Munich Cancer Registry

- Survival
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Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

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

Cancer statistics: Baseline statistics

C25: Pancreas cancer

Year of diagnosis	1998-2011
Patients	9042
Diseases	9042
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C25__E.pdf

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 4.5 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. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

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, April 2013

[#] 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 2.51 million to 3.96 in 2002, and to 4.52 million in 2007). Death certificates from 2011 are incorporated into these analyses.

[##] 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. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

ICD-10 codes used for specifying cancer site

ICD-10	Description
C25.-	Malignant neoplasm of pancreas
C25.0	Head of pancreas
C25.1	Body of pancreas
C25.2	Tail of pancreas
C25.3	Pancreatic duct
C25.4	Endocrine pancreas
C25.7	Other parts of pancreas
C25.8	Overlapping lesion of pancreas
C25.9	Pancreas, unspecified

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases # n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	309	97	31.4	8.4	97.4	99.7
1999	361	120	33.2	12.7	96.4	98.9
2000	322	126	39.1	10.6	97.5	100.0
2001	406	151	37.2	11.6	96.6	98.8
2002	663	273	41.2	17.2	96.5	99.7
2003	612	211	34.5	17.2	96.1	99.3
2004	663	215	32.4	15.5	95.0	99.2
2005	716	207	28.9	19.7	94.3	99.2
2006	736	201	27.3	17.5	94.4	99.3
2007	813	224	27.6	16.9	93.8	98.4 ##
2008	874	241	27.6	20.1	92.3	95.2
2009	892	244	27.4	20.2	89.7	95.4
2010	901	224	24.9	19.6	85.1	98.2
2011	774	228	29.5	21.2	73.8	91.3 ###
1998-2011	9042	2762	30.5	17.5	91.7	97.7

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

Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	309	139	170	45.0
1999	361	184	177	51.0
2000	322	153	169	47.5
2001	406	195	211	48.0
2002	663	312	351	47.1
2003	612	301	311	49.2
2004	663	296	367	44.6
2005	716	350	366	48.9
2006	736	373	363	50.7
2007	813	412	401	50.7
2008	874	409	465	46.8
2009	892	452	440	50.7
2010	901	430	471	47.7
2011	774	370	404	47.8
1998-2011	9042	4376	4666	48.4

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	139	170	12.5	14.5	7.4	5.7	11.3	8.8	14.9	12.1
1999	184	177	16.4	14.9	9.6	5.6	14.8	8.8	20.1	12.3
2000	153	169	13.4	14.1	7.8	5.6	12.0	8.6	15.7	11.7
2001	195	211	16.8	17.3	9.7	7.1	14.7	10.9	19.1	14.5
2002	312	351	16.7	17.9	9.4	6.6	14.2	10.3	18.2	14.1
2003	301	311	16.1	15.8	8.8	6.3	13.3	9.7	17.3	12.7
2004	296	367	15.7	18.6	8.5	6.9	12.8	10.7	16.6	14.5
2005	350	366	18.5	18.4	9.6	7.1	14.5	10.9	19.1	14.4
2006	373	363	19.5	18.1	10.3	6.5	15.5	10.1	20.1	13.8
2007	412	401	18.6	17.4	9.7	6.4	14.6	9.9	18.9	13.1
2008	409	465	18.4	20.0	9.2	7.4	14.0	11.3	18.4	15.1
2009	452	440	20.3	18.9	10.0	6.7	15.1	10.4	19.8	14.0
2010	430	471	19.1	20.1	9.0	6.9	13.7	10.8	18.4	14.9
2011	370	404	16.4	17.3	7.7	6.1	11.7	9.4	15.6	12.8
1998-2011	4376	4666	17.4	17.7	9.1	6.6	13.8	10.2	18.1	13.7

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

Table 3

Age distribution parameters by year of diagnosis (All)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	309	71.8	12.5	28.2	98.1	55.0	62.9	73.5	80.4	86.6
1999	361	72.3	11.7	27.6	98.8	56.4	64.2	74.1	80.5	86.3
2000	322	71.1	13.1	21.7	98.5	54.0	61.8	73.3	80.4	86.9
2001	406	71.5	11.7	35.1	97.7	56.4	63.8	71.8	80.3	87.0
2002	663	72.2	11.8	35.3	98.6	56.2	63.7	73.2	80.9	87.3
2003	612	71.4	12.1	33.2	98.4	55.3	63.2	72.7	80.2	87.3
2004	663	72.4	11.4	38.5	100	57.6	64.6	72.5	81.4	86.6
2005	716	72.1	11.6	36.2	99.8	57.9	64.2	71.9	80.8	86.2
2006	736	72.4	11.9	12.3	97.7	57.7	64.8	73.6	81.4	86.3
2007	813	72.3	11.9	25.6	97.2	55.8	64.2	72.7	81.3	87.1
2008	874	72.7	12.2	22.9	98.5	56.3	65.5	73.3	81.9	87.0
2009	892	72.9	11.6	27.9	102	57.5	65.5	73.4	82.1	87.2
2010	901	73.3	11.3	16.9	98.6	57.8	66.6	74.4	81.9	86.7
2011	774	73.1	11.5	34.6	99.1	57.5	67.1	73.8	81.7	87.0
1998-2011	9042	72.4	11.8	12.3	102	56.6	64.7	73.2	81.3	86.9

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	139	68.3	11.4	36.3	97.7	53.3	58.9	69.8	75.7	80.4
1999	184	69.0	11.7	27.6	93.0	53.9	61.3	69.2	78.0	84.1
2000	153	69.0	11.8	41.1	97.8	54.2	60.2	69.3	78.0	84.6
2001	195	68.7	11.7	35.1	94.0	55.0	61.3	68.5	78.1	84.6
2002	312	68.9	11.7	35.3	97.5	53.9	61.6	69.1	76.9	82.8
2003	301	69.4	11.3	33.2	98.0	55.1	63.0	69.3	77.0	82.9
2004	296	69.3	11.1	38.5	94.9	54.5	62.9	69.5	76.8	84.2
2005	350	69.7	10.8	36.2	98.5	56.3	62.4	69.1	78.2	83.7
2006	373	69.3	12.0	12.3	94.8	55.5	62.5	70.2	77.1	83.4
2007	412	69.6	11.7	25.6	95.5	53.3	62.1	70.0	78.0	85.1
2008	409	70.3	11.7	22.9	94.5	54.7	63.3	70.5	79.3	84.8
2009	452	70.5	11.1	29.0	102	55.6	63.5	71.0	78.5	84.6
2010	430	71.2	10.8	42.2	98.6	57.4	64.5	71.8	79.1	84.5
2011	370	71.2	11.2	38.8	96.2	55.6	64.5	72.6	78.9	84.6
1998-2011	4376	69.8	11.4	12.3	102	54.7	62.6	70.3	78.1	84.1

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	170	74.6	12.7	28.2	98.1	56.5	66.1	77.6	84.2	87.4
1999	177	75.8	10.6	45.8	98.8	60.6	69.2	76.7	84.0	88.1
2000	169	73.1	13.9	21.7	98.5	53.8	65.5	76.9	81.5	87.6
2001	211	74.1	11.1	38.6	97.7	58.3	67.4	74.6	81.8	88.0
2002	351	75.2	11.0	38.1	98.6	61.1	68.3	76.7	82.4	88.2
2003	311	73.3	12.6	37.1	98.4	55.6	63.8	76.0	82.7	88.6
2004	367	74.8	11.0	38.8	100	60.1	67.1	75.9	83.3	88.0
2005	366	74.4	11.8	36.3	99.8	60.2	66.3	75.0	82.4	90.6
2006	363	75.5	11.1	32.2	97.7	60.4	68.5	76.9	84.5	87.9
2007	401	75.0	11.5	38.3	97.2	59.2	67.8	75.9	84.1	88.6
2008	465	74.8	12.2	23.8	98.5	58.7	67.7	76.0	84.3	87.8
2009	440	75.3	11.7	27.9	101	59.5	67.5	76.7	84.1	88.6
2010	471	75.2	11.6	16.9	97.6	59.7	69.5	76.5	83.8	87.5
2011	404	74.9	11.5	34.6	99.1	59.3	68.7	75.8	83.2	87.7
1998-2011	4666	74.8	11.7	16.9	101	59.0	67.6	76.2	83.7	88.1

Table 4

Age distribution by 5-year age group and gender for period 1998-2011 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
10-14	1	0.0	0.0	1	0.0	0.0			0.0
15-19	2	0.0	0.0	1	0.0	0.0	1	0.0	0.0
20-24	4	0.0	0.1	1	0.0	0.1	3	0.1	0.1
25-29	8	0.1	0.2	5	0.1	0.2	3	0.1	0.2
30-34	13	0.1	0.3	5	0.1	0.3	8	0.2	0.3
35-39	41	0.5	0.8	24	0.5	0.8	17	0.4	0.7
40-44	93	1.0	1.8	59	1.3	2.2	34	0.7	1.4
45-49	206	2.3	4.1	132	3.0	5.2	74	1.6	3.0
50-54	372	4.1	8.2	227	5.2	10.4	145	3.1	6.1
55-59	592	6.5	14.7	354	8.1	18.5	238	5.1	11.2
60-64	1005	11.1	25.8	605	13.8	32.3	400	8.6	19.8
65-69	1252	13.8	39.7	721	16.5	48.8	531	11.4	31.2
70-74	1467	16.2	55.9	751	17.2	66.0	716	15.3	46.5
75-79	1401	15.5	71.4	654	14.9	80.9	747	16.0	62.5
80-84	1271	14.1	85.5	459	10.5	91.4	812	17.4	79.9
85+	1314	14.5	100.0	377	8.6	100.0	937	20.1	100.0
All ages	9042	100.0		4376	100.0		4666	100.0	

Included in the statistics are 22.6% multiple primaries in males and 19.2% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2011

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=1123 %	Females DCO rate n=1639 %	Males Prop.all cancers n=132509 %	Females Prop.all cancers n=129521 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14	1		0.1	0.0			0.8	
15-19	1	1	0.1	0.1			0.3	0.4
20-24	1	3	0.1	0.2			0.2	0.7
25-29	5	3	0.3	0.2			0.6	0.3
30-34	5	8	0.3	0.4		12.5	0.4	0.5
35-39	24	17	1.1	0.8	12.5	5.9	1.2	0.5
40-44	59	34	2.6	1.6	3.4	2.9	2.1	0.6
45-49	132	74	6.8	3.9	9.8	6.8	2.9	1.0
50-54	227	145	13.6	8.5	18.5	5.5	3.1	1.6
55-59	354	238	22.7	14.5	14.7	10.5	2.8	2.0
60-64	605	400	39.7	25.0	15.4	13.0	3.2	2.7
65-69	721	531	52.9	35.7	15.8	17.3	3.1	3.3
70-74	751	716	72.8	58.0	20.4	18.4	3.5	4.8
75-79	654	747	96.8	75.1	31.2	33.2	3.9	5.1
80-84	459	812	113.0	102.1	43.6	50.2	4.2	6.0
85+	377	937	135.9	126.2	65.5	71.1	4.6	6.4
All ages	4376	4666			25.7	35.1	3.3	3.6
Incidence								
Raw			17.4	17.7				
WS			9.1	6.6				
ES			13.8	10.2				
BRD-S			18.1	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).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2011
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C15	Oesophagus	2	0.8	2.5	0.3	9.0		4.4	
C16	Stomach	13	1.9	6.7	3.6	11.5	#	40.5	15.4
C17	Small intestine	5	0.2	24.5	8.0	57.3	#	17.5	
C18	Colon	14	4.6	3.1	1.7	5.1	#	34.5	28.6
C19-C20	Rectum	5	2.6	1.9	0.6	4.4		8.7	
C22	Liver	2	1.3	1.6	0.2	5.8		2.7	
C33-C34	Lung	17	5.5	3.1	1.8	4.9	#	41.9	29.4
C46,C49	Soft tissue	3	0.2	12.5	2.6	36.7	#	10.1	
C61	Prostate	22	13.6	1.6	1.0	2.4	#	30.7	54.5
C64	Kidney	6	1.6	3.7	1.4	8.1	#	16.1	
C67	Bladder	2	1.9	1.0	0.1	3.8		0.3	
C82-C85	NHL	2	1.8	1.1	0.1	4.1		0.9	
Other primaries		8	4.4	1.8	0.8	3.6		13.1	25.0
Not observed		0	5.6	0.0	0.0	0.7	#	-20.5	
All mult. primaries		101	46.1	2.2	1.8	2.7	#	200.7	24.8

Patients	2721
Mean age at second malignancy (years)	71.2
Person-years	2737
Mean observation time (years)	1.0
Median observation time (years)	0.5

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2011
FEMALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	9	1.3	7.2	3.3	13.6	#	29.6	33.3
C17	Small intestine	2	0.1	14.9	1.8	53.8	#	7.1	
C18	Colon	8	3.4	2.4	1.0	4.7	#	17.7	50.0
C19-C20	Rectum	4	1.5	2.8	0.8	7.0		9.7	50.0
C23-C24	Bile	4	0.5	8.2	2.2	20.9	#	13.4	25.0
C33-C34	Lung	8	2.2	3.7	1.6	7.2	#	22.2	25.0
C50	Breast	16	9.2	1.7	1.0	2.8		25.8	18.8
C54	Corpus uteri	3	1.8	1.7	0.3	4.9		4.6	66.7
C56	Ovary	9	1.4	6.6	3.0	12.6	#	29.2	66.7
C64	Kidney	2	0.8	2.4	0.3	8.8		4.5	50.0
C82-C85	NHL	2	1.2	1.6	0.2	5.9		3.0	50.0
C91-C96	Leukaemia	2	0.5	4.1	0.5	14.9		5.8	100.0
Other primaries		3	0.8	3.8	0.8	11.1		8.4	33.3
Not observed		0	7.1	0.0	0.0	0.5	#	-27.1	
All mult. primaries		72	31.7	2.3	1.8	2.9	#	153.9	38.9

Patients	2678
Mean age at second malignancy (years)	74.1
Person-years	2620
Mean observation time (years)	1.0
Median observation time (years)	0.5

The occurrence of second malignancy is statistically significant.

Observed second malignancy with count 1 are pooled in category "Other primaries".

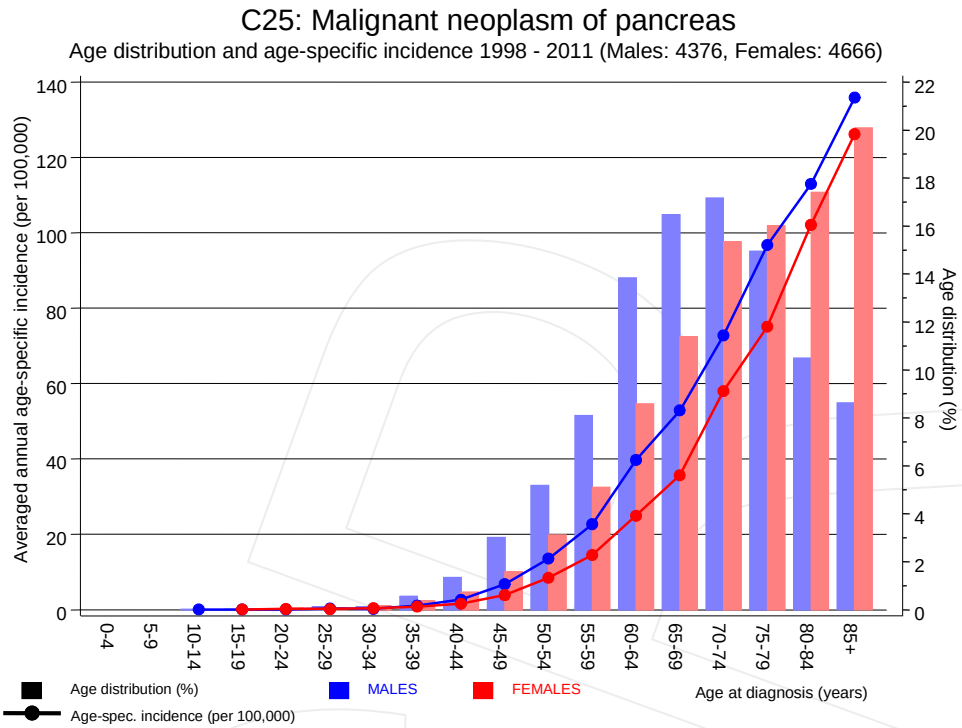


Figure 7. Age distribution and age-specific incidence

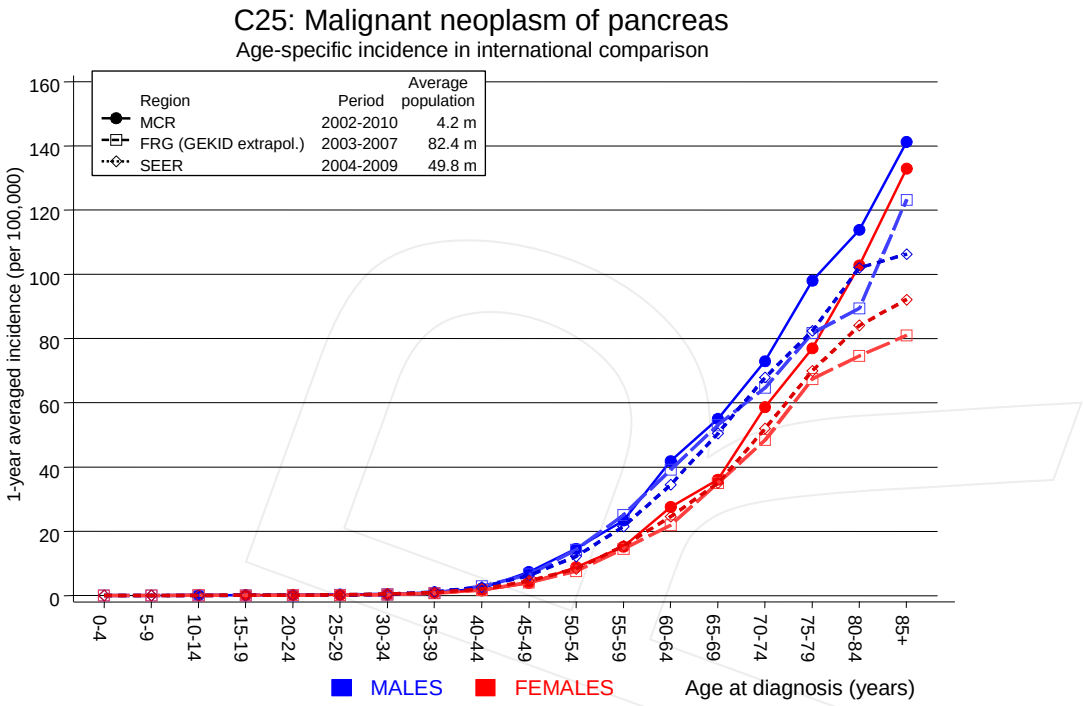


Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

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, 2011. http://www.gekid.de. Last access: 05/12/2011

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2012, based on the November 2011 submission. http://www.seer.cancer.gov.

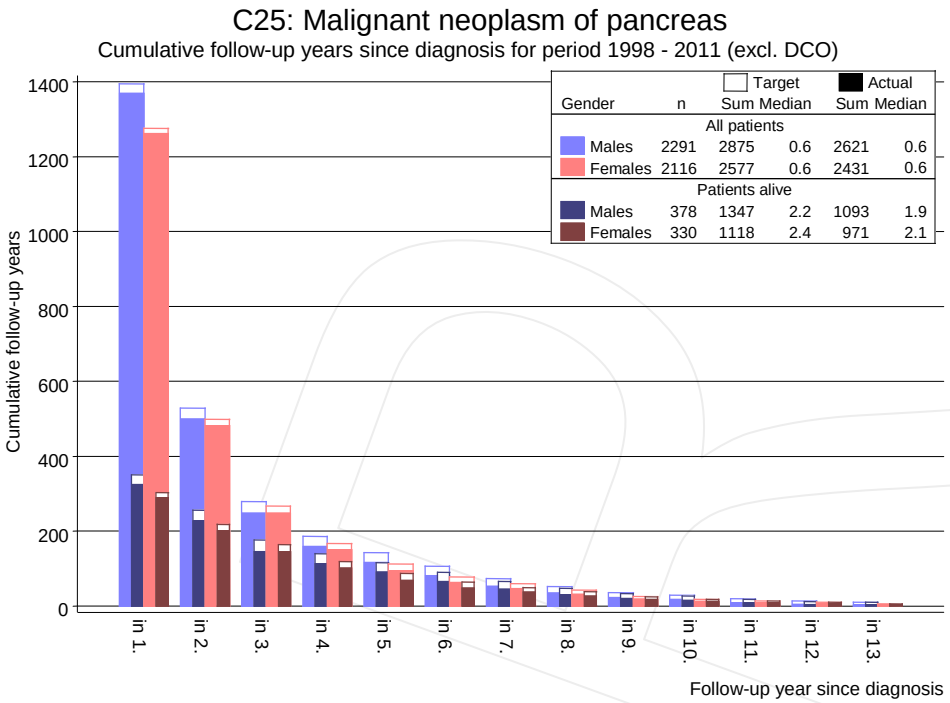
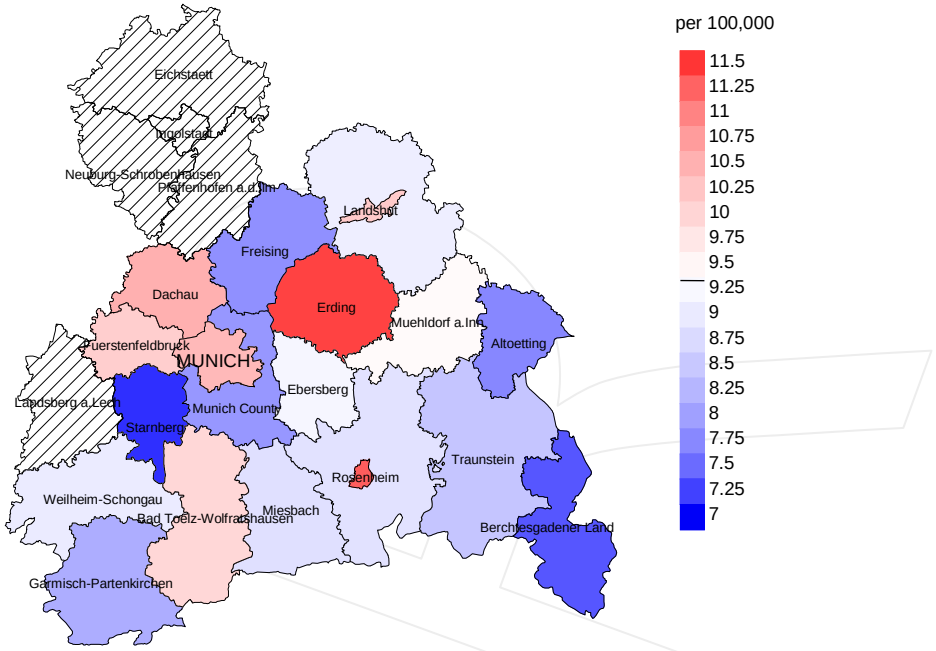


Figure 8. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Average incidence (world standard population) 2003 - 2008: Males



Average incidence (world standard population) 2003 - 2008: Females

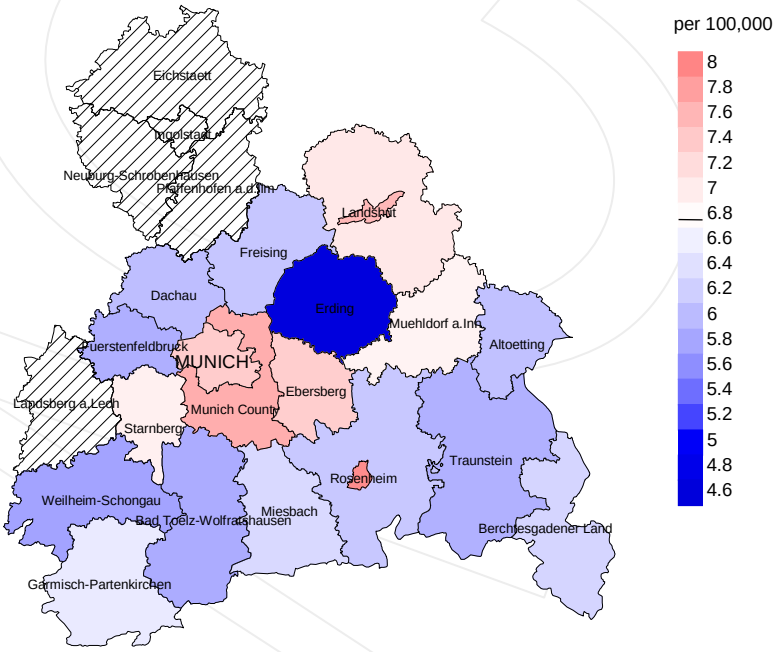
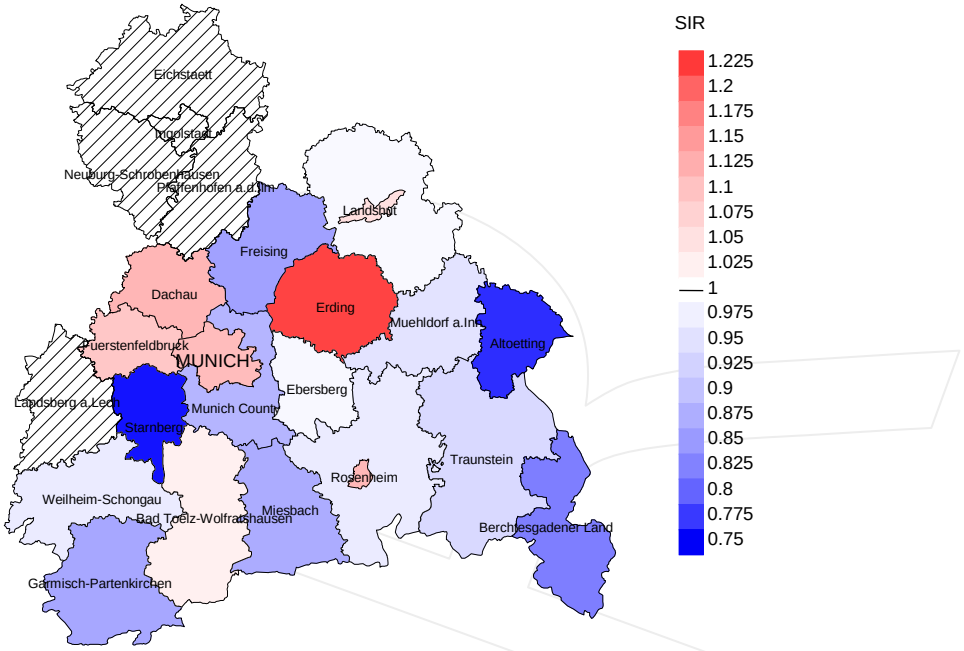


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 9.3/100,000 WS N=2,047, females 6.8/100,000 WS N=2,180). Since cancer data are not available in some counties until 2007, the local incidence rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 63 women were identified with newly diagnosed pancreas cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 7.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 5.0 and 10.5/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

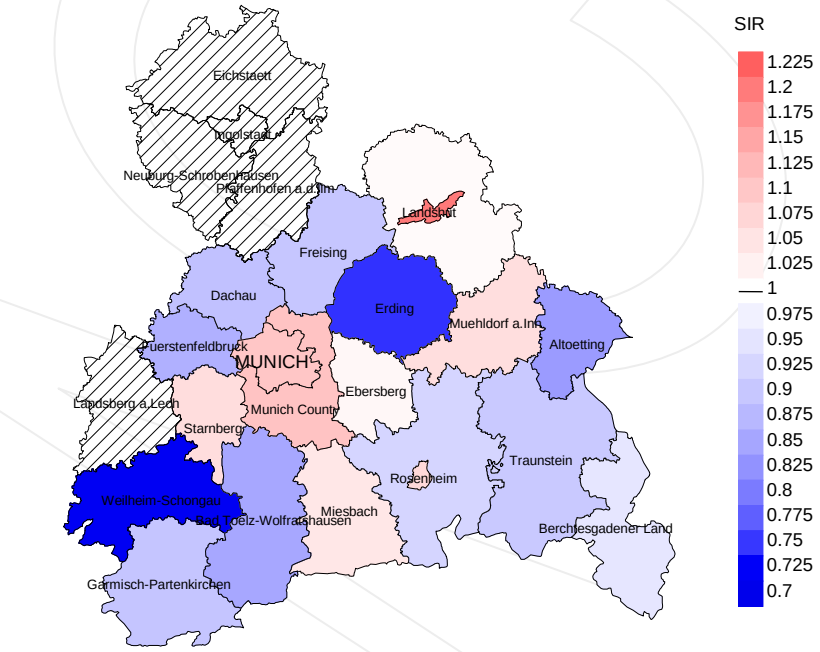


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=2,047, females N=2,180). Since cancer data are not available in some counties until 2007, the local SIR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 63 women were identified with newly diagnosed pancreas cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.02. Though, the value of this parameter may vary with an underlying probability of 99% between 0.72 and 1.39, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts, and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 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	309	99.7	31.4	301	97.4	95.0
1999	361	98.9	33.2	348	96.4	95.1
2000	322	100.0	39.1	314	97.5	97.5
2001	406	98.8	37.2	392	96.6	98.2
2002	663	99.7	41.2	640	96.5	98.1
2003	612	99.3	34.5	588	96.1	98.5
2004	663	99.2	32.4	630	95.0	98.3
2005	716	99.2	28.9	675	94.3	99.3
2006	736	99.3	27.3	695	94.4	98.8
2007	813	98.4	27.6	763	93.8	99.6
2008	874	95.2	27.6	807	92.3	99.3
2009	892	95.4	27.4	800	89.7	98.6
2010	901	98.2	24.9	767	85.1	98.8
2011	774	91.3	29.5	571	73.8	97.9
1998-2011	9042	97.7	30.5	8291	91.7	98.4

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 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	309	314	96.5	176	57.0
1999	361	354	95.2	222	61.5
2000	322	336	97.0	192	59.6
2001	406	369	96.2	242	59.6
2002	663	494	98.6	391	59.0
2003	612	524	98.9	351	57.4
2004	663	524	98.1	368	55.5
2005	716	567	97.9	370	51.7
2006	736	642	99.2	410	55.7
2007	813	667	99.1	426	52.4
2008	874	707	99.6	474	54.2
2009	892	694	99.0	465	52.1
2010	901	775	99.4	489	54.3
2011	774	698	98.6	428	55.3
1998-2011	9042	7665	98.4	5004	55.3

Table 10c

Annual cohorts of deaths, proportion of cancer-related and not cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. not cancer-related %	Prop. cancer recorded on death certificate %
1998	314	90.8	9.2	99.0
1999	354	90.7	9.3	98.8
2000	336	94.3	5.7	98.8
2001	369	95.1	4.9	99.7
2002	494	95.5	4.5	98.8
2003	524	97.3	2.7	99.8
2004	524	98.1	1.9	99.2
2005	567	97.2	2.8	99.6
2006	642	98.0	2.0	99.2
2007	667	97.5	2.5	99.4
2008	707	97.7	2.3	98.9
2009	694	97.0	3.0	98.8
2010	775	97.4	2.6	98.6
2011	698	96.3	3.7	99.3
1998-2011	7665	96.4	3.6	99.1

Table 11a

Means of age at death according to the grouping in Table 10
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	144	69.1	68.9	71.7	69.2
1999	179	70.1	69.4	76.2	70.1
2000	162	70.1	69.7	78.1	70.1
2001	170	70.4	70.6	67.3	70.5
2002	231	69.9	69.5	76.6	69.9
2003	263	69.2	69.1	75.1	69.4
2004	254	70.2	70.2	73.3	70.1
2005	286	70.6	70.6	71.9	70.9
2006	312	70.8	70.9	67.6	70.9
2007	320	70.2	70.0	77.0	70.1
2008	362	70.5	70.5	70.5	70.6
2009	353	70.7	70.8	70.0	70.9
2010	380	71.2	71.1	75.8	71.2
2011	345	71.9	71.8	74.7	72.1
1998-2011	3761	70.5	70.4	73.7	70.6

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 11b

Means of age at death according to the grouping in Table 10
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	170	75.6	75.0	80.0	76.0
1999	175	77.6	77.2	81.5	78.0
2000	174	74.6	74.2	79.1	74.9
2001	199	75.0	74.7	81.3	75.6
2002	263	76.0	75.6	86.5	76.0
2003	261	74.5	74.1	85.0	74.6
2004	270	75.4	75.5	72.2	75.5
2005	281	74.9	74.7	80.8	75.0
2006	330	75.5	75.6	75.3	75.6
2007	347	74.6	74.6	74.1	74.5
2008	345	75.8	75.5	84.9	75.6
2009	341	75.5	75.3	82.9	75.4
2010	395	75.2	75.0	83.0	75.2
2011	353	76.5	76.4	76.9	76.5
1998-2011	3904	75.4	75.3	80.6	75.5

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

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 12a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

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	134	12.1	0.96	7.2	0.98	11.0	0.97	14.7	0.99
1999	161	14.4	0.88	8.4	0.87	13.0	0.88	17.7	0.88
2000	155	13.6	1.01	7.8	1.00	12.0	1.00	16.1	1.03
2001	162	14.0	0.83	7.9	0.81	12.4	0.84	16.4	0.86
2002	218	11.7	0.70	6.6	0.70	10.0	0.71	13.0	0.71
2003	258	13.8	0.86	7.5	0.85	11.3	0.85	14.6	0.84
2004	250	13.3	0.84	7.0	0.82	10.7	0.83	14.2	0.86
2005	277	14.6	0.79	7.5	0.78	11.4	0.79	15.5	0.81
2006	305	15.9	0.82	8.0	0.77	12.2	0.79	16.4	0.82
2007	310	14.0	0.75	7.1	0.73	10.8	0.74	14.2	0.75
2008	356	16.0	0.87	7.9	0.85	12.0	0.86	16.1	0.87
2009	340	15.2	0.75	7.6	0.76	11.5	0.76	14.9	0.75
2010	368	16.3	0.86	7.9	0.87	12.0	0.87	15.8	0.86
2011	328	14.6	0.89	6.7	0.87	10.4	0.88	13.9	0.89
1998-2011	3622	14.4	0.83	7.4	0.81	11.4	0.82	15.1	0.83

Table 12b

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
FEMALES

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	151	12.8	0.89	5.2	0.91	8.0	0.91	10.8	0.90
1999	160	13.5	0.90	4.7	0.84	7.6	0.86	11.1	0.90
2000	162	13.5	0.96	5.2	0.94	8.2	0.95	11.0	0.95
2001	189	15.5	0.90	6.2	0.87	9.6	0.88	12.9	0.89
2002	254	13.0	0.72	4.7	0.71	7.4	0.71	10.2	0.72
2003	252	12.8	0.81	4.9	0.78	7.6	0.79	10.2	0.81
2004	264	13.4	0.72	4.8	0.69	7.5	0.70	10.3	0.71
2005	274	13.8	0.75	5.3	0.74	8.1	0.75	10.8	0.75
2006	324	16.1	0.89	5.7	0.88	9.0	0.89	12.4	0.90
2007	340	14.7	0.85	5.4	0.84	8.3	0.84	11.3	0.86
2008	335	14.4	0.72	5.2	0.70	8.1	0.72	10.8	0.72
2009	333	14.3	0.76	5.0	0.74	7.8	0.75	10.6	0.76
2010	387	16.5	0.82	5.8	0.83	9.0	0.84	12.4	0.83
2011	344	14.7	0.85	4.8	0.79	7.6	0.81	10.8	0.84
1998-2011	3769	14.3	0.81	5.2	0.79	8.1	0.80	11.0	0.81

Table 13

Age distribution of age at death (cancer-related) for period 1998-2011
(**incl. multiple primaries**)

Age at death	Cases			Males			Females		
Years	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
15-19	1	0.0	0.0	1	0.0	0.0			0.0
20-24	1	0.0	0.0	1	0.0	0.1			0.0
25-29	3	0.0	0.1	1	0.0	0.1	2	0.1	0.1
30-34	6	0.1	0.1	4	0.1	0.2	2	0.1	0.1
35-39	25	0.3	0.5	17	0.5	0.7	8	0.2	0.3
40-44	63	0.9	1.3	37	1.0	1.7	26	0.7	1.0
45-49	129	1.7	3.1	84	2.3	4.0	45	1.2	2.2
50-54	270	3.7	6.7	169	4.7	8.7	101	2.7	4.9
55-59	476	6.4	13.2	291	8.0	16.7	185	4.9	9.8
60-64	789	10.7	23.9	477	13.2	29.9	312	8.3	18.1
65-69	1072	14.5	38.4	636	17.6	47.4	436	11.6	29.6
70-74	1194	16.2	54.5	620	17.1	64.5	574	15.2	44.9
75-79	1211	16.4	70.9	564	15.6	80.1	647	17.2	62.0
80-84	1094	14.8	85.7	418	11.5	91.6	676	17.9	80.0
85+	1058	14.3	100.0	303	8.4	100.0	755	20.0	100.0
All ages	7392	100.0		3623	100.0		3769	100.0	

Included in the statistics are 22.6% multiple primaries in males and 19.2% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19	1		0.1	1.00	0.0		2.6	
20-24	1		0.1	1.00	0.0		1.3	
25-29	1	2	0.1	0.20	0.1	0.67	1.1	2.0
30-34	4	2	0.2	0.80	0.1	0.25	2.4	1.0
35-39	17	8	0.8	0.71	0.4	0.47	4.7	1.8
40-44	37	26	1.7	0.63	1.2	0.76	4.9	2.6
45-49	84	45	4.3	0.64	2.3	0.61	5.5	2.6
50-54	169	101	10.1	0.74	5.9	0.70	6.0	3.8
55-59	291	185	18.7	0.82	11.3	0.78	5.7	4.5
60-64	477	312	31.3	0.79	19.5	0.78	6.2	5.6
65-69	636	436	46.7	0.88	29.3	0.82	6.1	6.2
70-74	620	574	60.1	0.83	46.5	0.80	5.6	7.2
75-79	564	647	83.5	0.86	65.1	0.87	5.2	7.2
80-84	418	676	102.9	0.91	85.0	0.83	4.8	7.1
85+	303	755	109.2	0.80	101.7	0.81	4.2	6.6
All ages	3623	3769					5.4	6.2
Mortality								
Raw			14.4	0.83	14.3	0.81		
WS			7.4	0.82	5.2	0.79		
ES			11.4	0.82	8.1	0.80		
BRD-S			15.1	0.83	11.0	0.81		
PYLL-70								
per 100,000			68.2		42.8			
ES			60.0		36.0			
AYLL-70			9.0		8.6			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1998-2011
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10 Oropharynx	13	1.6	11	84.6			2	15.4
C16 Stomach	54	6.7	27	50.0	18	33.3	9	16.7
C18 Colon	101	12.6	74	73.3	18	17.8	9	8.9
C19-C20 Rectum	42	5.2	31	73.8	9	21.4	2	4.8
C23-C24 Bile	9	1.1	6	66.7	3	33.3		
C32 Larynx	14	1.7	12	85.7	1	7.1	1	7.1
C33-C34 Lung	49	6.1	27	55.1	11	22.4	11	22.4
C43 Malign. melanoma	41	5.1	38	92.7	1	2.4	2	4.9
C44 Skin others	33	4.1	27	81.8	4	12.1	2	6.1
C61 Prostate	232	28.9	199	85.8	12	5.2	21	9.1
C64 Kidney	24	3.0	17	70.8	6	25.0	1	4.2
C65 Renal pelvis	8	1.0	6	75.0	1	12.5	1	12.5
C67 Bladder	71	8.8	63	88.7	4	5.6	4	5.6
C70-C72 CNS cancer	11	1.4	7	63.6	1	9.1	3	27.3
C82-C85 NHL	19	2.4	16	84.2	3	15.8		
C91-C96 Leukaemia	9	1.1	3	33.3	3	33.3	3	33.3
Other primaries	73	9.1	42	57.5	18	24.7	13	17.8
All mult. primaries	803	100.0	606	75.5	113	14.1	84	10.5

Multiple primaries with number of cases n<8 are pooled in category "Other primaries".

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 multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2011
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	37	5.2	19	51.4	14	37.8	4	10.8
C17	Small intestine	8	1.1	3	37.5	4	50.0	1	12.5
C18	Colon	84	11.9	60	71.4	17	20.2	7	8.3
C19-C20	Rectum	29	4.1	23	79.3	2	6.9	4	13.8
C23-C24	Bile	7	1.0	2	28.6	4	57.1	1	14.3
C33-C34	Lung	27	3.8	10	37.0	6	22.2	11	40.7
C43	Malign. melanoma	31	4.4	30	96.8	1	3.2		
C44	Skin others	22	3.1	20	90.9	2	9.1		
C50	Breast	218	30.8	197	90.4	7	3.2	14	6.4
C53	Cervix uteri	21	3.0	17	81.0	2	9.5	2	9.5
C54	Corpus uteri	43	6.1	41	95.3	1	2.3	1	2.3
C56	Ovary	40	5.7	22	55.0	6	15.0	12	30.0
C64	Kidney	29	4.1	23	79.3	5	17.2	1	3.4
C67	Bladder	25	3.5	23	92.0	1	4.0	1	4.0
C70-C72	CNS cancer	10	1.4	8	80.0	1	10.0	1	10.0
C82-C85	NHL	12	1.7	9	75.0	2	16.7	1	8.3
C91-C96	Leukaemia	9	1.3	4	44.4	3	33.3	2	22.2
Other primaries		55	7.8	42	76.4	8	14.5	5	9.1
All mult. primaries		707	100.0	553	78.2	86	12.2	68	9.6

Multiple primaries with number of cases n<7 are pooled in category "Other primaries".

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 multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**Singular primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19	1		0.1	1.00	0.0		2.9	
20-24	1		0.1	1.00	0.0		1.3	
25-29	1	2	0.1	0.20	0.1	0.67	1.2	2.1
30-34	4	2	0.2	0.80	0.1	0.25	2.4	1.1
35-39	16	8	0.7	0.70	0.4	0.50	4.7	1.9
40-44	35	23	1.6	0.64	1.1	0.79	5.0	2.6
45-49	79	39	4.1	0.63	2.0	0.59	5.7	2.6
50-54	159	95	9.5	0.75	5.5	0.73	6.4	4.3
55-59	260	168	16.7	0.83	10.3	0.79	5.8	4.9
60-64	433	280	28.4	0.79	17.5	0.79	6.6	6.1
65-69	533	373	39.1	0.90	25.1	0.84	6.3	6.5
70-74	501	492	48.6	0.84	39.9	0.83	5.7	7.7
75-79	439	538	65.0	0.89	54.1	0.85	5.2	7.4
80-84	321	568	79.0	0.90	71.4	0.83	4.8	7.4
85+	239	634	86.2	0.82	85.4	0.80	4.3	6.9
All ages	3022	3222					5.6	6.5
Mortality								
Raw			12.0	0.84	12.2	0.81		
WS			6.3	0.82	4.5	0.79		
ES			9.5	0.83	7.0	0.80		
BRD-S			12.5	0.84	9.5	0.81		
PYLL-70								
per 100,000			62.3		38.7			
ES			54.9		32.6			
AYLL-70			9.3		8.8			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19	1		0.1	1.00	0.0		2.9	
20-24	1		0.1	1.00	0.0		1.4	
25-29	1	2	0.1	0.20	0.1	0.67	1.3	2.2
30-34	4	2	0.2	0.80	0.1	0.25	2.5	1.2
35-39	16	7	0.7	0.70	0.3	0.47	4.9	1.8
40-44	34	23	1.5	0.62	1.1	0.79	5.1	2.9
45-49	77	37	4.0	0.64	1.9	0.57	5.9	2.7
50-54	156	94	9.3	0.75	5.5	0.73	6.9	4.7
55-59	259	164	16.6	0.83	10.0	0.78	6.3	5.3
60-64	425	277	27.9	0.79	17.3	0.80	7.4	6.9
65-69	521	366	38.2	0.89	24.6	0.84	7.1	7.5
70-74	490	482	47.5	0.84	39.0	0.83	6.6	8.8
75-79	428	527	63.3	0.89	53.0	0.85	6.3	8.6
80-84	309	562	76.1	0.89	70.7	0.82	5.8	8.7
85+	232	626	83.6	0.80	84.3	0.80	5.2	7.8
All ages	2954	3169					6.4	7.4
Mortality								
Raw			11.8	0.83	12.0	0.81		
WS			6.2	0.82	4.4	0.79		
ES			9.3	0.83	6.9	0.80		
BRD-S			12.2	0.84	9.3	0.81		
PYLL-70								
per 100,000			61.3		37.9			
ES			54.0		31.9			
AYLL-70			9.3		8.8			

* See corresponding tables with multiple primaries.

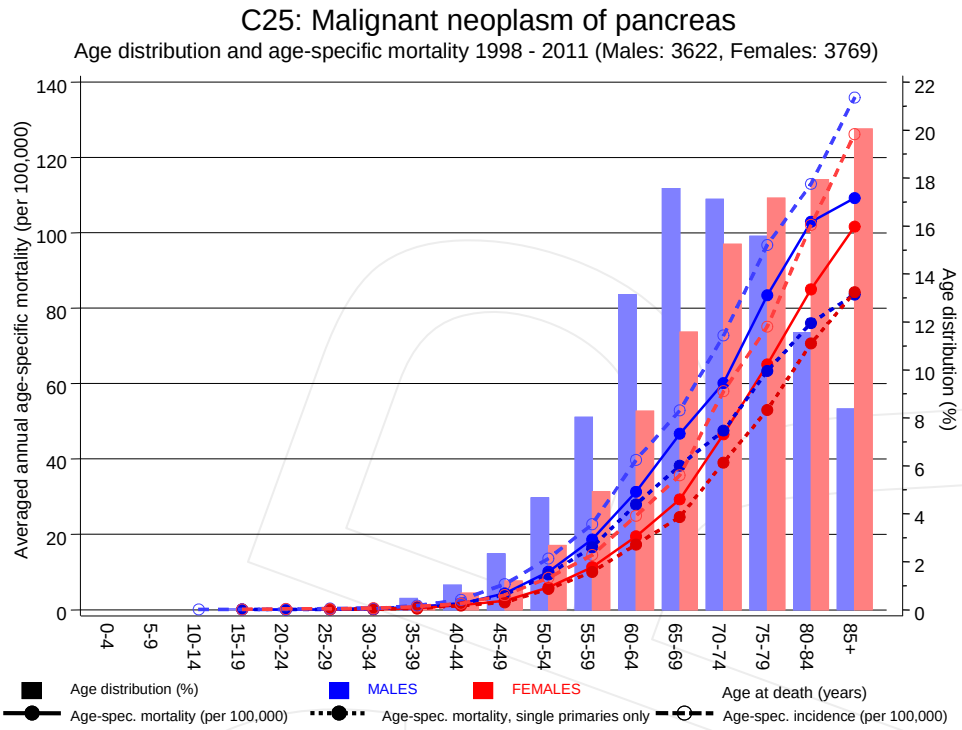
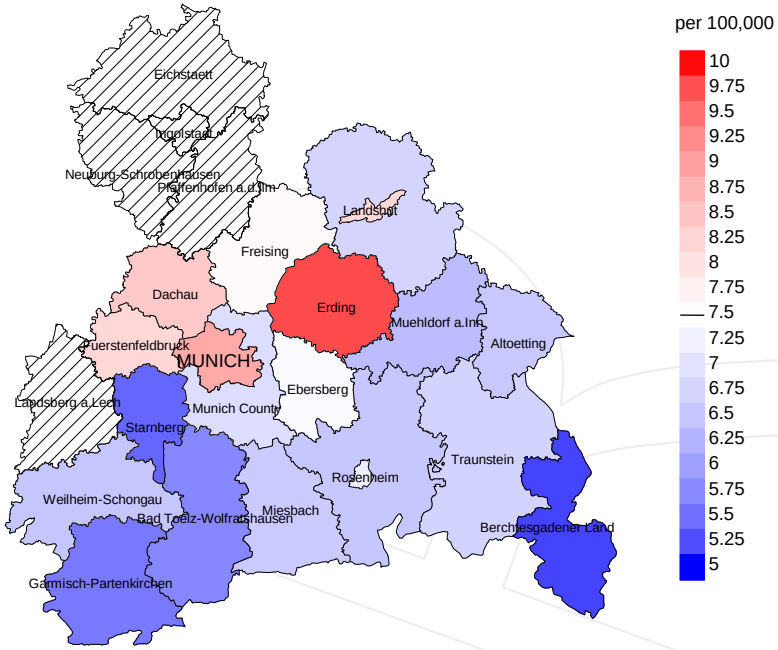


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2003 - 2008: Males



Average mortality (world standard population) 2003 - 2008: Females

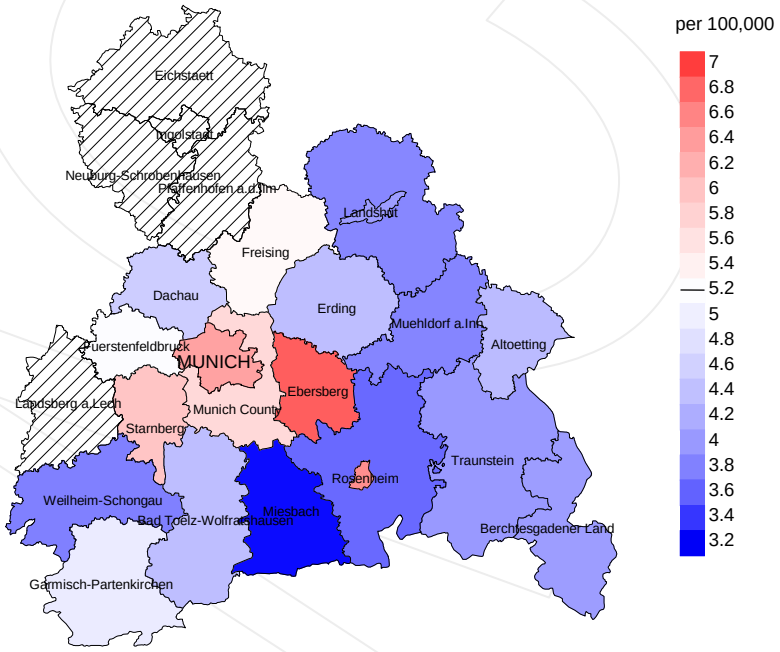
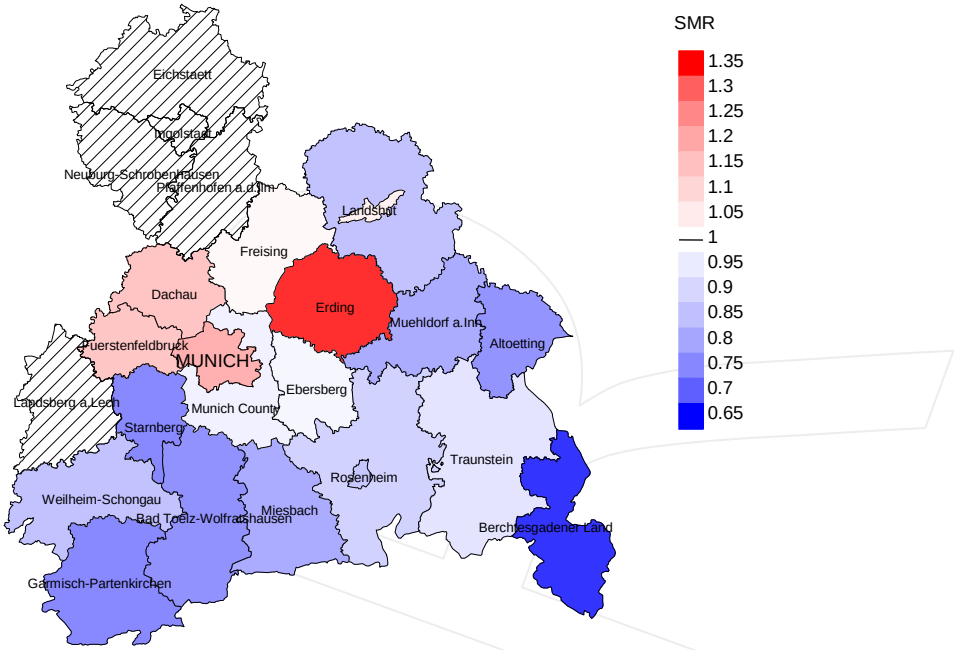


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 7.5/100,000 WS N=1,685, females 5.2/100,000 WS N=1,731). Since cancer data are not available in some counties until 2007, the local mortality rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 60 women died from pancreas cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 6.8/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 4.6 and 9.9/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

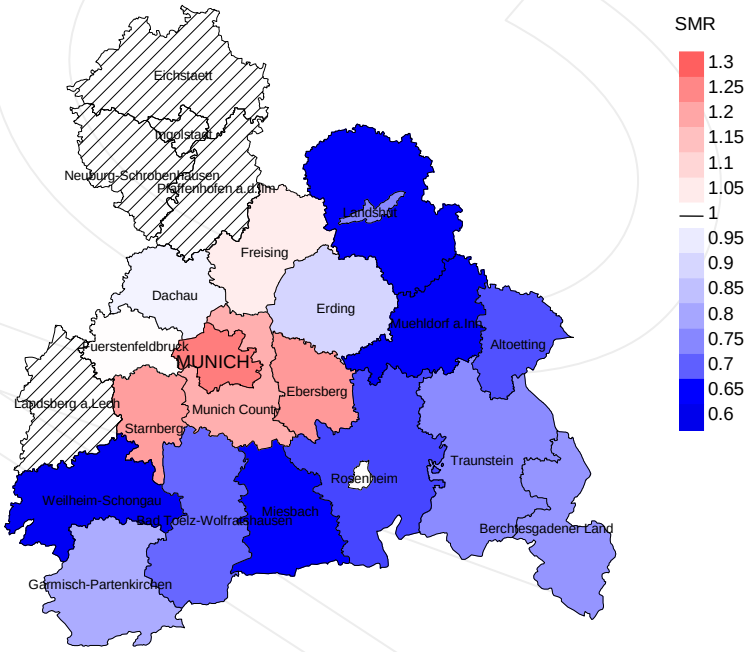


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,685, females N=1,731). Since cancer data are not available in some counties until 2007, the local SMR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 60 women died from pancreas cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.22. Though, the value of this parameter may vary with an underlying probability of 99% between 0.86 and 1.69, 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. 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 tumor-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 index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic 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 MI- index. 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

AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
MCR	Munich Cancer Registry (Tumorregister München)
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SEER	Surveillance, Epidemiology, and End Results (USA)
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

Recommended Citation

Munich Cancer Registry. Baseline statistics C25: Pancreas cancer [Internet]. 2013 [updated 2013 Apr 2; cited 2013 Jun 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C25__E.pdf

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