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-C95: Leukaemias

Year of diagnosis	1998-2012
Patients	7,860
Diseases	7,928
Creation date	03/20/2014
Export date	02/12/2014
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C9195E.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
C92	Myeloid leukaemia
C93	Monocytic leukaemia
C94	Other leukaemias of specified cell type
C95	Leukaemia of unspecified cell type

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	299	85	28.4	18.7	81.9	98.7	
1999	309	76	24.6	21.7	74.1	98.4	
2000	328	92	28.0	22.3	72.0	97.9	
2001	358	126	35.2	22.6	75.7	98.6	
2002	560	195	34.8	25.4	75.0	96.6	#
2003	568	197	34.7	23.8	72.9	97.2	#
2004	617	195	31.6	27.2	66.9	95.6	#
2005	579	179	30.9	30.6	70.6	95.9	#
2006	593	173	29.2	33.6	69.6	93.8	#
2007	643	160	24.9	26.3	61.1	84.3	# ##
2008	633	166	26.2	31.3	58.6	76.1	
2009	644	159	24.7	28.9	59.2	76.4	
2010	655	152	23.2	31.9	58.8	77.6	
2011	617	140	22.7	32.6	52.5	77.1	
2012	525	180	34.3	31.0	53.1	99.0	###
1998-2012	7928	2275	28.7	28.1	65.4	89.4	

\# 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	299	164	135	54.8
1999	309	165	144	53.4
2000	328	179	149	54.6
2001	358	195	163	54.5
2002	560	303	257	54.1
2003	568	316	252	55.6
2004	617	330	287	53.5
2005	579	335	244	57.9
2006	593	361	232	60.9
2007	643	360	283	56.0
2008	633	356	277	56.2
2009	644	339	305	52.6
2010	655	345	310	52.7
2011	617	339	278	54.9
2012	525	280	245	53.3
1998-2012	7928	4367	3561	55.1

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	164	135	14.8	11.5	10.1	6.2	13.8	8.2	17.0	9.8
1999	165	144	14.7	12.1	9.8	7.7	13.6	9.3	17.0	10.6
2000	179	149	15.7	12.4	11.3	7.3	14.8	9.3	18.1	10.7
2001	195	163	16.8	13.4	11.4	6.9	15.3	9.2	18.7	11.1
2002	303	257	16.3	13.1	10.8	6.3	14.3	8.6	17.8	10.6
2003	316	252	16.9	12.8	10.5	6.8	14.5	8.7	18.5	10.5
2004	330	287	17.5	14.5	11.3	7.9	15.0	10.1	18.5	12.0
2005	335	244	17.7	12.3	11.4	6.7	14.9	8.4	19.0	10.2
2006	361	232	18.9	11.5	12.0	5.8	15.9	7.4	19.5	9.2
2007	360	283	16.3	12.3	9.8	6.8	13.2	8.5	16.7	10.1
2008	356	277	16.0	11.9	10.5	6.1	13.0	7.9	15.9	9.7
2009	339	305	15.2	13.1	8.6	6.7	11.9	8.6	14.9	10.3
2010	345	310	15.3	13.2	8.8	6.7	11.9	8.6	15.1	10.4
2011	339	278	14.8	11.8	9.1	6.4	11.7	7.8	14.1	9.1
2012	280	245	12.3	10.4	6.8	5.5	9.1	6.9	11.8	8.2
1998-2012	4367	3561	15.9	12.4	10.0	6.6	13.3	8.4	16.5	10.1

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	299	64.6	20.2	0.9	95.8	37.1	55.6	68.0	79.0	86.5
1999	309	63.5	20.7	0.3	104	39.0	55.9	68.2	77.0	85.2
2000	328	62.6	20.3	0.4	97.6	35.5	53.6	66.7	76.3	85.6
2001	358	65.0	19.5	1.4	96.4	38.5	57.2	67.6	78.1	86.4
2002	560	66.3	19.1	1.0	99.3	41.7	59.1	69.6	78.9	86.4
2003	568	66.3	19.9	0.3	98.9	41.4	57.8	70.3	80.5	86.6
2004	617	65.4	20.0	0.4	98.6	38.9	58.6	68.7	79.4	85.5
2005	579	65.4	21.8	0.0	98.2	34.0	58.4	71.6	79.6	85.1
2006	593	66.6	20.7	0.6	95.4	38.1	60.7	71.7	79.8	86.3
2007	643	65.4	20.3	0.3	99.8	39.4	57.3	70.1	79.7	85.3
2008	633	65.6	21.4	0.4	98.1	35.0	60.0	71.0	79.6	86.2
2009	644	67.0	19.2	1.3	100	42.1	58.2	71.3	80.5	86.9
2010	655	67.6	20.3	0.3	101	42.8	59.9	72.4	81.4	87.8
2011	617	65.8	21.5	0.3	101	40.5	56.7	71.2	80.6	86.8
2012	525	67.3	21.1	0.0	102	39.4	58.2	73.1	81.4	87.4
1998-2012	7928	65.8	20.5	0.0	104	39.0	57.9	70.6	79.9	86.4

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	164	63.2	20.5	0.9	95.8	37.1	55.1	65.4	78.0	86.4
1999	165	63.3	19.3	0.3	94.1	39.5	55.6	67.5	77.0	84.0
2000	179	61.5	20.6	0.4	97.6	34.1	52.9	66.6	74.9	84.0
2001	195	61.6	18.7	1.4	96.4	37.9	54.5	64.8	75.1	80.8
2002	303	63.0	19.9	1.0	98.3	32.7	55.6	67.7	75.9	82.2
2003	316	64.9	19.0	1.6	93.6	40.6	58.7	68.3	78.0	84.1
2004	330	64.2	20.2	0.4	96.1	36.9	58.6	67.5	77.8	84.7
2005	335	64.2	21.9	0.0	94.6	32.1	56.7	70.8	78.4	84.1
2006	361	64.5	20.5	1.0	95.4	36.1	58.4	69.9	77.5	84.1
2007	360	64.6	19.3	0.3	97.8	39.5	56.4	69.8	78.0	83.3
2008	356	63.4	22.3	0.4	98.1	26.6	58.5	69.9	77.8	83.4
2009	339	66.3	17.9	2.2	97.0	45.0	57.9	70.1	77.8	85.1
2010	345	67.2	19.8	0.3	101	43.8	60.3	72.0	80.0	86.7
2011	339	64.7	20.8	2.5	101	40.6	56.3	69.6	78.7	85.1
2012	280	67.1	20.2	2.4	95.2	40.3	60.6	72.4	80.7	85.6
1998-2012	4367	64.5	20.2	0.0	101	37.6	57.1	69.2	78.0	84.4

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	135	66.2	19.8	1.3	93.9	38.4	57.2	71.4	81.5	86.7
1999	144	63.7	22.2	1.5	104	39.0	56.0	69.3	77.0	87.2
2000	149	63.8	20.0	2.1	95.1	36.3	54.5	66.8	77.3	86.2
2001	163	69.1	19.6	2.8	95.5	51.2	61.8	72.5	81.9	88.5
2002	257	70.1	17.5	2.9	99.3	47.5	62.1	73.2	82.6	89.0
2003	252	67.9	20.8	0.3	98.9	42.5	57.5	74.1	82.3	88.9
2004	287	66.7	19.8	0.7	98.6	41.0	58.1	69.9	81.0	86.9
2005	244	67.0	21.6	0.6	98.2	37.0	61.0	74.0	81.3	85.8
2006	232	69.7	20.6	0.6	95.1	44.2	65.2	75.0	82.7	88.5
2007	283	66.5	21.5	1.0	99.8	38.7	59.4	71.6	81.1	86.5
2008	277	68.3	20.0	1.4	97.4	41.4	61.0	72.7	82.4	87.4
2009	305	67.8	20.5	1.3	100	40.3	58.6	72.4	82.9	88.4
2010	310	68.0	20.8	0.8	98.7	41.1	58.9	72.8	82.6	88.7
2011	278	67.1	22.4	0.3	96.7	39.6	57.7	73.1	82.5	88.5
2012	245	67.5	22.1	0.0	102	39.4	57.0	74.2	82.8	88.8
1998-2012	3561	67.5	20.7	0.0	104	40.4	59.0	72.5	82.0	87.9

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	210	2.6	2.6	118	2.7	2.7	92	2.6	2.6
5-9	100	1.3	3.9	61	1.4	4.1	39	1.1	3.7
10-14	69	0.9	4.8	38	0.9	5.0	31	0.9	4.5
15-19	73	0.9	5.7	46	1.1	6.0	27	0.8	5.3
20-24	57	0.7	6.4	29	0.7	6.7	28	0.8	6.1
25-29	67	0.8	7.3	41	0.9	7.6	26	0.7	6.8
30-34	95	1.2	8.5	64	1.5	9.1	31	0.9	7.7
35-39	151	1.9	10.4	78	1.8	10.9	73	2.0	9.7
40-44	233	2.9	13.3	134	3.1	13.9	99	2.8	12.5
45-49	261	3.3	16.6	143	3.3	17.2	118	3.3	15.8
50-54	370	4.7	21.3	226	5.2	22.4	144	4.0	19.9
55-59	521	6.6	27.8	292	6.7	29.1	229	6.4	26.3
60-64	686	8.7	36.5	416	9.5	38.6	270	7.6	33.9
65-69	964	12.2	48.7	589	13.5	52.1	375	10.5	44.4
70-74	1056	13.3	62.0	626	14.3	66.4	430	12.1	56.5
75-79	1063	13.4	75.4	594	13.6	80.0	469	13.2	69.7
80-84	953	12.0	87.4	478	10.9	91.0	475	13.3	83.0
85+	999	12.6	100.0	394	9.0	100.0	605	17.0	100.0
All ages	7928	100.0		4367	100.0		3561	100.0	

Included in the statistics are 37.5% multiple primaries in males and 31.4% 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=1109 %	Females DCO rate n=1150 %	Males Prop.all cancers n=146755 %	Females Prop.all cancers n=142297 %
0- 4	118	92	8.6	7.1			38.6	40.7
5- 9	61	39	4.4	3.0	1.6	2.6	37.2	34.5
10-14	38	31	2.7	2.3			25.9	19.1
15-19	46	27	3.2	2.0	4.3	3.7	14.4	10.1
20-24	29	28	1.8	1.7	6.9	10.7	5.2	5.8
25-29	41	26	2.2	1.4	2.4	3.8	4.6	2.5
30-34	64	31	3.0	1.5	9.4	3.2	4.5	1.6
35-39	78	73	3.3	3.3	9.0	8.2	3.7	2.1
40-44	134	99	5.5	4.3	8.2	8.1	4.5	1.7
45-49	143	117	6.6	5.5	6.3	12.0	2.9	1.5
50-54	226	144	12.2	7.6	10.6	13.2	2.8	1.4
55-59	292	229	17.2	12.9	13.4	13.1	2.2	1.8
60-64	414	269	25.1	15.5	14.7	16.0	2.0	1.7
65-69	589	375	40.1	23.4	19.2	22.7	2.3	2.1
70-74	624	428	53.9	31.0	23.7	24.1	2.5	2.5
75-79	591	463	78.4	42.3	32.8	35.4	3.1	2.8
80-84	474	472	104.4	54.7	48.7	54.0	3.8	3.2
85+	392	602	126.4	73.5	66.3	69.1	4.3	3.8
All ages	4354	3545			25.5	32.4	3.0	2.5
Incidence								
Raw			15.9	12.4				
WS			10.0	6.6				
ES			13.2	8.4				
BRD-S			16.4	10.1				

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	0.3	18.0	5.8	42.0	#	5.5	
C09-C10	Oropharynx	3	1.3	2.3	0.5	6.6		1.9	
C15	Oesophagus	5	2.2	2.3	0.7	5.3		3.2	
C16	Stomach	14	5.2	2.7	1.5	4.5	#	10.2	
C18	Colon	23	12.4	1.9	1.2	2.8	#	12.3	4.3
C19-C20	Rectum	16	7.0	2.3	1.3	3.7	#	10.4	
C22	Liver	8	3.4	2.3	1.0	4.6	#	5.3	12.5
C25	Pancreas	4	4.4	0.9	0.2	2.3		-0.4	
C33-C34	Lung	36	14.8	2.4	1.7	3.4	#	24.5	
C38,C45	Mesothelioma	3	0.8	3.6	0.7	10.6		2.5	33.3
C43	Malign. melanoma	23	4.9	4.7	3.0	7.1	#	21.0	
C46,C49	Soft tissue	4	0.7	6.0	1.6	15.4	#	3.9	
C50	Breast	2	0.3	6.3	0.8	22.9		2.0	
C61	Prostate	80	37.3	2.1	1.7	2.7	#	49.4	6.3
C62	Testis	2	0.5	4.4	0.5	15.9		1.8	
C64	Kidney	6	4.4	1.4	0.5	3.0		1.8	
C65	Renal pelvis	2	0.5	4.0	0.5	14.4		1.7	
C67	Bladder	13	5.4	2.4	1.3	4.1	#	8.8	7.7
C70-C72	CNS cancer	5	1.7	2.9	1.0	6.8		3.8	
C73	Thyroid	2	0.8	2.4	0.3	8.7		1.4	
C76-C79	CUP	6	2.1	2.9	1.0	6.2	#	4.5	
C81	Hodgkin lymphoma	6	0.3	21.4	7.8	46.5	#	6.6	
C82-C85	NHL	21	5.0	4.2	2.6	6.5	#	18.6	14.3
C90	Mult. myeloma	7	1.6	4.4	1.8	9.1	#	6.3	
C91-C96	Leukaemia	25	2.0	12.4	8.0	18.3	#	26.6	36.0
Other primaries		6	3.1	1.9	0.7	4.2		3.4	
Not observed		0	4.2	0.0	0.0	0.9	#	-4.9	
All mult. primaries		327	126.7	2.6	2.3	2.9	#	232.0	6.4

Patients	2536
Mean age at second malignancy (years)	70.8
Person-years	8631
Mean observation time (years)	3.4
Median observation time (years)	2.3

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 %
C09-C10	Oropharynx	2	0.3	8.0	1.0	28.8		2.8	
C15	Oesophagus	2	0.3	5.9	0.7	21.2		2.7	
C16	Stomach	6	2.3	2.6	0.9	5.6		5.9	
C18	Colon	15	6.4	2.4	1.3	3.9	#	13.9	13.3
C19-C20	Rectum	4	2.8	1.4	0.4	3.7		1.9	
C21	Anus/canal	2	0.3	6.2	0.7	22.2		2.7	
C22	Liver	2	0.7	2.8	0.3	10.3		2.1	50.0
C23-C24	Bile	2	0.9	2.2	0.3	7.9		1.7	
C25	Pancreas	5	2.7	1.8	0.6	4.3		3.7	20.0
C33-C34	Lung	14	4.3	3.2	1.8	5.4	#	15.5	
C43	Malign. melanoma	6	2.2	2.8	1.0	6.0	#	6.1	
C50	Breast	40	18.8	2.1	1.5	2.9	#	34.1	
C53	Cervix uteri	3	0.9	3.5	0.7	10.3		3.4	66.7
C54	Corpus uteri	10	3.5	2.8	1.4	5.2	#	10.4	
C56	Ovary	3	2.7	1.1	0.2	3.3		0.6	
C73	Thyroid	3	1.1	2.6	0.5	7.7		3.0	
C76-C79	CUP	3	1.1	2.8	0.6	8.1		3.1	
C82-C85	NHL	13	2.4	5.4	2.9	9.2	#	17.0	23.1
C90	Mult. myeloma	2	0.8	2.5	0.3	9.2		2.0	
C91-C96	Leukaemia	8	1.0	8.0	3.4	15.7	#	11.2	12.5
Other primaries		7	3.1	2.2	0.9	4.6		6.2	14.3
Not observed		0	4.2	0.0	0.0	0.9	#	-6.7	
All mult. primaries		152	62.8	2.4	2.1	2.8	#	143.2	7.2

Patients	1915
Mean age at second malignancy (years)	69.7
Person-years	6226
Mean observation time (years)	3.3
Median observation time (years)	1.9

The occurrence of second malignancy is statistically significant.

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

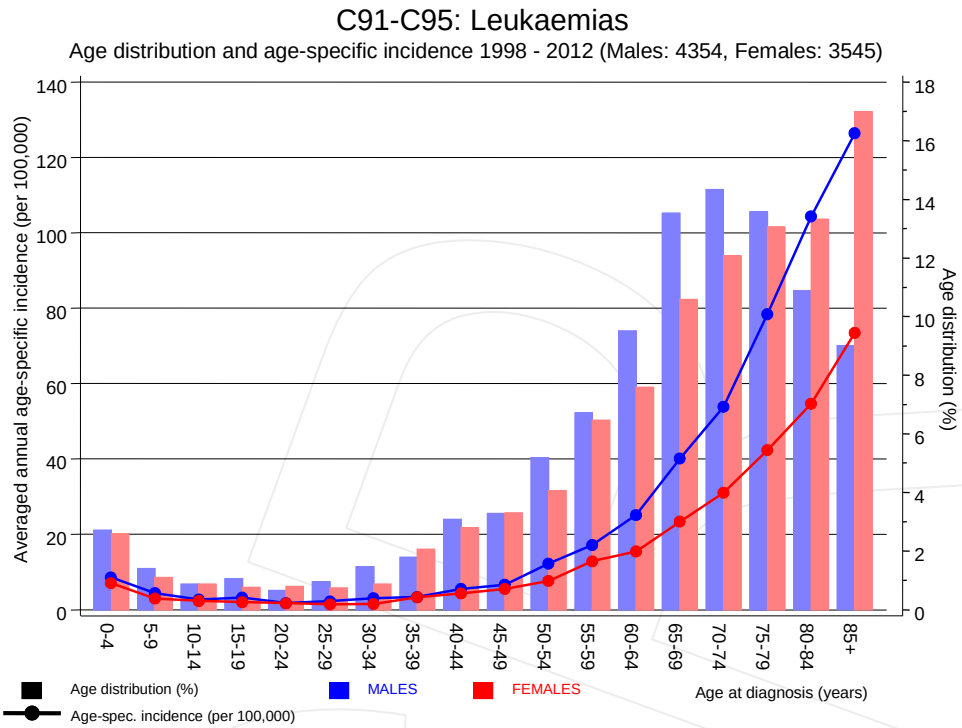


Figure 7. Age distribution and age-specific incidence

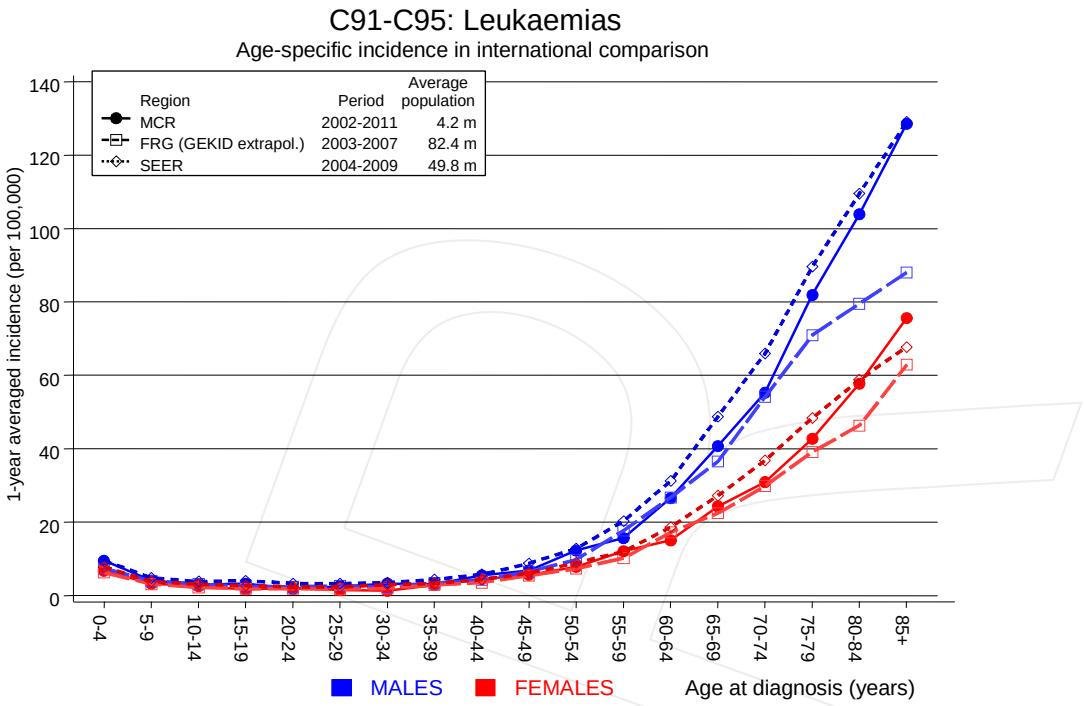


Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

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.

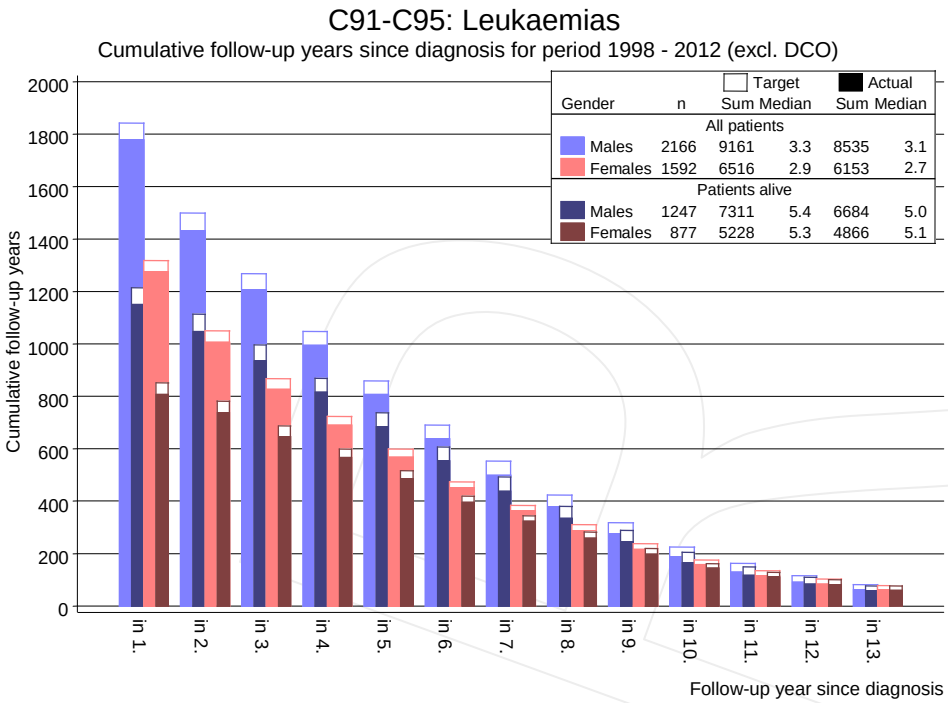
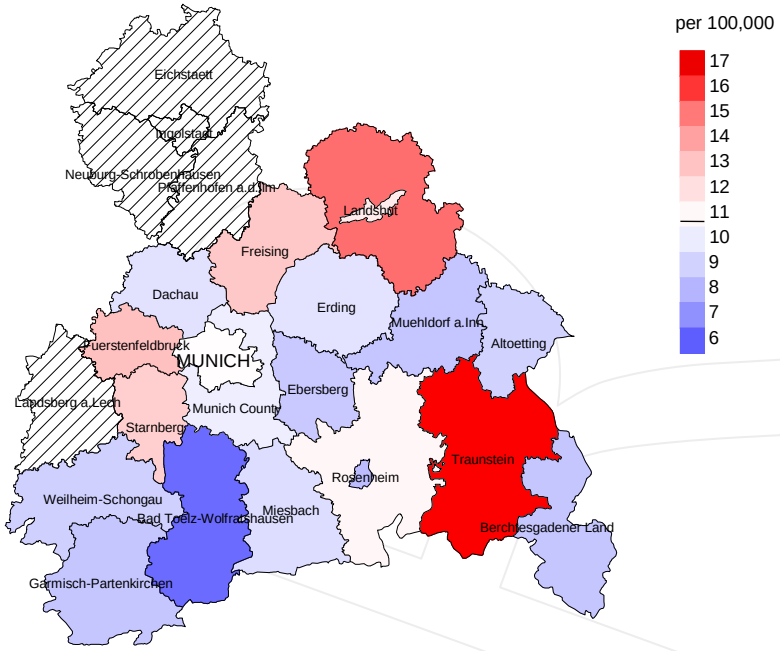


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

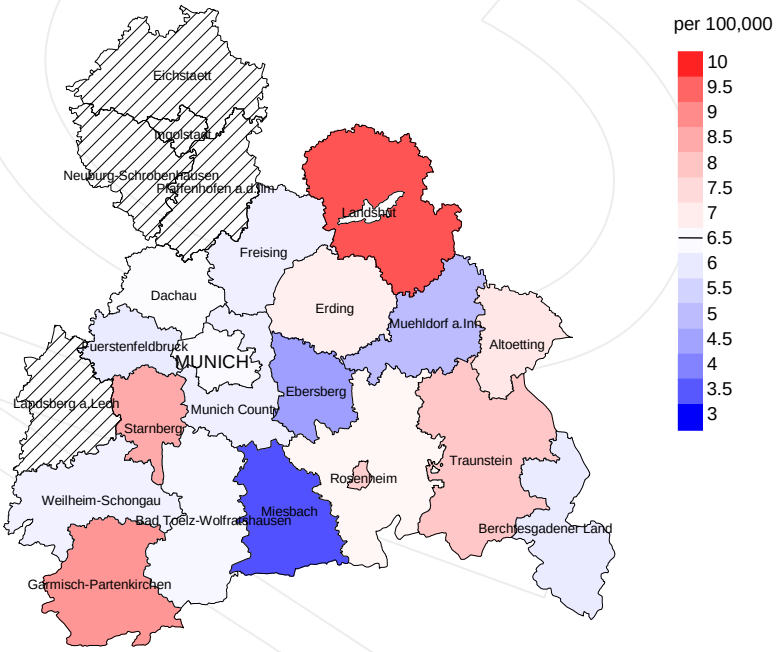
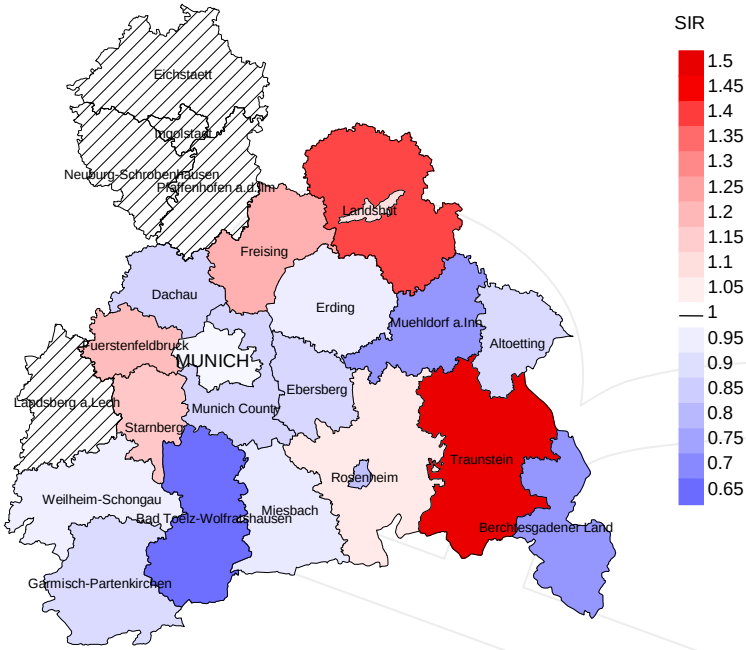


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 10.7/100,000 WS N=1,936, females 6.6/100,000 WS N=1,495). 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 26 women were identified with newly diagnosed leukaemias. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 4.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 2.1 and 9.0/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

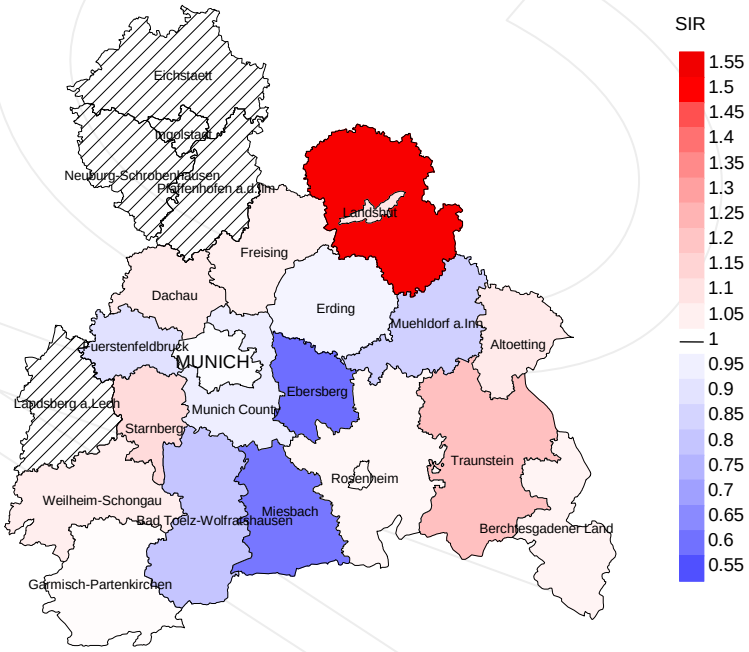


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,936, females N=1,495). 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 26 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 0.60. Though, the value of this parameter may vary with an underlying probability of 99% between 0.34 and 0.97.

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	299	98.7	28.4	245	81.9	98.0
1999	309	98.4	24.6	229	74.1	96.5
2000	328	97.9	28.0	236	72.0	96.2
2001	358	98.6	35.2	271	75.7	97.8
2002	560	96.6	34.8	420	75.0	98.3
2003	568	97.2	34.7	414	72.9	99.3
2004	617	95.6	31.6	413	66.9	98.5
2005	579	95.9	30.9	409	70.6	98.8
2006	593	93.8	29.2	413	69.6	98.1
2007	643	84.3	24.9	393	61.1	98.7
2008	633	76.1	26.2	371	58.6	98.4
2009	644	76.4	24.7	381	59.2	98.4
2010	655	77.6	23.2	385	58.8	99.0
2011	617	77.1	22.7	324	52.5	98.8
2012	525	99.0	34.3	279	53.1	97.8
1998-2012	7928	89.4	28.7	5183	65.4	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	299	222	98.2	113	37.8
1999	309	205	96.6	93	30.1
2000	328	223	96.4	112	34.1
2001	358	267	97.0	135	37.7
2002	560	344	98.3	225	40.2
2003	568	336	98.2	236	41.5
2004	617	338	98.8	222	36.0
2005	579	405	99.8	230	39.7
2006	593	379	98.7	242	40.8
2007	643	397	98.2	218	33.9
2008	633	404	98.3	219	34.6
2009	644	398	97.7	232	36.0
2010	655	444	98.2	250	38.2
2011	617	458	99.3	219	35.5
2012	525	451	99.6	241	45.9
1998-2012	7928	5271	98.4	2987	37.7

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	222	65.8	34.2	95.9
1999	205	70.2	29.8	95.5
2000	223	74.0	26.0	97.2
2001	267	71.5	28.5	95.8
2002	344	81.4	18.6	97.3
2003	336	82.7	17.3	95.8
2004	338	86.7	13.3	96.1
2005	405	86.2	13.8	97.5
2006	379	86.5	13.5	95.7
2007	397	84.6	15.4	95.4
2008	404	81.4	18.6	91.4
2009	398	84.4	15.6	93.1
2010	444	83.3	16.7	95.0
2011	458	83.2	16.8	93.0
2012	451	81.4	18.6	92.0
1998-2012	5271	81.4	18.6	94.9

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	122	66.8	64.4	72.3	67.1
1999	117	69.0	65.1	77.5	68.3
2000	133	68.2	65.7	76.1	68.3
2001	130	70.1	69.3	72.9	69.8
2002	177	70.5	70.1	72.6	70.6
2003	181	70.5	69.7	75.8	70.4
2004	183	71.8	71.0	77.5	71.9
2005	226	71.8	70.6	78.3	71.5
2006	224	71.5	70.4	78.2	71.1
2007	212	69.8	69.1	74.6	70.1
2008	232	71.6	71.3	72.8	71.9
2009	212	72.7	71.8	77.8	72.9
2010	244	74.1	72.9	79.2	74.0
2011	250	72.5	71.7	76.7	72.3
2012	267	74.4	73.4	78.2	73.8
1998-2012	2910	71.5	70.4	76.2	71.3

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	100	70.1	66.2	76.2	70.1
1999	88	74.5	72.8	79.1	74.4
2000	90	74.1	69.3	85.7	73.5
2001	137	73.9	70.8	80.2	73.8
2002	167	74.2	71.7	83.5	74.0
2003	155	74.5	72.3	82.6	74.3
2004	155	74.3	73.4	79.5	74.4
2005	179	73.4	72.6	79.4	73.6
2006	155	74.4	73.6	80.5	73.9
2007	185	73.7	72.2	80.6	74.0
2008	172	75.1	72.9	83.4	74.4
2009	186	74.5	73.7	79.2	74.3
2010	200	76.1	75.3	80.8	76.0
2011	208	74.1	72.0	82.8	73.5
2012	184	74.3	73.2	80.5	73.8
1998-2012	2361	74.2	72.6	81.0	74.0

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	85	7.7	0.52	5.3	0.53	7.2	0.52	9.0	0.53
1999	80	7.1	0.48	4.8	0.49	6.6	0.49	8.3	0.49
2000	101	8.9	0.56	5.8	0.51	8.2	0.55	10.7	0.59
2001	99	8.5	0.51	5.0	0.44	7.5	0.49	10.3	0.55
2002	149	8.0	0.50	4.5	0.42	6.8	0.48	9.3	0.53
2003	155	8.3	0.49	4.6	0.44	7.0	0.48	9.3	0.50
2004	160	8.5	0.49	4.4	0.40	6.9	0.46	9.7	0.53
2005	190	10.0	0.57	5.2	0.46	7.9	0.54	11.0	0.58
2006	192	10.0	0.53	5.0	0.42	7.7	0.49	10.6	0.54
2007	184	8.3	0.51	4.4	0.44	6.4	0.48	8.8	0.53
2008	193	8.7	0.55	4.2	0.40	6.4	0.49	8.7	0.55
2009	178	8.0	0.53	3.7	0.43	5.8	0.49	8.1	0.54
2010	199	8.8	0.58	4.0	0.46	6.2	0.52	8.6	0.57
2011	213	9.3	0.63	4.3	0.47	6.5	0.55	9.1	0.65
2012	211	9.2	0.76	4.1	0.61	6.4	0.70	8.9	0.75
1998-2012	2389	8.7	0.55	4.5	0.45	6.8	0.51	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	0.45	2.9	0.47	3.7	0.45	4.4	0.45
1999	64	5.4	0.44	2.3	0.30	3.4	0.36	4.5	0.42
2000	64	5.3	0.43	2.5	0.34	3.5	0.37	4.4	0.41
2001	92	7.6	0.57	3.3	0.48	4.8	0.53	6.4	0.58
2002	131	6.7	0.51	3.0	0.47	4.3	0.50	5.6	0.53
2003	123	6.2	0.49	2.5	0.38	3.8	0.44	5.1	0.48
2004	133	6.7	0.47	2.7	0.35	4.0	0.40	5.4	0.45
2005	159	8.0	0.65	3.2	0.49	4.8	0.57	6.2	0.61
2006	136	6.8	0.59	2.7	0.46	3.9	0.54	5.4	0.59
2007	152	6.6	0.54	2.8	0.41	4.0	0.47	5.2	0.52
2008	136	5.9	0.49	2.3	0.39	3.4	0.44	4.5	0.47
2009	158	6.8	0.52	2.7	0.40	3.9	0.46	5.3	0.51
2010	171	7.3	0.56	2.6	0.38	3.8	0.45	5.4	0.52
2011	169	7.2	0.61	2.8	0.44	4.1	0.53	5.4	0.61
2012	156	6.6	0.64	2.5	0.45	3.6	0.53	4.9	0.61
1998-2012	1905	6.6	0.54	2.7	0.41	4.0	0.47	5.3	0.52

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	9	0.2	0.2	4	0.2	0.2	5	0.3	0.3
5-9	16	0.4	0.6	9	0.4	0.5	7	0.4	0.6
10-14	22	0.5	1.1	11	0.5	1.0	11	0.6	1.2
15-19	22	0.5	1.6	12	0.5	1.5	10	0.5	1.7
20-24	25	0.6	2.2	17	0.7	2.2	8	0.4	2.1
25-29	25	0.6	2.7	18	0.7	2.9	7	0.4	2.5
30-34	29	0.7	3.4	20	0.8	3.7	9	0.5	3.0
35-39	62	1.4	4.8	33	1.4	5.1	29	1.5	4.5
40-44	71	1.6	6.5	43	1.8	6.9	28	1.5	5.9
45-49	92	2.1	8.6	45	1.9	8.7	47	2.5	8.4
50-54	117	2.7	11.3	67	2.8	11.5	50	2.6	11.0
55-59	235	5.4	16.7	132	5.4	16.9	103	5.4	16.4
60-64	330	7.6	24.3	201	8.3	25.2	129	6.7	23.1
65-69	524	12.1	36.3	341	14.0	39.2	183	9.5	32.6
70-74	681	15.7	52.0	406	16.7	55.9	275	14.3	47.0
75-79	786	18.1	70.1	451	18.6	74.5	335	17.5	64.4
80-84	677	15.6	85.6	342	14.1	88.6	335	17.5	81.9
85+	625	14.4	100.0	278	11.4	100.0	347	18.1	100.0
All ages	4348	100.0		2430	100.0		1918	100.0	

Included in the statistics are 37.5% multiple primaries in males and 31.4% 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	4	5	0.3	0.03	0.4	0.05	12.9	21.7
5- 9	9	7	0.6	0.15	0.5	0.18	25.7	17.9
10-14	11	11	0.8	0.29	0.8	0.35	33.3	39.3
15-19	12	10	0.8	0.26	0.7	0.37	28.6	29.4
20-24	17	8	1.0	0.59	0.5	0.29	20.5	17.0
25-29	18	7	1.0	0.44	0.4	0.27	18.8	6.4
30-34	20	9	0.9	0.31	0.4	0.29	11.4	4.2
35-39	33	29	1.4	0.42	1.3	0.40	8.6	5.8
40-44	43	28	1.8	0.32	1.2	0.28	5.3	2.6
45-49	45	47	2.1	0.31	2.2	0.40	2.7	2.5
50-54	67	50	3.6	0.30	2.6	0.35	2.2	1.7
55-59	132	103	7.8	0.45	5.8	0.45	2.4	2.3
60-64	201	129	12.2	0.48	7.4	0.48	2.4	2.1
65-69	341	183	23.2	0.58	11.4	0.49	3.0	2.4
70-74	406	275	35.0	0.65	19.9	0.64	3.3	3.1
75-79	451	335	59.9	0.76	30.6	0.71	3.7	3.4
80-84	342	335	75.3	0.72	38.8	0.71	3.5	3.2
85+	278	347	89.6	0.71	42.4	0.57	3.5	2.8
All ages	2430	1918					3.3	2.9
Mortality								
Raw			8.9	0.56	6.7	0.54		
WS			4.6	0.46	2.7	0.42		
ES			6.9	0.52	4.0	0.47		
BRD-S			9.5	0.57	5.3	0.52		
PYLL-70								
per 100,000			51.9		37.9			
ES			50.1		37.2			
AYLL-70			13.5		14.9			

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	11	1.0	5	45.5	3	27.3	3	27.3
C16 Stomach	22	2.0	10	45.5	1	4.5	11	50.0
C18 Colon	79	7.2	40	50.6	11	13.9	28	35.4
C19-C20 Rectum	39	3.5	15	38.5	5	12.8	19	48.7
C25 Pancreas	13	1.2	1	7.7	3	23.1	9	69.2
C33-C34 Lung	86	7.8	15	17.4	20	23.3	51	59.3
C43 Malign. melanoma	44	4.0	21	47.7	5	11.4	18	40.9
C44 Skin others	183	16.6	24	13.1	7	3.8	152	83.1
C46,C49 Soft tissue	12	1.1	6	50.0			6	50.0
C61 Prostate	186	16.9	124	66.7	20	10.8	42	22.6
C64 Kidney	34	3.1	24	70.6	3	8.8	7	20.6
C67 Bladder	55	5.0	34	61.8	4	7.3	17	30.9
C70-C72 CNS cancer	17	1.5	3	17.6	5	29.4	9	52.9
C76-C79 CUP	12	1.1	2	16.7	3	25.0	7	58.3
C81 Hodgkin lymphoma	14	1.3	6	42.9	1	7.1	7	50.0
C82-C85 NHL	35	3.2			7	20.0	28	80.0
C90 Mult. myeloma	18	1.6	10	55.6	6	33.3	2	11.1
C91-C96 Leukaemia	172	15.6			53	30.8	119	69.2
Other primaries	71	6.4	31	43.7	11	15.5	29	40.8
All mult. primaries	1103	100.0	371	33.6	168	15.2	564	51.1

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

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	13	1.8	6	46.2	3	23.1	4	30.8
C18	Colon	41	5.7	21	51.2	7	17.1	13	31.7
C19-C20	Rectum	16	2.2	10	62.5	2	12.5	4	25.0
C25	Pancreas	11	1.5	1	9.1	3	27.3	7	63.6
C33-C34	Lung	27	3.7	7	25.9	5	18.5	15	55.6
C43	Malign. melanoma	22	3.1	20	90.9			2	9.1
C44	Skin others	78	10.8	27	34.6	4	5.1	47	60.3
C50	Breast	164	22.7	124	75.6	12	7.3	28	17.1
C53	Cervix uteri	17	2.4	11	64.7	2	11.8	4	23.5
C54	Corpus uteri	35	4.9	25	71.4	3	8.6	7	20.0
C56	Ovary	18	2.5	9	50.0	3	16.7	6	33.3
C64	Kidney	10	1.4	3	30.0	3	30.0	4	40.0
C67	Bladder	17	2.4	10	58.8	3	17.6	4	23.5
C70-C72	CNS cancer	12	1.7	5	41.7	2	16.7	5	41.7
C73	Thyroid	16	2.2	15	93.8			1	6.3
C76-C79	CUP	7	1.0	2	28.6			5	71.4
C82-C85	NHL	16	2.2			1	6.3	15	93.8
C90	Mult. myeloma	16	2.2	6	37.5	5	31.3	5	31.3
C91-C96	Leukaemia	132	18.3			41	31.1	91	68.9
Other primaries		53	7.4	23	43.4	3	5.7	27	50.9
All mult. primaries		721	100.0	325	45.1	102	14.1	294	40.8

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 1998-2012
(**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	4	5	0.3	0.03	0.4	0.05	15.4	21.7
5- 9	9	7	0.6	0.15	0.5	0.18	27.3	19.4
10-14	11	11	0.8	0.30	0.8	0.35	33.3	42.3
15-19	12	9	0.8	0.26	0.7	0.35	30.8	29.0
20-24	16	7	1.0	0.59	0.4	0.26	20.5	16.3
25-29	16	7	0.9	0.41	0.4	0.28	17.8	6.8
30-34	20	9	0.9	0.33	0.4	0.31	11.6	4.8
35-39	30	26	1.3	0.42	1.2	0.38	8.4	5.8
40-44	39	23	1.6	0.31	1.0	0.26	5.2	2.5
45-49	39	40	1.8	0.30	1.9	0.41	2.5	2.5
50-54	56	39	3.0	0.28	2.1	0.34	2.1	1.6
55-59	114	79	6.7	0.45	4.4	0.43	2.4	2.1
60-64	155	101	9.4	0.47	5.8	0.47	2.2	2.0
65-69	260	150	17.7	0.57	9.4	0.52	2.9	2.4
70-74	317	202	27.4	0.72	14.6	0.62	3.2	2.8
75-79	318	250	42.2	0.76	22.9	0.73	3.4	3.2
80-84	253	257	55.7	0.79	29.8	0.72	3.4	3.1
85+	194	260	62.6	0.73	31.7	0.55	3.2	2.6
All ages	1863	1482					3.1	2.7
Mortality								
Raw			6.8	0.55	5.2	0.52		
WS			3.6	0.44	2.2	0.39		
ES			5.3	0.50	3.1	0.45		
BRD-S			7.2	0.57	4.1	0.51		
PYLL-70								
per 100,000			46.1		32.7			
ES			45.0		32.6			
AYLL-70			14.6		15.6			

* 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	4	5	0.3	0.04	0.4	0.06	16.0	21.7
5- 9	8	6	0.6	0.14	0.5	0.15	25.0	17.1
10-14	11	9	0.8	0.31	0.7	0.29	33.3	37.5
15-19	12	9	0.8	0.26	0.7	0.35	30.8	34.6
20-24	14	6	0.9	0.54	0.4	0.23	19.2	15.0
25-29	15	7	0.8	0.38	0.4	0.28	17.9	7.2
30-34	20	9	0.9	0.34	0.4	0.32	12.0	5.3
35-39	26	24	1.1	0.38	1.1	0.35	7.6	5.8
40-44	37	22	1.5	0.30	1.0	0.26	5.2	2.6
45-49	35	36	1.6	0.28	1.7	0.40	2.4	2.5
50-54	53	36	2.9	0.30	1.9	0.36	2.2	1.7
55-59	104	72	6.1	0.48	4.0	0.44	2.4	2.1
60-64	126	91	7.6	0.46	5.2	0.48	2.0	2.1
65-69	204	137	13.9	0.53	8.5	0.53	2.6	2.6
70-74	254	176	21.9	0.68	12.8	0.59	3.1	2.9
75-79	260	214	34.5	0.68	19.6	0.68	3.5	3.2
80-84	209	233	46.0	0.70	27.0	0.70	3.5	3.3
85+	167	236	53.8	0.64	28.8	0.51	3.4	2.7
All ages	1559	1328					3.1	2.8
Mortality								
Raw			5.7	0.51	4.6	0.50		
WS			3.1	0.41	2.0	0.38		
ES			4.5	0.47	2.8	0.44		
BRD-S			6.0	0.52	3.7	0.49		
PYLL-70								
per 100,000			42.1		30.0			
ES			41.3		29.9			
AYLL-70			15.6		15.7			

* See corresponding tables with multiple primaries.

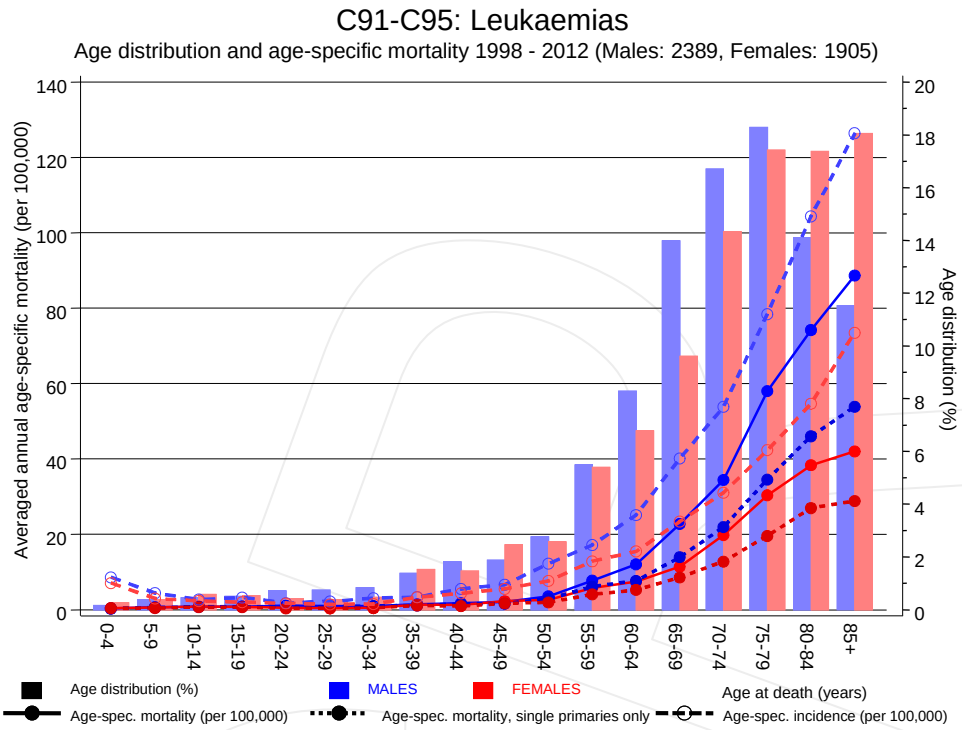
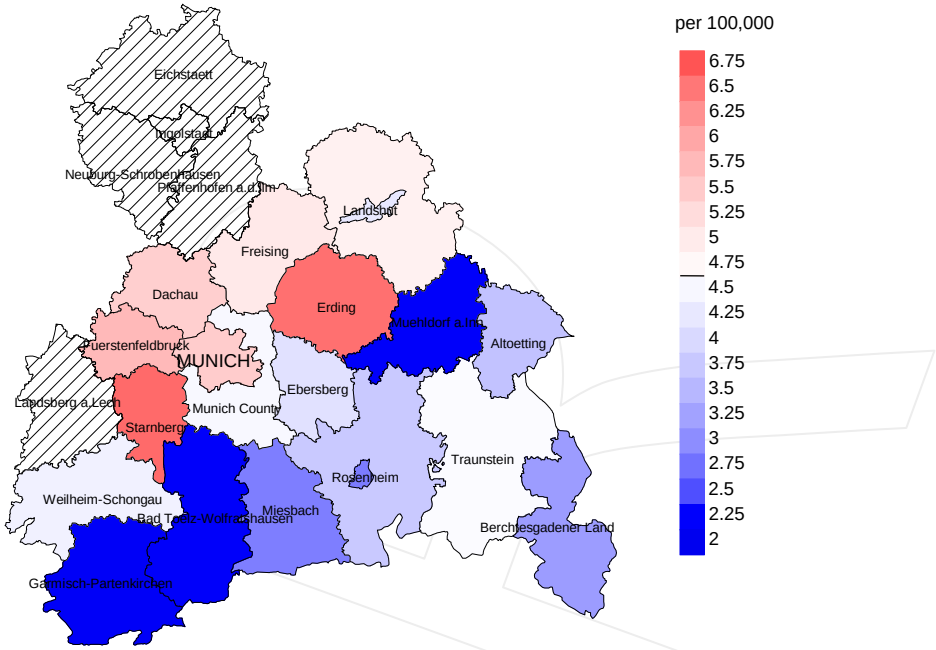


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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) 2003 - 2008: Males



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

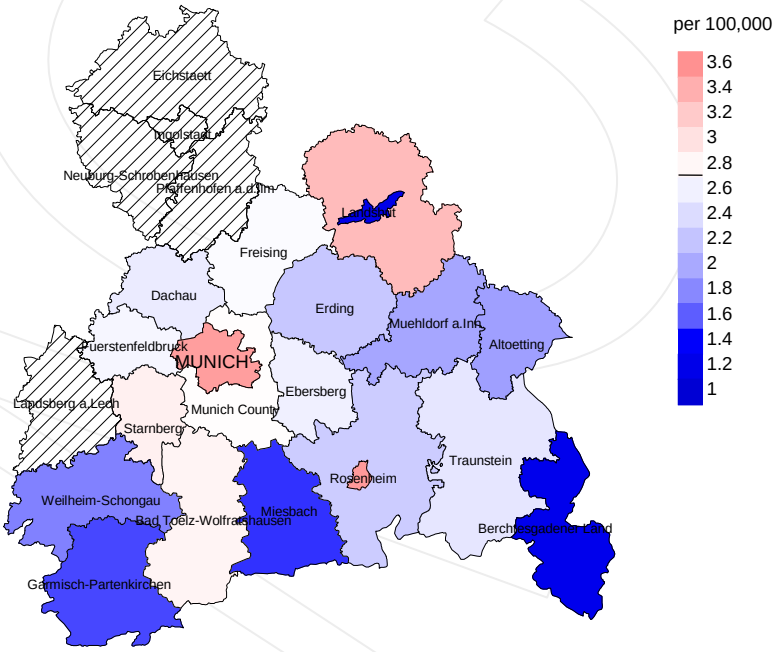
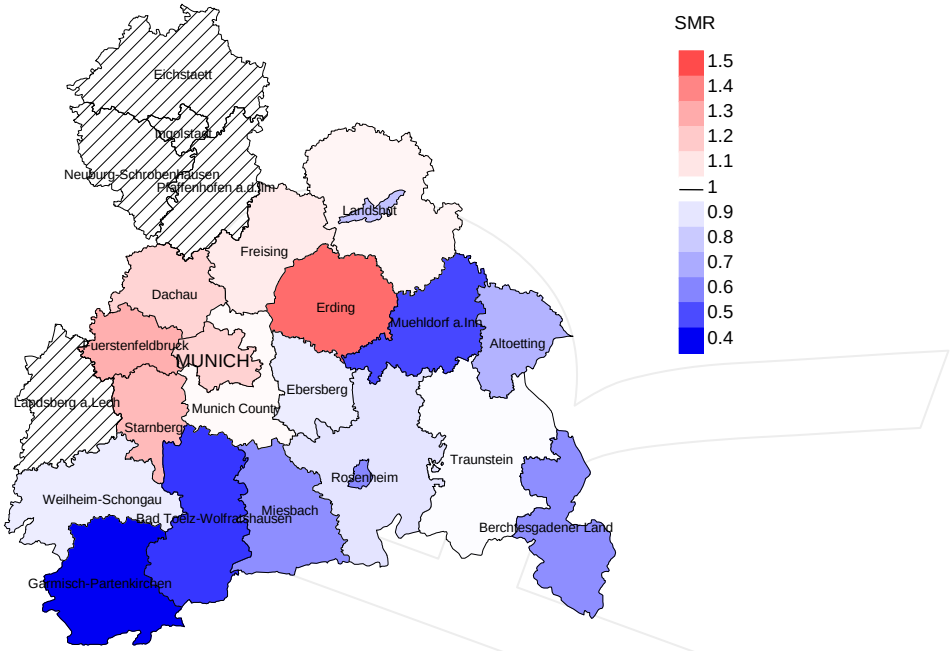


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.6/100,000 WS N=1,033, females 2.7/100,000 WS N=815). 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 20 women died from leukaemias. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.3 and 4.8/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

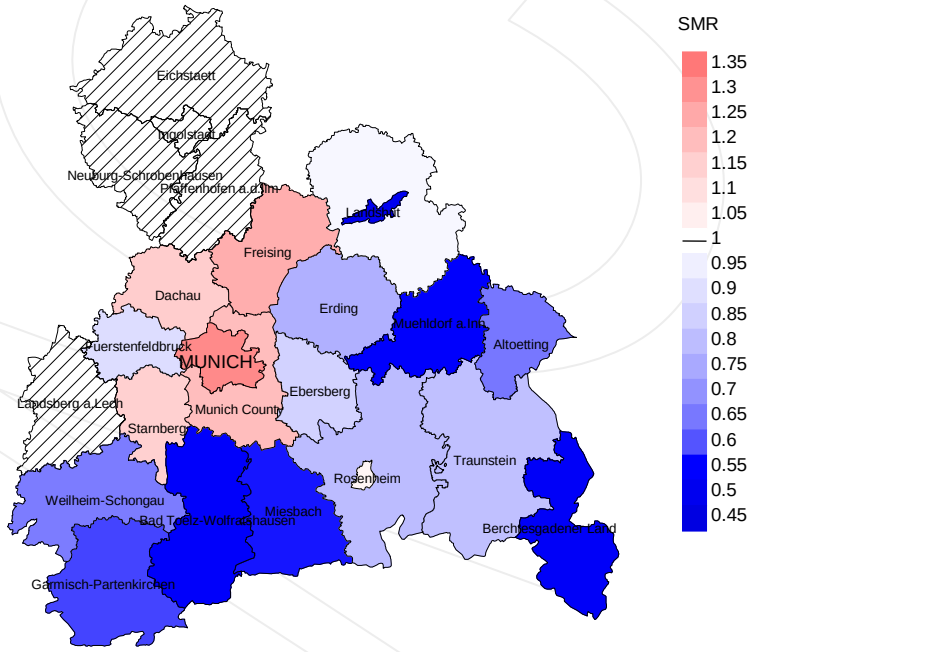


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,033, females N=815). 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 20 women died from leukaemias. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.86. Though, the value of this parameter may vary with an underlying probability of 99% between 0.44 and 1.49, 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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Munich Cancer Registry. Baseline statistics C91-C95: Leukaemias [Internet]. 2014 [updated 2014 Mar 20; cited 2014 May 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C9195E.pdf

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