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

C91: Lymphoid leukaemia

Year of diagnosis	1998-2012
Patients	3,532
Diseases	3,538
Creation date	03/20/2014
Export date	02/12/2014
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C91__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, March 2014

[#] 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 2013 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.

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 used for specifying cancer site

ICD-10	Description
C91.-	Lymphoid leukaemia
C91.0	Acute lymphoblastic leukaemia [ALL]
C91.1	Chronic lymphocytic leukaemia of B-cell type
C91.3	Prolymphocytic leukaemia of B-cell type
C91.4	Hairy-cell leukaemia
C91.5	Adult T-cell lymphoma/leukaemia (HTLV-1-associated)
C91.6	Prolymophocytic leukaemia of T-cell type
C91.7	Other lymphoid leukaemia
C91.8	Mature B-cell leukaemia Burkitt-type
C91.9	Lymphoid leukaemia, 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	123	8	6.5	23.6	70.7	97.6	
1999	123	8	6.5	30.1	60.2	96.7	
2000	126	18	14.3	31.0	65.9	96.0	
2001	176	42	23.9	23.3	65.9	98.3	
2002	299	79	26.4	29.1	70.2	96.3	#
2003	257	70	27.2	24.5	62.3	96.1	#
2004	292	56	19.2	28.1	54.1	92.8	#
2005	271	58	21.4	31.0	59.0	94.1	#
2006	271	42	15.5	37.3	50.9	90.0	#
2007	321	59	18.4	23.7	48.6	77.6	# ##
2008	283	51	18.0	33.9	43.1	67.5	
2009	279	50	17.9	27.6	38.7	65.9	
2010	259	56	21.6	27.4	42.1	69.9	
2011	256	54	21.1	29.7	35.5	69.1	
2012	202	56	27.7	22.3	37.1	98.5	###
1998-2012	3538	707	20.0	28.4	52.2	85.3	

\# 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	123	73	50	59.3
1999	123	62	61	50.4
2000	126	78	48	61.9
2001	176	98	78	55.7
2002	299	172	127	57.5
2003	257	160	97	62.3
2004	292	174	118	59.6
2005	271	173	98	63.8
2006	271	176	95	64.9
2007	321	181	140	56.4
2008	283	165	118	58.3
2009	279	153	126	54.8
2010	259	146	113	56.4
2011	256	147	109	57.4
2012	202	117	85	57.9
1998-2012	3538	2075	1463	58.6

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	73	50	6.6	4.3	5.0	2.4	6.2	3.1	7.3	3.7
1999	62	61	5.5	5.1	4.0	4.2	5.2	4.5	6.2	4.7
2000	78	48	6.8	4.0	5.1	2.7	6.5	3.1	7.4	3.4
2001	98	78	8.5	6.4	6.3	3.9	8.0	4.7	9.4	5.3
2002	172	127	9.2	6.5	6.3	3.1	8.2	4.2	9.8	5.2
2003	160	97	8.5	4.9	5.8	3.0	7.5	3.5	9.2	4.1
2004	174	118	9.2	6.0	6.5	3.5	8.1	4.3	9.6	4.9
2005	173	98	9.1	4.9	6.5	3.0	8.0	3.5	9.7	4.2
2006	176	95	9.2	4.7	6.6	2.9	8.1	3.3	9.4	3.9
2007	181	140	8.2	6.1	5.1	3.9	6.8	4.5	8.4	5.0
2008	165	118	7.4	5.1	5.4	3.0	6.3	3.5	7.3	4.1
2009	153	126	6.9	5.4	4.1	3.2	5.5	3.8	6.6	4.2
2010	146	113	6.5	4.8	4.2	2.8	5.2	3.3	6.4	3.8
2011	147	109	6.4	4.6	4.5	3.0	5.4	3.3	6.1	3.5
2012	117	85	5.1	3.6	3.4	2.3	4.1	2.5	4.9	2.8
1998-2012	2075	1463	7.6	5.1	5.2	3.1	6.5	3.6	7.8	4.2

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	123	61.5	21.1	1.4	95.8	37.1	55.0	64.7	76.2	82.8
1999	123	57.7	23.4	0.3	89.4	6.0	53.5	62.5	74.1	79.8
2000	126	61.5	20.8	2.1	91.2	38.5	55.5	64.5	74.1	85.0
2001	176	62.9	22.3	1.4	94.0	17.0	57.0	67.4	76.6	87.3
2002	299	66.2	19.7	2.6	95.0	41.4	60.5	68.7	78.9	87.9
2003	257	64.5	22.4	0.3	98.9	29.5	59.4	69.2	79.2	85.6
2004	292	62.9	22.0	1.4	98.6	29.0	57.0	67.7	77.7	84.5
2005	271	63.2	24.3	0.6	97.1	16.4	57.6	70.8	78.8	85.1
2006	271	63.6	23.5	1.3	95.4	18.1	57.3	69.8	79.1	85.9
2007	321	64.4	22.5	0.3	99.8	26.9	56.9	69.3	80.6	86.1
2008	283	63.3	24.9	0.4	97.4	13.5	60.2	69.8	79.5	86.4
2009	279	65.6	21.2	1.3	98.6	42.1	57.4	69.8	80.5	87.4
2010	259	65.7	24.3	0.3	101	19.7	57.4	73.1	81.9	88.5
2011	256	63.0	25.5	2.5	101	12.6	54.1	70.5	81.0	88.5
2012	202	64.0	26.0	2.4	96.9	15.9	55.1	72.8	83.3	87.9
1998-2012	3538	63.8	23.1	0.3	101	21.1	57.1	69.2	79.3	86.6

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	73	58.2	21.6	2.0	95.8	33.9	51.8	62.3	72.5	81.0
1999	62	59.2	21.6	0.3	89.4	31.9	54.1	61.0	74.7	80.4
2000	78	61.0	18.9	2.6	91.1	43.8	55.1	64.5	71.0	80.2
2001	98	60.2	20.7	1.4	90.7	17.0	53.2	65.8	73.7	79.6
2002	172	62.4	20.4	2.6	90.9	31.2	57.6	66.3	75.5	82.5
2003	160	63.0	20.9	1.6	90.7	31.4	58.3	67.4	76.5	83.4
2004	174	61.1	22.1	1.4	95.2	25.6	55.9	65.5	75.5	82.3
2005	173	62.0	23.8	0.7	94.6	15.6	55.9	69.0	77.2	83.0
2006	176	62.1	23.4	1.3	95.4	17.6	55.5	68.6	77.7	85.1
2007	181	64.3	20.0	0.3	97.8	39.6	56.8	69.0	77.9	83.8
2008	165	61.2	25.2	0.4	93.7	8.9	60.2	69.2	77.0	83.5
2009	153	65.8	18.5	2.2	97.0	47.0	57.6	69.5	77.5	85.4
2010	146	64.6	23.9	0.3	101	19.7	54.7	72.2	80.6	87.2
2011	147	61.6	24.4	2.5	101	12.6	53.7	68.5	78.2	84.9
2012	117	63.4	24.8	2.4	95.2	14.9	55.2	72.0	79.3	86.5
1998-2012	2075	62.3	22.2	0.3	101	22.7	55.8	68.0	77.1	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	50	66.3	19.4	1.4	90.3	43.1	61.0	68.6	77.9	85.9
1999	61	56.3	25.2	1.5	88.4	4.1	52.3	63.5	73.6	77.1
2000	48	62.5	23.8	2.1	91.2	4.6	57.9	65.2	77.4	86.5
2001	78	66.4	24.0	2.8	94.0	16.2	61.5	72.2	82.6	90.4
2002	127	71.3	17.5	2.9	95.0	53.4	63.9	74.3	83.5	90.1
2003	97	67.2	24.5	0.3	98.9	29.4	60.5	73.7	81.7	90.6
2004	118	65.6	21.7	4.3	98.6	35.3	58.1	69.7	80.2	87.3
2005	98	65.3	25.1	0.6	97.1	16.4	62.4	74.7	80.7	88.9
2006	95	66.4	23.7	2.5	93.9	18.1	60.0	73.1	82.4	87.1
2007	140	64.6	25.5	1.0	99.8	12.7	57.1	71.3	82.7	87.7
2008	118	66.3	24.1	1.4	97.4	19.2	60.6	71.0	82.7	88.9
2009	126	65.4	24.1	1.3	98.6	24.9	56.5	72.4	83.0	88.1
2010	113	67.1	24.9	0.8	97.5	24.7	60.9	74.7	83.7	89.5
2011	109	64.8	26.9	2.5	96.7	11.6	56.3	73.0	84.4	90.7
2012	85	64.9	27.8	3.7	96.9	15.9	55.1	74.4	86.7	89.2
1998-2012	1463	65.8	24.1	0.3	99.8	19.0	59.0	72.4	82.4	88.7

Table 4

Age distribution by 5-year age group and gender for period 1998-2012 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	168	4.7	4.7	95	4.6	4.6	73	5.0	5.0
5-9	83	2.3	7.1	49	2.4	6.9	34	2.3	7.3
10-14	50	1.4	8.5	27	1.3	8.2	23	1.6	8.9
15-19	47	1.3	9.8	29	1.4	9.6	18	1.2	10.1
20-24	24	0.7	10.5	12	0.6	10.2	12	0.8	10.9
25-29	20	0.6	11.1	13	0.6	10.8	7	0.5	11.4
30-34	25	0.7	11.8	20	1.0	11.8	5	0.3	11.8
35-39	42	1.2	13.0	28	1.3	13.2	14	1.0	12.7
40-44	76	2.1	15.1	45	2.2	15.3	31	2.1	14.8
45-49	97	2.7	17.9	64	3.1	18.4	33	2.3	17.1
50-54	165	4.7	22.5	116	5.6	24.0	49	3.3	20.4
55-59	242	6.8	29.4	155	7.5	31.5	87	5.9	26.4
60-64	350	9.9	39.3	213	10.3	41.7	137	9.4	35.7
65-69	443	12.5	51.8	291	14.0	55.8	152	10.4	46.1
70-74	448	12.7	64.4	293	14.1	69.9	155	10.6	56.7
75-79	439	12.4	76.9	259	12.5	82.4	180	12.3	69.0
80-84	367	10.4	87.2	190	9.2	91.5	177	12.1	81.1
85+	452	12.8	100.0	176	8.5	100.0	276	18.9	100.0
All ages	3538	100.0		2075	100.0		1463	100.0	

Included in the statistics are 42.4% multiple primaries in males and 31.1% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2012

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=334 %	Females DCO rate n=370 %	Males Prop.all cancers n=146755 %	Females Prop.all cancers n=142297 %
0- 4	95	73	6.9	5.6			31.0	32.3
5- 9	49	34	3.5	2.6	2.0	2.9	29.9	30.1
10-14	27	23	1.9	1.7			18.4	14.2
15-19	29	18	2.0	1.3	3.4	5.6	9.1	6.7
20-24	12	12	0.7	0.7		8.3	2.2	2.5
25-29	13	7	0.7	0.4	7.7	14.3	1.5	0.7
30-34	20	5	0.9	0.2	5.0		1.4	0.3
35-39	28	14	1.2	0.6		7.1	1.3	0.4
40-44	45	31	1.9	1.3	4.4		1.5	0.5
45-49	64	33	3.0	1.6	1.6		1.3	0.4
50-54	116	49	6.3	2.6	3.4	8.2	1.4	0.5
55-59	155	87	9.1	4.9	4.5	1.1	1.1	0.7
60-64	213	137	12.9	7.9	7.0	7.3	1.0	0.8
65-69	291	152	19.8	9.5	9.6	8.6	1.1	0.9
70-74	293	155	25.3	11.2	13.0	14.8	1.2	0.9
75-79	259	179	34.4	16.4	25.1	24.6	1.4	1.1
80-84	190	176	41.8	20.4	33.2	51.1	1.5	1.2
85+	175	275	56.4	33.6	61.1	65.5	1.9	1.7
All ages	2074	1460			16.1	25.3	1.4	1.0
Incidence								
Raw			7.6	5.1				
WS			5.2	3.1				
ES			6.5	3.6				
BRD-S			7.8	4.1				

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 1998-2012
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C07-C08	Salivary gland	5	0.2	25.4	8.2	59.3	#	8.4	
C15	Oesophagus	4	1.5	2.6	0.7	6.6		4.3	
C16	Stomach	9	3.7	2.4	1.1	4.6	#	9.3	
C18	Colon	19	8.8	2.2	1.3	3.4	#	17.9	5.3
C19-C20	Rectum	13	5.0	2.6	1.4	4.5	#	14.1	
C22	Liver	7	2.4	2.9	1.2	5.9	#	8.0	14.3
C25	Pancreas	2	3.1	0.6	0.1	2.3		-1.9	
C33-C34	Lung	28	10.5	2.7	1.8	3.9	#	30.7	
C43	Malign. melanoma	15	3.4	4.4	2.5	7.3	#	20.3	
C46,C49	Soft tissue	3	0.5	6.4	1.3	18.8	#	4.4	
C50	Breast	2	0.2	9.0	1.1	32.4	#	3.1	
C61	Prostate	57	26.3	2.2	1.6	2.8	#	53.6	3.5
C62	Testis	2	0.2	8.2	1.0	29.5		3.1	
C64	Kidney	5	3.1	1.6	0.5	3.8		3.3	
C65	Renal pelvis	2	0.4	5.6	0.7	20.4		2.9	
C67	Bladder	10	3.8	2.6	1.2	4.8	#	10.8	
C70-C72	CNS cancer	4	1.2	3.4	0.9	8.6		4.9	
C73	Thyroid	2	0.6	3.5	0.4	12.8		2.5	
C76-C79	CUP	3	1.5	2.0	0.4	5.9		2.6	
C81	Hodgkin lymphoma	4	0.2	21.4	5.8	54.8	#	6.7	
C82-C85	NHL	8	3.5	2.3	1.0	4.5		7.9	25.0
C90	Mult. myeloma	3	1.1	2.7	0.6	7.8		3.3	
C91-C96	Leukaemia	7	1.4	4.9	2.0	10.1	#	9.7	28.6
Other primaries		5	1.8	2.8	0.9	6.5		5.6	20.0
Not observed		0	4.8	0.0	0.0	0.8	#	-8.4	
All mult. primaries		219	89.2	2.5	2.1	2.8	#	226.9	4.1

Patients	1310
Mean age at second malignancy (years)	71.2
Person-years	5718
Mean observation time (years)	4.4
Median observation time (years)	3.8

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 1998-2012
FEMALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	5	1.5	3.4	1.1	7.9	#	9.8	
C18	Colon	7	4.0	1.7	0.7	3.6		8.2	14.3
C19-C20	Rectum	2	1.7	1.1	0.1	4.1		0.7	
C21	Anus/canal	2	0.2	10.0	1.2	36.2	#	5.0	
C25	Pancreas	3	1.7	1.7	0.4	5.1		3.5	
C33-C34	Lung	9	2.7	3.4	1.5	6.4	#	17.5	
C43	Malign. melanoma	5	1.3	3.9	1.3	9.0	#	10.3	
C50	Breast	25	11.3	2.2	1.4	3.3	#	37.8	
C54	Corpus uteri	4	2.2	1.8	0.5	4.7		5.0	
C56	Ovary	3	1.6	1.8	0.4	5.4		3.8	
C73	Thyroid	3	0.6	4.7	1.0	13.8		6.6	
C76-C79	CUP	2	0.7	2.9	0.4	10.4		3.6	
C82-C85	NHL	10	1.5	6.6	3.2	12.1	#	23.5	20.0
C91-C96	Leukaemia	3	0.6	4.8	1.0	13.9		6.6	
Other primaries		8	2.5	3.2	1.4	6.4	#	15.3	
Not observed		0	4.5	0.0	0.0	0.8	#	-12.4	
All mult. primaries		91	38.7	2.3	1.9	2.9	#	144.8	3.3

Patients	832
Mean age at second malignancy (years)	70.7
Person-years	3608
Mean observation time (years)	4.3
Median observation time (years)	3.7

The occurrence of second malignancy is statistically significant.

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

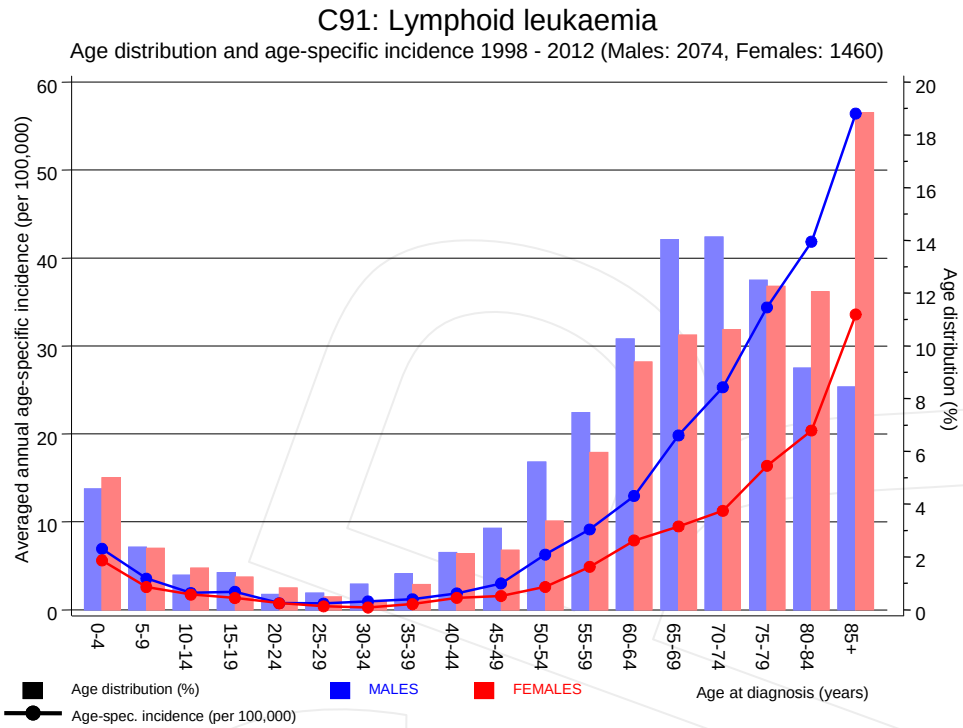


Figure 7. Age distribution and age-specific incidence

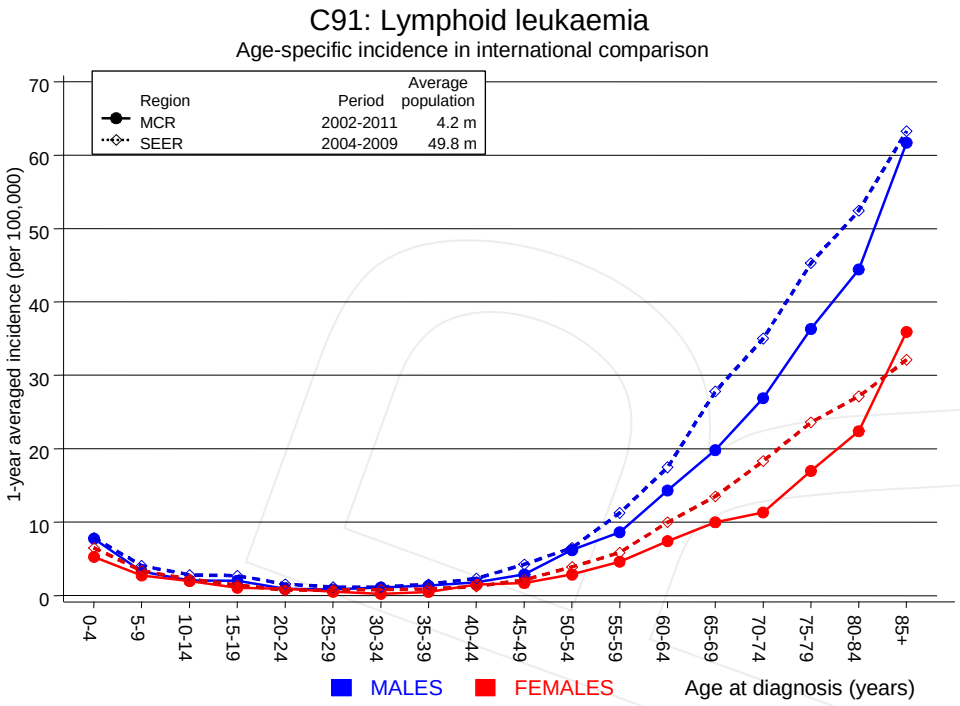


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

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.

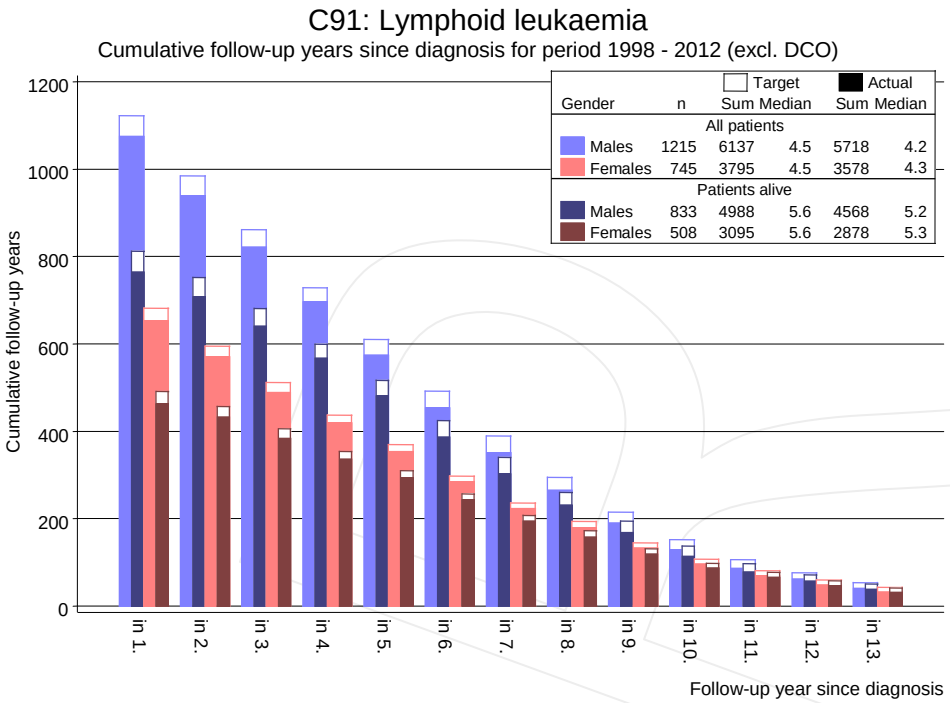
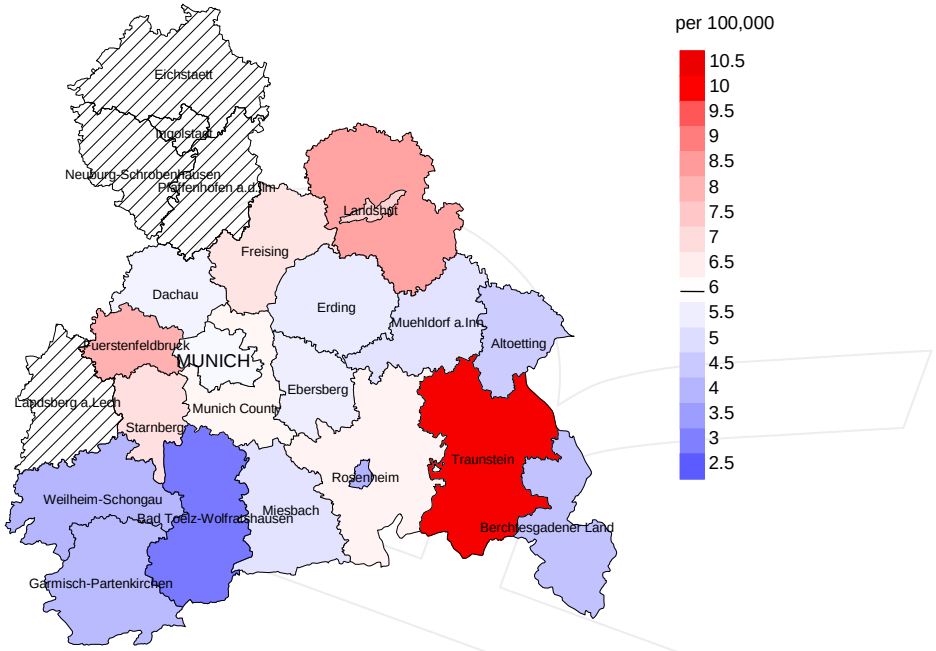


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

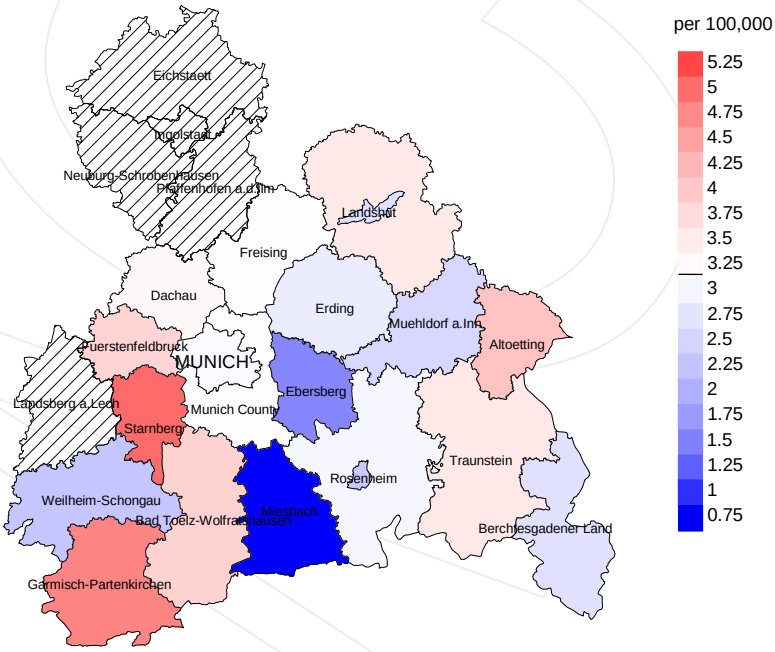
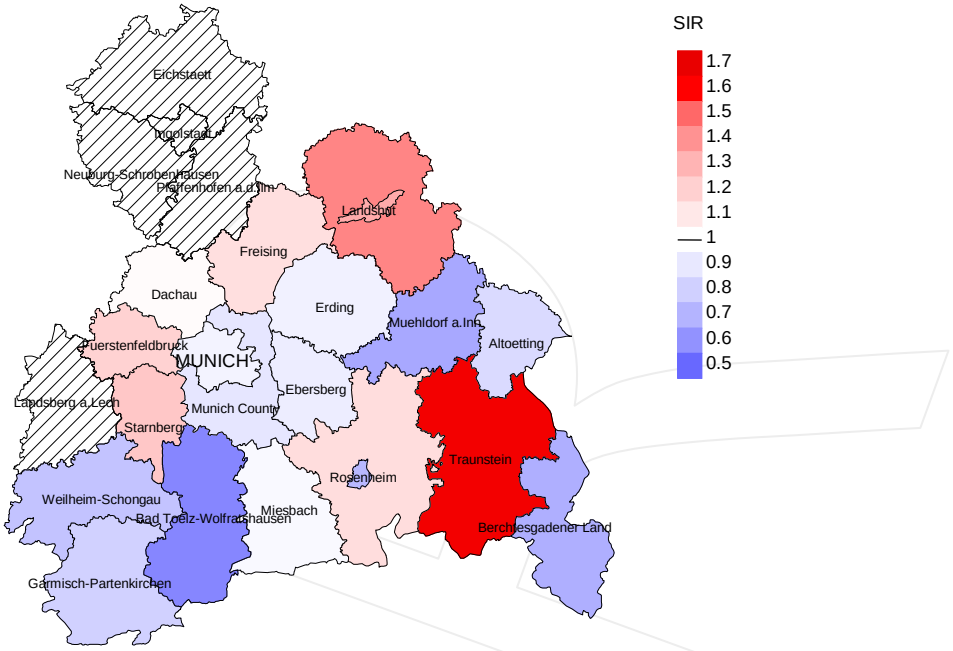


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 6.0/100,000 WS N=982, females 3.2/100,000 WS N=630). 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 11 women were identified with newly diagnosed lymphoid leukaemia. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.4 and 4.5/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

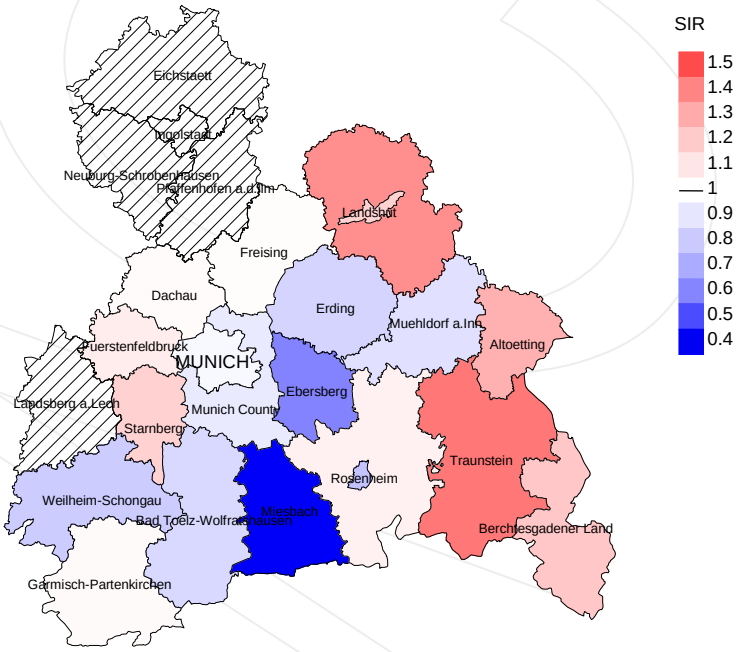


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=982, females N=630). 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 11 women were identified with newly diagnosed lymphoid leukaemia. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.60. Though, the value of this parameter may vary with an underlying probability of 99% between 0.23 and 1.23, 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	123	97.6	6.5	87	70.7	98.9
1999	123	96.7	6.5	74	60.2	95.9
2000	126	96.0	14.3	83	65.9	96.4
2001	176	98.3	23.9	116	65.9	98.3
2002	299	96.3	26.4	210	70.2	99.0
2003	257	96.1	27.2	160	62.3	99.4
2004	292	92.8	19.2	158	54.1	99.4
2005	271	94.1	21.4	160	59.0	98.8
2006	271	90.0	15.5	138	50.9	97.8
2007	321	77.6	18.4	156	48.6	99.4
2008	283	67.5	18.0	122	43.1	96.7
2009	279	65.9	17.9	108	38.7	98.1
2010	259	69.9	21.6	109	42.1	99.1
2011	256	69.1	21.1	91	35.5	96.7
2012	202	98.5	27.7	75	37.1	97.3
1998-2012	3538	85.3	20.0	1847	52.2	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 4.52 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	123	50	98.0	10	8.1
1999	123	59	93.2	7	5.7
2000	126	65	93.8	20	15.9
2001	176	109	96.3	47	26.7
2002	299	153	98.7	92	30.8
2003	257	142	98.6	84	32.7
2004	292	140	99.3	63	21.6
2005	271	168	100.0	72	26.6
2006	271	163	98.2	61	22.5
2007	321	184	98.4	78	24.3
2008	283	182	98.9	65	23.0
2009	279	158	100.0	57	20.4
2010	259	183	98.9	73	28.2
2011	256	184	99.5	61	23.8
2012	202	190	100.0	65	32.2
1998-2012	3538	2130	98.6	855	24.2

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	50	68.0	32.0	91.8
1999	59	67.8	32.2	89.1
2000	65	66.2	33.8	98.4
2001	109	63.3	36.7	93.3
2002	153	78.4	21.6	96.0
2003	142	81.7	18.3	95.0
2004	140	87.1	12.9	95.0
2005	168	82.1	17.9	97.0
2006	163	80.4	19.6	92.5
2007	184	77.7	22.3	91.2
2008	182	82.4	17.6	90.6
2009	158	84.8	15.2	93.0
2010	183	79.8	20.2	93.4
2011	184	76.6	23.4	89.1
2012	190	77.9	22.1	89.5
1998-2012	2130	78.6	21.4	92.8

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	31	66.6	62.6	80.3	65.7
1999	34	66.6	58.1	82.2	63.8
2000	44	65.6	61.7	73.9	65.3
2001	55	71.3	70.8	72.5	70.4
2002	88	72.4	71.7	75.6	72.5
2003	80	71.3	70.7	74.3	71.2
2004	87	70.9	69.7	80.4	71.1
2005	101	72.4	70.3	81.3	71.9
2006	98	72.3	70.3	81.0	71.4
2007	102	71.7	70.3	77.5	72.0
2008	111	73.6	72.5	78.9	73.4
2009	92	74.4	73.3	81.9	74.7
2010	108	75.8	74.8	79.2	75.5
2011	111	73.9	72.8	78.5	73.6
2012	119	75.2	74.1	78.2	74.7
1998-2012	1261	72.5	71.1	78.3	72.2

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	19	74.9	68.6	81.8	73.1
1999	25	74.4	71.4	81.9	72.6
2000	21	74.4	65.2	89.4	72.5
2001	54	76.3	72.2	81.7	75.8
2002	65	76.2	71.8	87.7	75.8
2003	62	75.2	72.7	86.7	74.8
2004	53	73.2	71.1	85.6	73.5
2005	67	78.5	76.7	88.8	78.2
2006	65	75.5	73.9	81.9	74.5
2007	82	77.8	74.6	87.3	78.4
2008	71	77.4	75.4	87.3	76.9
2009	66	73.3	71.3	82.1	72.9
2010	75	77.2	75.0	86.6	76.8
2011	73	76.0	72.0	85.9	74.7
2012	71	77.7	77.4	79.5	76.8
1998-2012	869	76.2	73.6	85.0	75.7

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	24	2.2	0.33	1.6	0.33	2.1	0.34	2.4	0.34
1999	22	2.0	0.35	1.6	0.39	1.9	0.36	2.3	0.37
2000	30	2.6	0.38	2.1	0.40	2.6	0.39	2.9	0.40
2001	38	3.3	0.39	1.9	0.31	2.9	0.37	4.0	0.42
2002	73	3.9	0.42	2.1	0.34	3.3	0.41	4.7	0.48
2003	65	3.5	0.41	1.9	0.33	2.9	0.39	4.0	0.43
2004	77	4.1	0.44	2.2	0.34	3.4	0.41	4.5	0.46
2005	81	4.3	0.47	2.4	0.36	3.4	0.43	4.7	0.48
2006	79	4.1	0.45	2.1	0.32	3.1	0.39	4.3	0.46
2007	82	3.7	0.45	2.0	0.38	2.9	0.42	4.0	0.47
2008	91	4.1	0.55	2.0	0.36	3.0	0.48	4.2	0.58
2009	80	3.6	0.52	1.6	0.40	2.6	0.48	3.6	0.55
2010	85	3.8	0.58	1.6	0.37	2.5	0.49	3.8	0.59
2011	89	3.9	0.61	1.8	0.39	2.7	0.50	3.8	0.62
2012	88	3.9	0.75	1.7	0.50	2.7	0.65	3.8	0.77
1998-2012	1004	3.7	0.48	1.9	0.37	2.9	0.44	3.9	0.51

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	10	0.9	0.20	0.5	0.19	0.6	0.19	0.7	0.19
1999	18	1.5	0.30	0.7	0.17	1.0	0.22	1.3	0.27
2000	13	1.1	0.27	0.7	0.25	0.8	0.25	0.9	0.26
2001	31	2.5	0.40	1.0	0.26	1.5	0.33	2.1	0.40
2002	47	2.4	0.37	1.1	0.37	1.6	0.37	2.0	0.39
2003	51	2.6	0.53	1.1	0.36	1.6	0.44	2.1	0.52
2004	45	2.3	0.38	1.0	0.30	1.4	0.33	1.8	0.37
2005	57	2.9	0.58	1.0	0.32	1.5	0.44	2.1	0.51
2006	52	2.6	0.55	1.1	0.37	1.5	0.45	2.1	0.54
2007	61	2.6	0.44	1.1	0.27	1.5	0.34	2.0	0.40
2008	59	2.5	0.50	1.0	0.31	1.4	0.39	1.9	0.46
2009	54	2.3	0.43	1.0	0.32	1.4	0.37	1.8	0.43
2010	61	2.6	0.54	1.0	0.34	1.4	0.42	1.9	0.50
2011	52	2.2	0.48	0.9	0.31	1.2	0.38	1.6	0.45
2012	60	2.5	0.71	0.8	0.36	1.3	0.49	1.8	0.63
1998-2012	671	2.3	0.46	1.0	0.31	1.4	0.37	1.8	0.44

Table 13

Age distribution of age at death (cancer-related) for period 1998-2012
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	5	0.3	0.3	3	0.3	0.3	2	0.3	0.3
5-9	13	0.8	1.1	7	0.7	1.0	6	0.9	1.2
10-14	16	1.0	2.0	8	0.8	1.8	8	1.2	2.4
15-19	10	0.6	2.6	4	0.4	2.2	6	0.9	3.3
20-24	16	1.0	3.6	11	1.1	3.3	5	0.7	4.0
25-29	8	0.5	4.0	6	0.6	3.9	2	0.3	4.3
30-34	8	0.5	4.5	7	0.7	4.6	1	0.1	4.5
35-39	20	1.2	5.7	10	1.0	5.6	10	1.5	5.9
40-44	12	0.7	6.4	10	1.0	6.5	2	0.3	6.2
45-49	26	1.5	8.0	13	1.3	7.8	13	1.9	8.2
50-54	33	2.0	9.9	20	2.0	9.8	13	1.9	10.1
55-59	75	4.5	14.4	51	5.1	14.9	24	3.6	13.7
60-64	122	7.3	21.6	80	7.9	22.8	42	6.2	19.9
65-69	202	12.0	33.7	145	14.4	37.2	57	8.5	28.4
70-74	257	15.3	48.9	166	16.5	53.6	91	13.5	41.9
75-79	293	17.4	66.3	181	17.9	71.6	112	16.6	58.5
80-84	281	16.7	83.1	154	15.3	86.8	127	18.9	77.4
85+	285	16.9	100.0	133	13.2	100.0	152	22.6	100.0
All ages	1682	100.0		1009	100.0		673	100.0	

Included in the statistics are 42.4% multiple primaries in males and 31.1% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**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	2	0.2	0.03	0.2	0.03	9.7	8.7
5- 9	7	6	0.5	0.14	0.5	0.18	20.0	15.4
10-14	8	8	0.6	0.30	0.6	0.35	24.2	28.6
15-19	4	6	0.3	0.14	0.4	0.33	9.5	17.6
20-24	11	5	0.7	0.92	0.3	0.42	13.3	10.6
25-29	6	2	0.3	0.46	0.1	0.29	6.3	1.8
30-34	7	1	0.3	0.35	0.0	0.20	4.0	0.5
35-39	10	10	0.4	0.36	0.5	0.71	2.6	2.0
40-44	10	2	0.4	0.22	0.1	0.06	1.2	0.2
45-49	13	13	0.6	0.20	0.6	0.39	0.8	0.7
50-54	20	13	1.1	0.17	0.7	0.27	0.7	0.5
55-59	51	24	3.0	0.33	1.3	0.28	0.9	0.5
60-64	80	42	4.9	0.38	2.4	0.31	1.0	0.7
65-69	145	57	9.9	0.50	3.6	0.38	1.3	0.7
70-74	166	91	14.3	0.57	6.6	0.59	1.3	1.0
75-79	181	112	24.0	0.70	10.2	0.62	1.5	1.1
80-84	154	127	33.9	0.81	14.7	0.72	1.6	1.2
85+	133	152	42.9	0.76	18.6	0.55	1.7	1.2
All ages	1009	673					1.4	1.0
Mortality								
Raw			3.7	0.49	2.3	0.46		
WS			1.9	0.37	1.0	0.31		
ES			2.9	0.44	1.4	0.37		
BRD-S			4.0	0.51	1.8	0.44		
PYLL-70								
per 100,000			21.0		13.5			
ES			21.4		14.6			
AYLL-70			13.8		17.3			

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

Table 15a

Multiple primaries in deaths in period 1998-2012
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	7	1.2	1	14.3	3	42.9	3	42.9
C07-C08 Salivary gland	5	0.9			1	20.0	4	80.0
C16 Stomach	11	1.9	2	18.2			9	81.8
C18 Colon	44	7.5	18	40.9	6	13.6	20	45.5
C19-C20 Rectum	24	4.1	7	29.2	3	12.5	14	58.3
C25 Pancreas	6	1.0			2	33.3	4	66.7
C33-C34 Lung	59	10.1	5	8.5	13	22.0	41	69.5
C43 Malign. melanoma	30	5.1	10	33.3	3	10.0	17	56.7
C44 Skin others	158	27.0	16	10.1	7	4.4	135	85.4
C46,C49 Soft tissue	10	1.7	5	50.0			5	50.0
C61 Prostate	84	14.4	39	46.4	11	13.1	34	40.5
C64 Kidney	14	2.4	6	42.9	2	14.3	6	42.9
C67 Bladder	25	4.3	9	36.0	3	12.0	13	52.0
C70-C72 CNS cancer	10	1.7			3	30.0	7	70.0
C76-C79 CUP	6	1.0					6	100.0
C81 Hodgkin lymphoma	9	1.5	2	22.2	1	11.1	6	66.7
C82-C85 NHL	24	4.1			5	20.8	19	79.2
C90 Mult. myeloma	8	1.4	3	37.5	4	50.0	1	12.5
C91-C96 Leukaemia	20	3.4			3	15.0	17	85.0
Other primaries	31	5.3	12	38.7	6	19.4	13	41.9
All mult. primaries	585	100.0	135	23.1	76	13.0	374	63.9

Multiple primaries with number of cases n<5 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 1998-2012
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	6	2.4	1	16.7	3	50.0	2	33.3
C18	Colon	18	7.1	7	38.9	2	11.1	9	50.0
C19-C20	Rectum	4	1.6	3	75.0			1	25.0
C23-C24	Bile	3	1.2	1	33.3	1	33.3	1	33.3
C25	Pancreas	6	2.4					6	100.0
C33-C34	Lung	13	5.1	1	7.7	1	7.7	11	84.6
C43	Malign. melanoma	9	3.6	7	77.8			2	22.2
C44	Skin others	59	23.3	14	23.7	4	6.8	41	69.5
C46,C49	Soft tissue	2	0.8	1	50.0			1	50.0
C50	Breast	47	18.6	26	55.3	6	12.8	15	31.9
C51	Vulva	4	1.6	3	75.0			1	25.0
C53	Cervix uteri	3	1.2	3	100.0				
C54	Corpus uteri	7	2.8	3	42.9	1	14.3	3	42.9
C56	Ovary	10	4.0	3	30.0	2	20.0	5	50.0
C64	Kidney	7	2.8	2	28.6	3	42.9	2	28.6
C67	Bladder	5	2.0	2	40.0	2	40.0	1	20.0
C70-C72	CNS cancer	9	3.6	2	22.2	2	22.2	5	55.6
C73	Thyroid	2	0.8	1	50.0			1	50.0
C76-C79	CUP	4	1.6	1	25.0			3	75.0
C82-C85	NHL	13	5.1			1	7.7	12	92.3
C90	Mult. myeloma	5	2.0			2	40.0	3	60.0
C91-C96	Leukaemia	5	2.0			1	20.0	4	80.0
Other primaries		12	4.7	3	25.0	2	16.7	7	58.3
All mult. primaries		253	100.0	84	33.2	33	13.0	136	53.8

Multiple primaries with number of cases n<2 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 1998-2012
(**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	3	2	0.2	0.03	0.2	0.03	11.5	8.7
5- 9	7	6	0.5	0.14	0.5	0.18	21.2	16.7
10-14	8	8	0.6	0.30	0.6	0.35	24.2	30.8
15-19	4	5	0.3	0.14	0.4	0.29	10.3	16.1
20-24	11	5	0.7	0.92	0.3	0.42	14.1	11.6
25-29	5	2	0.3	0.42	0.1	0.29	5.6	1.9
30-34	7	1	0.3	0.37	0.0	0.20	4.1	0.5
35-39	9	9	0.4	0.35	0.4	0.69	2.5	2.0
40-44	10	2	0.4	0.23	0.1	0.07	1.3	0.2
45-49	11	12	0.5	0.19	0.6	0.43	0.7	0.7
50-54	17	12	0.9	0.16	0.6	0.28	0.6	0.5
55-59	43	20	2.5	0.32	1.1	0.28	0.9	0.5
60-64	64	37	3.9	0.36	2.1	0.31	0.9	0.7
65-69	122	50	8.3	0.51	3.1	0.41	1.3	0.8
70-74	140	84	12.1	0.67	6.1	0.68	1.4	1.2
75-79	142	86	18.8	0.77	7.9	0.64	1.5	1.1
80-84	121	100	26.6	0.92	11.6	0.76	1.6	1.2
85+	94	118	30.3	0.81	14.4	0.54	1.5	1.2
All ages	818	559					1.4	1.0
Mortality								
Raw			3.0	0.49	1.9	0.46		
WS			1.6	0.36	0.8	0.30		
ES			2.3	0.44	1.2	0.37		
BRD-S			3.2	0.52	1.5	0.44		
PYLL-70								
per 100,000			19.1		12.5			
ES			19.8		13.7			
AYLL-70			14.8		18.0			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**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	2	0.2	0.03	0.2	0.03	12.0	8.7
5- 9	6	5	0.4	0.13	0.4	0.15	18.8	14.3
10-14	8	6	0.6	0.32	0.4	0.26	24.2	25.0
15-19	4	5	0.3	0.14	0.4	0.29	10.3	19.2
20-24	9	4	0.6	0.75	0.2	0.33	12.3	10.0
25-29	4	2	0.2	0.33	0.1	0.29	4.8	2.1
30-34	7	1	0.3	0.39	0.0	0.20	4.2	0.6
35-39	8	9	0.3	0.32	0.4	0.69	2.3	2.2
40-44	9	2	0.4	0.21	0.1	0.07	1.3	0.2
45-49	9	10	0.4	0.16	0.5	0.38	0.6	0.7
50-54	16	11	0.9	0.18	0.6	0.29	0.7	0.5
55-59	35	18	2.1	0.31	1.0	0.29	0.8	0.5
60-64	44	31	2.7	0.33	1.8	0.30	0.7	0.7
65-69	80	43	5.5	0.43	2.7	0.43	1.0	0.8
70-74	97	67	8.4	0.60	4.9	0.60	1.2	1.1
75-79	100	64	13.3	0.64	5.9	0.53	1.3	1.0
80-84	87	87	19.2	0.74	10.1	0.73	1.5	1.2
85+	74	100	23.9	0.66	12.2	0.47	1.5	1.1
All ages	600	467					1.2	1.0
Mortality								
Raw			2.2	0.42	1.6	0.42		
WS			1.2	0.30	0.7	0.27		
ES			1.7	0.37	1.0	0.34		
BRD-S			2.3	0.44	1.3	0.40		
PYLL-70								
per 100,000			16.4		11.0			
ES			17.2		12.0			
AYLL-70			16.8		18.1			

* See corresponding tables with multiple primaries.

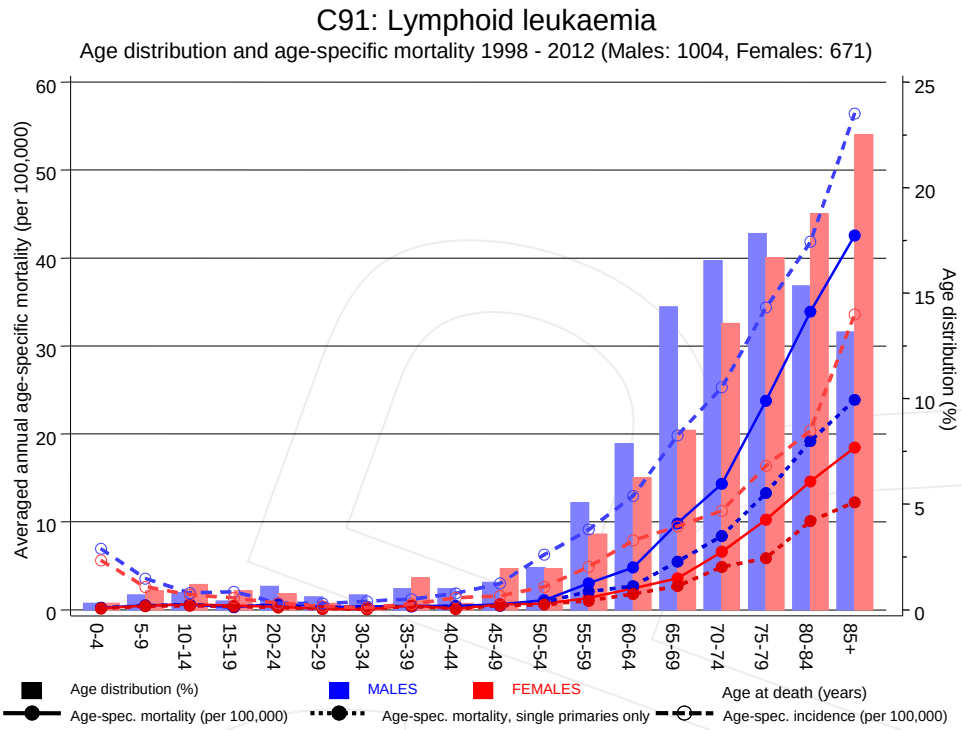
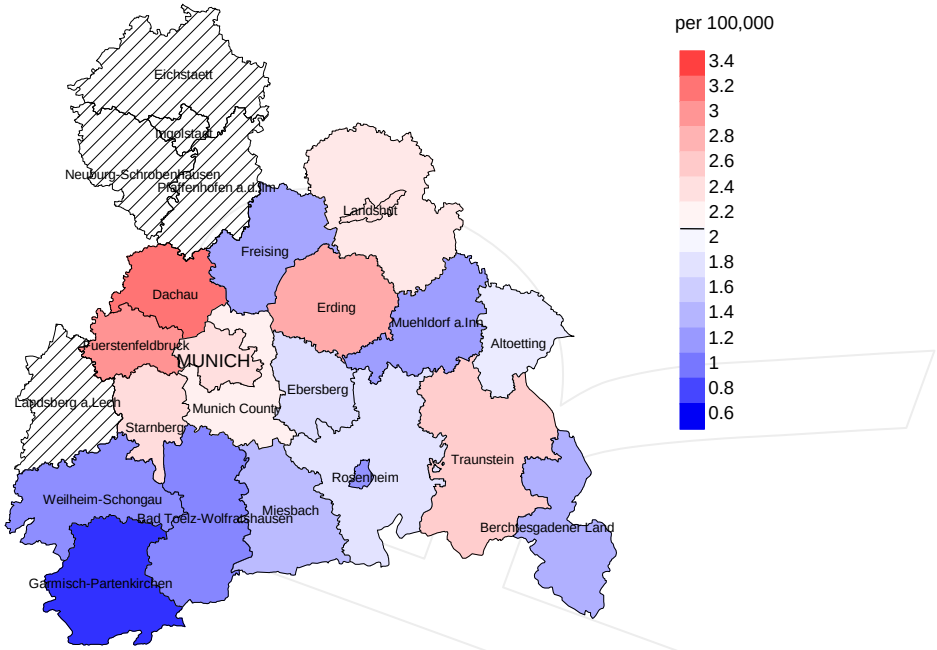


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



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

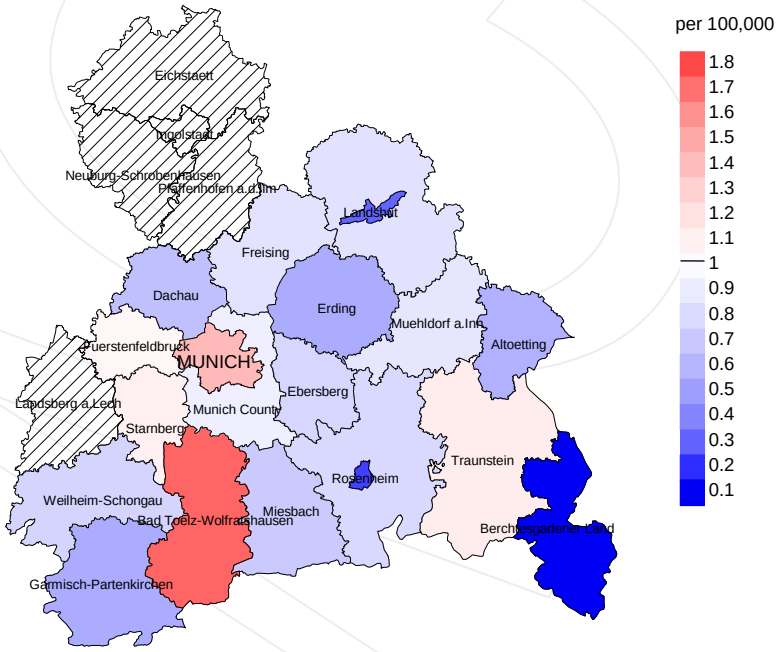
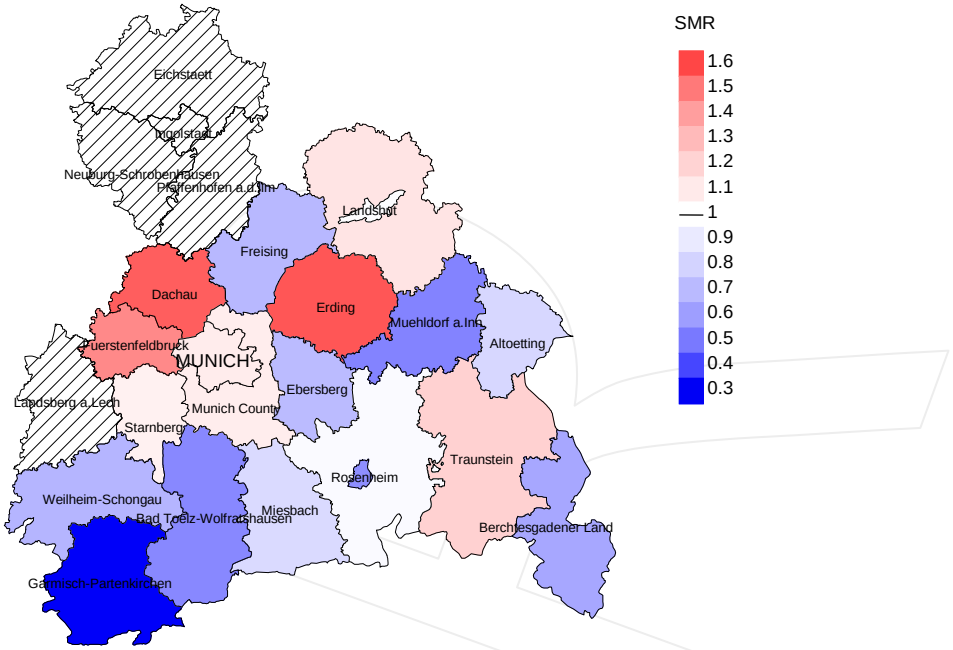


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 2.1/100,000 WS N=455, females 1.0/100,000 WS N=314). 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 8 women died from lymphoid leukaemia. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.8/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.2 and 2.1/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

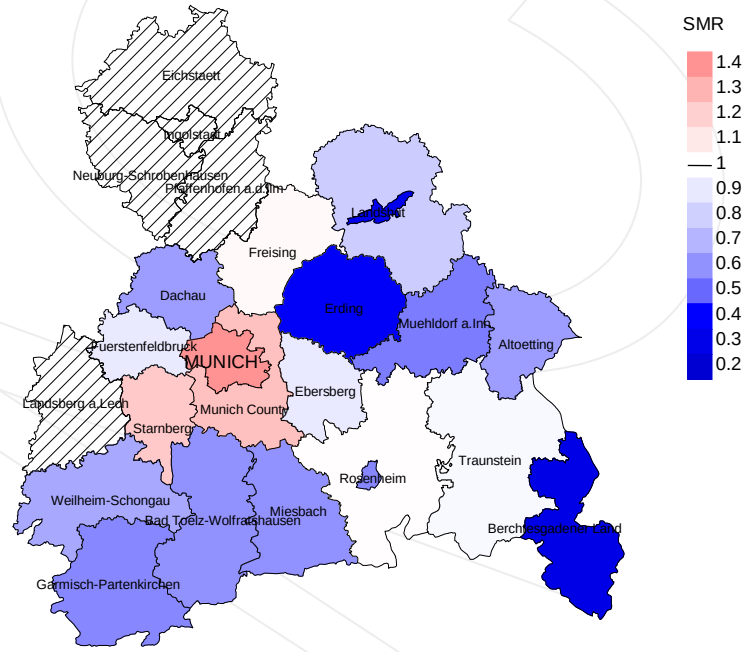


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=455, females N=314). 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 8 women died from lymphoid leukaemia. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.90. Though, the value of this parameter may vary with an underlying probability of 99% between 0.29 and 2.10, 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

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