30-34	25	0.3	0.5
35-39	81	0.9	1.4
40-44	161	1.8	3.2
45-49	258	2.9	6.0
50-54	387	4.3	10.3
55-59	545	6.0	16.3
60-64	706	7.8	24.1
65-69	1062	11.7	35.9
70-74	1322	14.6	50.5
75-79	1504	16.6	67.1
80-84	1387	15.3	82.4
85+	1593	17.6	100.0
All ages	9051	100.0	

Table 13

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9	1	0.1	0.50	4.0
10-14		0.0		
15-19	2	0.1	0.09	8.0
20-24	4	0.2	0.12	9.3
25-29	13	0.6	0.08	13.1
30-34	25	1.1	0.07	13.8
35-39	81	3.6	0.15	19.9
40-44	161	6.7	0.19	18.8
45-49	258	9.9	0.24	15.4
50-54	387	15.4	0.25	14.6
55-59	545	25.0	0.28	14.3
60-64	706	37.2	0.34	14.1
65-69	1062	58.6	0.44	15.2
70-74	1322	76.9	0.51	15.1
75-79	1504	100.2	0.60	15.3
80-84	1387	130.3	0.76	14.8
85+	1593	152.8	0.93	13.3
All ages	9051			14.7
Mortality				
Raw		26.9	0.46	
WS		10.3	0.35	
ES		15.5	0.38	
BRD-S		20.1	0.42	
PYLL-70				
per 100,000		128.3		
ES		107.5		
AYLL-70		11.2		

Table 14

Further malignancies in deaths in period 1998–2020

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06	Oral cavity	28	0.6	9	32.1			19	67.9
C09–C10	Oropharynx	19	0.4	10	52.6			9	47.4
C15	Oesophagus	25	0.5	2	8.0	1	4.0	22	88.0
C16	Stomach	147	2.9	28	19.0	12	8.2	107	72.8
C17	Small intestine	27	0.5	6	22.2	6	22.2	15	55.6
C18	Colon	484	9.7	164	33.9	57	11.8	263	54.3
C19–C20	Rectum	239	4.8	92	38.5	20	8.4	127	53.1
C21	Anus/canal	46	0.9	19	41.3	1	2.2	26	56.5
C22	Liver	38	0.8	4	10.5	1	2.6	33	86.8
C23–C24	Bile	64	1.3	14	21.9	3	4.7	47	73.4
C25	Pancreas	184	3.7	14	7.6	10	5.4	160	87.0
C26	GI cancer	12	0.2	3	25.0	1	8.3	8	66.7
C33–C34	Lung	417	8.3	42	10.1	31	7.4	344	82.5
C40–C41	Bone	12	0.2	3	25.0			9	75.0
C43	Malign. melanoma	154	3.1	88	57.1	6	3.9	60	39.0
C44	Skin others	226	4.5	102	45.1	19	8.4	105	46.5
C46,C49	Soft tissue	33	0.7	9	27.3	3	9.1	21	63.6
C48	Peritoneal	76	1.5	34	44.7	19	25.0	23	30.3
C50	Breast	1412	28.2	827	58.6	125	8.9	460	32.6
C51	Vulva	35	0.7	13	37.1	7	20.0	15	42.9
C52	Vagina	16	0.3	5	31.3	5	31.3	6	37.5
C53	Cervix uteri	134	2.7	94	70.1	16	11.9	24	17.9
C54	Corpus uteri	180	3.6	85	47.2	77	42.8	18	10.0
C55,C57	Fem. genitals un	21	0.4	10	47.6	4	19.0	7	33.3
C56	Ovary	162	3.2	37	22.8	69	42.6	56	34.6
C64	Kidney	93	1.9	36	38.7	8	8.6	49	52.7
C65	Renal pelvis	21	0.4	5	23.8			16	76.2
C66	Ureter	17	0.3	1	5.9			16	94.1
C67	Bladder	168	3.4	27	16.1	18	10.7	123	73.2
C70–C72	CNS cancer	52	1.0	8	15.4	2	3.8	42	80.8
C73	Thyroid	56	1.1	35	62.5	1	1.8	20	35.7
C76–C79	CUP	102	2.0	27	26.5	13	12.7	62	60.8
C82–C85	NHL	123	2.5	50	40.7	11	8.9	62	50.4
C90	Mult. myeloma	26	0.5	4	15.4	1	3.8	21	80.8
C91–C96	Leukaemia	71	1.4	14	19.7	6	8.5	51	71.8
Others, specified		86	1.7	42	48.8	5	5.8	39	45.3
All further malignancies		5006	100.0	1963	39.2	558	11.1	2485	49.6

Further malignancies with number of cases 1 to 11 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 2007-2020
(**First primaries only** *)

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9	1	0.1	0.50	4.0
10-14		0.0		
15-19	2	0.1	0.09	8.7
20-24	4	0.2	0.13	9.8
25-29	10	0.4	0.07	11.0
30-34	22	1.0	0.06	13.8
35-39	75	3.3	0.15	20.3
40-44	148	6.1	0.19	19.6
45-49	219	8.4	0.23	15.3
50-54	322	12.8	0.24	14.3
55-59	461	21.2	0.27	14.4
60-64	583	30.7	0.33	14.3
65-69	858	47.3	0.43	15.5
70-74	1065	61.9	0.51	15.7
75-79	1215	80.9	0.62	16.2
80-84	1085	101.9	0.77	15.0
85+	1293	124.0	0.98	13.7
All ages	7363			15.1
Mortality				
Raw		21.9	0.45	
WS		8.5	0.34	
ES		12.7	0.37	
BRD-S		16.4	0.41	
PYLL-70				
per 100,000		109.5		
ES		92.1		
AYLL-70		11.4		

* See corresponding tables with multiple malignancies.

Table 16

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9	1	0.1	0.50	4.0
10-14		0.0		
15-19	2	0.1	0.09	9.1
20-24	4	0.2	0.14	10.0
25-29	10	0.4	0.07	11.4
30-34	22	1.0	0.06	14.0
35-39	71	3.1	0.14	19.5
40-44	137	5.7	0.18	18.4
45-49	201	7.7	0.23	14.2
50-54	286	11.4	0.23	13.0
55-59	406	18.6	0.25	12.9
60-64	503	26.5	0.31	12.6
65-69	697	38.4	0.38	12.9
70-74	867	50.4	0.47	13.2
75-79	974	64.9	0.55	13.4
80-84	843	79.2	0.64	12.2
85+	1002	96.1	0.79	11.1
All ages	6026			12.7
Mortality				
Raw		17.9	0.40	
WS		7.2	0.31	
ES		10.6	0.33	
BRD-S		13.6	0.36	
PYLL-70				
per 100,000		98.4		
ES		83.0		
AYLL-70		11.9		

* See corresponding tables with multiple malignancies.

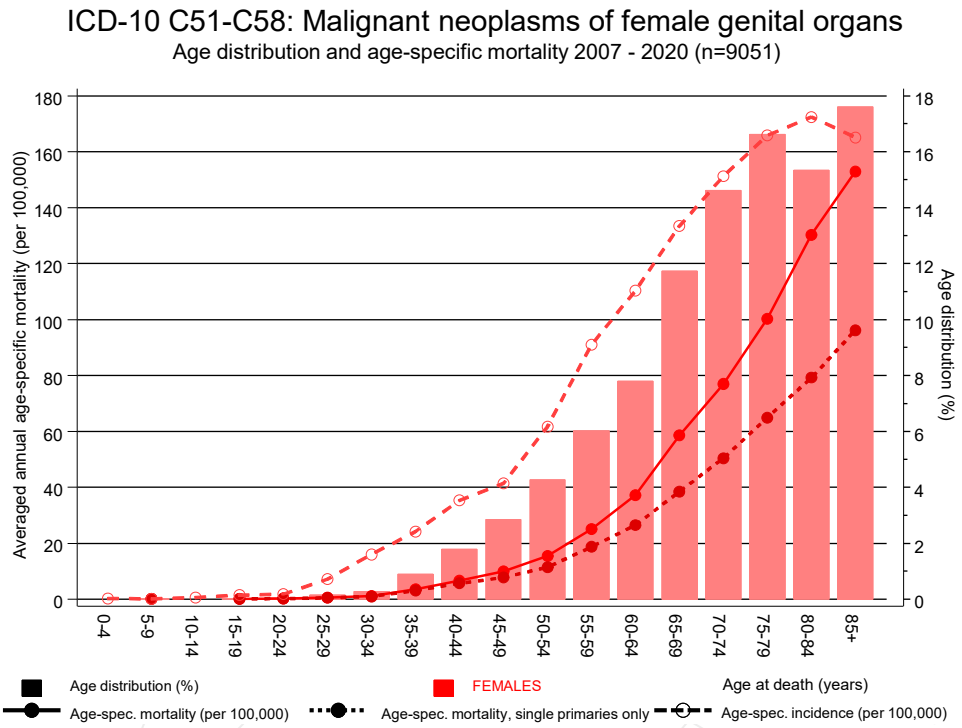

Figure 17. Distribution of age at death (bars; n=mean=67.8 yrs, median=69.6 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

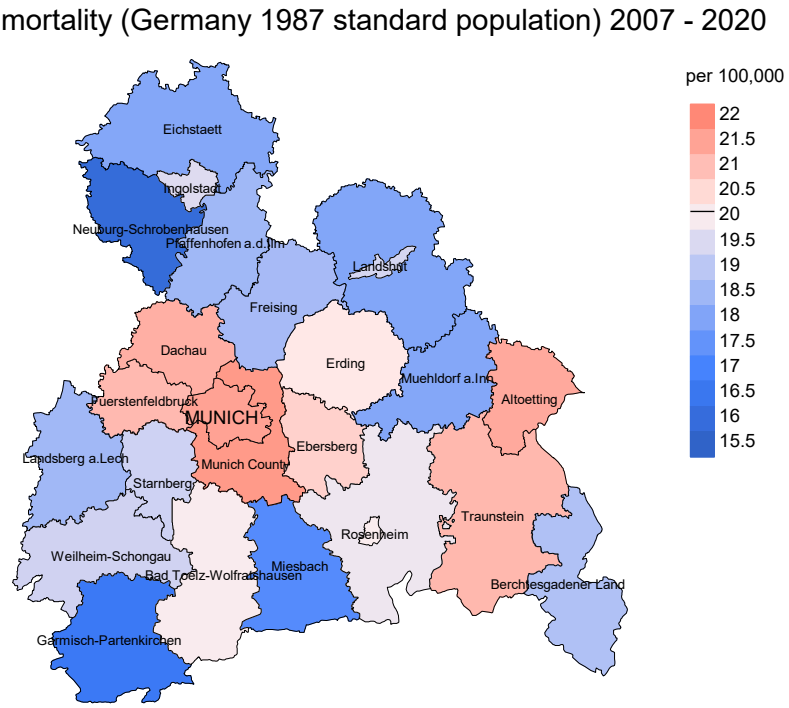

Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (20.1/100,000 WS N=9,051).

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 258 women died from fem. genitale cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 20.7/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 17.4 and 24.3/100,000.

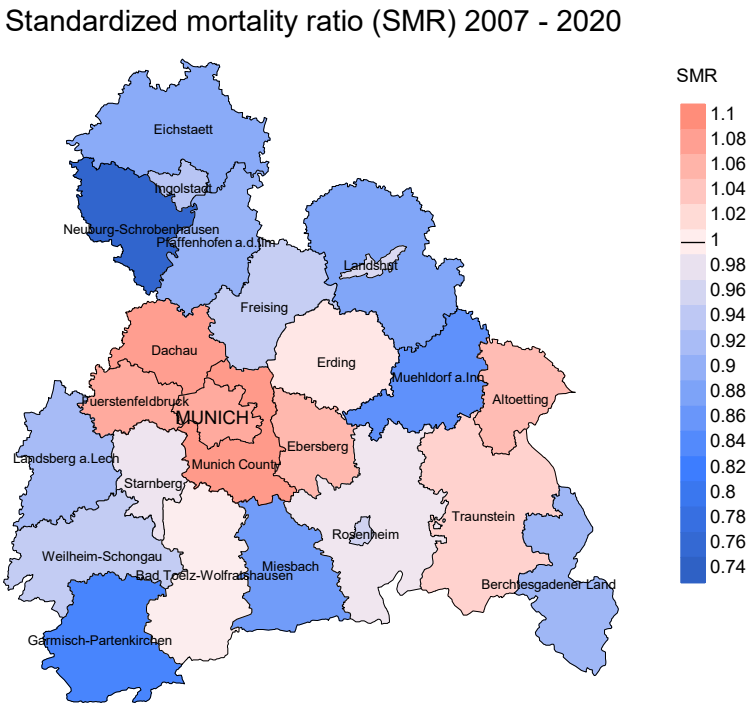

Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=9,051).

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 258 women died from fem. genitale cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.05. Though, the value of this parameter may vary with an underlying probability of 99% between 0.89 and 1.24, 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 C51-C58: Fem. genitale cancer - Incidence and Mortality [Internet]. 2021 [updated 2021 Dec 21; cited 2022 Feb 1]. Available from: https://www.tumorregister-muenchen.de/en/facts/base/bC5158E-ICD-10-C51-C58-Fem.-genitale-cancer-incidence-and-mortality.pdf

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