Munich Cancer Registry

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ICD-10 C91: Lymphoid leukaemia

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	4,077
Diseases	4,083
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/bC91__E-ICD-10-C91-Lymphoid-leukaemia-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
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

... or ...

Morphology codes (ICD-O-3 2011) used for specifying cancer site

Code	Description
9823/3	B-cell lymphocytic leukemia/small lymphocytic lymphoma

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	126	8	6.3	24.6	70.6	94.4	
1999	123	8	6.5	30.1	62.6	94.3	
2000	128	18	14.1	31.3	68.8	96.1	
2001	177	42	23.7	23.2	68.4	96.6	
2002	301	79	26.2	29.6	72.8	95.3	#
2003	258	69	26.7	26.4	65.1	93.4	
2004	295	56	19.0	29.5	56.3	90.2	
2005	279	59	21.1	32.6	61.3	92.5	
2006	278	44	15.8	38.8	57.9	89.2	
2007	333	61	18.3	26.4	53.2	76.0	#
2008	299	52	17.4	36.1	47.8	72.2	
2009	300	50	16.7	29.3	43.0	67.3	
2010	281	58	20.6	29.2	47.0	71.2	
2011	280	53	18.9	33.2	37.9	70.0	
2012	280	56	20.0	27.1	39.3	70.0	
2013	230	52	22.6	31.3	39.6	97.4	
2014	115	47	40.9	26.1	51.3	93.0	##
1998-2014	4083	812	19.9	30.1	54.1	83.8	

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	126	75	51	59.5
1999	123	62	61	50.4
2000	128	80	48	62.5
2001	177	98	79	55.4
2002	301	173	128	57.5
2003	258	161	97	62.4
2004	295	177	118	60.0
2005	279	179	100	64.2
2006	278	178	100	64.0
2007	333	189	144	56.8
2008	299	175	124	58.5
2009	300	168	132	56.0
2010	281	161	120	57.3
2011	280	161	119	57.5
2012	280	166	114	59.3
2013	230	138	92	60.0
2014	115	68	47	59.1
1998-2014	4083	2409	1674	59.0

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	75	51	6.8	4.3	5.1	2.5	6.4	3.2	7.5	3.7
1999	62	61	5.5	5.1	4.0	4.2	5.2	4.5	6.2	4.7
2000	80	48	7.0	4.0	5.2	2.7	6.6	3.1	7.5	3.4
2001	98	79	8.5	6.5	6.4	4.0	8.0	4.8	9.4	5.4
2002	173	128	9.3	6.5	6.4	3.1	8.2	4.3	9.9	5.3
2003	161	97	8.6	4.9	5.9	3.0	7.6	3.5	9.3	4.1
2004	177	118	9.4	6.0	6.6	3.5	8.2	4.3	9.8	4.9
2005	179	100	9.5	5.0	6.7	3.1	8.3	3.6	10.0	4.3
2006	178	100	9.3	5.0	6.6	3.0	8.1	3.5	9.5	4.1
2007	189	144	8.5	6.2	5.3	4.0	7.1	4.6	8.8	5.1
2008	175	124	7.9	5.3	5.7	3.1	6.6	3.7	7.7	4.3
2009	168	132	7.5	5.7	4.4	3.3	6.0	3.9	7.3	4.4
2010	161	120	7.1	5.1	4.6	2.9	5.8	3.4	7.0	4.0
2011	161	119	7.0	5.0	4.8	3.1	5.8	3.5	6.7	3.8
2012	166	114	7.3	4.8	5.0	3.4	5.8	3.6	7.1	3.9
2013	138	92	6.0	3.9	4.0	2.5	4.9	2.8	5.8	3.2
2014	68	47	3.0	2.0	1.3	0.6	2.1	0.9	2.8	1.3
1998-2014	2409	1674	7.5	5.0	5.1	3.0	6.4	3.5	7.7	4.1

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 patients)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	126	61.2	21.1	1.4	95.8	36.3	54.9	64.7	76.0	82.8
1999	123	57.7	23.4	0.3	89.4	6.0	53.5	62.5	74.1	79.8
2000	128	61.7	20.6	2.1	91.2	38.5	55.9	64.5	74.1	85.0
2001	177	62.7	22.3	1.4	94.0	17.0	56.8	67.3	76.3	87.3
2002	301	65.8	20.2	2.6	95.0	40.4	60.5	68.7	78.9	87.9
2003	258	64.5	22.4	0.3	98.9	29.5	58.8	69.2	79.2	85.6
2004	295	62.8	21.9	1.4	98.6	29.0	56.8	67.7	77.5	84.5
2005	279	63.3	24.1	0.6	97.1	16.4	57.6	70.8	78.1	85.1
2006	278	63.8	23.3	1.3	95.4	18.1	58.0	69.9	78.9	85.9
2007	333	64.4	22.2	0.3	99.8	30.3	56.8	69.2	80.1	86.1
2008	299	63.8	24.3	0.4	97.4	13.7	60.5	69.9	79.5	86.3
2009	300	65.8	20.7	1.3	98.6	42.9	57.5	69.8	80.3	86.9
2010	281	65.8	24.1	0.3	101	31.2	56.9	72.8	81.9	88.4
2011	280	63.8	24.6	2.5	101	12.8	55.7	70.8	80.6	87.9
2012	280	62.2	26.3	0.6	96.9	12.2	53.3	71.5	81.0	87.2
2013	230	64.1	24.3	0.1	100	18.9	56.8	71.5	81.3	87.5
2014	115	75.8	14.6	26.7	98.3	55.6	67.6	78.5	87.0	92.2
1998-2014	4083	64.1	22.9	0.1	101	24.0	57.4	69.7	79.5	86.7

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	75	58.1	21.5	2.0	95.8	33.9	51.3	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	80	61.3	18.7	2.6	91.1	44.3	55.6	64.5	71.3	79.5
2001	98	59.8	20.6	1.4	90.7	17.0	53.1	64.5	72.6	79.6
2002	173	62.1	20.8	2.6	90.9	31.1	57.4	66.1	75.5	82.5
2003	161	62.9	21.0	1.6	90.7	33.3	57.7	67.4	76.5	83.1
2004	177	61.0	21.9	1.4	95.2	25.6	55.9	65.5	75.0	81.9
2005	179	62.0	23.5	0.7	94.6	15.6	55.9	69.0	77.2	83.0
2006	178	62.2	23.3	1.3	95.4	17.6	55.9	68.6	77.6	85.1
2007	189	64.2	19.6	0.3	97.8	39.6	56.5	68.9	77.5	83.8
2008	175	61.7	24.7	0.4	93.7	10.2	60.5	69.5	77.1	83.5
2009	168	65.9	18.2	2.2	97.0	46.7	57.4	69.5	77.7	85.3
2010	161	64.3	23.7	0.3	101	31.2	54.1	71.6	80.5	87.0
2011	161	62.4	23.6	2.5	101	12.8	54.3	69.3	78.0	84.4
2012	166	62.4	25.4	2.4	95.2	13.0	53.4	71.6	79.8	84.9
2013	138	63.8	23.7	2.3	100	18.7	55.3	71.1	80.4	87.2
2014	68	73.8	13.8	31.7	95.9	55.6	66.5	75.0	83.6	91.0
1998-2014	2409	62.8	22.1	0.3	101	25.0	56.1	68.3	77.4	84.3

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	51	65.7	19.7	1.4	90.3	41.0	59.7	68.5	77.9	85.2
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	79	66.4	23.8	2.8	94.0	16.2	61.5	72.0	82.6	90.4
2002	128	70.9	18.2	2.9	95.0	49.5	63.8	74.3	83.3	90.1
2003	97	67.2	24.5	0.3	98.9	29.4	60.5	73.7	81.7	90.6
2004	118	65.5	21.7	4.3	98.6	35.3	58.1	69.7	80.2	87.3
2005	100	65.6	24.9	0.6	97.1	18.6	62.8	74.9	80.2	88.9
2006	100	66.7	23.1	2.5	93.9	25.4	61.0	73.2	81.4	86.9
2007	144	64.7	25.2	1.0	99.8	13.3	57.3	70.9	82.5	87.6
2008	124	66.6	23.6	1.4	97.4	22.0	60.6	71.6	82.6	88.3
2009	132	65.7	23.6	1.3	98.6	28.2	57.9	71.8	82.9	88.1
2010	120	67.8	24.5	0.8	97.5	28.7	61.1	75.5	84.2	89.5
2011	119	65.6	25.9	2.5	96.7	12.8	56.7	73.2	83.9	90.0
2012	114	62.0	27.8	0.6	96.9	11.8	53.2	71.4	84.5	88.7
2013	92	64.5	25.3	0.1	97.3	20.8	59.0	71.5	82.6	90.4
2014	47	78.7	15.5	26.7	98.3	55.6	71.6	83.8	90.6	92.3
1998-2014	1674	66.0	23.9	0.1	99.8	22.0	59.4	72.4	82.4	88.9

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	86	4.1	4.1	50	4.1	4.1	36	4.0	4.0
5-9	57	2.7	6.8	28	2.3	6.4	29	3.3	7.3
10-14	35	1.7	8.4	18	1.5	7.8	17	1.9	9.2
15-19	31	1.5	9.9	18	1.5	9.3	13	1.5	10.7
20-24	16	0.8	10.6	8	0.7	10.0	8	0.9	11.5
25-29	14	0.7	11.3	7	0.6	10.5	7	0.8	12.3
30-34	17	0.8	12.1	11	0.9	11.4	6	0.7	13.0
35-39	25	1.2	13.3	15	1.2	12.6	10	1.1	14.1
40-44	40	1.9	15.2	19	1.5	14.2	21	2.4	16.5
45-49	57	2.7	17.8	40	3.3	17.5	17	1.9	18.4
50-54	91	4.3	22.1	65	5.3	22.8	26	2.9	21.3
55-59	123	5.8	28.0	73	6.0	28.7	50	5.6	26.9
60-64	148	7.0	34.9	87	7.1	35.8	61	6.8	33.7
65-69	251	11.9	46.8	163	13.3	49.1	88	9.9	43.6
70-74	297	14.0	60.8	195	15.9	65.0	102	11.4	55.0
75-79	242	11.4	72.2	149	12.2	77.2	93	10.4	65.5
80-84	265	12.5	84.7	150	12.2	89.4	115	12.9	78.4
85+	323	15.3	100.0	130	10.6	100.0	193	21.6	100.0
All ages	2118	100.0		1226	100.0		892	100.0	

Included in the statistics are 43.8% multiple primaries in males and 33.8% 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=205 %	Females DCO rate n=223 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4	50	36	5.7	4.3			28.1	26.1
5- 9	28	29	3.2	3.5			29.2	37.2
10-14	18	17	1.9	1.9			18.0	19.1
15-19	18	13	1.9	1.4			8.3	7.9
20-24	8	8	0.7	0.7		12.5	2.1	2.6
25-29	7	7	0.6	0.6		14.3	1.3	1.1
30-34	11	6	0.9	0.5	9.1		1.4	0.5
35-39	15	10	1.2	0.8		10.0	1.3	0.5
40-44	19	21	1.2	1.4			1.0	0.6
45-49	40	17	2.5	1.1			1.2	0.3
50-54	65	26	5.0	2.0	4.6	7.7	1.3	0.4
55-59	73	50	6.9	4.4	8.2	2.0	1.0	0.7
60-64	87	61	8.9	5.8	4.6	8.2	0.8	0.7
65-69	163	88	16.9	8.4	7.4	5.7	1.0	0.8
70-74	195	102	21.4	9.8	8.2	9.8	1.1	0.9
75-79	149	93	27.1	13.0	22.1	17.2	1.2	0.9
80-84	150	114	42.9	20.3	28.7	44.7	1.8	1.3
85+	130	193	56.1	33.4	66.9	67.4	2.1	1.9
All ages	1226	891			16.7	25.0	1.3	1.0
Incidence								
Raw			6.8	4.8				
WS			4.4	2.9				
ES			5.5	3.3				
BRD-S			6.6	3.8				

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).

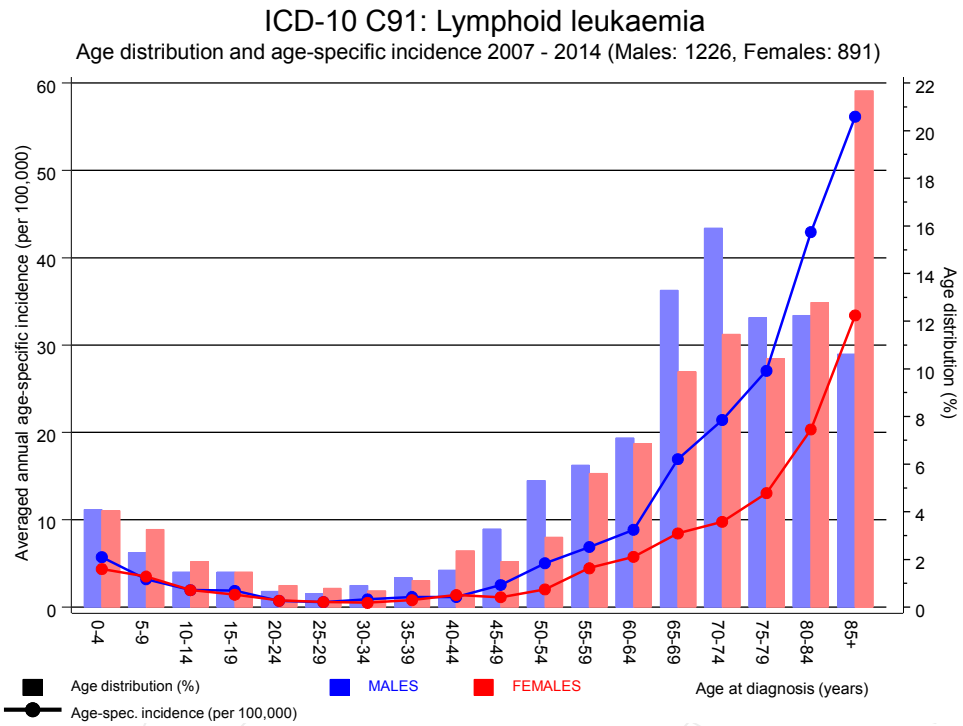


Figure 6. Age distribution and age-specific incidence

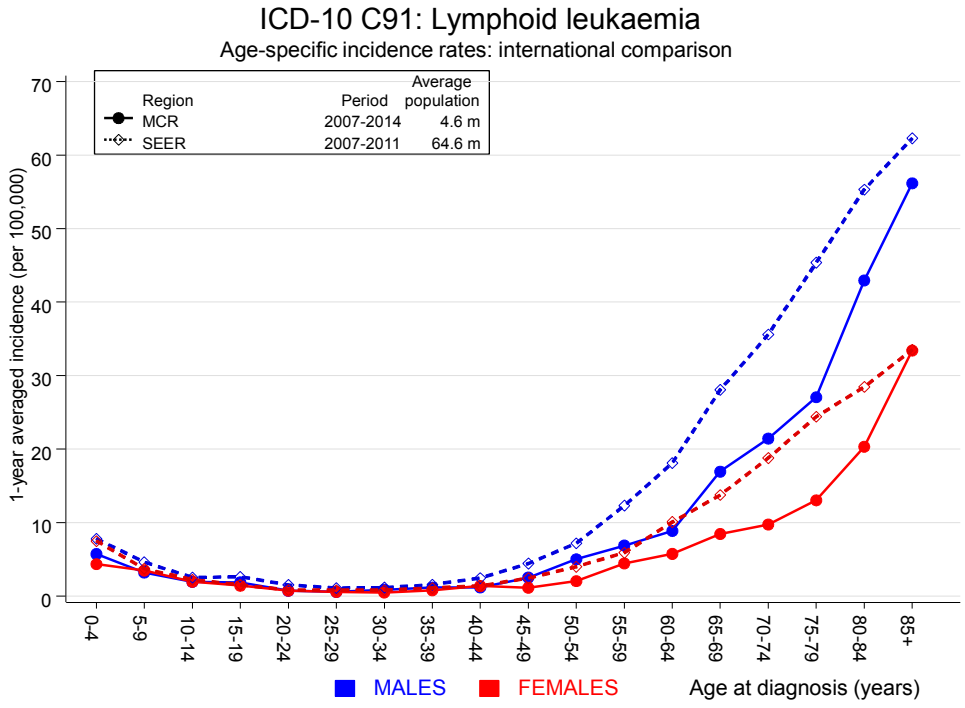


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

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

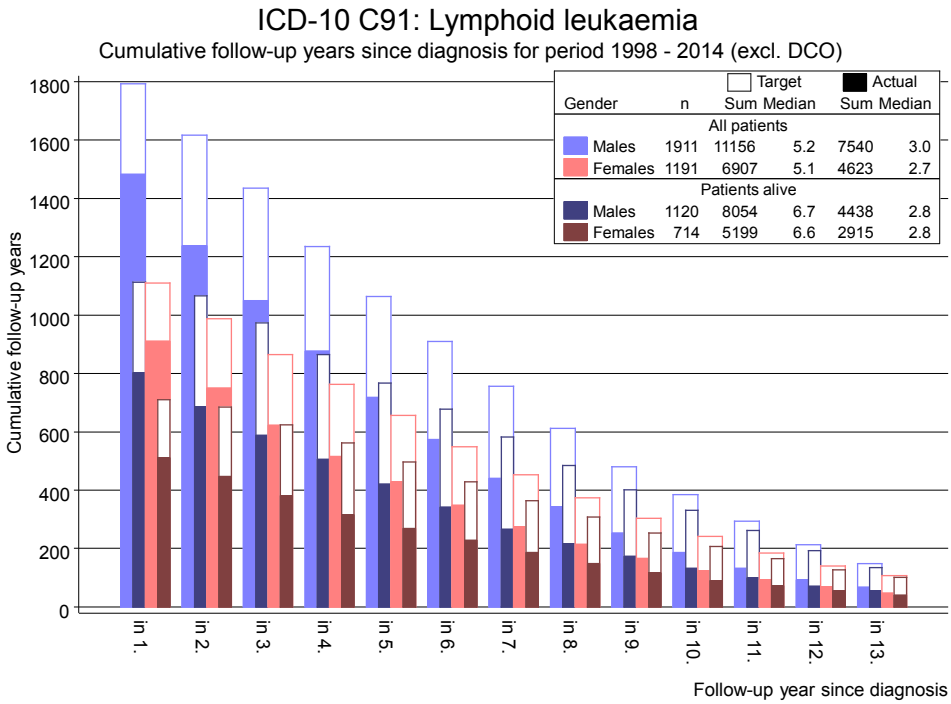


Figure 7. Cumulative follow-up years depending on time since diagnosis

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 %
C07-C08	Salivary gland	5	0.3	18.3	6.0	42.8	#	6.1	
C15	Oesophagus	5	2.1	2.3	0.8	5.4		3.7	
C16	Stomach	12	4.9	2.5	1.3	4.3	#	9.2	
C18	Colon	24	11.8	2.0	1.3	3.0	#	15.8	4.2
C19-C20	Rectum	19	6.5	2.9	1.7	4.5	#	16.1	
C22	Liver	7	3.3	2.1	0.8	4.3		4.8	14.3
C25	Pancreas	7	4.4	1.6	0.6	3.3		3.4	
C33-C34	Lung	41	14.1	2.9	2.1	3.9	#	34.8	
C43	Malign. melanoma	26	5.1	5.1	3.4	7.5	#	27.2	
C46,C49	Soft tissue	5	0.7	7.7	2.5	17.9	#	5.6	
C50	Breast	2	0.3	6.4	0.8	23.1		2.2	
C61	Prostate	78	35.3	2.2	1.7	2.8	#	55.4	3.8
C62	Testis	2	0.3	6.1	0.7	22.2		2.2	
C64	Kidney	11	4.2	2.6	1.3	4.7	#	8.8	
C65	Renal pelvis	2	0.5	3.9	0.5	14.1		1.9	
C67	Bladder	13	5.4	2.4	1.3	4.1	#	9.9	
C70-C72	CNS cancer	7	1.6	4.4	1.8	9.0	#	7.0	14.3
C73	Thyroid	3	0.8	3.9	0.8	11.5		2.9	
C76-C79	CUP	5	2.0	2.5	0.8	5.8		3.9	
C81	Hodgkin lymphoma	6	0.3	22.0	8.1	48.0	#	7.4	
C82-C85	NHL	17	4.9	3.5	2.0	5.6	#	15.7	17.6
C90	Mult. myeloma	5	1.6	3.2	1.0	7.5	#	4.5	
C91-C96	Leukaemia	10	2.0	5.0	2.4	9.1	#	10.4	30.0
Other primaries		8	4.5	1.8	0.8	3.5		4.6	12.5
Not observed		0	4.6	0.0	0.0	0.8	#	-6.0	
All mult. primaries		320	121.4	2.6	2.4	2.9	#	257.5	4.1

Patients	2015
Median age at second malignancy (years)	72.7
Person-years	7711
Mean observation time (years)	3.8
Median observation time (years)	2.8

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

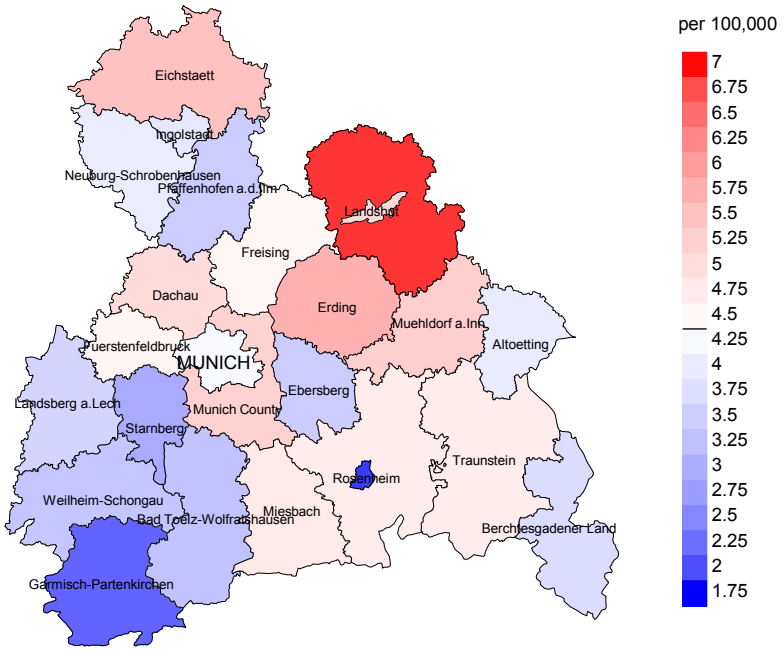
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C09–C10	Oropharynx	2	0.2	10.6	1.3	38.4	#	3.8	
C16	Stomach	5	1.9	2.7	0.9	6.2		6.6	
C18	Colon	9	5.2	1.7	0.8	3.3		8.0	11.1
C19–C20	Rectum	3	2.2	1.4	0.3	4.0		1.7	
C21	Anus/canal	2	0.3	7.7	0.9	27.7		3.7	
C22	Liver	2	0.6	3.3	0.4	11.9		2.9	
C25	Pancreas	6	2.3	2.6	0.9	5.6		7.8	
C33–C34	Lung	13	3.6	3.6	1.9	6.1	#	19.8	7.7
C43	Malign. melanoma	7	1.8	3.9	1.6	8.1	#	11.0	
C50	Breast	34	14.8	2.3	1.6	3.2	#	40.5	
C54	Corpus uteri	6	2.9	2.1	0.8	4.6		6.6	
C56	Ovary	4	2.1	1.9	0.5	4.9		4.0	
C64	Kidney	6	1.3	4.6	1.7	10.0	#	9.9	
C73	Thyroid	5	0.8	6.3	2.0	14.7	#	8.9	
C76–C79	CUP	2	0.9	2.2	0.3	7.8		2.3	
C82–C85	NHL	17	2.0	8.4	4.9	13.5	#	31.6	11.8
C90	Mult. myeloma	3	0.6	4.6	1.0	13.5		5.0	
C91–C96	Leukaemia	7	0.9	8.2	3.3	16.9	#	13.0	
Other primaries		8	2.2	3.6	1.6	7.1	#	12.2	
Not observed		0	4.2	0.0	0.0	0.9	#	−8.9	
All mult. primaries		141	50.8	2.8	2.3	3.3	#	190.4	2.8

Patients	1272
Median age at second malignancy (years)	73.4
Person-years	4736
Mean observation time (years)	3.7
Median observation time (years)	2.5

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

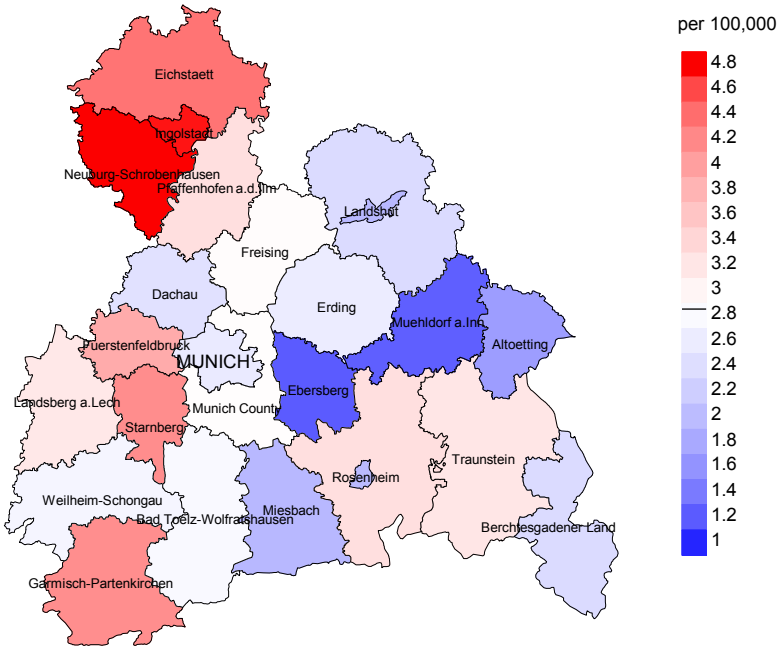
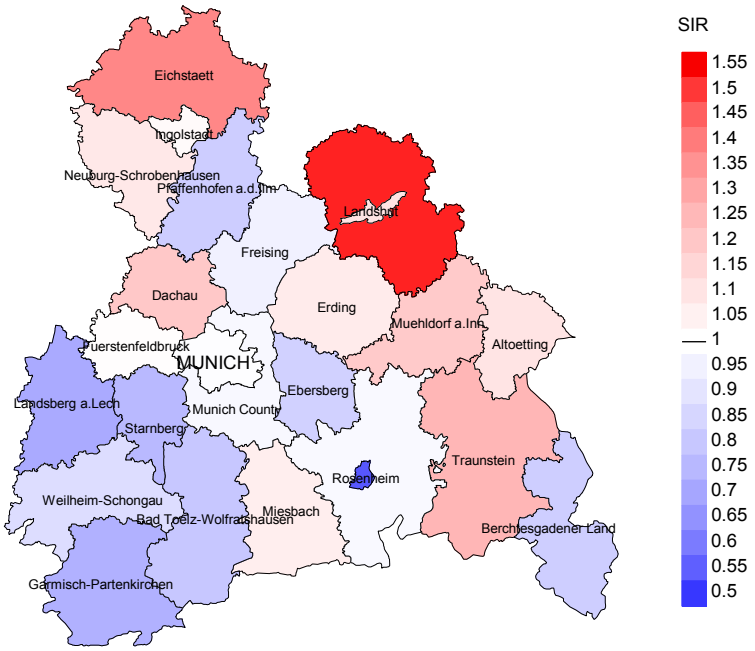


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.4/100,000 WS N=1,226, females 2.9/100,000 WS N=891).

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 17 women were identified with newly diagnosed lymphoid leukaemia. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.5 and 2.6/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

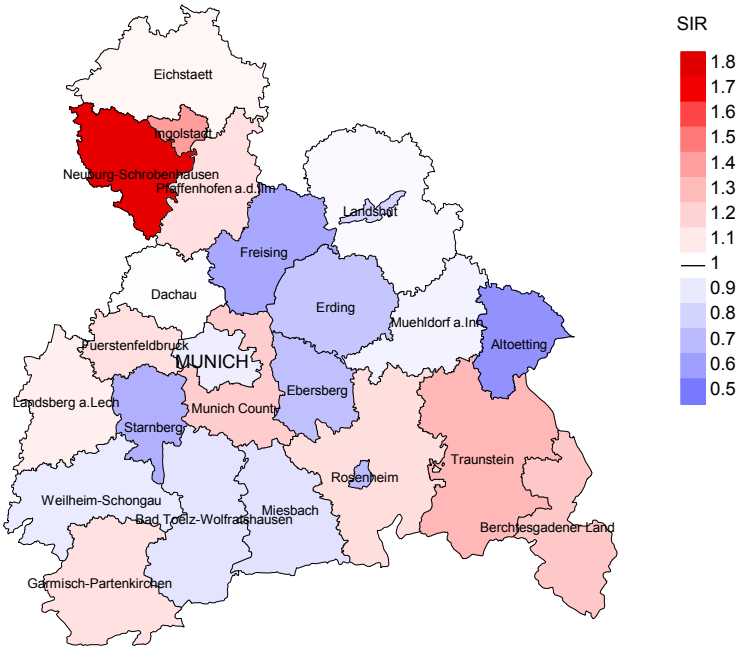


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,226, females N=891).

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 17 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 0.72. Though, the value of this parameter may vary with an underlying probability of 99% between 0.35 and 1.30, 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	126	94.4	6.3	89	70.6	98.9
1999	123	94.3	6.5	77	62.6	96.1
2000	128	96.1	14.1	88	68.8	97.7
2001	177	96.6	23.7	121	68.4	98.3
2002	301	95.3	26.2	219	72.8	99.1
2003	258	93.4	26.7	168	65.1	99.4
2004	295	90.2	19.0	166	56.3	99.4
2005	279	92.5	21.1	171	61.3	98.8
2006	278	89.2	15.8	161	57.9	97.5
2007	333	76.0	18.3	177	53.2	98.9
2008	299	72.2	17.4	143	47.8	97.9
2009	300	67.3	16.7	129	43.0	100.0
2010	281	71.2	20.6	132	47.0	97.0
2011	280	70.0	18.9	106	37.9	100.0
2012	280	70.0	20.0	110	39.3	98.2
2013	230	97.4	22.6	91	39.6	97.8
2014	115	93.0	40.9	59	51.3	98.3
1998-2014	4083	83.8	19.9	2207	54.1	98.6

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	126	50	98.0	10	7.9
1999	123	59	93.2	7	5.7
2000	128	65	93.8	20	15.6
2001	177	109	96.3	46	26.0
2002	301	153	98.7	92	30.6
2003	258	142	98.6	83	32.2
2004	295	141	99.3	62	21.0
2005	279	169	100.0	73	26.2
2006	278	163	98.2	61	21.9
2007	333	184	98.4	78	23.4
2008	299	182	98.9	65	21.7
2009	300	158	100.0	57	19.0
2010	281	183	99.5	73	26.0
2011	280	185	99.5	61	21.8
2012	280	200	98.5	67	23.9
2013	230	195	98.5	69	30.0
2014	115	179	99.4	56	48.7
1998-2014	4083	2517	98.6	980	24.0

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	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	141	87.2	12.8	95.0
2005	169	82.2	17.8	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	80.3	19.7	93.4
2011	185	77.3	22.7	89.1
2012	200	78.5	21.5	89.8
2013	195	74.4	25.6	85.9
2014	179	67.0	33.0	84.8
1998-2014	2517	77.6	22.4	91.7

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	31	68.2	67.5	83.5	67.9
1999	34	71.6	65.5	82.9	68.8
2000	44	71.4	70.1	77.1	71.4
2001	55	73.7	72.0	79.2	72.2
2002	88	75.5	75.2	77.1	76.5
2003	80	72.4	72.3	75.5	72.4
2004	88	73.3	71.8	81.2	73.3
2005	102	76.2	73.7	79.4	75.7
2006	98	74.3	73.0	82.4	73.7
2007	102	76.4	75.2	81.6	76.4
2008	111	75.1	74.6	80.9	75.0
2009	92	78.9	76.7	84.0	78.9
2010	108	76.9	76.2	79.6	77.4
2011	112	76.6	75.9	79.5	76.2
2012	125	77.5	76.9	82.0	77.7
2013	123	75.3	74.4	82.6	75.6
2014	113	78.9	75.8	83.3	77.7
1998-2014	1506	75.8	74.3	80.8	75.5

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	19	78.6	73.1	82.2	76.9
1999	25	79.5	74.9	83.2	76.5
2000	21	83.4	77.6	88.7	83.3
2001	54	77.8	75.3	81.3	77.3
2002	65	82.4	74.9	88.7	79.2
2003	62	78.9	77.5	84.5	78.4
2004	53	78.4	76.9	84.8	77.5
2005	67	80.8	78.1	89.3	80.7
2006	65	78.0	77.5	81.8	77.8
2007	82	81.1	77.5	87.5	81.1
2008	71	82.7	80.1	90.1	81.9
2009	66	79.5	77.3	83.5	79.5
2010	75	82.3	82.0	89.6	82.2
2011	73	80.9	75.5	85.9	79.8
2012	75	79.3	78.9	82.3	78.9
2013	72	82.1	80.3	85.5	82.2
2014	66	82.7	81.9	86.0	82.7
1998-2014	1011	80.4	77.9	86.1	79.5

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	24	2.2	0.32	1.6	0.32	2.1	0.33	2.4	0.33
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	0.39
2001	38	3.3	0.39	1.9	0.30	2.9	0.37	4.0	0.43
2002	73	3.9	0.42	2.1	0.33	3.3	0.40	4.7	0.47
2003	65	3.5	0.40	1.9	0.33	2.9	0.39	4.0	0.43
2004	78	4.1	0.44	2.2	0.34	3.4	0.41	4.6	0.47
2005	82	4.3	0.46	2.4	0.36	3.5	0.42	4.8	0.48
2006	79	4.1	0.45	2.1	0.32	3.1	0.39	4.3	0.46
2007	82	3.7	0.43	2.0	0.37	2.9	0.41	4.0	0.45
2008	91	4.1	0.52	2.0	0.35	3.0	0.46	4.2	0.54
2009	80	3.6	0.48	1.6	0.37	2.6	0.44	3.6	0.50
2010	86	3.8	0.53	1.6	0.34	2.6	0.44	3.8	0.54
2011	91	4.0	0.57	1.8	0.37	2.8	0.48	3.9	0.58
2012	93	4.1	0.56	1.8	0.37	2.8	0.49	4.0	0.56
2013	93	4.1	0.67	1.8	0.46	2.8	0.57	3.9	0.66
2014	75	3.3	1.10	1.4	1.05	2.3	1.06	3.2	1.14
1998-2014	1182	3.7	0.49	1.9	0.37	2.8	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	0.32	2.1	0.40
2002	47	2.4	0.37	1.1	0.36	1.6	0.37	2.0	0.38
2003	51	2.6	0.53	1.1	0.36	1.6	0.45	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	0.57	1.0	0.31	1.5	0.43	2.1	0.50
2006	52	2.6	0.52	1.1	0.35	1.5	0.43	2.1	0.52
2007	61	2.6	0.43	1.1	0.27	1.5	0.33	2.0	0.39
2008	59	2.5	0.48	1.0	0.30	1.4	0.37	1.9	0.43
2009	54	2.3	0.41	1.0	0.31	1.4	0.36	1.8	0.41
2010	61	2.6	0.51	1.0	0.33	1.4	0.40	1.9	0.48
2011	52	2.2	0.44	0.9	0.29	1.2	0.36	1.6	0.41
2012	64	2.7	0.56	0.9	0.26	1.4	0.37	1.9	0.49
2013	52	2.2	0.57	0.8	0.34	1.2	0.42	1.6	0.49
2014	45	1.9	0.96	0.8	1.30	1.0	1.11	1.3	0.99
1998-2014	772	2.3	0.46	0.9	0.31	1.3	0.37	1.8	0.44

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	0.3	0.3			0.0	3	0.7	0.7
5-9	7	0.6	0.9	4	0.6	0.6	3	0.7	1.3
10-14	9	0.8	1.7	2	0.3	0.9	7	1.6	2.9
15-19	6	0.5	2.2	3	0.4	1.3	3	0.7	3.6
20-24	6	0.5	2.7	4	0.6	1.9	2	0.4	4.0
25-29	4	0.4	3.1	3	0.4	2.3	1	0.2	4.2
30-34	8	0.7	3.8	5	0.7	3.0	3	0.7	4.9
35-39	8	0.7	4.5	4	0.6	3.6	4	0.9	5.8
40-44	12	1.1	5.5	9	1.3	4.9	3	0.7	6.5
45-49	15	1.3	6.8	5	0.7	5.6	10	2.2	8.7
50-54	22	1.9	8.8	14	2.0	7.6	8	1.8	10.5
55-59	41	3.6	12.3	26	3.7	11.4	15	3.3	13.8
60-64	70	6.1	18.5	48	6.9	18.3	22	4.9	18.8
65-69	111	9.7	28.2	82	11.8	30.1	29	6.5	25.2
70-74	177	15.5	43.7	118	17.0	47.1	59	13.2	38.4
75-79	203	17.8	61.5	140	20.2	67.3	63	14.1	52.5
80-84	213	18.7	80.1	122	17.6	84.9	91	20.3	72.8
85+	227	19.9	100.0	105	15.1	100.0	122	27.2	100.0
All ages	1142	100.0		694	100.0		448	100.0	

Included in the statistics are 43.8% multiple primaries in males and 33.8% 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	0.08		20.0
5- 9	4	3	0.5	0.14	0.4	0.10	19.0	16.7
10-14	2	7	0.2	0.11	0.8	0.41	11.1	35.0
15-19	3	3	0.3	0.17	0.3	0.23	8.3	13.6
20-24	4	2	0.4	0.50	0.2	0.25	8.3	7.1
25-29	3	1	0.2	0.43	0.1	0.14	4.8	1.6
30-34	5	3	0.4	0.45	0.2	0.50	5.7	2.7
35-39	4	4	0.3	0.27	0.3	0.40	2.3	1.6
40-44	9	3	0.6	0.47	0.2	0.14	2.0	0.5
45-49	5	10	0.3	0.13	0.7	0.59	0.5	0.8
50-54	14	8	1.1	0.22	0.6	0.31	0.7	0.4
55-59	26	15	2.4	0.36	1.3	0.30	0.8	0.6
60-64	48	22	4.9	0.55	2.1	0.36	1.0	0.6
65-69	82	29	8.5	0.50	2.8	0.33	1.1	0.6
70-74	118	59	13.0	0.61	5.6	0.58	1.3	0.9
75-79	140	63	25.4	0.94	8.8	0.68	1.6	1.0
80-84	122	91	34.9	0.81	16.2	0.79	1.7	1.4
85+	105	122	45.4	0.81	21.1	0.63	1.7	1.4
All ages	694	448					1.4	1.0
Mortality								
Raw			3.8	0.57	2.4	0.50		
WS			1.8	0.40	0.9	0.32		
ES			2.7	0.50	1.3	0.40		
BRD-S			3.8	0.58	1.7	0.47		
PYLL-70								
per 100,000			16.6		13.9			
ES			16.2		15.5			
AYLL-70			12.7		19.5			

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 ←%
C16	Stomach	11	1.5	2	18.2			9	81.8
C18	Colon	50	6.8	18	36.0	7	14.0	25	50.0
C19–C20	Rectum	31	4.2	8	25.8	6	19.4	17	54.8
C25	Pancreas	10	1.4			3	30.0	7	70.0
C33–C34	Lung	71	9.6	7	9.9	16	22.5	48	67.6
C43	Malign. melanoma	41	5.5	15	36.6	3	7.3	23	56.1
C44	Skin others	194	26.3	23	11.9	10	5.2	161	83.0
C46,C49	Soft tissue	13	1.8	5	38.5	1	7.7	7	53.8
C61	Prostate	109	14.7	50	45.9	14	12.8	45	41.3
C64	Kidney	16	2.2	8	50.0	2	12.5	6	37.5
C67	Bladder	33	4.5	14	42.4	4	12.1	15	45.5
C70–C72	CNS cancer	13	1.8	1	7.7	3	23.1	9	69.2
C76–C79	CUP	9	1.2			1	11.1	8	88.9
C81	Hodgkin lymphoma	13	1.8	4	30.8	2	15.4	7	53.8
C82–C85	NHL	38	5.1			9	23.7	29	76.3
C90	Mult. myeloma	13	1.8	3	23.1	5	38.5	5	38.5
C91–C96	Leukaemia	23	3.1			3	13.0	20	87.0
Other primaries		51	6.9	17	33.3	9	17.6	25	49.0
All mult. primaries		739	100.0	175	23.7	98	13.3	466	63.1

Multiple primaries with number of cases 1 to 6 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	8	2.6	1	12.5	4	50.0	3	37.5
C18	Colon	22	7.1	9	40.9	2	9.1	11	50.0
C19-C20	Rectum	9	2.9	5	55.6	1	11.1	3	33.3
C25	Pancreas	7	2.3					7	100.0
C33-C34	Lung	15	4.9			1	6.7	14	93.3
C43	Malign. melanoma	11	3.6	7	63.6			4	36.4
C44	Skin others	73	23.6	17	23.3	4	5.5	52	71.2
C50	Breast	52	16.8	29	55.8	7	13.5	16	30.8
C51	Vulva	4	1.3	3	75.0			1	25.0
C54	Corpus uteri	9	2.9	4	44.4	2	22.2	3	33.3
C56	Ovary	10	3.2	3	30.0	2	20.0	5	50.0
C64	Kidney	8	2.6	2	25.0	3	37.5	3	37.5
C67	Bladder	5	1.6	2	40.0	2	40.0	1	20.0
C70-C72	CNS cancer	14	4.5	6	42.9	2	14.3	6	42.9
C76-C79	CUP	4	1.3	1	25.0			3	75.0
C82-C85	NHL	19	6.1			2	10.5	17	89.5
C90	Mult. myeloma	6	1.9			2	33.3	4	66.7
C91-C96	Leukaemia	6	1.9			1	16.7	5	83.3
Other primaries		27	8.7	12	44.4	3	11.1	12	44.4
All mult. primaries		309	100.0	101	32.7	38	12.3	170	55.0

Multiple primaries with number of cases 1 to 3 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.	Males MI-index	Females Age-spec. mortal.	Females MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4		3	0.0		0.4	0.08		23.1
5- 9	4	3	0.5	0.14	0.4	0.11	20.0	16.7
10-14	2	7	0.2	0.11	0.8	0.41	11.1	36.8
15-19	3	2	0.3	0.17	0.2	0.17	9.1	10.0
20-24	4	2	0.4	0.50	0.2	0.25	9.3	7.7
25-29	3	1	0.2	0.43	0.1	0.14	5.5	1.7
30-34	5	3	0.4	0.45	0.2	0.50	5.8	3.2
35-39	4	4	0.3	0.27	0.3	0.40	2.4	1.8
40-44	8	3	0.5	0.42	0.2	0.17	1.9	0.5
45-49	5	9	0.3	0.13	0.6	0.69	0.5	0.9
50-54	11	7	0.8	0.18	0.5	0.30	0.7	0.5
55-59	23	10	2.2	0.34	0.9	0.27	0.9	0.5
60-64	34	21	3.5	0.53	2.0	0.43	0.9	0.7
65-69	62	22	6.4	0.51	2.1	0.34	1.1	0.5
70-74	95	52	10.4	0.73	5.0	0.71	1.4	1.0
75-79	110	47	20.0	1.08	6.6	0.73	1.8	1.0
80-84	93	73	26.6	0.96	13.0	0.84	1.7	1.4
85+	67	99	28.9	0.80	17.1	0.63	1.5	1.5
All ages	533	368					1.4	1.1
Mortality								
Raw			3.0	0.57	2.0	0.52		
WS			1.4	0.37	0.8	0.32		
ES			2.1	0.48	1.1	0.40		
BRD-S			3.0	0.58	1.4	0.48		
PYLL-70								
per 100,000			14.9		12.8			
ES			14.8		14.4			
AYLL-70			14.2		20.9			

* 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.	Males MI-index	Females Age-spec. mortal.	Females MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4		3	0.0		0.4	0.08		23.1
5- 9	4	3	0.5	0.14	0.4	0.11	20.0	16.7
10-14	2	6	0.2	0.12	0.7	0.35	11.1	33.3
15-19	3	2	0.3	0.18	0.2	0.17	9.1	11.1
20-24	3	2	0.3	0.38	0.2	0.25	7.7	8.3
25-29	2	1	0.2	0.29	0.1	0.14	3.9	1.8
30-34	5	3	0.4	0.45	0.2	0.50	5.9	3.6
35-39	3	4	0.2	0.20	0.3	0.40	1.9	2.0
40-44	7	3	0.4	0.37	0.2	0.17	1.8	0.6
45-49	3	7	0.2	0.08	0.5	0.64	0.3	0.8
50-54	10	5	0.8	0.17	0.4	0.26	0.7	0.4
55-59	16	9	1.5	0.26	0.8	0.28	0.7	0.5
60-64	15	14	1.5	0.28	1.3	0.32	0.4	0.6
65-69	36	17	3.7	0.36	1.6	0.33	0.8	0.5
70-74	60	40	6.6	0.63	3.8	0.58	1.1	1.0
75-79	64	32	11.6	0.78	4.5	0.62	1.3	0.8
80-84	60	59	17.2	0.70	10.5	0.71	1.5	1.4
85+	51	79	22.0	0.63	13.7	0.53	1.5	1.4
All ages	344	289					1.1	1.0
Mortality								
Raw			1.9	0.42	1.5	0.44		
WS			0.9	0.27	0.7	0.28		
ES			1.4	0.35	0.9	0.34		
BRD-S			1.9	0.42	1.1	0.41		
PYLL-70								
per 100,000			11.7		11.4			
ES			12.0		13.1			
AYLL-70			17.2		22.9			

* See corresponding tables with multiple primaries.

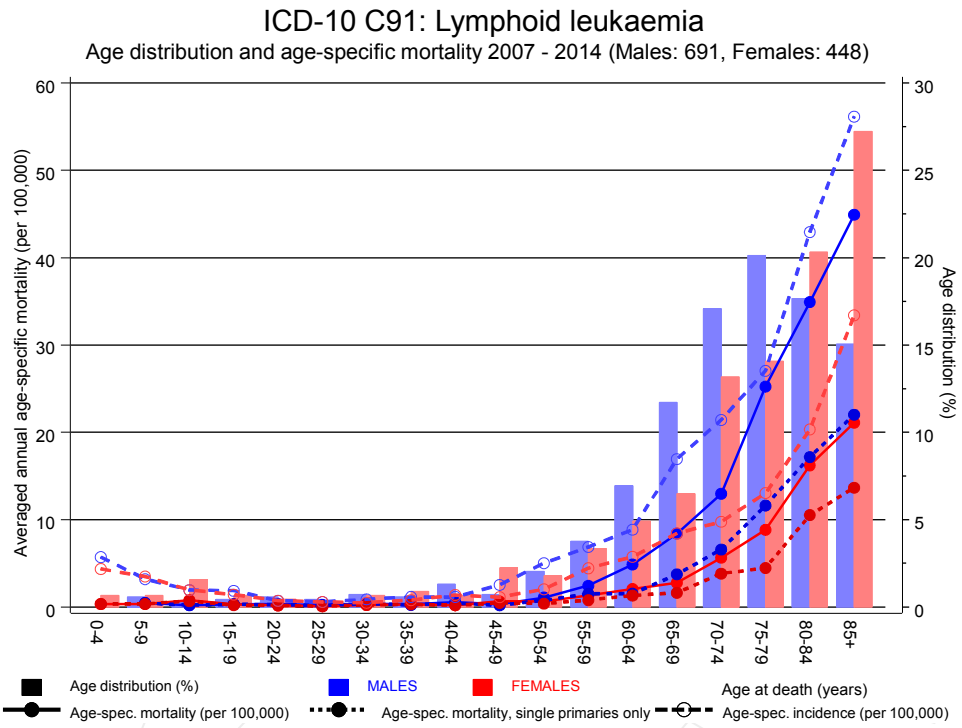
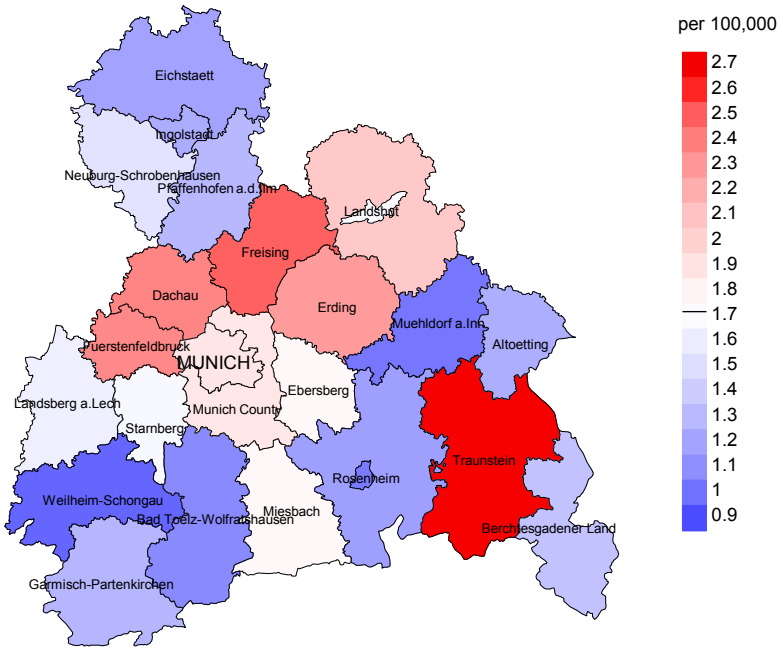


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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) 2007 - 2014: Males



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

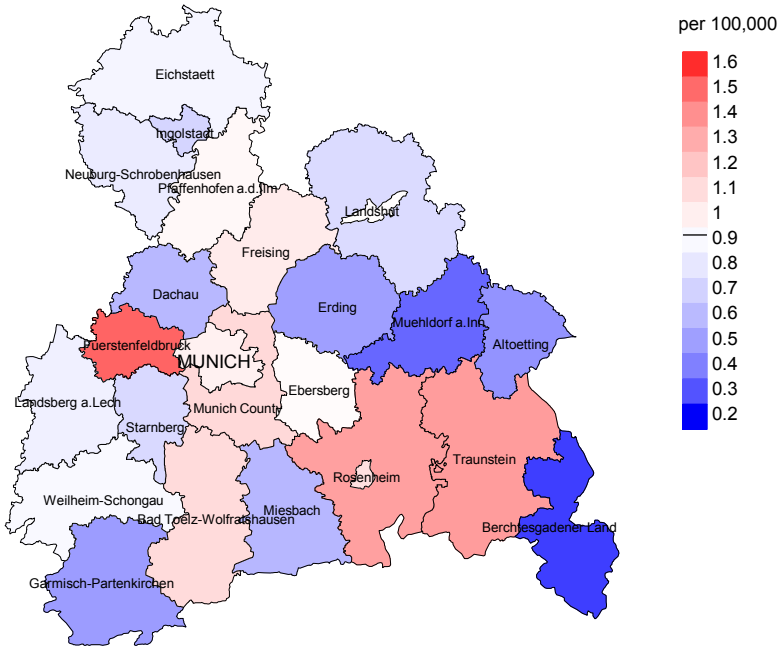


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.7/100,000 WS N=686, females 0.9/100,000 WS N=447).

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 16 women died from lymphoid leukaemia. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.3 and 2.3/100,000.

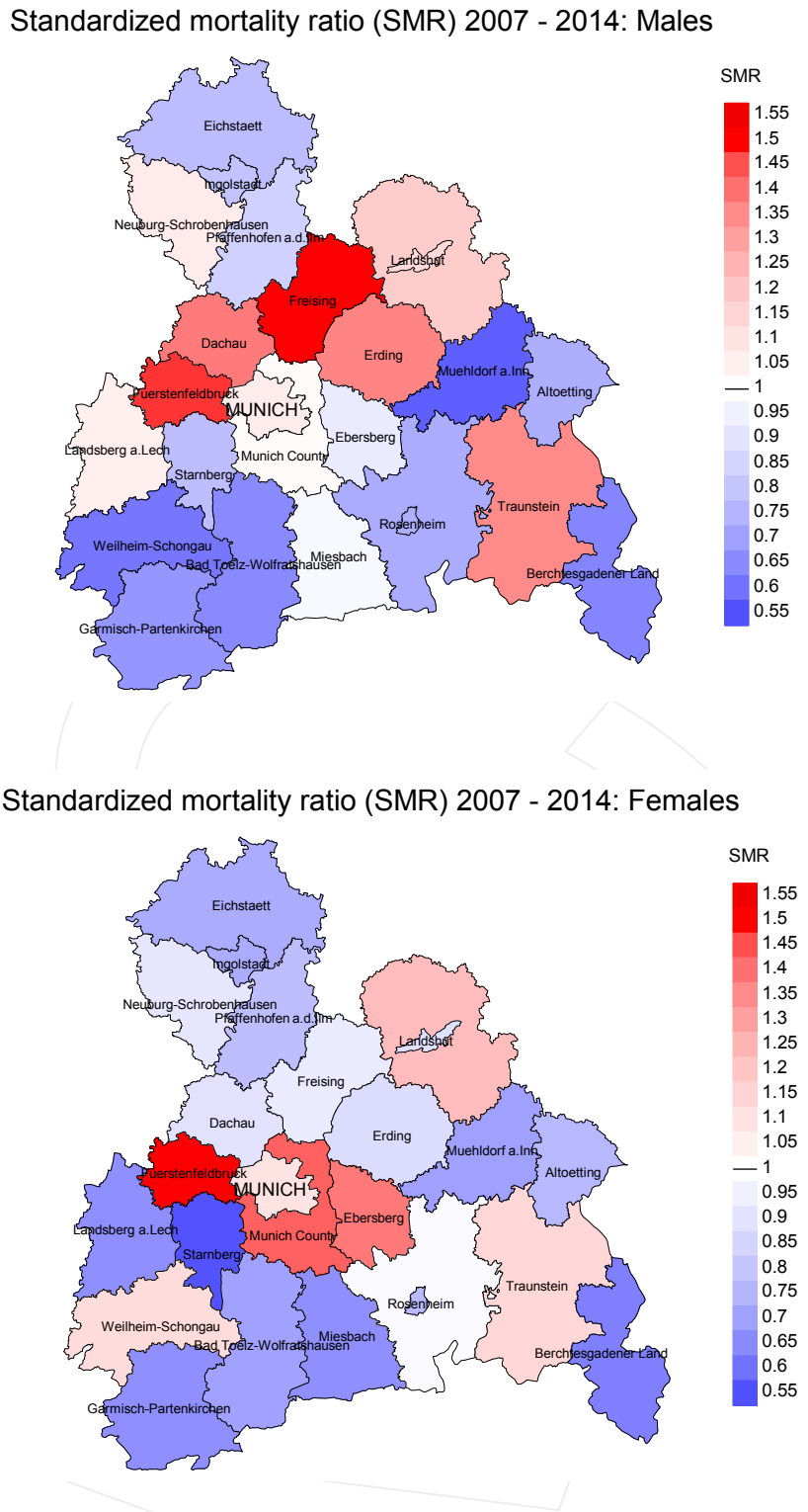


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=686, females N=447).

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 16 women died from lymphoid leukaemia. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.39. Though, the value of this parameter may vary with an underlying probability of 99% between 0.66 and 2.55, 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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