Munich Cancer Registry

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ICD-10 C52: Vaginal cancer

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	396
Diseases	396
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/bC52__E-ICD-10-C52-Vaginal-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
C52	Malignant neoplasm of vagina

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	12			25.0	10.4	83.3	91.7	
1999	8	2	25.0	25.0	9.4	100.0	100.0	
2000	10			16.7	9.3	30.0	90.0	
2001	12	1	8.3	16.7	9.3	83.3	100.0	
2002	10	1	10.0	21.2	9.0	90.0	100.0	#
2003	19	1	5.3	18.3	8.7	84.2	100.0	
2004	19	4	21.1	17.8	8.3	84.2	100.0	
2005	14	1	7.1	17.3	8.8	85.7	100.0	
2006	17	1	5.9	17.4	8.5	82.4	88.2	
2007	28			19.5	8.6	67.9	100.0	#
2008	13	2	15.4	19.1	8.3	76.9	100.0	
2009	21	3	14.3	21.3	8.8	81.0	100.0	
2010	25	2	8.0	21.2	9.2	72.0	100.0	
2011	25	1	4.0	21.0	8.2	80.0	100.0	
2012	17	1	5.9	22.0	7.5	64.7	100.0	
2013	20	1	5.0	21.9	7.7	65.0	95.0	
2014	18	1	5.6	22.9	8.1	83.3	100.0	
2015	16	1	6.3	22.0	6.7	56.3	93.8	
2016	17			23.1	7.9	64.7	100.0	
2017	20			23.5	6.9	50.0	100.0	
2018	15			23.3	9.3	53.3	100.0	
2019	23			23.5	10.3	47.8	100.0	
2020	17			24.2	11.8	17.6	100.0	##
1998-2020	396	23	5.8	24.2	10.4	68.9	98.5	

396 cases diagnosed 1998-2020 are related to a total of 396 patients. Currently, in 131 (33.1 %) of these 396 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 89 / 24 / 18 (22.5 % / 6.1 % / 4.5 %) 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 15 cases has been diagnosed, of which 23.3 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 9.3 % 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	12	1.0	0.5	0.7	0.9
1999	8	0.7	0.3	0.4	0.6
2000	10	0.8	0.5	0.7	0.8
2001	12	1.0	0.5	0.7	0.9
2002	10	0.5	0.2	0.3	0.4
2003	19	1.0	0.4	0.5	0.8
2004	19	1.0	0.6	0.7	0.8
2005	14	0.7	0.3	0.4	0.6
2006	17	0.8	0.3	0.5	0.6
2007	28	1.2	0.5	0.7	1.0
2008	13	0.6	0.2	0.3	0.4
2009	21	0.9	0.4	0.5	0.7
2010	25	1.1	0.5	0.7	0.8
2011	25	1.1	0.4	0.6	0.8
2012	17	0.7	0.3	0.5	0.6
2013	20	0.8	0.5	0.6	0.7
2014	18	0.7	0.3	0.4	0.6
2015	16	0.7	0.3	0.4	0.5
2016	17	0.7	0.3	0.4	0.5
2017	20	0.8	0.4	0.5	0.6
2018	15	0.6	0.2	0.3	0.4
2019	23	0.9	0.3	0.4	0.7
2020	17	0.7	0.3	0.4	0.5
1998–2020	396	0.8	0.3	0.5	0.6

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	12	69.1	16.0	32.6	89.4	54.0	58.1	74.2	80.8	82.7
1999	8	72.7	15.2	42.4	89.2	42.4	65.5	77.2	82.2	89.2
2000	10	56.2	14.4	37.5	75.7	40.3	45.7	51.7	72.1	75.4
2001	12	70.2	20.9	14.7	93.2	55.1	61.7	75.6	83.7	84.9
2002	10	73.0	15.1	46.1	96.1	49.5	64.1	75.8	82.5	90.0
2003	19	73.9	10.7	54.0	85.8	57.1	62.0	79.4	82.6	84.7
2004	19	65.0	22.4	2.9	92.5	25.2	57.9	67.0	82.0	91.1
2005	14	71.3	22.7	17.6	89.4	25.4	73.2	75.6	85.1	88.7
2006	17	75.9	15.1	49.9	96.0	50.2	66.4	80.6	86.9	95.1
2007	28	72.4	14.7	26.6	92.7	52.6	65.8	76.9	82.4	88.1
2008	13	76.6	12.5	47.8	91.3	64.5	68.1	80.4	85.5	88.8
2009	21	71.7	15.1	33.3	95.5	58.6	60.7	72.1	82.0	87.9
2010	25	69.8	14.1	46.7	95.3	49.5	58.7	70.4	79.9	87.7
2011	25	72.3	13.3	42.2	90.3	49.5	67.4	74.7	82.0	88.0
2012	17	69.9	13.1	29.9	91.2	59.4	68.8	71.6	73.9	84.3
2013	20	65.5	20.8	0.7	90.3	39.7	59.8	72.4	79.3	83.5
2014	18	71.2	14.4	43.1	92.5	46.2	57.8	74.3	80.4	87.6
2015	16	70.9	15.2	45.6	91.8	48.1	57.9	73.2	81.6	89.2
2016	17	74.7	12.2	53.1	94.3	57.2	66.1	72.6	86.3	89.6
2017	20	69.1	9.2	51.0	85.1	56.6	63.1	69.0	76.0	81.1
2018	15	79.6	14.1	48.7	99.9	60.2	71.9	81.7	89.7	95.8
2019	23	75.3	10.1	48.9	88.1	64.7	72.5	79.6	81.4	84.0
2020	17	69.2	17.0	42.8	96.3	42.8	58.9	71.7	81.9	93.7
1998–2020	396	71.3	15.4	0.7	99.9	49.9	63.1	73.9	82.3	88.0

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%
0-4	1	0.4	0.4
5-9	0	0.0	0.4
10-14	0	0.0	0.4
15-19	0	0.0	0.4
20-24	0	0.0	0.4
25-29	2	0.7	1.1
30-34	2	0.7	1.8
35-39	0	0.0	1.8
40-44	6	2.2	4.0
45-49	14	5.1	9.1
50-54	13	4.7	13.8
55-59	15	5.5	19.3
60-64	19	6.9	26.2
65-69	34	12.4	38.5
70-74	43	15.6	54.2
75-79	32	11.6	65.8
80-84	54	19.6	85.5
85+	40	14.5	100.0
All ages	275	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=12 %	Prop. all cancers n=155051 %
0- 4	1	0.1		0.6
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	2	0.1		0.2
30-34	2	0.1		0.1
35-39		0.0		
40-44	6	0.2		0.1
45-49	14	0.5		0.1
50-54	13	0.5		0.1
55-59	15	0.7		0.1
60-64	19	1.0		0.1
65-69	34	1.9	2.9	0.2
70-74	43	2.5	4.7	0.2
75-79	32	2.1		0.2
80-84	54	5.1	1.9	0.4
85+	40	3.8	20.0	0.2
All ages	275		4.4	0.2
Incidence				
Raw		0.8		
WS		0.3		
ES		0.5		
BRD-S		0.6		

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).

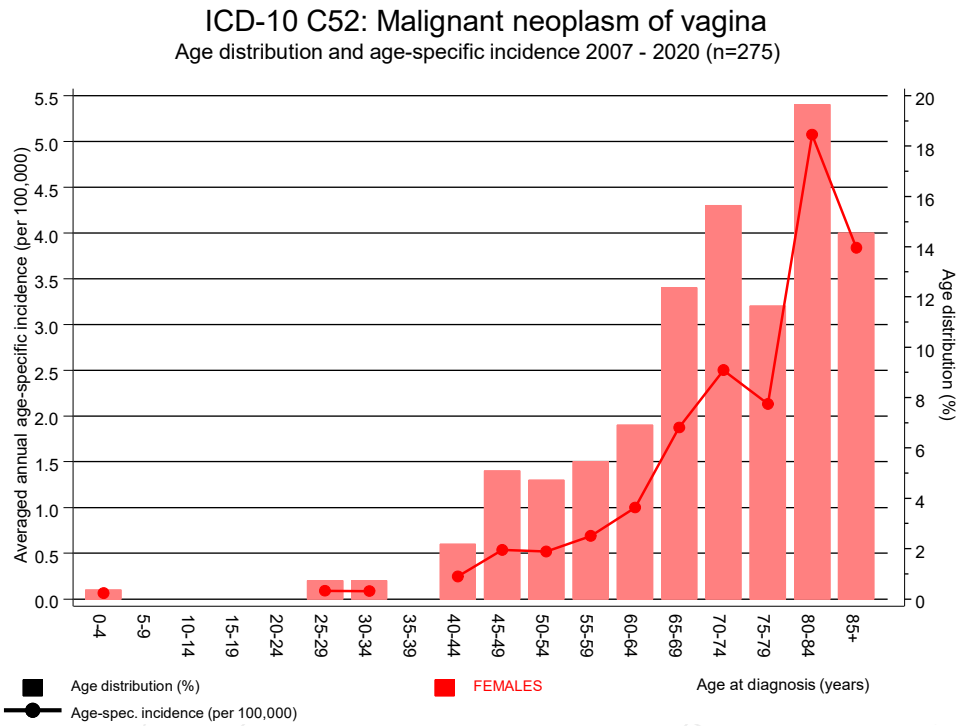

Figure 6. Age distribution (mean=71.8 yrs, median=73.7 yrs) and age-specific incidence.

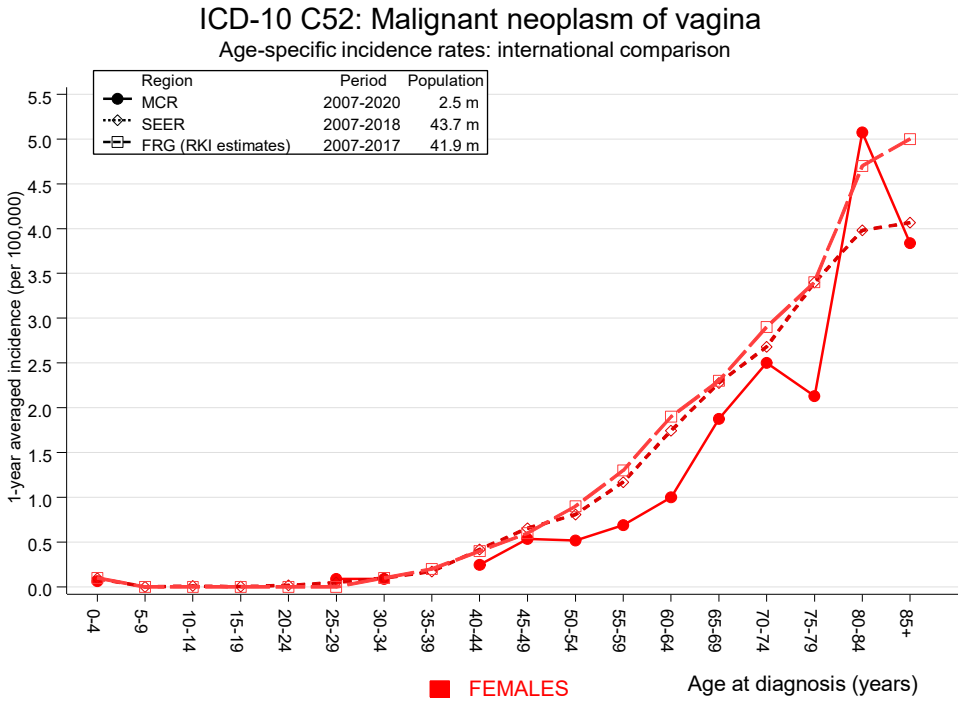

Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, RKI estimates) and SEER (Surveillance, Epidemiology, and End Results, USA).

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 %
C17	Small intestine	1	0.1	15.8	0.4	88.1		8.7	
C18	Colon	6	1.4	4.4	1.6	9.6	#	43.0	16.7
C19–C20	Rectum	3	0.5	5.7	1.2	16.6	#	22.9	66.7
C21	Anus/canal	2	0.1	29.7	3.6	107.2	#	17.9	
C22	Liver	1	0.2	6.0	0.2	33.6		7.7	
C23–C24	Bile	1	0.2	5.0	0.1	28.1		7.4	
C33–C34	Lung	5	0.9	5.5	1.8	12.8	#	37.8	40.0
C43	Malign. melanoma	2	0.5	4.3	0.5	15.7		14.2	50.0
C44	Skin others	1	0.0	776.9	19.7	4329	#	9.2	
C50	Breast	4	3.6	1.1	0.3	2.8		3.7	
C51	Vulva	1	0.1	6.7	0.2	37.5		7.9	
C53	Cervix uteri	2	0.2	13.0	1.6	47.0	#	17.1	
C54	Corpus uteri	8	0.6	12.3	5.3	24.3	#	68.0	37.5
C55,C57	Fem. genitals un	2	0.0	58.2	7.1	210.3	#	18.2	50.0
C56	Ovary	3	0.5	6.0	1.2	17.6	#	23.1	66.7
C64	Kidney	1	0.3	3.4	0.1	18.9		6.5	
C67	Bladder	1	0.3	3.5	0.1	19.5		6.6	
C82–C85	NHL	1	0.5	2.0	0.1	11.0		4.6	
Not observed		0	2.8	0.0	0.0	1.3		-25.7	
All further malignancies		45	12.7	3.5	2.6	4.7	#	298.8	26.7

Patients	378
Median age at next malignancy (years)	77.2
Person-years	1081
Mean observation time (years)	2.9
Median observation time (years)	1.3

The occurrence of further specified malignancy is statistically significant.

Average incidence (Germany 1987 standard population) 2007 - 2020

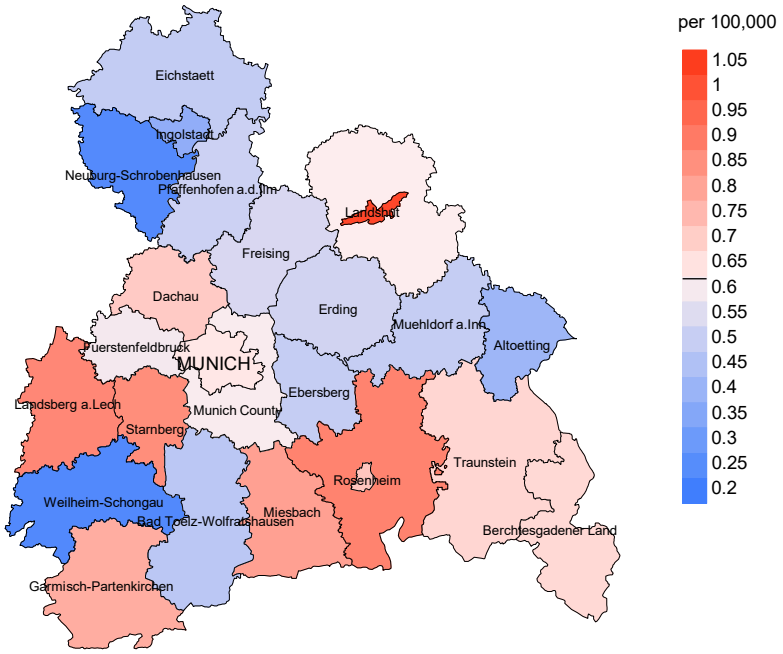

Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (0.6/100,000 WS N=275).

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 6 women were identified with newly diagnosed vaginal cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.4/100,000.

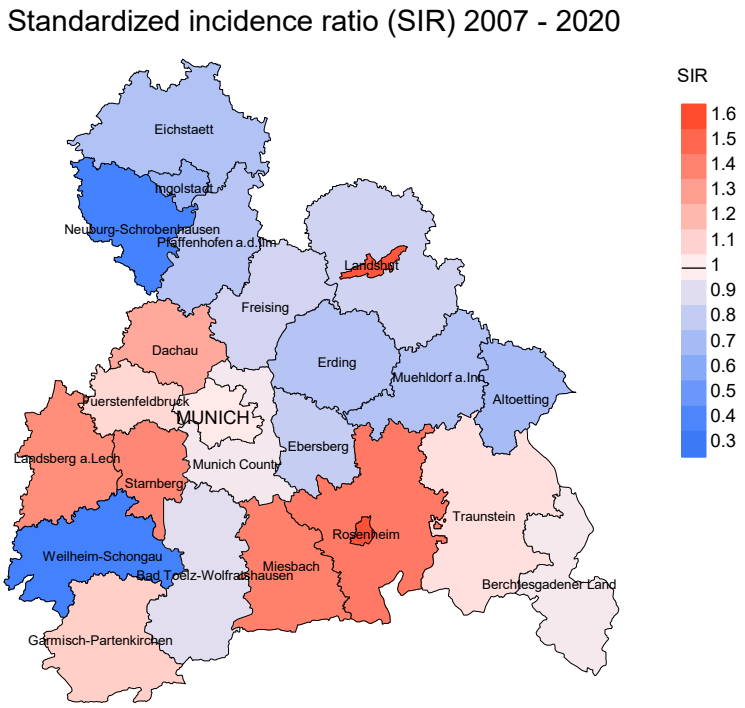

Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=275).

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 6 women were identified with newly diagnosed vaginal cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.80. Though, the value of this parameter may vary with an underlying probability of 99% between 0.21 and 2.10, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.94 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	12	91.7		10	83.3	100.0
1999	8	100.0	25.0	8	100.0	87.5
2000	10	90.0		3	30.0	66.7
2001	12	100.0	8.3	10	83.3	90.0
2002	10	100.0	10.0	9	90.0	88.9
2003	19	100.0	5.3	16	84.2	93.8
2004	19	100.0	21.1	16	84.2	100.0
2005	14	100.0	7.1	12	85.7	100.0
2006	17	88.2	5.9	14	82.4	100.0
2007	28	100.0		19	67.9	94.7
2008	13	100.0	15.4	10	76.9	90.0
2009	21	100.0	14.3	17	81.0	100.0
2010	25	100.0	8.0	18	72.0	94.4
2011	25	100.0	4.0	20	80.0	95.0
2012	17	100.0	5.9	11	64.7	90.9
2013	20	95.0	5.0	13	65.0	84.6
2014	18	100.0	5.6	15	83.3	93.3
2015	16	93.8	6.3	9	56.3	88.9
2016	17	100.0		11	64.7	100.0
2017	20	100.0		10	50.0	60.0
2018	15	100.0		8	53.3	50.0
2019	23	100.0		11	47.8	81.8
2020	17	100.0		3	17.6	100.0
1998-2020	396	98.5	5.8	273	68.9	91.2

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	12	9	100.0	2	16.7
1999	8	11	90.9	2	25.0
2000	10	9	88.9		
2001	12	10	90.0	6	50.0
2002	10	12	83.3	2	20.0
2003	19	6	100.0	3	15.8
2004	19	21	95.2	6	31.6
2005	14	13	100.0	4	28.6
2006	17	12	100.0	5	29.4
2007	28	21	100.0	4	14.3
2008	13	12	100.0	2	15.4
2009	21	9	100.0	4	19.0
2010	25	12	100.0	5	20.0
2011	25	11	100.0	2	8.0
2012	17	22	100.0	3	17.6
2013	20	20	100.0	2	10.0
2014	18	21	95.2	5	27.8
2015	16	20	100.0	5	31.3
2016	17	14	100.0	5	29.4
2017	20	13	92.3	4	20.0
2018	15	13	53.8	2	13.3
2019	23	15	33.3	2	8.7
2020	17	17	88.2	2	11.8
1998-2020	396	323	92.0	77	19.4

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	9	66.7	33.3	77.8
1999	11	72.7	27.3	80.0
2000	9	100.0		100.0
2001	10	70.0	30.0	88.9
2002	12	50.0	50.0	60.0
2003	6	66.7	33.3	83.3
2004	21	85.7	14.3	90.0
2005	13	92.3	7.7	92.3
2006	12	66.7	33.3	75.0
2007	21	71.4	28.6	81.0
2008	12	66.7	33.3	83.3
2009	9	33.3	66.7	44.4
2010	12	83.3	16.7	83.3
2011	11	90.9	9.1	90.9
2012	22	77.3	22.7	86.4
2013	20	85.0	15.0	95.0
2014	21	71.4	28.6	70.0
2015	20	75.0	25.0	80.0
2016	14	85.7	14.3	85.7
2017	13	76.9	23.1	91.7
2018	13	76.9	23.1	100.0
2019	15	53.3	46.7	80.0
2020	17	52.9	47.1	60.0
1998-2020	323	73.4	26.6	81.8

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	9	62.0	59.8	83.0	61.2
1999	11	82.2	82.1	85.0	82.1
2000	9	72.7	72.7		72.6
2001	10	72.3	71.8	81.6	77.3
2002	12	82.3	76.5	85.5	80.8
2003	6	82.9	79.1	88.8	82.4
2004	21	81.0	81.5	77.1	81.5
2005	13	79.2	77.0	89.0	77.0
2006	12	83.9	83.1	88.3	83.7
2007	21	79.6	79.3	84.5	79.3
2008	12	82.1	79.7	82.1	82.1
2009	9	79.5	83.8	75.0	84.3
2010	12	82.7	82.3	91.8	82.3
2011	11	77.4	78.5	74.1	78.5
2012	22	77.3	74.6	86.4	74.6
2013	20	77.0	76.8	90.3	76.8
2014	21	79.9	78.1	87.6	77.4
2015	20	80.9	80.6	81.2	82.6
2016	14	78.9	74.3	87.4	74.3
2017	13	80.6	81.0	76.3	81.4
2018	13	78.8	78.1	84.6	80.0
2019	15	79.0	78.0	82.2	84.5
2020	17	81.4	80.7	89.0	80.7
1998–2020	323	80.0	78.5	84.9	79.7

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	6	0.5	0.50	0.3	0.55	0.4	0.53	0.4	0.43
1999	8	0.7	1.00	0.2	0.95	0.4	0.92	0.6	1.00
2000	9	0.7	0.90	0.3	0.58	0.5	0.65	0.6	0.76
2001	7	0.6	0.58	0.3	0.53	0.4	0.60	0.5	0.53
2002	6	0.3	0.60	0.1	0.60	0.2	0.61	0.3	0.62
2003	4	0.2	0.21	0.1	0.16	0.1	0.17	0.2	0.20
2004	18	0.9	0.95	0.4	0.58	0.5	0.74	0.7	0.84
2005	12	0.6	0.86	0.2	0.66	0.3	0.76	0.4	0.77
2006	8	0.4	0.47	0.1	0.39	0.2	0.40	0.3	0.48
2007	15	0.6	0.54	0.3	0.60	0.4	0.55	0.5	0.51
2008	8	0.3	0.62	0.1	0.65	0.2	0.70	0.3	0.68
2009	3	0.1	0.14	0.0	0.06	0.0	0.08	0.1	0.12
2010	10	0.4	0.40	0.1	0.23	0.2	0.27	0.3	0.34
2011	10	0.4	0.40	0.1	0.29	0.2	0.33	0.3	0.37
2012	17	0.7	1.00	0.3	0.76	0.4	0.85	0.5	0.95
2013	17	0.7	0.85	0.3	0.63	0.4	0.74	0.5	0.78
2014	15	0.6	0.83	0.2	0.72	0.3	0.75	0.5	0.85
2015	15	0.6	0.94	0.2	0.72	0.3	0.80	0.4	0.81
2016	12	0.5	0.71	0.2	0.74	0.3	0.71	0.4	0.77
2017	10	0.4	0.50	0.1	0.31	0.2	0.35	0.2	0.39
2018	10	0.4	0.67	0.1	0.60	0.2	0.67	0.3	0.66
2019	8	0.3	0.35	0.1	0.40	0.2	0.40	0.2	0.36
2020	9	0.4	0.53	0.1	0.26	0.1	0.33	0.2	0.45
1998-2020	237	0.5	0.60	0.2	0.49	0.3	0.53	0.4	0.56

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	0.6	0.6
10-14	0	0.0	0.6
15-19	0	0.0	0.6
20-24	0	0.0	0.6
25-29	0	0.0	0.6
30-34	1	0.6	1.3
35-39	0	0.0	1.3
40-44	1	0.6	1.9
45-49	4	2.5	4.4
50-54	8	5.0	9.4
55-59	4	2.5	11.9
60-64	9	5.7	17.6
65-69	10	6.3	23.9
70-74	20	12.6	36.5
75-79	31	19.5	56.0
80-84	30	18.9	74.8
85+	40	25.2	100.0
All ages	159	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	1.00	4.0
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29		0.0		
30-34	1	0.0	0.50	0.6
35-39		0.0		
40-44	1	0.0	0.17	0.1
45-49	4	0.2	0.29	0.2
50-54	8	0.3	0.62	0.3
55-59	4	0.2	0.27	0.1
60-64	9	0.5	0.47	0.2
65-69	10	0.6	0.29	0.1
70-74	20	1.2	0.47	0.2
75-79	31	2.1	0.97	0.3
80-84	30	2.8	0.56	0.3
85+	40	3.8	1.00	0.3
All ages	159			0.3
Mortality				
Raw		0.5	0.58	
WS		0.2	0.47	
ES		0.2	0.50	
BRD-S		0.3	0.54	
PYLL-70				
per 100,000		1.8		
ES		1.6		
AYLL-70		13.2		

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	1	0.8					1	100.0
C09–C10	Oropharynx	1	0.8	1	100.0				
C15	Oesophagus	2	1.7			1	50.0	1	50.0
C16	Stomach	1	0.8	1	100.0				
C17	Small intestine	2	1.7					2	100.0
C18	Colon	9	7.6	6	66.7	1	11.1	2	22.2
C19–C20	Rectum	7	5.9	4	57.1			3	42.9
C21	Anus/canal	2	1.7	1	50.0			1	50.0
C22	Liver	1	0.8					1	100.0
C23–C24	Bile	1	0.8					1	100.0
C25	Pancreas	1	0.8	1	100.0				
C33–C34	Lung	9	7.6	2	22.2	2	22.2	5	55.6
C43	Malign. melanoma	2	1.7	1	50.0			1	50.0
C44	Skin others	8	6.8	3	37.5			5	62.5
C48	Peritoneal	1	0.8	1	100.0				
C50	Breast	15	12.7	12	80.0			3	20.0
C51	Vulva	3	2.5	1	33.3			2	66.7
C52	Vagina	6	5.1					6	100.0
C53	Cervix uteri	10	8.5	7	70.0	2	20.0	1	10.0
C54	Corpus uteri	15	12.7	9	60.0	4	26.7	2	13.3
C55,C57	Fem. genitals un	4	3.4	1	25.0	1	25.0	2	50.0
C56	Ovary	4	3.4	1	25.0			3	75.0
C64	Kidney	1	0.8					1	100.0
C67	Bladder	4	3.4	3	75.0			1	25.0
C69	Eye carcinoma	1	0.8	1	100.0				
C70–C72	CNS cancer	1	0.8					1	100.0
C73	Thyroid	1	0.8	1	100.0				
C76–C79	CUP	1	0.8	1	100.0				
C91–C96	Leukaemia	4	3.4	1	25.0			3	75.0
All further malignancies		118	100.0	59	50.0	11	9.3	48	40.7

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	1.00	4.0
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29		0.0		
30-34	1	0.0	1.00	0.6
35-39		0.0		
40-44		0.0		
45-49	3	0.1	0.23	0.2
50-54	8	0.3	0.89	0.4
55-59	3	0.1	0.27	0.1
60-64	5	0.3	0.38	0.1
65-69	8	0.4	0.36	0.1
70-74	14	0.8	0.52	0.2
75-79	20	1.3	0.91	0.3
80-84	20	1.9	0.51	0.3
85+	28	2.7	0.85	0.3
All ages	111			0.2
Mortality				
Raw		0.3	0.57	
WS		0.1	0.49	
ES		0.2	0.52	
BRD-S		0.2	0.54	
PYLL-70				
per 100,000		1.4		
ES		1.3		
AYLL-70		13.9		

* 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	1.00	4.0
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29		0.0		
30-34	1	0.0	1.00	0.6
35-39		0.0		
40-44		0.0		
45-49	2	0.1	0.17	0.1
50-54	6	0.2	1.00	0.3
55-59	2	0.1	0.20	0.1
60-64	3	0.2	0.25	0.1
65-69	7	0.4	0.33	0.1
70-74	12	0.7	0.44	0.2
75-79	17	1.1	0.89	0.2
80-84	17	1.6	0.47	0.2
85+	24	2.3	0.77	0.3
All ages	92			0.2
Mortality				
Raw		0.3	0.52	
WS		0.1	0.44	
ES		0.1	0.46	
BRD-S		0.2	0.48	
PYLL-70				
per 100,000		1.1		
ES		1.1		
AYLL-70		14.3		

* See corresponding tables with multiple malignancies.

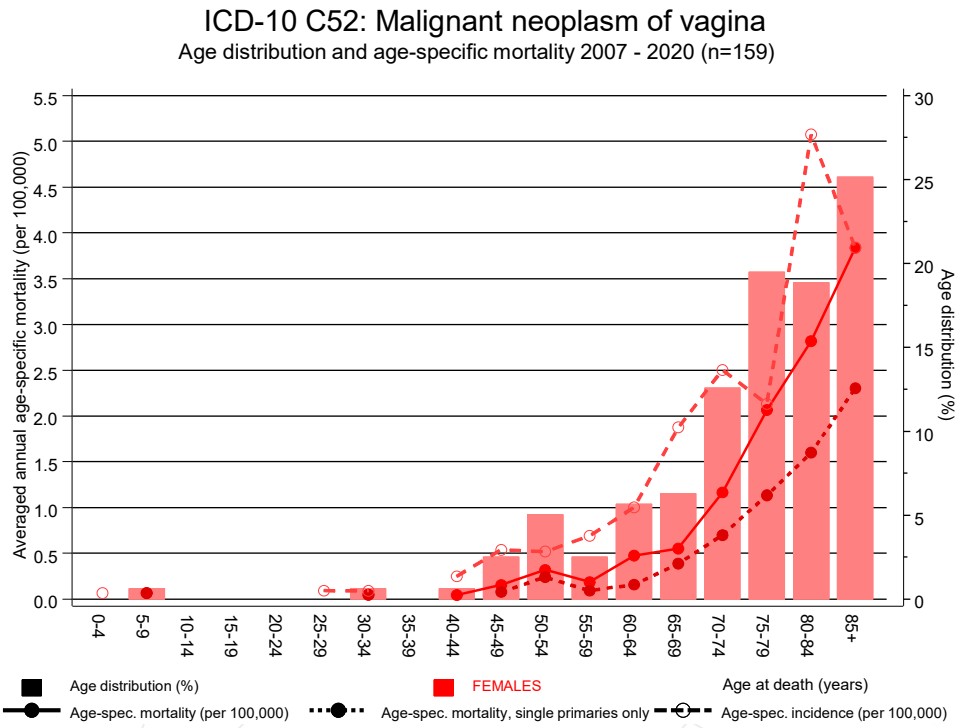

Figure 17. Distribution of age at death (bars; n=mean=73.0 yrs, median=75.1 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

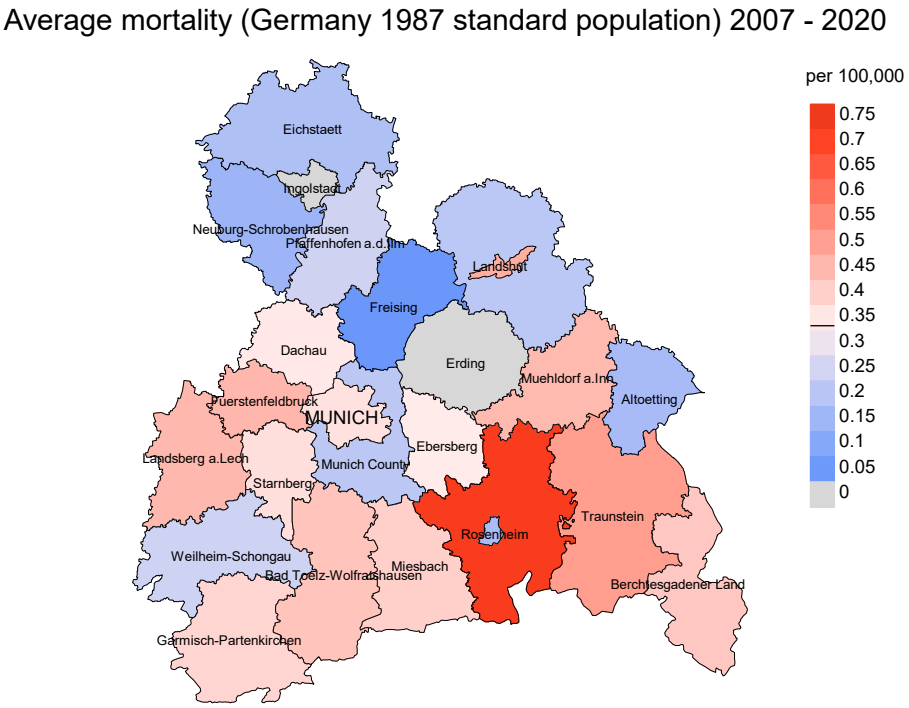

Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (0.3/100,000 WS N=159).

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 4 women died from vaginal cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.3/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.1/100,000.

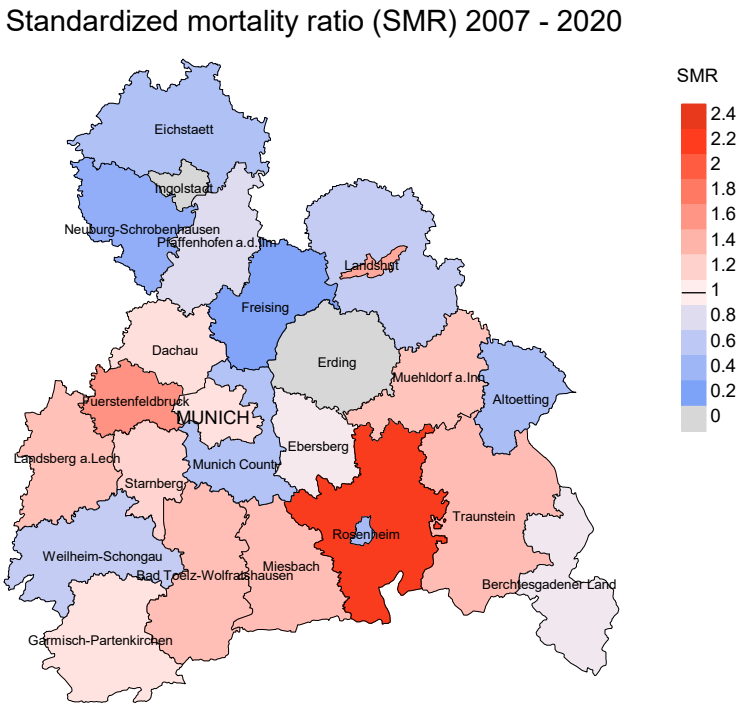

Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (N=159).

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 4 women died from vaginal cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.94. Though, the value of this parameter may vary with an underlying probability of 99% between 0.16 and 2.96, 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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