

Munich Cancer Registry



- ▶ Survival
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ICD-10 C56: Ovarian cancer

Incidence and Mortality

Year of diagnosis	1998-2019
Patients	8,343
Diseases	8,346
Creation date	01/25/2021
Database export	01/07/2021
Population (females)	2.48 m





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

https://www.tumorregister-muenchen.de/en/facts/base/bC56__E-ICD-10-C56-Ovarian-cancer-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
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C56	Malignant neoplasm of ovary
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... if not existing any of ...

Topography codes (ICD-O-3 2000) used for specifying cancer site

Code	Description
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C48.-	Retroperitoneum and peritoneum
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C49.-	Connective, subcutaneous and other soft tissues
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C57.0	Other and unspecified female genital organs: Fallopian tube
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Extra-ovarian carcinomas are additionally excluded by internal coding.

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	279	45	16.1	12.2	6.0	82.8	98.2
1999	260	31	11.9	13.2	6.0	80.4	98.5
2000	267	40	15.0	14.1	5.9	80.1	98.1
2001	234	42	17.9	14.2	5.8	78.6	97.0
2002	428	79	18.5	16.0	5.7	82.9	98.6 #
2003	443	78	17.6	15.4	5.5	78.6	97.7
2004	382	63	16.5	15.3	5.3	83.5	97.4
2005	362	49	13.5	15.3	5.1	82.0	96.7
2006	403	46	11.4	15.4	5.0	78.9	98.0
2007	484	74	15.3	15.6	4.8	77.5	94.2 #
2008	493	70	14.2	15.5	4.5	74.4	98.4
2009	395	49	12.4	15.5	4.4	71.6	98.5
2010	448	60	13.4	15.8	4.2	76.3	97.3
2011	421	53	12.6	16.1	3.6	72.4	98.8
2012	393	36	9.2	16.1	3.4	68.7	97.7
2013	447	54	12.1	16.1	3.2	66.0	98.9
2014	403	56	13.9	16.4	3.1	61.8	96.3
2015	405	48	11.9	16.4	3.1	62.7	97.8
2016	415	44	10.6	16.5	3.3	54.9	99.5
2017	385	40	10.4	16.8	2.9	43.4	98.7
2018	327	8	2.4	16.9	1.9	27.5	99.7
2019	272	3	1.1	16.9	0.0	20.2	72.8 ##
1998-2019	8346	1068	12.8	16.9	6.0	69.0	97.1

8,346 cases diagnosed 1998-2019 are related to a total of 8,343 patients. Currently, in 2,061 (24.7 %) of these 8,343 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,675 / 333 / 53 (20.1 % / 4.0 % / 0.6 %) 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 385 cases has been diagnosed, of which 16.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 2.9 % 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	279	23.7	12.9	17.6	21.1
1999	260	21.9	10.8	15.5	18.9
2000	267	22.2	11.3	16.0	19.3
2001	234	19.2	10.2	14.0	16.6
2002	428	21.9	10.8	15.3	18.7
2003	443	22.5	11.4	16.0	19.3
2004	382	19.3	9.9	13.8	16.6
2005	362	18.2	8.8	12.3	15.1
2006	403	20.1	9.7	13.7	16.7
2007	484	21.0	10.0	14.3	17.4
2008	493	21.2	10.6	14.8	17.9
2009	395	17.0	8.1	11.5	14.2
2010	448	19.1	9.1	12.9	15.6
2011	421	18.0	8.7	12.2	14.9
2012	393	16.7	8.0	11.1	13.5
2013	447	18.7	9.4	12.9	15.4
2014	403	16.7	8.2	11.3	13.5
2015	405	16.6	7.9	11.1	13.4
2016	415	16.9	7.7	10.9	13.3
2017	385	15.6	7.5	10.5	12.6
2018	327	13.2	6.7	9.3	10.8
2019	272	11.0	5.2	7.3	8.9
1998-2019	8346	18.2	8.9	12.5	15.1

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.	10%	25%	Median		
		Mean	dev.					50%	75%	90%
1998	279	64.9	16.1	14.6	92.1	43.5	55.2	66.7	77.1	85.4
1999	260	67.3	14.3	16.5	96.5	49.6	58.2	67.9	78.5	85.1
2000	267	66.9	14.2	19.9	94.8	47.3	57.4	66.5	78.8	85.3
2001	234	64.7	15.7	26.3	98.8	41.5	54.9	65.4	76.8	85.4
2002	428	67.3	14.2	13.2	96.6	47.9	59.0	68.2	78.3	83.4
2003	443	66.5	14.9	7.6	95.3	46.7	56.3	67.4	78.1	83.5
2004	382	66.4	15.1	15.9	97.3	45.8	56.6	66.6	78.2	84.4
2005	362	67.6	14.9	19.2	96.4	45.7	57.7	68.2	79.9	84.9
2006	403	67.7	14.4	24.9	95.8	45.8	57.9	69.0	79.1	84.6
2007	484	68.1	14.2	19.8	98.1	48.5	58.6	69.4	79.2	85.8
2008	493	66.8	15.1	11.1	102	46.5	57.9	68.4	78.4	84.9
2009	395	67.3	15.0	11.2	97.6	46.7	56.3	69.2	78.8	84.5
2010	448	68.1	14.5	17.0	98.5	48.9	58.3	69.1	78.4	86.7
2011	421	67.5	13.6	4.1	94.5	49.9	58.7	69.4	77.4	83.6
2012	393	67.7	15.4	5.4	95.9	47.8	59.2	69.9	79.1	85.3
2013	447	66.6	15.0	9.1	100	48.2	57.1	68.8	77.2	84.5
2014	403	66.7	15.8	13.3	96.8	45.4	56.8	69.9	78.2	85.1
2015	405	67.4	14.8	16.5	101	47.9	57.8	69.0	77.9	85.2
2016	415	68.1	14.5	4.9	97.3	49.8	58.9	70.1	78.8	84.6
2017	385	66.7	14.2	26.2	94.7	48.3	56.1	68.2	77.9	83.9
2018	327	65.1	14.4	19.6	94.6	44.9	55.0	65.6	76.9	82.7
2019	272	66.6	13.8	14.6	95.3	47.5	58.0	67.9	77.2	82.3
1998-2019	8346	67.0	14.7	4.1	102	47.3	57.5	68.3	78.2	84.7

Table 4

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

Age at diagnosis Years	Cases		Cum.%
	n	%	
0-4	2	0.0	0.0
5-9	2	0.0	0.1
10-14	9	0.2	0.2
15-19	20	0.4	0.6
20-24	17	0.3	0.9
25-29	32	0.6	1.6
30-34	48	0.9	2.5
35-39	85	1.6	4.1
40-44	175	3.3	7.4
45-49	275	5.2	12.6
50-54	419	7.9	20.5
55-59	512	9.7	30.2
60-64	537	10.2	40.3
65-69	664	12.6	52.9
70-74	672	12.7	65.6
75-79	752	14.2	79.8
80-84	579	10.9	90.8
85+	488	9.2	100.0
All ages	5288	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=595 %	Prop. all cancers n=144724 %
0– 4	2	0.1		1.2
5– 9	2	0.1		2.2
10–14	9	0.6		7.7
15–19	20	1.3		8.1
20–24	17	1.0		3.6
25–29	32	1.5	3.1	2.9
30–34	48	2.3	2.1	2.4
35–39	85	4.0		2.6
40–44	175	7.7	2.9	3.0
45–49	275	11.3	2.5	3.1
50–54	419	18.1	2.1	3.6
55–59	512	25.6	4.9	4.1
60–64	537	30.6	3.5	3.7
65–69	664	39.4	6.3	3.7
70–74	671	41.8	8.9	3.6
75–79	752	54.6	11.6	4.2
80–84	579	59.5	21.9	4.1
85+	488	50.6	43.4	3.2
All ages	5287		11.3	3.7
Incidence				
Raw		17.0		
WS		8.2		
ES		11.5		
BRD-S		13.8		

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 C56: Malignant neoplasm of ovary (invasive)

Age distribution and age-specific incidence 2007 - 2019 (n=5287)

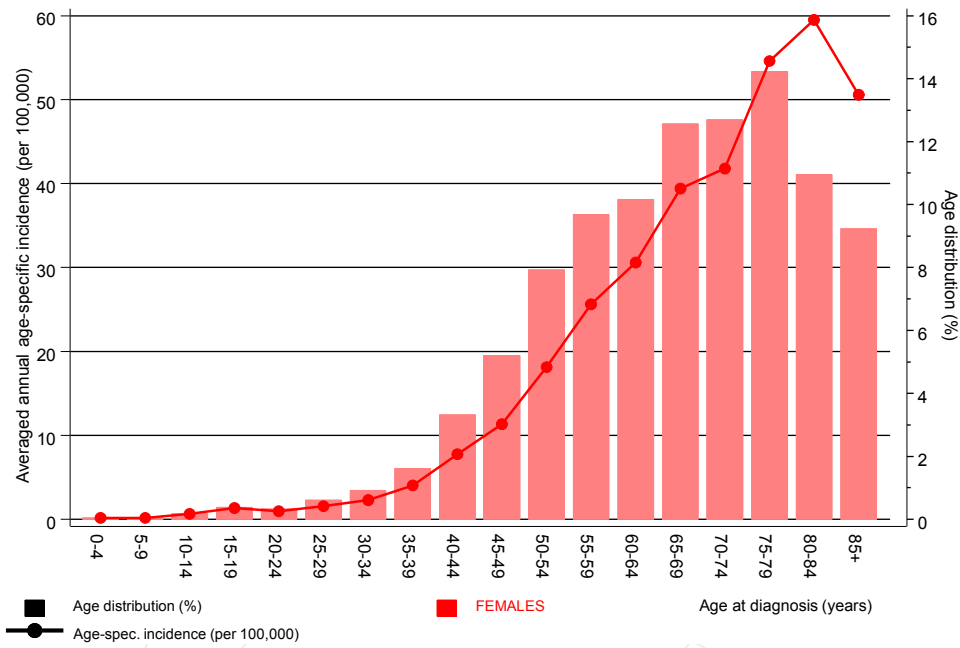


Figure 6. Age distribution (mean=67.2 yrs, median=68.9 yrs) and age-specific incidence.

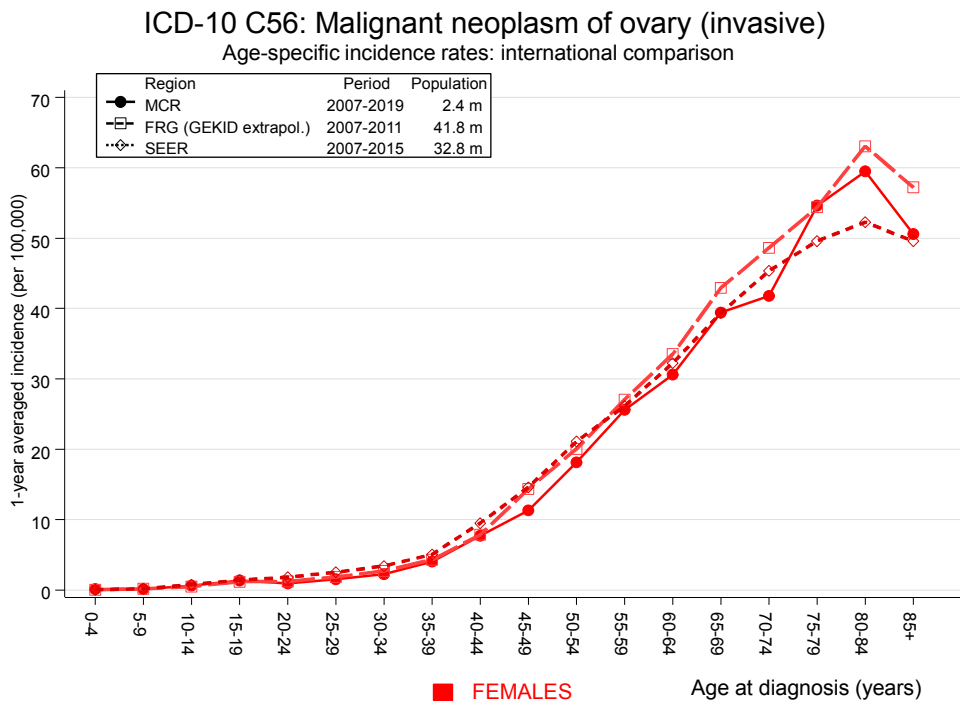


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

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	2	1.3	1.5	0.2	5.4	0.3	
C07-C08 Salivary gland	1	0.3	2.9	0.1	16.2	0.3	
C09-C10 Oropharynx	2	1.0	1.9	0.2	7.0	0.4	
C15 Oesophagus	2	1.4	1.4	0.2	5.0	0.2	50.0
C16 Stomach	26	7.0	3.7	2.4	5.4 #	8.5	7.7
C17 Small intestine	9	1.2	7.5	3.4	14.2 #	3.5	
C18 Colon	73	20.1	3.6	2.8	4.6 #	23.6	20.5
C19-C20 Rectum	16	8.6	1.9	1.1	3.0 #	3.3	6.3
C21 Anus/canal	1	1.2	0.8	0.0	4.5	-0.1	
C22 Liver	5	2.6	1.9	0.6	4.5	1.1	20.0
C23-C24 Bile	7	2.9	2.4	1.0	5.0	1.8	42.9
C25 Pancreas	21	9.5	2.2	1.4	3.4 #	5.1	42.9
C26 GI cancer	1	0.3	3.2	0.1	17.7	0.3	
C33-C34 Lung	39	17.1	2.3	1.6	3.1 #	9.8	15.4
C38,C45 Mesothelioma	1	0.4	2.5	0.1	14.0	0.3	
C43 Malign. melanoma	6	8.6	0.7	0.3	1.5	-1.2	
C46,C49 Soft tissue	3	1.2	2.4	0.5	7.1	0.8	
C48 Peritoneal	13	0.9	14.3	7.6	24.4 #	5.4	
C50 Breast	182	71.7	2.5	2.2	2.9 #	49.2	4.9
C51 Vulva	9	2.2	4.1	1.9	7.9 #	3.0	11.1
C53 Cervix uteri	15	3.2	4.7	2.6	7.7 #	5.3	20.0
C54 Corpus uteri	213	12.7	16.7	14.5	19.1 #	89.4	4.7
C55,C57 Fem. genitals un	3	0.4	7.4	1.5	21.7 #	1.2	66.7
C56 Ovary	7	9.1	0.8	0.3	1.6	-0.9	
C64 Kidney	11	5.1	2.1	1.1	3.8 #	2.6	
C65 Renal pelvis	2	0.7	3.1	0.4	11.1	0.6	
C66 Ureter	1	0.3	3.0	0.1	16.5	0.3	100.0
C67 Bladder	8	3.9	2.0	0.9	4.0	1.8	
C70-C72 CNS cancer	5	2.9	1.7	0.6	4.0	0.9	20.0
C73 Thyroid	10	4.2	2.4	1.1	4.4 #	2.6	10.0
C76-C79 CUP	8	3.7	2.2	0.9	4.3	1.9	37.5
C82-C85 NHL	20	8.4	2.4	1.5	3.7 #	5.2	5.0
C90 Mult. myeloma	7	2.6	2.7	1.1	5.5 #	2.0	14.3
C91-C96 Leukaemia	6	3.1	2.0	0.7	4.3	1.3	16.7
Not observed	0	3.7	0.0	0.0	1.0 #	-1.7	
All further malignancies	735	224.0	3.3	3.0	3.5 #	228.1	9.8
Patients		7482					
Median age at next malignancy (years)		67.7					
Person-years		22407					
Mean observation time (years)		3.0					
Median observation time (years)		1.7					

The occurrence of further specified malignancy is statistically significant.

Average incidence (Germany 1987 standard population) 2007 - 2019

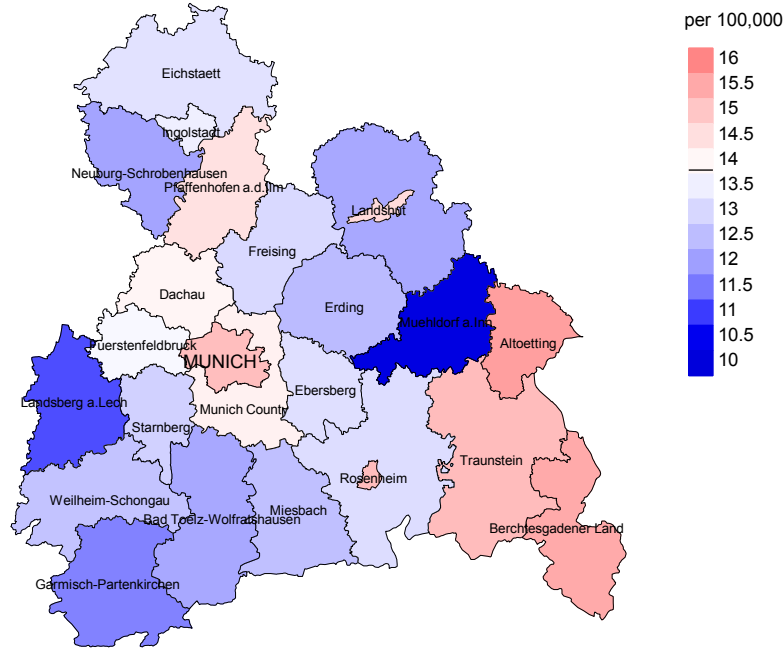


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (13.8/100,000 WS N=5,287).

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 140 women were identified with newly diagnosed ovarian cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 13.1/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 10.4 and 16.3/100,000.

Standardized incidence ratio (SIR) 2007 - 2019

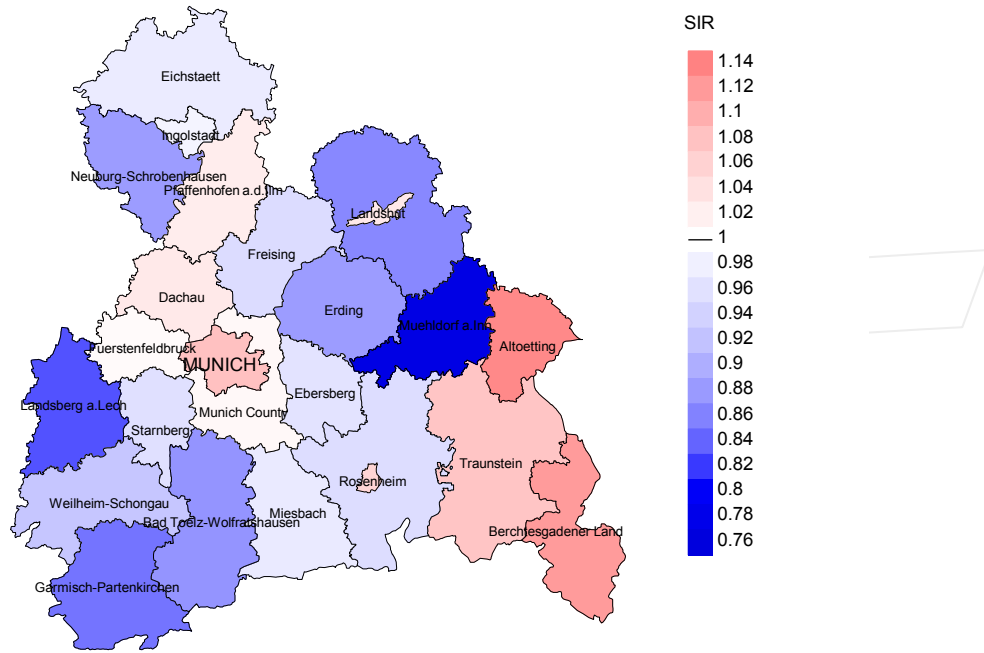


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=5,287).

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 140 women were identified with newly diagnosed ovarian cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.96. Though, the value of this parameter may vary with an underlying probability of 99% between 0.77 and 1.19, 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	279	98.2	16.1	231	82.8	87.4
1999	260	98.5	11.9	209	80.4	93.3
2000	267	98.1	15.0	214	80.1	94.4
2001	234	97.0	17.9	184	78.6	98.4
2002	428	98.6	18.5	355	82.9	96.6
2003	443	97.7	17.6	348	78.6	97.1
2004	382	97.4	16.5	319	83.5	97.2
2005	362	96.7	13.5	297	82.0	98.7
2006	403	98.0	11.4	318	78.9	98.4
2007	484	94.2	15.3	375	77.5	97.6
2008	493	98.4	14.2	367	74.4	95.4
2009	395	98.5	12.4	283	71.6	96.1
2010	448	97.3	13.4	342	76.3	93.6
2011	421	98.8	12.6	305	72.4	95.1
2012	393	97.7	9.2	270	68.7	95.9
2013	447	98.9	12.1	295	66.0	93.9
2014	403	96.3	13.9	249	61.8	90.4
2015	405	97.8	11.9	254	62.7	88.6
2016	415	99.5	10.6	228	54.9	80.3
2017	385	98.7	10.4	167	43.4	74.9
2018	327	99.7	2.4	90	27.5	48.9
2019	272	72.8	1.1	55	20.2	80.0
1998-2019	8346	97.1	12.8	5755	69.0	93.1

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	279	186	87.6	69	24.7
1999	260	191	86.9	58	22.3
2000	267	175	90.9	63	23.6
2001	234	200	93.5	58	24.8
2002	428	313	96.5	135	31.5
2003	443	292	99.0	117	26.4
2004	382	288	98.3	104	27.2
2005	362	306	98.0	89	24.6
2006	403	285	96.5	100	24.8
2007	484	329	99.1	120	24.8
2008	493	351	100.0	119	24.1
2009	395	356	99.4	94	23.8
2010	448	351	98.3	118	26.3
2011	421	329	97.0	104	24.7
2012	393	287	96.5	82	20.9
2013	447	364	98.4	101	22.6
2014	403	303	98.3	100	24.8
2015	405	354	97.7	99	24.4
2016	415	359	98.9	100	24.1
2017	385	295	96.6	85	22.1
2018	327	247	30.4	46	14.1
2019	272	207	55.6	32	11.8
1998–2019	8346	6368	93.1	1993	23.9

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 4.92 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer- related %	Prop. non-cancer- related %	Prop. cancer recorded on death certificate %
1998	186	79.0	21.0	94.5
1999	191	81.7	18.3	93.4
2000	175	89.7	10.3	95.0
2001	200	88.0	12.0	93.6
2002	313	87.2	12.8	94.4
2003	292	88.7	11.3	92.7
2004	288	90.6	9.4	93.3
2005	306	92.5	7.5	95.0
2006	285	87.0	13.0	94.9
2007	329	90.6	9.4	93.9
2008	351	93.2	6.8	95.2
2009	356	88.5	11.5	93.5
2010	351	94.3	5.7	96.2
2011	329	87.8	12.2	92.8
2012	287	86.8	13.2	93.5
2013	364	87.9	12.1	91.3
2014	303	90.1	9.9	93.3
2015	354	86.2	13.8	89.6
2016	359	88.6	11.4	91.5
2017	295	86.8	13.2	90.2
2018	247	64.4	35.6	85.3
2019	207	70.0	30.0	88.7
1998–2019	6368	87.1	12.9	93.1

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	186	74.6	73.5	79.0	74.7
1999	191	74.3	72.4	79.6	75.2
2000	175	73.0	73.2	71.9	73.8
2001	200	73.4	70.2	86.6	72.5
2002	313	73.7	72.5	82.9	73.1
2003	292	74.3	73.3	84.3	73.4
2004	288	73.8	73.3	82.5	73.3
2005	306	73.6	72.0	83.7	72.7
2006	285	74.6	73.2	83.0	73.9
2007	329	75.8	74.2	83.9	75.0
2008	351	74.6	74.0	87.8	74.2
2009	356	72.8	72.0	81.1	72.1
2010	351	75.0	74.8	86.1	74.9
2011	329	73.0	71.9	83.0	72.5
2012	287	76.0	74.3	86.8	74.7
2013	364	74.7	74.0	87.3	74.2
2014	303	74.2	73.7	84.4	73.7
2015	354	75.2	74.0	84.8	74.3
2016	359	73.8	72.8	82.0	73.2
2017	295	77.6	76.4	86.7	76.7
2018	247	76.0	72.3	79.4	77.6
2019	207	74.8	73.7	78.0	74.2
1998-2019	6368	74.5	73.3	82.7	73.9

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	147	12.5	0.53	5.5	0.43	8.3	0.47	10.5	0.50
1999	156	13.1	0.60	5.6	0.52	8.6	0.55	11.3	0.60
2000	157	13.1	0.59	5.6	0.49	8.4	0.53	11.0	0.57
2001	176	14.5	0.75	6.5	0.63	9.6	0.68	12.0	0.73
2002	273	13.9	0.64	6.2	0.58	9.2	0.60	11.7	0.62
2003	259	13.1	0.58	5.6	0.49	8.3	0.52	10.9	0.56
2004	261	13.2	0.68	5.6	0.56	8.2	0.59	10.6	0.64
2005	283	14.2	0.78	6.1	0.70	9.0	0.73	11.5	0.77
2006	248	12.3	0.62	5.1	0.53	7.6	0.55	9.8	0.59
2007	298	12.9	0.62	5.1	0.51	7.7	0.54	10.2	0.59
2008	327	14.1	0.66	5.6	0.53	8.4	0.57	11.0	0.62
2009	315	13.5	0.80	5.8	0.71	8.5	0.74	10.8	0.76
2010	331	14.1	0.74	5.4	0.60	8.1	0.63	10.8	0.70
2011	289	12.4	0.69	5.2	0.59	7.7	0.63	9.8	0.66
2012	249	10.6	0.63	4.0	0.50	6.2	0.56	8.1	0.60
2013	320	13.4	0.72	5.2	0.55	7.8	0.60	10.1	0.66
2014	273	11.3	0.68	4.4	0.54	6.6	0.59	8.6	0.64
2015	305	12.5	0.75	4.9	0.62	7.3	0.66	9.5	0.71
2016	318	13.0	0.77	5.5	0.71	8.0	0.73	10.0	0.75
2017	256	10.4	0.67	3.7	0.49	5.6	0.54	7.6	0.60
2018	159	6.4	0.49	2.6	0.38	3.8	0.41	4.9	0.45
2019	145	5.8	0.53	2.3	0.45	3.5	0.47	4.4	0.50
1998-2019	5545	12.1	0.66	4.9	0.55	7.4	0.59	9.5	0.63

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	2	0.1	0.1
20-24	2	0.1	0.1
25-29	7	0.2	0.3
30-34	8	0.2	0.5
35-39	20	0.6	1.1
40-44	52	1.5	2.5
45-49	112	3.1	5.7
50-54	158	4.4	10.1
55-59	235	6.6	16.6
60-64	315	8.8	25.4
65-69	437	12.2	37.6
70-74	609	17.0	54.6
75-79	614	17.1	71.7
80-84	514	14.3	86.1
85+	500	13.9	100.0
All ages	3585	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	2	0.1	0.10	8.0
20-24	2	0.1	0.12	5.1
25-29	7	0.3	0.22	7.5
30-34	8	0.4	0.17	5.0
35-39	20	1.0	0.24	5.5
40-44	52	2.3	0.30	6.5
45-49	112	4.6	0.41	7.1
50-54	158	6.8	0.38	6.5
55-59	235	11.8	0.46	6.7
60-64	315	17.9	0.59	6.8
65-69	437	25.9	0.66	6.7
70-74	609	37.9	0.91	7.4
75-79	614	44.6	0.82	6.8
80-84	514	52.8	0.89	6.1
85+	500	51.8	1.02	4.5
All ages	3585			6.3
Mortality				
Raw		11.5	0.68	
WS		4.6	0.56	
ES		6.8	0.59	
BRD-S		8.8	0.64	
PYLL-70				
per 100,000		55.6		
ES		46.5		
AYLL-70		10.8		

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	7	0.4	3	42.9			4	57.1
C07-C08 Salivary gland	2	0.1					2	100.0
C15 Oesophagus	2	0.1					2	100.0
C16 Stomach	59	3.5	15	25.4	8	13.6	36	61.0
C17 Small intestine	11	0.7	3	27.3	4	36.4	4	36.4
C18 Colon	178	10.6	80	44.9	32	18.0	66	37.1
C19-C20 Rectum	58	3.5	25	43.1	15	25.9	18	31.0
C21 Anus/canal	6	0.4	2	33.3	1	16.7	3	50.0
C22 Liver	8	0.5	1	12.5			7	87.5
C23-C24 Bile	18	1.1	8	44.4	2	11.1	8	44.4
C25 Pancreas	54	3.2	11	20.4	6	11.1	37	68.5
C26 GI cancer	4	0.2	2	50.0	1	25.0	1	25.0
C30-C31 Sinuses	2	0.1	2	100.0				
C33-C34 Lung	61	3.6	11	18.0	9	14.8	41	67.2
C38,C45 Mesothelioma	2	0.1	1	50.0			1	50.0
C40-C41 Bone	4	0.2	1	25.0			3	75.0
C43 Malign. melanoma	51	3.0	37	72.5	2	3.9	12	23.5
C44 Skin others	70	4.2	35	50.0	10	14.3	25	35.7
C46,C49 Soft tissue	7	0.4	2	28.6	1	14.3	4	57.1
C48 Peritoneal	58	3.5	36	62.1	10	17.2	12	20.7
C50 Breast	538	32.1	377	70.1	43	8.0	118	21.9
C51 Vulva	13	0.8	4	30.8	2	15.4	7	53.8
C52 Vagina	2	0.1	1	50.0			1	50.0
C53 Cervix uteri	62	3.7	44	71.0	12	19.4	6	9.7
C54 Corpus uteri	160	9.5	35	21.9	104	65.0	21	13.1
C55,C57 Fem. genitals un	15	0.9	5	33.3	3	20.0	7	46.7
C56 Ovary	27	1.6			2	7.4	25	92.6
C64 Kidney	28	1.7	15	53.6	2	7.1	11	39.3
C65 Renal pelvis	3	0.2	1	33.3			2	66.7
C66 Ureter	3	0.2	1	33.3			2	66.7
C67 Bladder	27	1.6	10	37.0	1	3.7	16	59.3
C69 Eye melanoma	3	0.2	3	100.0				
C70-C72 CNS cancer	12	0.7	1	8.3	2	16.7	9	75.0
C73 Thyroid	25	1.5	20	80.0	1	4.0	4	16.0
C74-C80 Cancer others	2	0.1	1	50.0			1	50.0
C76-C79 CUP	36	2.1	17	47.2	5	13.9	14	38.9
C82-C85 NHL	37	2.2	21	56.8	4	10.8	12	32.4
C90 Mult. myeloma	6	0.4	1	16.7	1	16.7	4	66.7
C91-C96 Leukaemia	10	0.6	2	20.0	1	10.0	7	70.0
Others, specified	7	0.4	3	42.9	2	28.6	2	28.6

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 ←%
All further malignancies	1678	100.0	837	49.9	286	17.0	555	33.1

Further malignancies with number of cases 1 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	2	0.1	0.10	8.7
20-24	2	0.1	0.13	5.4
25-29	4	0.2	0.14	4.7
30-34	7	0.3	0.15	5.0
35-39	16	0.8	0.21	4.8
40-44	48	2.1	0.32	6.8
45-49	87	3.6	0.40	6.4
50-54	127	5.5	0.38	6.1
55-59	195	9.8	0.48	6.6
60-64	253	14.4	0.61	6.7
65-69	347	20.6	0.65	6.7
70-74	487	30.3	0.93	7.7
75-79	498	36.2	0.88	7.2
80-84	408	41.9	0.90	6.2
85+	408	42.3	1.06	4.7
All ages	2889			6.4
Mortality				
Raw		9.3	0.69	
WS		3.7	0.56	
ES		5.5	0.60	
BRD-S		7.1	0.65	
PYLL-70				
per 100,000		45.3		
ES		37.9		
AYLL-70		10.9		

* 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	2	0.1	0.11	9.1
20-24	2	0.1	0.13	5.6
25-29	4	0.2	0.14	4.8
30-34	6	0.3	0.13	4.4
35-39	13	0.6	0.19	4.0
40-44	46	2.0	0.33	6.6
45-49	82	3.4	0.39	6.1
50-54	116	5.0	0.37	5.7
55-59	186	9.3	0.48	6.4
60-64	231	13.2	0.59	6.2
65-69	309	18.3	0.62	6.2
70-74	443	27.6	0.91	7.2
75-79	443	32.2	0.82	6.6
80-84	361	37.1	0.83	5.7
85+	353	36.6	0.93	4.2
All ages	2597			5.9
Mortality				
Raw		8.3	0.65	
WS		3.4	0.53	
ES		5.0	0.57	
BRD-S		6.4	0.61	
PYLL-70				
per 100,000		42.0		
ES		35.2		
AYLL-70		11.0		

* See corresponding tables with multiple malignancies.

ICD-10 C56: Malignant neoplasm of ovary (invasive)

Age distribution and age-specific mortality 2007 - 2019 (n=3585)

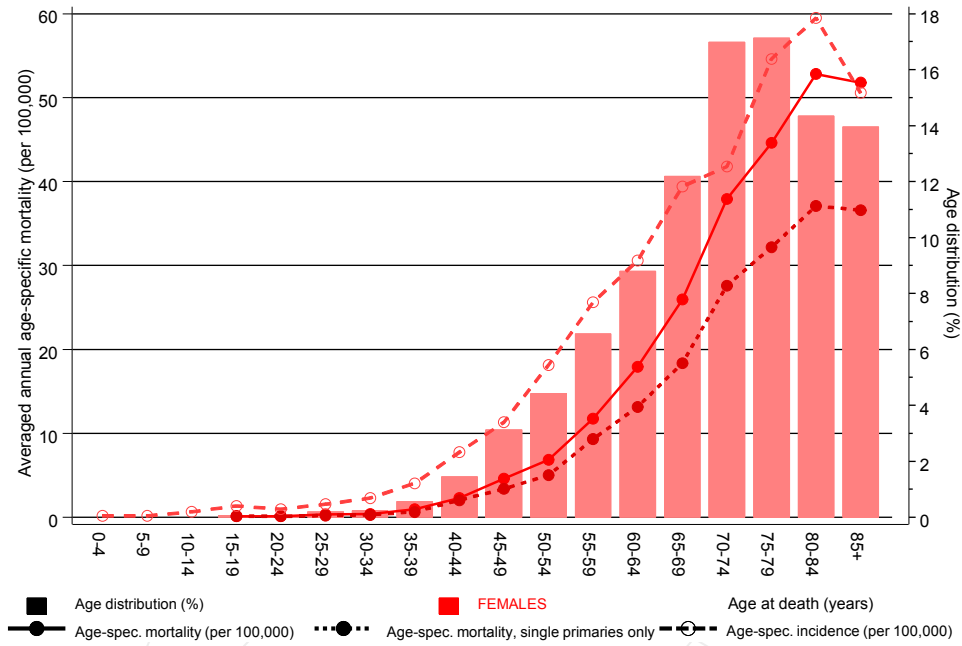


Figure 17. Distribution of age at death (bars; n=mean=68.3 yrs, median=69.9 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (Germany 1987 standard population) 2007 - 2019

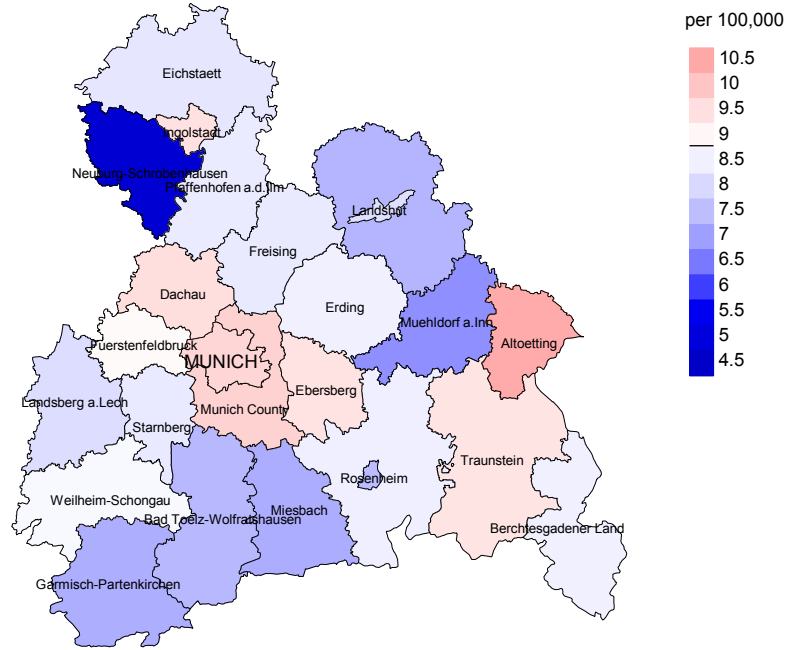


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (8.8/100,000 WS N=3,585).

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 106 women died from ovarian cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 9.4/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 7.2 and 12.1/100,000.

Standardized mortality ratio (SMR) 2007 - 2019

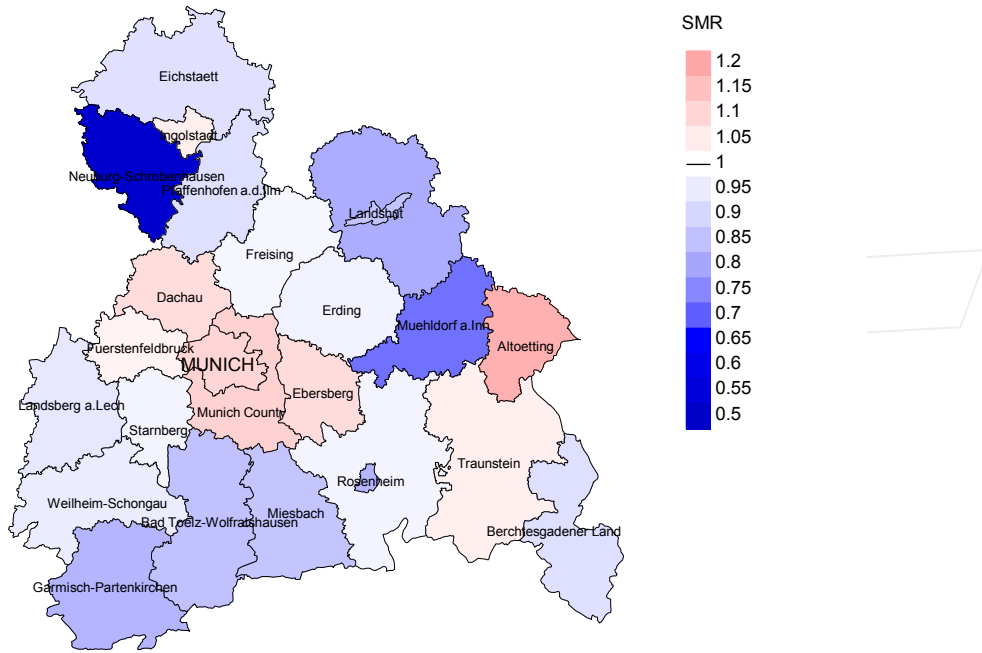


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=3,585).

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 106 women died from ovarian cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.09. Though, the value of this parameter may vary with an underlying probability of 99% between 0.84 and 1.39, 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 C56: Ovarian cancer - Incidence and Mortality [Internet]. 2021 [updated 2021 Jan 25; cited 2021 Mar 1]. Available from: https://www.tumorregister-muenchen.de/en/facts/base/bC56__E-ICD-10-C56-Ovarian-cancer-incidence-and-mortality.pdf

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