Munich Cancer Registry

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ICD-10 C91-C95: Leukaemias

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	9,084
Diseases	9,174
Creation date	04/13/2016
Export date	12/23/2015
Population	4.64 m

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

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

http://www.tumorregister-muenchen.de/en/facts/base/bC9195E-ICD-10-C91-C95-Leukaemias-incidence-and-mortality.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 4.64 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, April 2016

[#] 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).

[##] 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.

Some remarks regarding this cancer type

The results for leukemias should be interpreted with caution. As with other primarily non-surgically or non-radiologically treated cancer diseases, the MCR hardly manages to obtain even the simplest information on this cancer. The proportion of DCO cases indicates a situation that is far away from a satisfying cooperation. In the group of institutions that potentially participate in reporting are a few hospitals that refuse any contribution to MCR.

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

Code	Description
C91.-	Lymphoid leukaemia
C92.-	Myeloid leukaemia
C93.-	Monocytic leukaemia
C94.-	Other leukaemias of specified cell type
C95.-	Leukaemia of unspecified cell type

INCIDENCE

Table 1

All patients by year of diagnosis,
proportions of DCO, multiple primaries, deaths, and active follow-up
(incl. DCO)

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	300	85	28.3	19.7	82.7	97.0
1999	308	76	24.7	21.8	75.6	97.4
2000	329	92	28.0	22.8	73.9	97.3
2001	360	126	35.0	22.5	76.7	97.5
2002	563	195	34.6	25.8	76.4	95.2 #
2003	573	193	33.7	25.0	74.5	95.6
2004	621	195	31.4	27.9	68.9	93.7
2005	591	179	30.3	31.8	71.9	94.8
2006	605	176	29.1	34.4	73.1	92.4
2007	657	161	24.5	28.2	64.7	81.7 #
2008	652	166	25.5	32.8	62.0	79.0
2009	666	157	23.6	30.2	61.7	77.2
2010	685	155	22.6	32.3	62.2	78.0
2011	658	139	21.1	34.0	57.3	78.0
2012	695	172	24.7	32.1	58.6	80.4
2013	559	166	29.7	35.1	57.8	98.7
2014	352	156	44.3	38.4	62.8	95.5 ##
1998–2014	9174	2589	28.2	29.8	67.0	88.4

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 found in the respective headings.

Table 1a

All patients
by year of diagnosis and gender
(incl. DCO)

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	300	166	134	55.3
1999	308	166	142	53.9
2000	329	180	149	54.7
2001	360	195	165	54.2
2002	563	305	258	54.2
2003	573	318	255	55.5
2004	621	333	288	53.6
2005	591	345	246	58.4
2006	605	364	241	60.2
2007	657	367	290	55.9
2008	652	365	287	56.0
2009	666	356	310	53.5
2010	685	364	321	53.1
2011	658	364	294	55.3
2012	695	379	316	54.5
2013	559	324	235	58.0
2014	352	197	155	56.0
1998–2014	9174	5088	4086	55.5

Table 2

Incidence measures by year of diagnosis including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 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	166	134	15.0	11.4	10.2	6.2	14.0	8.1	17.2	9.7
1999	166	142	14.8	12.0	9.9	7.5	13.7	9.1	17.1	10.4
2000	180	149	15.8	12.4	11.5	7.3	14.9	9.2	18.1	10.7
2001	195	165	16.8	13.6	11.5	7.0	15.3	9.3	18.6	11.3
2002	305	258	16.4	13.2	10.9	6.4	14.4	8.7	17.9	10.7
2003	318	255	17.0	12.9	10.6	6.9	14.6	8.9	18.6	10.6
2004	333	288	17.7	14.6	11.4	7.9	15.1	10.2	18.6	12.1
2005	345	246	18.2	12.4	11.7	6.7	15.3	8.4	19.5	10.3
2006	364	241	19.0	12.0	12.1	6.0	16.0	7.7	19.7	9.6
2007	367	290	16.6	12.6	10.0	7.0	13.4	8.8	17.0	10.5
2008	365	287	16.4	12.4	10.7	6.3	13.3	8.2	16.3	10.0
2009	356	310	16.0	13.3	9.0	6.7	12.4	8.7	15.6	10.5
2010	364	321	16.2	13.7	9.5	6.9	12.7	8.9	15.9	10.8
2011	364	294	15.9	12.5	9.7	6.7	12.5	8.2	15.1	9.6
2012	379	316	16.6	13.4	9.5	7.6	12.5	9.2	16.2	10.7
2013	324	235	14.2	10.0	8.0	5.1	10.7	6.5	13.8	7.9
2014	197	155	8.6	6.6	3.8	2.4	6.0	3.5	8.3	4.8
1998-2014	5088	4086	15.9	12.2	9.8	6.4	13.1	8.2	16.3	9.9

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 patients)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	300	64.3	20.3	0.9	95.8	37.2	55.3	68.0	78.9	86.5
1999	308	63.5	20.7	0.3	104	39.0	55.9	68.1	77.0	85.2
2000	329	62.5	20.5	0.4	97.6	35.1	53.7	66.7	76.3	85.6
2001	360	64.8	19.5	1.4	96.4	38.3	57.2	67.5	78.1	86.3
2002	563	66.0	19.4	1.0	99.3	40.4	58.6	69.5	78.9	86.4
2003	573	66.2	19.9	0.3	98.9	41.4	57.7	70.3	80.3	86.3
2004	621	65.3	20.0	0.4	98.6	39.1	58.6	68.8	79.3	85.5
2005	591	65.4	21.6	0.0	98.2	34.4	58.5	71.6	79.5	85.0
2006	605	66.6	20.6	0.6	95.4	38.1	60.9	71.8	79.7	86.2
2007	657	65.3	20.2	0.3	99.8	39.4	57.2	70.1	79.4	85.1
2008	652	65.6	21.3	0.4	98.1	35.3	60.1	70.9	79.6	85.5
2009	666	67.1	19.0	1.3	100	42.2	58.4	71.3	80.5	86.8
2010	685	67.3	20.4	0.3	101	42.5	59.3	72.1	81.1	87.8
2011	658	65.9	21.1	0.3	101	40.7	56.8	71.1	80.2	86.6
2012	695	66.1	21.7	0.0	102	34.3	57.7	72.3	80.9	86.6
2013	559	67.7	20.9	0.0	100	36.7	61.5	73.2	82.1	87.3
2014	352	74.6	14.6	0.5	98.3	55.6	68.3	76.6	84.6	90.1
1998-2014	9174	66.2	20.4	0.0	104	39.2	58.5	71.1	80.1	86.5

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	166	63.0	20.6	0.9	95.8	37.1	54.9	65.4	77.8	86.4
1999	166	63.3	19.2	0.3	94.1	39.5	55.6	67.2	77.0	84.0
2000	180	61.4	20.9	0.4	97.6	33.5	53.0	66.5	74.9	83.9
2001	195	61.4	18.7	1.4	96.4	37.9	54.4	63.9	75.0	80.8
2002	305	62.7	20.2	1.0	98.3	32.3	55.6	67.6	75.8	82.2
2003	318	64.9	19.1	1.6	93.6	39.9	58.7	68.4	77.9	84.1
2004	333	64.1	20.1	0.4	96.1	37.2	58.6	67.5	77.5	84.6
2005	345	64.3	21.6	0.0	94.6	34.0	57.6	70.8	78.2	84.1
2006	364	64.6	20.4	1.0	95.4	36.1	58.7	69.9	77.5	84.1
2007	367	64.5	19.2	0.3	97.8	39.6	56.1	69.7	77.9	83.2
2008	365	63.6	22.1	0.4	98.1	26.7	58.8	69.7	77.8	83.4
2009	356	66.4	17.7	2.2	97.0	45.0	57.9	70.1	77.8	84.5
2010	364	66.5	20.2	0.3	101	42.6	59.6	71.5	79.6	86.6
2011	364	64.9	20.4	2.5	101	41.3	56.6	69.7	78.3	85.0
2012	379	66.2	20.9	2.4	95.2	33.4	60.2	72.2	80.1	84.7
2013	324	67.1	20.2	0.5	100	37.0	60.9	72.2	79.0	86.5
2014	197	74.4	14.2	0.5	95.9	56.4	68.3	76.3	83.9	89.2
1998-2014	5088	65.0	20.1	0.0	101	38.1	57.6	69.9	78.3	84.7

Table 3b

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	Median 10%	25%	50%	75%	90%
1998	134	66.0	19.8	1.3	93.9	38.4	57.2	70.9	81.3	86.6
1999	142	63.8	22.3	1.5	104	39.0	56.2	69.3	77.1	87.2
2000	149	63.8	20.0	2.1	95.1	36.3	54.5	66.8	77.3	86.2
2001	165	68.8	19.8	2.8	95.5	50.1	61.8	72.4	81.9	88.5
2002	258	69.9	17.8	2.9	99.3	46.9	61.8	73.2	82.6	89.0
2003	255	67.8	20.7	0.3	98.9	42.5	57.5	73.6	82.3	88.9
2004	288	66.8	19.7	0.7	98.6	41.0	58.5	69.9	80.8	86.9
2005	246	67.1	21.5	0.6	98.2	37.0	61.3	74.2	81.1	85.8
2006	241	69.6	20.5	0.6	95.1	43.5	65.1	74.9	82.6	88.4
2007	290	66.4	21.4	1.0	99.8	38.2	59.8	71.5	81.1	86.5
2008	287	68.1	20.0	1.4	97.4	41.4	60.7	72.3	82.0	87.3
2009	310	68.0	20.4	1.3	100	40.4	59.0	72.5	82.9	88.3
2010	321	68.3	20.7	0.8	98.7	42.5	59.2	73.1	82.7	88.9
2011	294	67.1	22.0	0.3	96.7	40.2	57.7	73.0	82.2	88.5
2012	316	65.9	22.6	0.0	102	34.3	56.8	72.5	81.9	88.4
2013	235	68.5	21.8	0.0	97.9	35.7	61.5	75.4	83.5	88.2
2014	155	74.8	15.1	9.9	98.3	53.4	69.1	77.2	85.3	90.7
1998-2014	4086	67.7	20.6	0.0	104	40.3	59.6	72.7	82.1	88.1

Table 4

Age distribution by 5-year age group and gender for period 2007-2014
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	109	2.2	2.2	61	2.2	2.2	48	2.2	2.2
5-9	66	1.3	3.6	34	1.3	3.5	32	1.4	3.6
10-14	49	1.0	4.5	26	1.0	4.5	23	1.0	4.7
15-19	53	1.1	5.6	35	1.3	5.7	18	0.8	5.5
20-24	39	0.8	6.4	19	0.7	6.4	20	0.9	6.4
25-29	42	0.9	7.3	25	0.9	7.4	17	0.8	7.2
30-34	50	1.0	8.3	28	1.0	8.4	22	1.0	8.2
35-39	78	1.6	9.9	38	1.4	9.8	40	1.8	10.0
40-44	121	2.5	12.3	65	2.4	12.2	56	2.5	12.5
45-49	174	3.5	15.9	98	3.6	15.8	76	3.4	15.9
50-54	212	4.3	20.2	127	4.7	20.5	85	3.8	19.8
55-59	268	5.4	25.6	142	5.2	25.7	126	5.7	25.5
60-64	336	6.8	32.4	196	7.2	32.9	140	6.3	31.8
65-69	578	11.7	44.2	351	12.9	45.8	227	10.3	42.1
70-74	722	14.7	58.8	439	16.2	62.0	283	12.8	54.9
75-79	679	13.8	72.6	388	14.3	76.3	291	13.2	68.1
80-84	651	13.2	85.8	362	13.3	89.6	289	13.1	81.2
85+	697	14.2	100.0	282	10.4	100.0	415	18.8	100.0
All ages	4924	100.0		2716	100.0		2208	100.0	

Included in the statistics are 43.1% multiple primaries in males and 36.6% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 2007-2014

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=646 %	Females DCO rate n=620 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4	61	48	7.0	5.8			34.3	34.8
5- 9	34	32	3.9	3.8			35.4	41.0
10-14	26	23	2.8	2.6			26.0	25.8
15-19	35	18	3.6	2.0			16.2	10.9
20-24	19	20	1.7	1.8		10.0	5.1	6.4
25-29	25	17	2.1	1.4		5.9	4.5	2.6
30-34	28	22	2.2	1.8	7.1	4.5	3.6	1.9
35-39	38	40	2.9	3.2	7.9	5.0	3.3	2.0
40-44	65	56	4.0	3.7	4.6	5.4	3.6	1.5
45-49	98	74	6.2	4.9	5.1	12.2	3.0	1.4
50-54	127	85	9.8	6.6	10.2	7.1	2.6	1.3
55-59	142	126	13.4	11.2	14.1	7.1	1.9	1.7
60-64	195	139	19.9	13.1	11.8	9.4	1.8	1.5
65-69	351	227	36.5	21.7	16.0	18.5	2.2	2.0
70-74	434	281	47.7	26.9	18.4	17.8	2.6	2.4
75-79	385	287	69.9	40.2	27.3	28.2	3.1	2.9
80-84	361	287	103.4	51.2	42.4	44.6	4.2	3.3
85+	282	413	121.8	71.5	64.9	66.1	4.6	4.0
All ages	2706	2195			23.9	28.2	3.0	2.4
Incidence								
Raw			15.0	11.7				
WS			8.7	6.1				
ES			11.6	7.7				
BRD-S			14.7	9.3				

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).

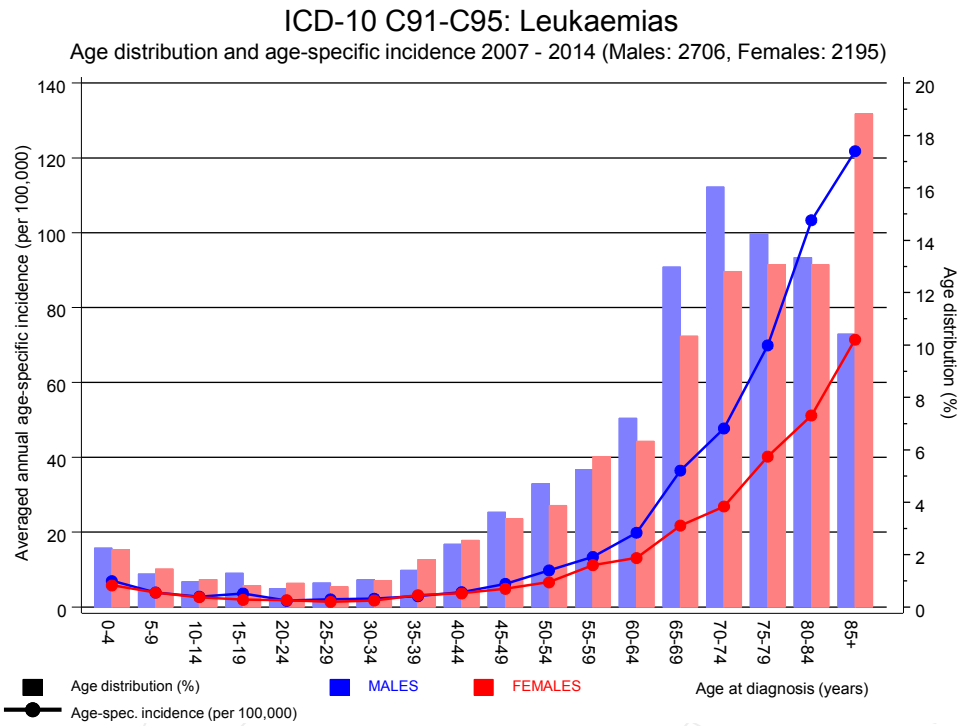


Figure 6. Age distribution and age-specific incidence

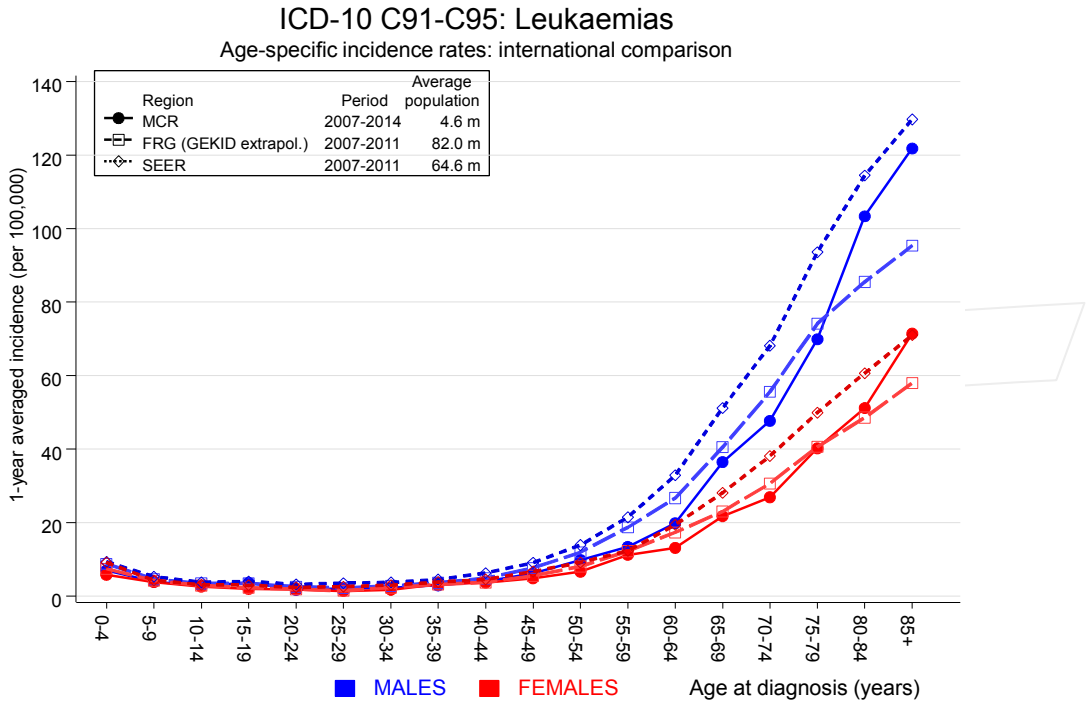


Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2014. http://www.gekid.de. Last access: 02/11/2015

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

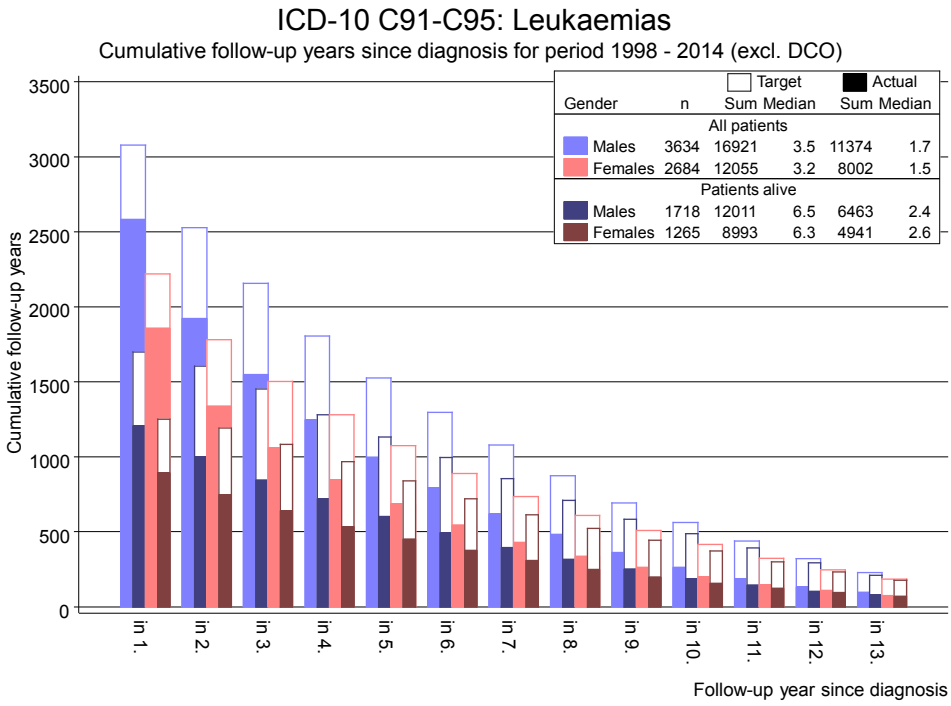


Figure 7. Cumulative follow-up years depending on time since diagnosis

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

Table 8a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	2	1.4	1.4	0.2	5.0		0.5	
C07-C08	Salivary gland	5	0.4	12.9	4.2	30.1	#	4.0	
C09-C10	Oropharynx	4	1.8	2.3	0.6	5.8		1.9	
C15	Oesophagus	7	3.1	2.3	0.9	4.7		3.4	
C16	Stomach	16	7.0	2.3	1.3	3.7	#	7.7	
C17	Small intestine	2	0.9	2.3	0.3	8.3		1.0	
C18	Colon	35	16.8	2.1	1.5	2.9	#	15.6	2.9
C19-C20	Rectum	24	9.4	2.6	1.6	3.8	#	12.5	
C22	Liver	8	4.7	1.7	0.7	3.3		2.8	12.5
C25	Pancreas	12	6.2	1.9	1.0	3.4		5.0	
C33-C34	Lung	54	20.2	2.7	2.0	3.5	#	28.9	1.9
C38,C45	Mesothelioma	3	1.2	2.6	0.5	7.6		1.6	33.3
C43	Malign. melanoma	36	7.3	4.9	3.4	6.8	#	24.6	
C46,C49	Soft tissue	6	0.9	6.4	2.4	14.0	#	4.3	
C50	Breast	2	0.4	4.5	0.5	16.2		1.3	
C61	Prostate	105	50.4	2.1	1.7	2.5	#	46.8	5.7
C62	Testis	2	0.6	3.4	0.4	12.2		1.2	
C64	Kidney	13	6.1	2.1	1.1	3.7	#	6.0	
C65	Renal pelvis	2	0.7	2.7	0.3	9.9		1.1	
C67	Bladder	16	7.6	2.1	1.2	3.4	#	7.2	6.3
C70-C72	CNS cancer	9	2.3	3.9	1.8	7.4	#	5.7	11.1
C73	Thyroid	4	1.1	3.5	1.0	9.0		2.5	
C76-C79	CUP	7	2.9	2.4	1.0	5.0		3.5	
C81	Hodgkin lymphoma	8	0.4	19.6	8.4	38.5	#	6.5	
C82-C85	NHL	34	6.9	4.9	3.4	6.8	#	23.2	11.8
C90	Mult. myeloma	10	2.2	4.5	2.2	8.3	#	6.7	
C91-C96	Leukaemia	46	2.9	16.0	11.7	21.3	#	37.0	28.3
Other primaries		7	5.6	1.2	0.5	2.6		1.2	14.3
Not observed		0	2.3	0.0	0.0	1.6		-1.9	
All mult. primaries		479	173.8	2.8	2.5	3.0	#	261.6	6.3

Patients	3972
Median age at second malignancy (years)	72.0
Person-years	11669
Mean observation time (years)	2.9
Median observation time (years)	1.5

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Table 8b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998–2014
FEMALES

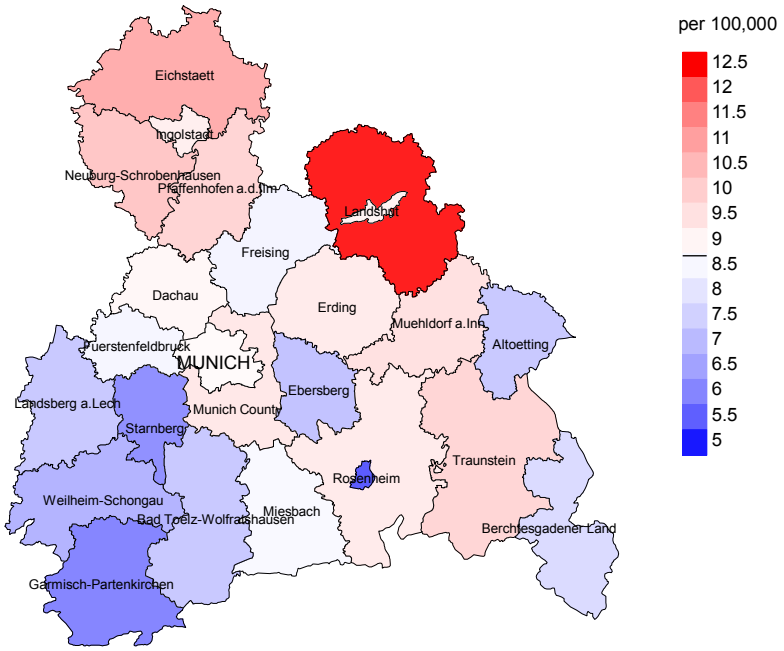
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C09–C10	Oropharynx	3	0.3	9.3	1.9	27.2	#	3.2	
C15	Oesophagus	2	0.5	4.1	0.5	14.8		1.8	
C16	Stomach	6	3.0	2.0	0.7	4.4		3.7	
C18	Colon	19	8.3	2.3	1.4	3.6	#	13.0	15.8
C19–C20	Rectum	4	3.6	1.1	0.3	2.9		0.5	
C21	Anus/canal	2	0.4	4.6	0.6	16.8		1.9	
C22	Liver	3	1.0	3.1	0.6	9.0		2.5	33.3
C23–C24	Bile	3	1.2	2.5	0.5	7.3		2.2	33.3
C25	Pancreas	8	3.7	2.2	0.9	4.2		5.2	12.5
C33–C34	Lung	20	6.0	3.4	2.0	5.2	#	17.0	5.0
C43	Malign. melanoma	8	3.1	2.6	1.1	5.1	#	6.0	
C50	Breast	54	24.9	2.2	1.6	2.8	#	35.3	
C53	Cervix uteri	5	1.1	4.5	1.5	10.6	#	4.7	40.0
C54	Corpus uteri	14	4.7	3.0	1.6	5.0	#	11.3	
C56	Ovary	5	3.4	1.5	0.5	3.4		1.9	
C64	Kidney	8	2.1	3.8	1.6	7.4	#	7.1	12.5
C70–C72	CNS cancer	2	1.2	1.7	0.2	6.1		1.0	
C73	Thyroid	5	1.4	3.5	1.1	8.1	#	4.3	
C76–C79	CUP	3	1.5	2.0	0.4	5.9		1.8	
C82–C85	NHL	23	3.3	7.1	4.5	10.6	#	23.9	13.0
C90	Mult. myeloma	4	1.0	3.8	1.0	9.8	#	3.6	
C91–C96	Leukaemia	22	1.4	16.0	10.0	24.2	#	25.0	13.6
Other primaries		9	1.6	5.7	2.6	10.9	#	9.0	11.1
Not observed		0	5.0	0.0	0.0	0.7	#	-6.1	
All mult. primaries		232	83.6	2.8	2.4	3.2	#	179.9	7.3

Patients	2980
Median age at second malignancy (years)	71.8
Person-years	8247
Mean observation time (years)	2.8
Median observation time (years)	1.2

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Average incidence (world standard population) 2007 - 2014: Males



Average incidence (world standard population) 2007 - 2014: Females

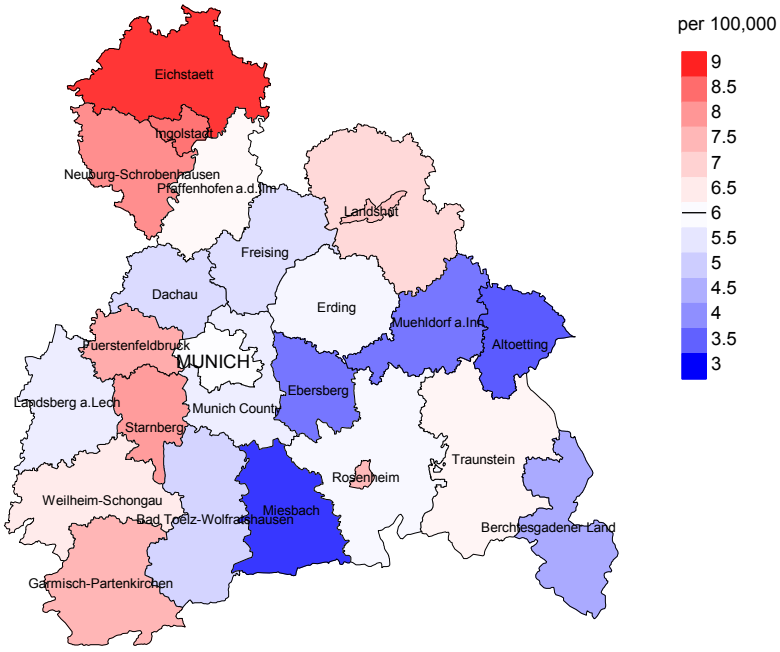
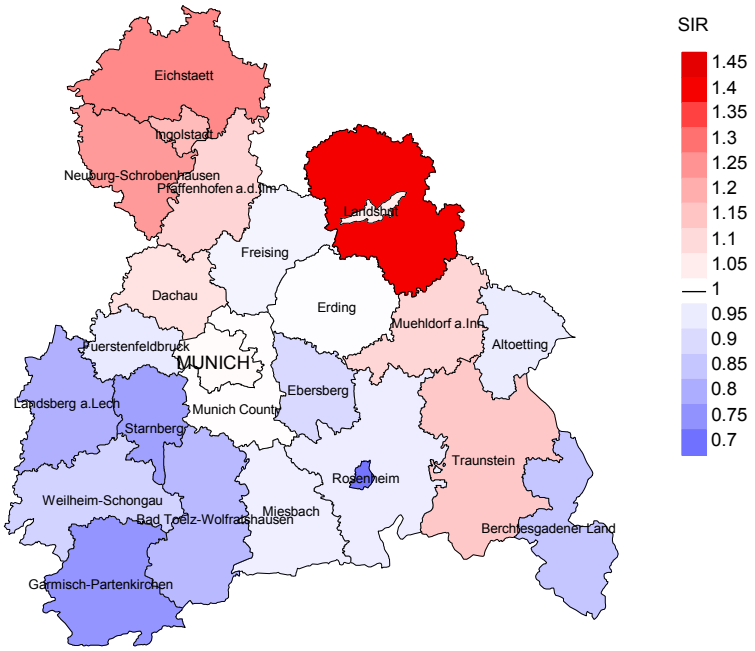


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 8.7/100,000 WS N=2,706, females 6.1/100,000 WS N=2,195).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 43 women were identified with newly diagnosed leukaemias. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 3.7/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 2.0 and 6.9/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

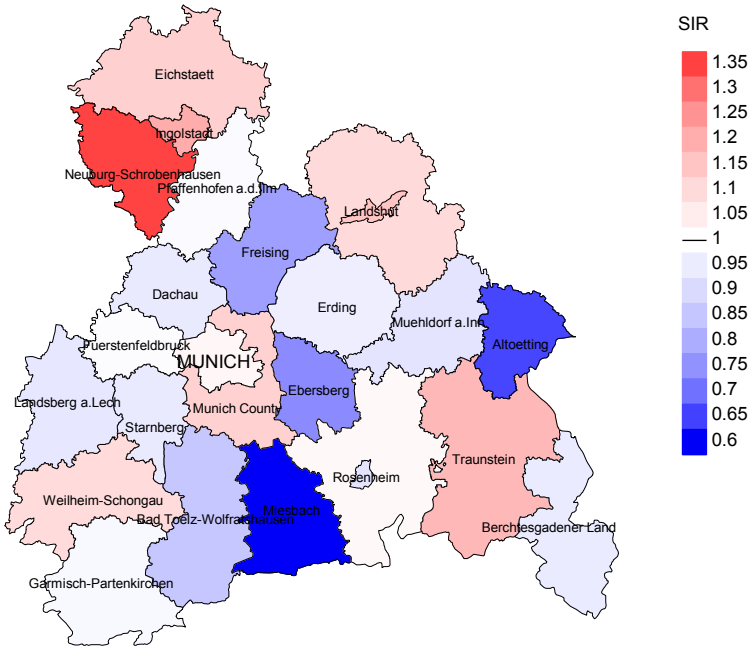


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=2,706, females N=2,195).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 43 women were identified with newly diagnosed leukaemias. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.74. Though, the value of this parameter may vary with an underlying probability of 99% between 0.48 and 1.08, 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 4.64 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	300	97.0	28.3	248	82.7	98.0
1999	308	97.4	24.7	233	75.6	96.6
2000	329	97.3	28.0	243	73.9	97.1
2001	360	97.5	35.0	276	76.7	97.8
2002	563	95.2	34.6	430	76.4	98.4
2003	573	95.6	33.7	427	74.5	99.3
2004	621	93.7	31.4	428	68.9	98.8
2005	591	94.8	30.3	425	71.9	98.8
2006	605	92.4	29.1	442	73.1	98.0
2007	657	81.7	24.5	425	64.7	98.6
2008	652	79.0	25.5	404	62.0	98.8
2009	666	77.2	23.6	411	61.7	98.8
2010	685	78.0	22.6	426	62.2	97.9
2011	658	78.0	21.1	377	57.3	98.9
2012	695	80.4	24.7	407	58.6	98.0
2013	559	98.7	29.7	323	57.8	98.1
2014	352	95.5	44.3	221	62.8	97.7
1998-2014	9174	88.4	28.2	6146	67.0	98.3

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 4.64 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	300	222	98.2	113	37.7
1999	308	204	96.6	93	30.2
2000	329	222	96.4	112	34.0
2001	360	268	97.0	134	37.2
2002	563	342	98.2	225	40.0
2003	573	336	98.2	234	40.8
2004	621	339	98.8	221	35.6
2005	591	406	99.8	232	39.3
2006	605	379	98.7	242	40.0
2007	657	399	98.2	217	33.0
2008	652	404	98.3	218	33.4
2009	666	399	97.7	231	34.7
2010	685	446	98.0	251	36.6
2011	658	462	98.7	221	33.6
2012	695	483	98.3	251	36.1
2013	559	502	98.4	252	45.1
2014	352	418	99.0	210	59.7
1998-2014	9174	6231	98.3	3457	37.7

Table 10c

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 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	222	65.8	34.2	95.9
1999	204	70.1	29.9	95.4
2000	222	74.3	25.7	97.7
2001	268	71.6	28.4	95.8
2002	342	81.3	18.7	97.3
2003	336	83.0	17.0	95.8
2004	339	86.7	13.3	96.1
2005	406	86.2	13.8	97.5
2006	379	86.5	13.5	95.7
2007	399	84.7	15.3	95.4
2008	404	81.4	18.6	91.4
2009	399	84.7	15.3	93.1
2010	446	83.6	16.4	95.0
2011	462	83.3	16.7	93.0
2012	483	81.8	18.2	92.4
2013	502	76.1	23.9	89.9
2014	418	74.6	25.4	89.4
1998-2014	6231	80.7	19.3	94.1

Table 11a

Medians 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 (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	122	69.7	67.7	74.4	69.8
1999	116	72.4	68.9	81.1	71.8
2000	133	72.1	70.5	77.1	72.1
2001	131	72.5	71.9	74.7	72.2
2002	176	73.2	72.3	75.9	73.8
2003	181	72.3	71.2	76.0	72.0
2004	184	74.7	74.4	80.0	74.7
2005	228	74.9	73.8	78.6	74.4
2006	224	74.0	73.4	77.6	73.9
2007	214	73.8	73.1	81.6	73.5
2008	232	73.4	73.3	76.6	73.6
2009	211	75.2	74.8	79.1	75.3
2010	245	75.7	74.6	80.3	75.8
2011	253	75.3	74.6	78.3	75.3
2012	284	76.6	75.1	81.5	75.8
2013	294	76.0	75.4	77.7	76.0
2014	245	77.6	76.3	80.8	76.9
1998-2014	3473	74.7	73.8	78.8	74.6

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

Medians 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 (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	100	76.0	73.6	82.0	76.0
1999	88	77.0	76.0	82.8	76.7
2000	89	77.7	75.2	86.1	77.7
2001	137	77.0	75.3	82.7	76.5
2002	166	77.4	74.2	85.7	77.0
2003	155	77.9	75.8	84.5	77.8
2004	155	77.1	76.4	82.8	76.9
2005	178	77.9	76.0	85.2	77.9
2006	155	77.3	76.6	81.8	77.0
2007	185	76.0	74.1	86.1	76.0
2008	172	78.7	76.4	84.7	77.9
2009	188	78.7	77.7	83.4	78.3
2010	201	80.4	78.9	82.8	80.7
2011	209	77.6	74.0	83.7	75.9
2012	199	76.9	76.4	82.1	76.9
2013	208	79.0	77.6	82.5	78.3
2014	173	79.0	77.4	82.9	78.8
1998-2014	2758	77.8	76.2	83.5	77.5

By 2010, life expectancy at birth was 77.5 years for boys and 82.6 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 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	85	7.7	0.51	5.3	0.52	7.2	0.52	9.0	0.52
1999	79	7.1	0.48	4.7	0.48	6.5	0.48	8.2	0.48
2000	101	8.9	0.56	5.8	0.50	8.2	0.55	10.7	0.59
2001	100	8.6	0.51	5.0	0.44	7.6	0.50	10.4	0.56
2002	148	7.9	0.49	4.5	0.41	6.8	0.47	9.3	0.52
2003	155	8.3	0.49	4.6	0.44	7.0	0.48	9.3	0.50
2004	161	8.6	0.49	4.5	0.39	6.9	0.46	9.7	0.53
2005	192	10.1	0.56	5.3	0.45	8.0	0.53	11.1	0.57
2006	192	10.0	0.53	5.0	0.41	7.7	0.48	10.6	0.54
2007	186	8.4	0.51	4.4	0.44	6.4	0.48	8.9	0.52
2008	193	8.7	0.53	4.2	0.39	6.4	0.48	8.7	0.54
2009	178	8.0	0.50	3.7	0.41	5.8	0.46	8.1	0.52
2010	201	8.9	0.56	4.0	0.43	6.3	0.50	8.7	0.55
2011	217	9.5	0.60	4.4	0.45	6.6	0.53	9.3	0.61
2012	226	9.9	0.60	4.4	0.47	6.9	0.55	9.5	0.59
2013	221	9.7	0.69	4.1	0.52	6.5	0.61	9.4	0.68
2014	180	7.9	0.92	3.2	0.86	5.3	0.89	7.6	0.92
1998-2014	2815	8.8	0.56	4.4	0.45	6.7	0.52	9.3	0.57

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	61	5.2	0.46	2.9	0.47	3.7	0.45	4.4	0.45
1999	64	5.4	0.45	2.3	0.31	3.4	0.37	4.5	0.43
2000	64	5.3	0.43	2.5	0.34	3.5	0.37	4.4	0.41
2001	92	7.6	0.56	3.3	0.47	4.8	0.52	6.4	0.57
2002	130	6.6	0.51	2.9	0.46	4.2	0.49	5.5	0.52
2003	124	6.3	0.49	2.6	0.38	3.9	0.44	5.1	0.48
2004	133	6.7	0.46	2.7	0.35	4.0	0.39	5.4	0.44
2005	158	7.9	0.64	3.2	0.48	4.7	0.56	6.1	0.60
2006	136	6.8	0.57	2.7	0.45	3.9	0.52	5.4	0.57
2007	152	6.6	0.53	2.8	0.40	4.0	0.46	5.2	0.50
2008	136	5.9	0.48	2.3	0.37	3.4	0.42	4.5	0.46
2009	160	6.9	0.52	2.7	0.40	4.0	0.46	5.3	0.51
2010	172	7.3	0.54	2.6	0.38	3.9	0.44	5.4	0.51
2011	169	7.2	0.58	2.8	0.42	4.1	0.50	5.4	0.57
2012	169	7.2	0.54	2.7	0.36	4.0	0.43	5.4	0.50
2013	162	6.9	0.69	2.5	0.49	3.7	0.58	5.0	0.64
2014	132	5.6	0.86	2.1	0.87	3.0	0.87	4.0	0.85
1998-2014	2214	6.6	0.54	2.7	0.42	3.9	0.48	5.2	0.53

Table 13

Age distribution of age at death (cancer-related) for period 2007-2014
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	3	0.1	0.1			0.0	3	0.2	0.2
5-9	8	0.3	0.4	4	0.2	0.2	4	0.3	0.6
10-14	13	0.4	0.8	4	0.2	0.5	9	0.7	1.3
15-19	12	0.4	1.2	7	0.4	0.9	5	0.4	1.7
20-24	12	0.4	1.6	8	0.5	1.4	4	0.3	2.0
25-29	15	0.5	2.2	12	0.7	2.1	3	0.2	2.2
30-34	13	0.4	2.6	7	0.4	2.6	6	0.5	2.7
35-39	24	0.8	3.4	12	0.7	3.3	12	0.9	3.6
40-44	46	1.6	5.0	25	1.5	4.8	21	1.7	5.3
45-49	58	2.0	7.0	26	1.6	6.4	32	2.5	7.8
50-54	71	2.4	9.4	42	2.6	8.9	29	2.3	10.1
55-59	126	4.3	13.8	64	3.9	12.8	62	4.9	15.0
60-64	175	6.0	19.8	109	6.6	19.5	66	5.2	20.2
65-69	314	10.8	30.6	202	12.3	31.8	112	8.8	29.0
70-74	514	17.7	48.2	313	19.0	50.8	201	15.9	44.9
75-79	550	18.9	67.1	335	20.4	71.2	215	17.0	61.8
80-84	487	16.7	83.8	269	16.4	87.5	218	17.2	79.0
85+	471	16.2	100.0	205	12.5	100.0	266	21.0	100.0
All ages	2912	100.0		1644	100.0		1268	100.0	

Included in the statistics are 43.1% multiple primaries in males and 36.6% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**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		3	0.0		0.4	0.06		20.0
5- 9	4	4	0.5	0.12	0.5	0.13	19.0	22.2
10-14	4	9	0.4	0.15	1.0	0.39	22.2	45.0
15-19	7	5	0.7	0.20	0.5	0.28	19.4	22.7
20-24	8	4	0.7	0.42	0.4	0.20	16.7	14.3
25-29	12	3	1.0	0.48	0.2	0.18	19.4	4.7
30-34	7	6	0.6	0.25	0.5	0.27	8.0	5.5
35-39	12	12	0.9	0.32	1.0	0.30	6.8	4.7
40-44	25	21	1.5	0.38	1.4	0.38	5.4	3.3
45-49	26	32	1.6	0.27	2.1	0.42	2.5	2.6
50-54	42	29	3.2	0.33	2.3	0.34	2.2	1.6
55-59	64	62	6.0	0.45	5.5	0.49	2.1	2.4
60-64	109	66	11.1	0.56	6.2	0.47	2.3	1.9
65-69	202	112	21.0	0.58	10.7	0.49	2.8	2.1
70-74	313	201	34.4	0.71	19.2	0.71	3.4	3.1
75-79	335	215	60.8	0.86	30.1	0.74	3.9	3.4
80-84	269	218	77.0	0.74	38.9	0.75	3.6	3.3
85+	205	266	88.5	0.73	46.0	0.64	3.4	3.1
All ages	1644	1268					3.3	2.9
Mortality								
Raw			9.1	0.61	6.8	0.57		
WS			4.2	0.48	2.6	0.43		
ES			6.4	0.55	3.8	0.49		
BRD-S			9.0	0.61	5.1	0.55		
PYLL-70								
per 100,000			40.7		34.9			
ES			38.3		34.3			
AYLL-70			12.5		15.0			

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

Table 15a

Multiple primaries in deaths in period 1998–2014
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06	Oral cavity	11	0.8	5	45.5	2	18.2	4	36.4
C16	Stomach	24	1.7	11	45.8	1	4.2	12	50.0
C18	Colon	92	6.5	44	47.8	13	14.1	35	38.0
C19–C20	Rectum	48	3.4	18	37.5	8	16.7	22	45.8
C25	Pancreas	19	1.3	1	5.3	4	21.1	14	73.7
C33–C34	Lung	108	7.6	22	20.4	24	22.2	62	57.4
C43	Malign. melanoma	59	4.1	29	49.2	5	8.5	25	42.4
C44	Skin others	239	16.8	39	16.3	16	6.7	184	77.0
C46,C49	Soft tissue	17	1.2	8	47.1	1	5.9	8	47.1
C61	Prostate	241	16.9	163	67.6	24	10.0	54	22.4
C62	Testis	11	0.8	9	81.8			2	18.2
C64	Kidney	36	2.5	26	72.2	3	8.3	7	19.4
C67	Bladder	71	5.0	47	66.2	5	7.0	19	26.8
C70–C72	CNS cancer	22	1.5	4	18.2	6	27.3	12	54.5
C76–C79	CUP	15	1.1	2	13.3	4	26.7	9	60.0
C81	Hodgkin lymphoma	19	1.3	9	47.4	2	10.5	8	42.1
C82–C85	NHL	53	3.7			12	22.6	41	77.4
C90	Mult. myeloma	27	1.9	13	48.1	8	29.6	6	22.2
C91–C96	Leukaemia	232	16.3			67	28.9	165	71.1
Other primaries		81	5.7	33	40.7	13	16.0	35	43.2
All mult. primaries		1425	100.0	483	33.9	218	15.3	724	50.8

Multiple primaries with number of cases 1 to 10 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 1998–2014
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	15	1.7	6	40.0	4	26.7	5	33.3
C18	Colon	49	5.5	24	49.0	7	14.3	18	36.7
C19–C20	Rectum	23	2.6	14	60.9	3	13.0	6	26.1
C25	Pancreas	13	1.4	1	7.7	3	23.1	9	69.2
C33–C34	Lung	32	3.6	8	25.0	5	15.6	19	59.4
C43	Malign. melanoma	28	3.1	24	85.7			4	14.3
C44	Skin others	93	10.3	30	32.3	4	4.3	59	63.4
C50	Breast	200	22.2	155	77.5	13	6.5	32	16.0
C53	Cervix uteri	19	2.1	14	73.7	2	10.5	3	15.8
C54	Corpus uteri	41	4.6	29	70.7	4	9.8	8	19.5
C56	Ovary	19	2.1	9	47.4	3	15.8	7	36.8
C64	Kidney	12	1.3	4	33.3	3	25.0	5	41.7
C67	Bladder	19	2.1	12	63.2	3	15.8	4	21.1
C70–C72	CNS cancer	23	2.6	12	52.2	2	8.7	9	39.1
C73	Thyroid	18	2.0	17	94.4			1	5.6
C82–C85	NHL	24	2.7			3	12.5	21	87.5
C90	Mult. myeloma	18	2.0	6	33.3	5	27.8	7	38.9
C91–C96	Leukaemia	180	20.0			47	26.1	133	73.9
Other primaries		73	8.1	30	41.1	3	4.1	40	54.8
All mult. primaries		899	100.0	395	43.9	114	12.7	390	43.4

Multiple primaries with number of cases 1 to 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 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**First 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		3	0.0		0.4	0.06		23.1
5- 9	4	4	0.5	0.12	0.5	0.13	20.0	22.2
10-14	4	9	0.4	0.16	1.0	0.39	22.2	47.4
15-19	7	4	0.7	0.21	0.4	0.24	21.2	20.0
20-24	8	3	0.7	0.44	0.3	0.15	18.6	11.5
25-29	11	3	0.9	0.44	0.2	0.20	20.0	5.1
30-34	7	6	0.6	0.27	0.5	0.30	8.1	6.3
35-39	10	12	0.8	0.28	1.0	0.31	6.1	5.3
40-44	23	16	1.4	0.38	1.0	0.34	5.4	2.9
45-49	22	26	1.4	0.25	1.7	0.46	2.4	2.5
50-54	30	21	2.3	0.27	1.6	0.32	1.9	1.4
55-59	52	45	4.9	0.43	4.0	0.48	2.0	2.1
60-64	76	51	7.7	0.54	4.8	0.49	1.9	1.8
65-69	140	83	14.6	0.56	8.0	0.52	2.5	2.0
70-74	219	134	24.1	0.78	12.8	0.69	3.1	2.6
75-79	227	148	41.2	0.91	20.7	0.75	3.6	3.0
80-84	185	160	53.0	0.83	28.5	0.79	3.5	3.2
85+	126	201	54.4	0.72	34.8	0.64	2.9	3.0
All ages	1151	929					3.0	2.7
Mortality								
Raw			6.4	0.59	5.0	0.56		
WS			3.0	0.44	2.0	0.40		
ES			4.6	0.52	2.8	0.47		
BRD-S			6.3	0.60	3.7	0.53		
PYLL-70								
per 100,000			34.4		29.1			
ES			32.8		29.2			
AYLL-70			14.0		16.1			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**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		3	0.0		0.4	0.06		23.1
5- 9	4	4	0.5	0.12	0.5	0.13	20.0	22.2
10-14	4	8	0.4	0.17	0.9	0.35	22.2	44.4
15-19	7	4	0.7	0.22	0.4	0.24	21.2	22.2
20-24	7	3	0.6	0.41	0.3	0.15	17.9	12.5
25-29	10	3	0.8	0.40	0.2	0.20	19.6	5.4
30-34	7	6	0.6	0.27	0.5	0.30	8.2	7.2
35-39	8	9	0.6	0.22	0.7	0.24	5.1	4.4
40-44	20	15	1.2	0.33	1.0	0.32	5.0	2.9
45-49	17	21	1.1	0.20	1.4	0.40	2.0	2.3
50-54	27	17	2.1	0.26	1.3	0.30	1.9	1.3
55-59	43	38	4.0	0.39	3.4	0.45	1.8	2.0
60-64	50	42	5.1	0.41	4.0	0.44	1.5	1.7
65-69	101	70	10.5	0.47	6.7	0.49	2.1	2.1
70-74	166	111	18.2	0.72	10.6	0.61	2.9	2.7
75-79	165	121	30.0	0.75	17.0	0.69	3.4	3.0
80-84	147	136	42.1	0.71	24.3	0.72	3.6	3.3
85+	103	176	44.5	0.61	30.5	0.57	3.0	3.1
All ages	886	787					2.8	2.7
Mortality								
Raw			4.9	0.50	4.2	0.51		
WS			2.4	0.37	1.7	0.36		
ES			3.5	0.44	2.4	0.43		
BRD-S			4.9	0.50	3.2	0.48		
PYLL-70								
per 100,000			29.3		25.6			
ES			28.4		26.1			
AYLL-70			15.4		16.7			

* See corresponding tables with multiple primaries.

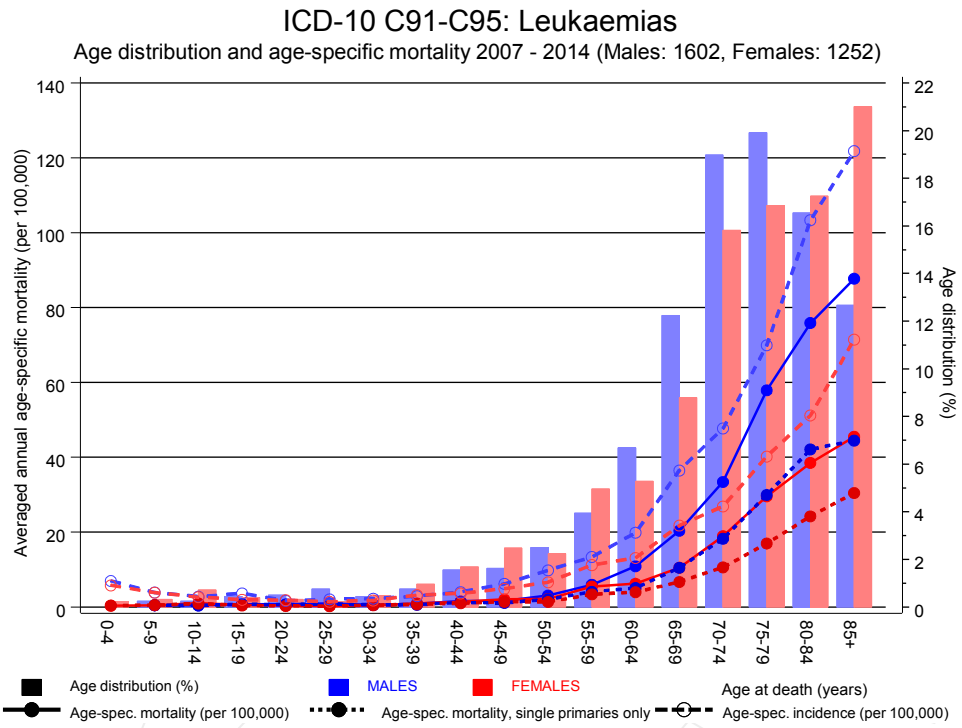
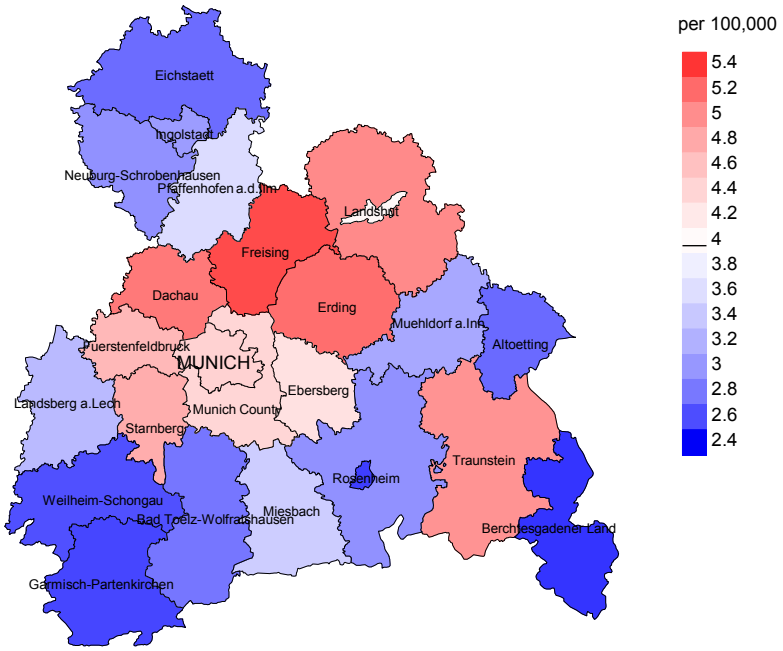


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2014: Males



Average mortality (world standard population) 2007 - 2014: Females

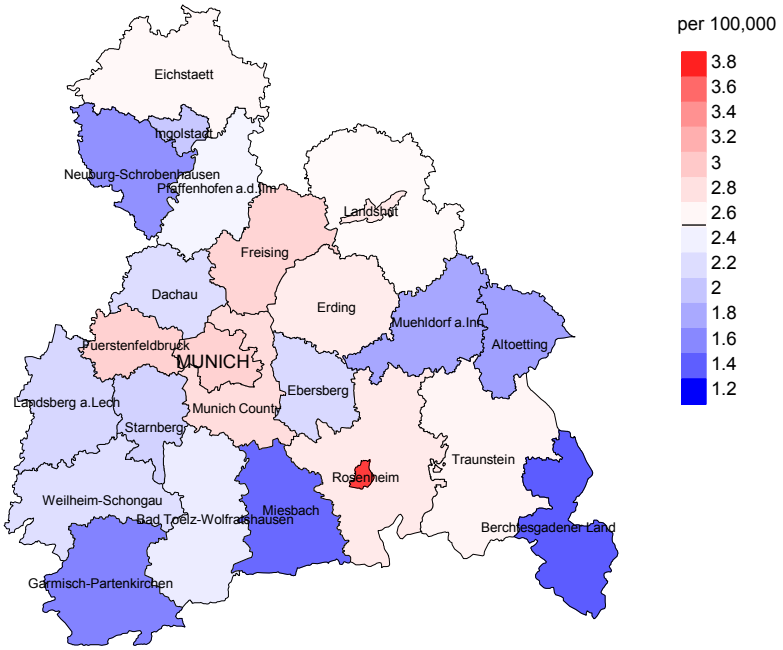
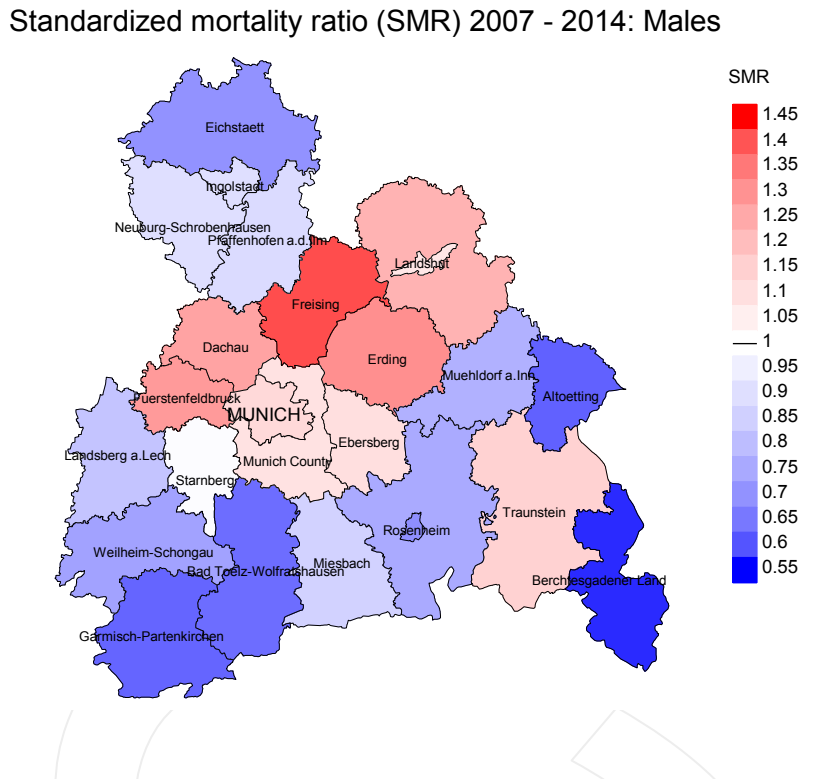


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.0/100,000 WS N=1,574, females 2.5/100,000 WS N=1,235).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 31 women died from leukaemias. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.2 and 3.8/100,000.



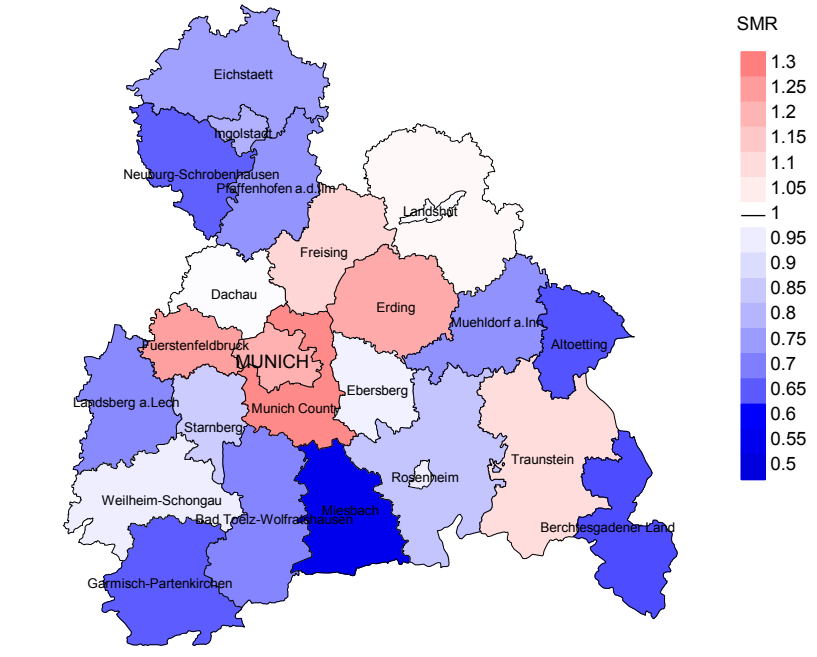


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,574, females N=1,235).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 31 women died from leukaemias. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.96. Though, the value of this parameter may vary with an underlying probability of 99% between 0.57 and 1.50, 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 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

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
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)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

Recommended Citation

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