Munich Cancer Registry

ICD-10 C56: Ovarian cancer

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	8,693
Diseases	8,696
Creation date	12/21/2021
Database export	12/20/2021
Population (females)	2.50 m

BERLIN

GERMANY

BAVARIA

MUNICH

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

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
C56	Malignant neoplasm of ovary

`... if `**`not`**` existing any of ...`

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

Code	Description
C48.-	Retroperitoneum and peritoneum
C49.-	Connective, subcutaneous and other soft tissues
C57.0	Other and unspecified female genital organs: Fallopian tube

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	280	45	16.1	12.1	6.2	83.6	97.9
1999	260	31	11.9	13.1	6.1	81.2	98.5
2000	267	40	15.0	14.1	6.1	81.3	98.1
2001	234	42	17.9	14.2	5.9	79.5	97.0
2002	427	78	18.3	15.9	5.8	83.6	98.6 #
2003	442	77	17.4	15.3	5.7	79.9	98.0
2004	382	63	16.5	15.2	5.5	84.0	97.9
2005	362	49	13.5	15.3	5.3	82.6	96.7
2006	403	46	11.4	15.3	5.2	80.1	98.0
2007	483	73	15.1	15.6	5.0	78.3	94.4 #
2008	493	70	14.2	15.4	4.8	75.3	98.4
2009	393	47	12.0	15.4	4.7	72.5	98.5
2010	447	59	13.2	15.7	4.5	77.9	97.5
2011	422	53	12.6	16.0	4.1	74.6	98.8
2012	392	35	8.9	16.0	3.8	69.4	98.0
2013	448	53	11.8	16.0	3.6	68.1	98.9
2014	404	55	13.6	16.2	3.4	65.8	96.8
2015	406	47	11.6	16.3	3.3	67.5	97.8
2016	420	46	11.0	16.4	3.6	62.1	99.5
2017	381	35	9.2	16.6	3.2	52.2	98.7
2018	358	25	7.0	16.8	2.4	41.1	99.4
2019	286	4	1.4	16.9	1.6	31.8	99.7
2020	306	3	1.0	17.1	1.4	21.6	99.7 ##
1998-2020	8696	1076	12.4	17.1	6.2	69.9	98.1

8,696 cases diagnosed 1998-2020 are related to a total of 8,693 patients. Currently, in 2,172 (25.0 %) of these 8,693 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,756 / 361 / 55 (20.2 % / 4.2 % / 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 2018, a subgroup of 358 cases has been diagnosed, of which 16.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 2.4 % 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	280	23.8	12.9	17.7	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	427	21.8	10.8	15.3	18.7
2003	442	22.4	11.4	16.0	19.2
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	483	20.9	10.0	14.3	17.3
2008	493	21.2	10.6	14.8	17.9
2009	393	16.9	8.1	11.4	14.1
2010	447	19.1	9.1	12.9	15.6
2011	422	18.1	8.7	12.3	14.9
2012	392	16.6	8.0	11.0	13.4
2013	448	18.8	9.5	13.0	15.5
2014	404	16.8	8.2	11.3	13.5
2015	406	16.7	8.0	11.2	13.4
2016	420	17.1	7.8	11.0	13.5
2017	381	15.5	7.4	10.4	12.5
2018	358	14.4	7.3	10.0	11.7
2019	286	11.5	5.5	7.7	9.3
2020	306	12.3	6.5	8.8	10.2
1998-2020	8696	18.0	8.8	12.4	14.9

The computation of the incidence measures includes all cancers, irrespective of first or subsequent malignancy.
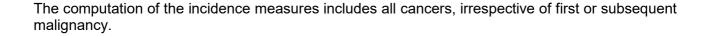
Table 3

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	280	64.8	16.2	14.6	92.1	43.5	55.2	66.6	77.0	85.1
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	427	67.3	14.3	13.2	96.6	47.9	59.0	68.2	78.3	83.4
2003	442	66.4	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	483	68.1	14.2	19.8	98.1	48.5	58.4	69.4	79.3	85.8
2008	493	66.8	15.1	11.1	102	46.5	57.9	68.4	78.4	84.9
2009	393	67.3	15.0	11.2	97.6	46.7	56.3	69.2	78.8	84.5
2010	447	68.0	14.6	17.0	98.5	48.9	58.2	69.1	78.4	86.7
2011	422	67.4	13.7	4.1	94.5	49.7	58.6	69.4	77.4	83.6
2012	392	67.7	15.4	5.4	95.9	47.8	59.2	70.0	79.2	85.3
2013	448	66.5	15.1	9.1	100	48.1	56.9	68.8	77.2	84.5
2014	404	66.7	15.8	13.3	96.8	45.4	56.8	69.9	78.1	85.1
2015	406	67.2	14.8	16.5	101	47.6	57.0	68.7	77.9	85.2
2016	420	68.0	14.6	4.9	97.3	49.8	58.6	70.1	78.8	84.6
2017	381	66.7	14.2	26.2	94.7	48.3	56.1	67.9	77.9	83.9
2018	358	65.6	14.9	19.6	96.2	44.9	55.0	66.2	77.4	83.3
2019	286	66.6	13.8	14.6	95.3	47.5	58.1	67.5	77.2	82.4
2020	306	64.7	14.2	17.3	96.3	48.2	55.4	65.6	75.6	81.6
1998−2020	8696	66.9	14.8	4.1	102	47.3	57.4	68.2	78.2	84.6

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%
0-4	2	0.0	0.0
5-9	2	0.0	0.1
10-14	9	0.2	0.2
15-19	22	0.4	0.6
20-24	19	0.3	1.0
25-29	36	0.6	1.6
30-34	54	1.0	2.6
35-39	92	1.6	4.2
40-44	187	3.3	7.5
45-49	294	5.2	12.7
50-54	451	8.0	20.7
55-59	557	9.9	30.6
60-64	577	10.2	40.8
65-69	708	12.6	53.4
70-74	709	12.6	66.0
75-79	796	14.1	80.1
80-84	613	10.9	90.9
85+	511	9.1	100.0
All ages	5639	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=605 %	Prop. all cancers n=155051 %
0- 4	2	0.1		1.2
5- 9	2	0.1		2.0
10-14	9	0.6		7.0
15-19	22	1.4		8.3
20-24	19	1.0		3.7
25-29	36	1.6	2.8	3.0
30-34	54	2.4	1.9	2.5
35-39	92	4.0		2.6
40-44	187	7.7	2.7	3.0
45-49	294	11.3	2.0	3.1
50-54	451	18.0	1.8	3.6
55-59	557	25.6	4.5	4.2
60-64	577	30.4	3.8	3.7
65-69	708	39.0	6.1	3.7
70-74	708	41.2	8.1	3.6
75-79	796	53.0	11.4	4.1
80-84	613	57.6	21.0	4.0
85+	511	49.0	42.5	3.1
All ages	5638		10.7	3.6

Incidence	
Raw	16.8
WS	8.1
ES	11.4
BRD-S	13.7

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 - 2020 (n=5638)

Figure 6. Age distribution (mean=67.0 yrs, median=68.7 yrs) and age-specific incidence.

ICD-10 C56: Malignant neoplasm of ovary (invasive)
Age-specific incidence rates: international comparison

Region	Period	Population
MCR	2007-2020	2.5 m
SEER	2007-2018	43.7 m
FRG (RKI estimates)	2007-2017	41.9 m

■ FEMALES   Age at diagnosis (years)

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	2	1.4	1.4	0.2	5.1		0.2	
C07-C08 Salivary gland	1	0.4	2.7	0.1	14.9		0.3	
C09-C10 Oropharynx	2	1.1	1.8	0.2	6.5		0.4	
C15 Oesophagus	4	1.6	2.5	0.7	6.4		1.0	25.0
C16 Stomach	27	7.5	3.6	2.4	5.2	#	8.0	7.4
C17 Small intestine	11	1.3	8.4	4.2	15.0	#	4.0	
C18 Colon	76	21.6	3.5	2.8	4.4	#	22.4	18.4
C19-C20 Rectum	17	9.2	1.8	1.1	3.0	#	3.2	5.9
C21 Anus/canal	1	1.4	0.7	0.0	4.1		-0.2	
C22 Liver	5	2.8	1.8	0.6	4.1		0.9	20.0
C23-C24 Bile	8	3.1	2.6	1.1	5.1	#	2.0	37.5
C25 Pancreas	22	10.3	2.1	1.3	3.2	#	4.8	40.9
C26 GI cancer	1	0.3	3.1	0.1	17.0		0.3	
C33-C34 Lung	44	18.5	2.4	1.7	3.2	#	10.5	18.2
C38,C45 Mesothelioma	1	0.4	2.4	0.1	13.1		0.2	
C43 Malign. melanoma	9	9.5	0.9	0.4	1.8		-0.2	
C46,C49 Soft tissue	3	1.3	2.2	0.5	6.5		0.7	
C48 Peritoneal	14	1.0	13.9	7.6	23.3	#	5.3	
C50 Breast	191	77.2	2.5	2.1	2.9	#	46.9	5.2
C51 Vulva	9	2.4	3.8	1.7	7.2	#	2.7	11.1
C53 Cervix uteri	17	3.4	5.0	2.9	7.9	#	5.6	17.6
C54 Corpus uteri	229	13.6	16.8	14.7	19.1	#	88.7	3.9
C55,C57 Fem. genitals un	3	0.4	7.0	1.4	20.5	#	1.1	66.7
C56 Ovary	7	9.7	0.7	0.3	1.5		-1.1	
C64 Kidney	13	5.5	2.4	1.3	4.1	#	3.1	
C65 Renal pelvis	2	0.7	2.8	0.3	10.3		0.5	
C66 Ureter	2	0.4	5.4	0.7	19.5		0.7	50.0
C67 Bladder	11	4.2	2.6	1.3	4.6	#	2.8	9.1
C70-C72 CNS cancer	5	3.1	1.6	0.5	3.7		0.8	20.0
C73 Thyroid	11	4.4	2.5	1.2	4.5	#	2.7	9.1
C76-C79 CUP	11	3.9	2.8	1.4	5.0	#	2.9	27.3
C82-C85 NHL	21	9.0	2.3	1.4	3.6	#	4.9	4.8
C90 Mult. myeloma	7	2.8	2.5	1.0	5.2	#	1.7	14.3
C91-C96 Leukaemia	6	3.3	1.8	0.7	4.0		1.1	16.7
Not observed	0	4.0	0.0	0.0	0.9	#	-1.6	
All further malignancies	793	240.8	3.3	3.1	3.5	#	227.3	9.3

Patients	7962
Median age at next malignancy (years)	67.6
Person-years	24291
Mean observation time (years)	3.1
Median observation time (years)	1.7

\# The occurrence of further specified malignancy is statistically significant.

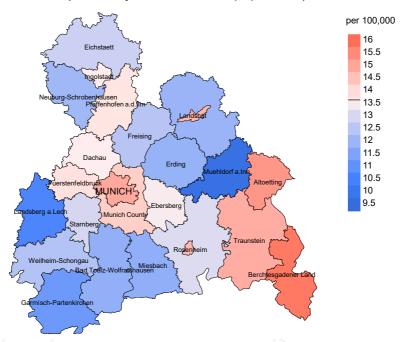Average incidence (Germany 1987 standard population) 2007 - 2020

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 (13.7/100,000 WS N=5,638).

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 157 women were identified with newly diagnosed ovarian cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 13.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 10.9 and 16.7/100,000.
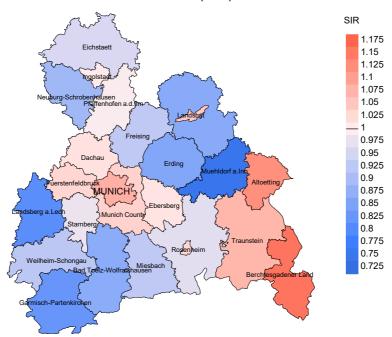
Standardized incidence ratio (SIR) 2007 - 2020

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=5,638).

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 157 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 1.01. Though, the value of this parameter may vary with an underlying probability of 99% between 0.82 and 1.24, 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	280	97.9	16.1	234	83.6	87.2
1999	260	98.5	11.9	211	81.2	92.9
2000	267	98.1	15.0	217	81.3	93.5
2001	234	97.0	17.9	186	79.5	97.3
2002	427	98.6	18.3	357	83.6	96.9
2003	442	98.0	17.4	353	79.9	96.9
2004	382	97.9	16.5	321	84.0	97.2
2005	362	96.7	13.5	299	82.6	98.3
2006	403	98.0	11.4	323	80.1	97.8
2007	483	94.4	15.1	378	78.3	97.1
2008	493	98.4	14.2	371	75.3	95.7
2009	393	98.5	12.0	285	72.5	97.5
2010	447	97.5	13.2	348	77.9	94.5
2011	422	98.8	12.6	315	74.6	95.6
2012	392	98.0	8.9	272	69.4	97.1
2013	448	98.9	11.8	305	68.1	93.8
2014	404	96.8	13.6	266	65.8	94.0
2015	406	97.8	11.6	274	67.5	90.9
2016	420	99.5	11.0	261	62.1	83.5
2017	381	98.7	9.2	199	52.2	82.4
2018	358	99.4	7.0	147	41.1	73.5
2019	286	99.7	1.4	91	31.8	84.6
2020	306	99.7	1.0	66	21.6	97.0
1998-2020	8696	98.1	12.4	6079	69.9	93.8

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	280	186	87.6	69	24.6
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	427	313	96.5	134	31.4
2003	442	292	99.0	116	26.2
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	483	328	99.1	119	24.6
2008	493	351	100.0	119	24.1
2009	393	355	99.4	92	23.4
2010	447	350	98.3	117	26.2
2011	422	329	97.0	104	24.6
2012	392	286	96.5	81	20.7
2013	448	363	98.3	100	22.3
2014	404	302	98.3	99	24.5
2015	406	353	97.7	98	24.1
2016	420	359	98.9	100	23.8
2017	381	293	97.6	81	21.3
2018	358	278	66.9	68	19.0
2019	286	249	49.0	36	12.6
2020	306	278	88.1	44	14.4
1998−2020	8696	6710	93.7	2049	23.6

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	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	328	90.5	9.5	93.8
2008	351	93.2	6.8	95.2
2009	355	88.5	11.5	93.5
2010	350	94.3	5.7	96.2
2011	329	87.8	12.2	92.8
2012	286	86.7	13.3	93.5
2013	363	87.9	12.1	91.3
2014	302	90.1	9.9	93.3
2015	353	86.1	13.9	89.6
2016	359	88.6	11.4	91.5
2017	293	86.7	13.3	90.2
2018	278	75.9	24.1	81.7
2019	249	70.3	29.7	88.5
2020	278	66.9	33.1	84.9
1998-2020	6710	86.5	13.5	92.5

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	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	328	75.8	74.3	83.9	75.1
2008	351	74.6	74.0	87.8	74.2
2009	355	72.8	71.9	81.1	72.1
2010	350	75.0	74.6	86.1	74.9
2011	329	73.0	71.9	83.0	72.5
2012	286	76.1	74.4	86.8	74.9
2013	363	74.8	74.0	87.3	74.2
2014	302	74.2	73.7	84.4	73.7
2015	353	75.1	73.9	84.8	74.3
2016	359	73.8	72.8	82.0	73.2
2017	293	77.6	76.5	86.7	76.7
2018	278	76.5	74.7	81.6	76.6
2019	249	74.9	73.6	77.9	73.5
2020	278	77.3	75.8	79.1	76.2
1998-2020	6710	74.6	73.5	82.5	74.0

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	0.42	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	0.59	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	297	12.9	0.61	5.1	0.51	7.7	0.54	10.1	0.59
2008	327	14.1	0.66	5.6	0.53	8.4	0.57	11.0	0.62
2009	314	13.5	0.80	5.8	0.72	8.5	0.74	10.7	0.76
2010	330	14.1	0.74	5.4	0.60	8.1	0.63	10.8	0.69
2011	289	12.4	0.68	5.2	0.59	7.7	0.63	9.8	0.66
2012	248	10.5	0.63	4.0	0.50	6.1	0.56	8.0	0.60
2013	319	13.4	0.71	5.2	0.55	7.7	0.60	10.1	0.65
2014	272	11.3	0.67	4.4	0.54	6.6	0.58	8.5	0.63
2015	304	12.5	0.75	4.9	0.62	7.3	0.65	9.5	0.70
2016	318	13.0	0.76	5.5	0.71	8.0	0.73	10.0	0.74
2017	254	10.3	0.67	3.6	0.49	5.6	0.54	7.5	0.60
2018	211	8.5	0.59	3.3	0.45	4.9	0.49	6.4	0.54
2019	175	7.0	0.61	2.9	0.52	4.2	0.55	5.3	0.57
2020	186	7.5	0.61	2.9	0.45	4.3	0.48	5.5	0.54
1998-2020	5804	12.0	0.67	4.9	0.55	7.3	0.59	9.4	0.63

Table 12

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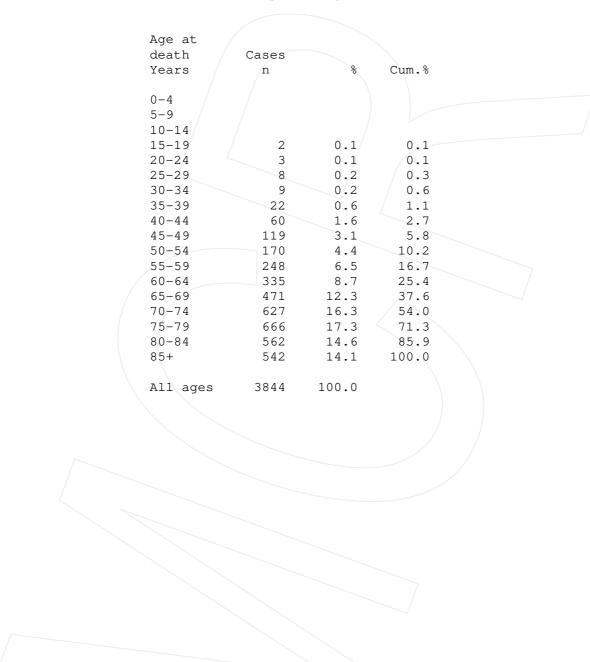(**incl. multiple malignancies**)

Age at death Years	Cases n	%	Cum.%
0-4			
5-9			
10-14			
15-19	2	0.1	0.1
20-24	3	0.1	0.1
25-29	8	0.2	0.3
30-34	9	0.2	0.6
35-39	22	0.6	1.1
40-44	60	1.6	2.7
45-49	119	3.1	5.8
50-54	170	4.4	10.2
55-59	248	6.5	16.7
60-64	335	8.7	25.4
65-69	471	12.3	37.6
70-74	627	16.3	54.0
75-79	666	17.3	71.3
80-84	562	14.6	85.9
85+	542	14.1	100.0
All ages	3844	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		0.0		
10-14		0.0		
15-19	2	0.1	0.09	8.0
20-24	3	0.2	0.16	7.0
25-29	8	0.4	0.22	8.1
30-34	9	0.4	0.17	5.0
35-39	22	1.0	0.24	5.4
40-44	60	2.5	0.32	7.0
45-49	119	4.6	0.40	7.1
50-54	170	6.8	0.38	6.4
55-59	248	11.4	0.45	6.5
60-64	335	17.6	0.58	6.7
65-69	471	26.0	0.67	6.8
70-74	627	36.5	0.89	7.2
75-79	666	44.4	0.84	6.8
80-84	562	52.8	0.92	6.0
85+	542	52.0	1.06	4.5
All ages	3844			6.2
Mortality				
Raw		11.4	0.68	
WS		4.5	0.56	
ES		6.7	0.59	
BRD-S		8.7	0.64	
PYLL-70				
per 100,000		55.7		
ES		46.6		
AYLL-70		10.9		

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 ←%
C00	Lip	2	0.1	2	100.0				
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	60	3.5	16	26.7	8	13.3	36	60.0
C17	Small intestine	12	0.7	3	25.0	4	33.3	5	41.7
C18	Colon	178	10.2	81	45.5	32	18.0	65	36.5
C19-C20	Rectum	62	3.6	27	43.5	16	25.8	19	30.6
C21	Anus/canal	7	0.4	3	42.9	1	14.3	3	42.9
C22	Liver	9	0.5	1	11.1			8	88.9
C23-C24	Bile	19	1.1	8	42.1	3	15.8	8	42.1
C25	Pancreas	55	3.2	11	20.0	6	10.9	38	69.1
C26	GI cancer	5	0.3	2	40.0	1	20.0	2	40.0
C30-C31	Sinuses	2	0.1	2	100.0				
C33-C34	Lung	63	3.6	11	17.5	10	15.9	42	66.7
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	2.9	37	72.5	2	3.9	12	23.5
C44	Skin others	75	4.3	39	52.0	10	13.3	26	34.7
C46,C49	Soft tissue	7	0.4	2	28.6	1	14.3	4	57.1
C48	Peritoneal	54	3.1	31	57.4	10	18.5	13	24.1
C50	Breast	555	32.0	391	70.5	44	7.9	120	21.6
C51	Vulva	15	0.9	5	33.3	2	13.3	8	53.3
C52	Vagina	2	0.1	1	50.0			1	50.0
C53	Cervix uteri	64	3.7	45	70.3	12	18.8	7	10.9
C54	Corpus uteri	165	9.5	34	20.6	110	66.7	21	12.7
C55,C57	Fem. genitals un	15	0.9	5	33.3	3	20.0	7	46.7
C56	Ovary	30	1.7			2	6.7	28	93.3
C64	Kidney	30	1.7	15	50.0	3	10.0	12	40.0
C65	Renal pelvis	3	0.2	1	33.3			2	66.7
C66	Ureter	4	0.2	1	25.0			3	75.0
C67	Bladder	29	1.7	10	34.5	1	3.4	18	62.1
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	1.4	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	38	2.2	18	47.4	5	13.2	15	39.5
C81	Hodgkin lymphoma	2	0.1	1	50.0	1	50.0		
C82-C85	NHL	43	2.5	24	55.8	7	16.3	12	27.9
C90	Mult. myeloma	6	0.3	1	16.7	1	16.7	4	66.7
C91-C96	Leukaemia	10	0.6	2	20.0	1	10.0	7	70.0

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 ←%
Others, specified	6	0.3	3	50.0	1	16.7	2	33.3
All further malignancies	1737	100.0	863	49.7	300	17.3	574	33.0

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 2007-2020
(**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	0.09	8.7
20-24	3	0.2	0.18	7.3
25-29	5	0.2	0.15	5.5
30-34	8	0.4	0.16	5.0
35-39	18	0.8	0.22	4.9
40-44	55	2.3	0.35	7.3
45-49	94	3.6	0.40	6.5
50-54	137	5.5	0.39	6.1
55-59	207	9.5	0.47	6.5
60-64	270	14.2	0.60	6.6
65-69	375	20.7	0.66	6.8
70-74	502	29.2	0.92	7.4
75-79	541	36.0	0.91	7.2
80-84	440	41.3	0.92	6.1
85+	447	42.9	1.11	4.7
All ages	3104			6.3
Mortality				
Raw		9.2	0.70	
WS		3.7	0.56	
ES		5.5	0.61	
BRD-S		7.0	0.65	
PYLL-70				
per 100,000		45.7		
ES		38.3		
AYLL-70		11.0		

* 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		0.0		
10–14		0.0		
15–19	2	0.1	0.10	9.1
20–24	3	0.2	0.18	7.5
25–29	5	0.2	0.15	5.7
30–34	7	0.3	0.14	4.5
35–39	15	0.7	0.19	4.1
40–44	52	2.1	0.35	7.0
45–49	88	3.4	0.39	6.2
50–54	126	5.0	0.38	5.7
55–59	198	9.1	0.46	6.3
60–64	249	13.1	0.60	6.2
65–69	335	18.5	0.63	6.2
70–74	457	26.6	0.91	7.0
75–79	485	32.3	0.85	6.7
80–84	391	36.7	0.85	5.6
85+	388	37.2	0.98	4.3
All ages	2801			5.9
Mortality				
Raw		8.3	0.66	
WS		3.3	0.54	
ES		5.0	0.58	
BRD–S		6.4	0.62	
PYLL–70				
per 100,000		42.5		
ES		35.6		
AYLL–70		11.1		

* See corresponding tables with multiple malignancies.

ICD-10 C56: Malignant neoplasm of ovary (invasive)
Age distribution and age-specific mortality 2007 - 2020 (n=3844)
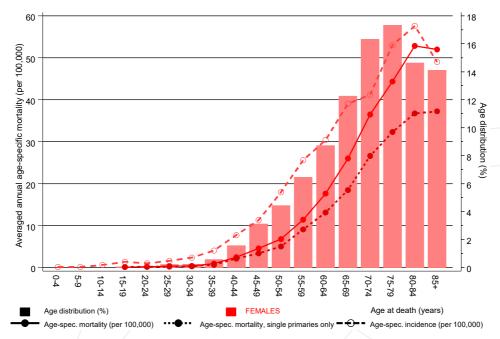
Figure 17. Distribution of age at death (bars; n=mean=68.3 yrs, median=69.9 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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 - 2020
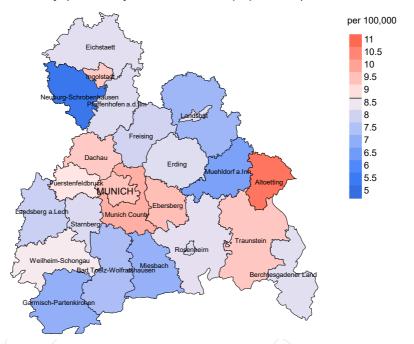
Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (8.7/100,000 WS N=3,844).

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 117 women died from ovarian cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 9.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 7.4 and 12.1/100,000.

Standardized mortality ratio (SMR) 2007 - 2020
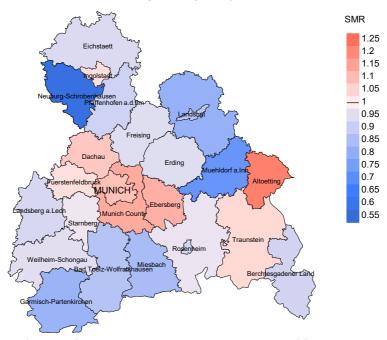
Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=3,844).

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 117 women died from ovarian cancer. 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 0.87 and 1.42, 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

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