Munich Cancer Registry

- Survival
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- *Deutsch*

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

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

Cancer statistics: Baseline statistics

C81: Hodgkin lymphoma

Year of diagnosis	1998-2013
Patients	1,556
Diseases	1,556
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C81__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 4.64 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. 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, May 2015

[#] 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 2014 are incorporated into these analyses.

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

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

Code	Description
C81.-	Hodgkin lymphoma
C81.0	Nodular lymphocyte predominant Hodgkin lymphoma
C81.1	Nodular sclerosis (classical) Hodgkin lymphoma
C81.2	Mixed cellularity (classical) Hodgkin lymphoma
C81.3	Lymphocyte depleted (classical) Hodgkin lymphoma
C81.4	Lymphocyte-rich (classical) Hodgkin lymphoma
C81.7	Other (classical) Hodgkin lymphoma
C81.9	Hodgkin lymphoma, 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	85	4	4.7	16.5	24.7	94.1	
1999	66	6	9.1	19.7	34.8	90.9	
2000	61	5	8.2	18.0	27.9	95.1	
2001	58	3	5.2	12.1	27.6	86.2	
2002	100	6	6.0	16.0	28.0	90.0	#
2003	112	4	3.6	8.9	19.6	91.1	
2004	110	3	2.7	19.1	16.4	95.5	
2005	115	3	2.6	16.5	16.5	87.8	
2006	87	2	2.3	20.7	26.4	98.9	
2007	108	2	1.9	13.9	18.5	75.9	# ##
2008	116	1	0.9	12.1	18.1	44.0	
2009	97	3	3.1	12.4	15.5	49.5	
2010	119	2	1.7	6.7	14.3	47.9	
2011	110	3	2.7	10.9	14.5	50.9	
2012	145	5	3.4	14.5	16.6	65.5	
2013	67	6	9.0	22.4	16.4	100.0	###
1998-2013	1556	58	3.7	14.5	20.0	76.3	

\# 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	85	50	35	58.8
1999	66	33	33	50.0
2000	61	31	30	50.8
2001	58	27	31	46.6
2002	100	58	42	58.0
2003	112	61	51	54.5
2004	110	61	49	55.5
2005	115	62	53	53.9
2006	87	52	35	59.8
2007	108	63	45	58.3
2008	116	62	54	53.4
2009	97	59	38	60.8
2010	119	70	49	58.8
2011	110	65	45	59.1
2012	145	92	53	63.4
2013	67	39	28	58.2
1998-2013	1556	885	671	56.9

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 4.64 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	50	35	4.5	3.0	4.0	3.1	4.3	3.1	4.6	3.2
1999	33	33	2.9	2.8	2.5	2.7	2.7	2.7	2.9	3.1
2000	31	30	2.7	2.5	2.1	2.7	2.4	2.6	2.5	2.9
2001	27	31	2.3	2.5	2.0	2.3	2.2	2.5	2.2	2.7
2002	58	42	3.1	2.1	2.5	2.1	2.8	2.1	3.0	2.3
2003	61	51	3.3	2.6	2.8	2.8	3.0	2.7	3.2	3.0
2004	61	49	3.2	2.5	3.1	2.3	3.1	2.4	3.3	2.7
2005	62	53	3.3	2.7	3.0	2.4	3.1	2.5	3.5	2.8
2006	52	35	2.7	1.7	2.3	1.8	2.5	1.8	2.7	1.9
2007	63	45	2.8	1.9	2.6	1.7	2.7	1.8	2.9	2.0
2008	62	54	2.8	2.3	2.6	2.1	2.7	2.1	2.9	2.4
2009	59	38	2.6	1.6	2.2	1.6	2.4	1.6	2.6	1.8
2010	70	49	3.1	2.1	2.8	2.0	2.9	2.0	3.1	2.3
2011	65	45	2.8	1.9	2.5	1.7	2.7	1.8	3.0	2.0
2012	92	53	4.0	2.2	3.2	2.1	3.6	2.1	4.0	2.4
2013	39	28	1.7	1.2	1.4	0.9	1.6	1.1	1.6	1.2
1998-2013	885	671	3.0	2.2	2.6	2.0	2.8	2.1	3.0	2.3

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	85	39.5	19.4	6.1	94.0	18.2	24.7	34.9	56.0	64.0
1999	66	44.3	21.3	9.1	84.3	17.3	28.8	39.1	61.5	77.0
2000	61	41.4	19.6	6.6	85.3	20.1	27.3	35.7	57.7	69.1
2001	58	44.3	19.3	9.4	86.0	19.6	29.9	41.3	58.5	72.3
2002	100	43.1	19.2	7.5	82.6	20.7	28.0	38.8	61.0	70.8
2003	112	40.1	18.6	6.1	85.1	19.1	25.7	36.2	54.6	69.1
2004	110	39.8	17.8	11.2	85.7	20.6	26.2	36.1	52.1	66.0
2005	115	43.8	21.2	12.6	86.4	17.5	23.8	39.4	62.7	76.1
2006	87	43.4	21.2	9.2	89.9	16.9	26.5	39.9	59.1	77.7
2007	108	43.9	19.7	5.2	84.2	20.2	27.6	41.8	60.0	73.2
2008	116	43.7	21.7	5.5	87.7	17.1	24.5	39.4	60.6	76.2
2009	97	45.0	21.0	7.9	92.1	18.9	28.4	42.1	63.0	74.0
2010	119	44.8	21.6	3.2	85.5	19.2	25.6	41.9	65.6	74.6
2011	110	46.0	21.2	6.9	96.6	21.3	26.6	45.2	60.5	78.4
2012	145	47.2	22.6	11.0	93.4	19.4	26.4	42.7	68.0	78.7
2013	67	48.9	21.1	8.1	90.8	22.8	34.0	47.3	65.9	78.8
1998-2013	1556	43.7	20.6	3.2	96.6	19.1	26.6	39.9	60.6	74.0

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	50	41.3	19.5	6.1	94.0	19.2	25.5	35.9	56.0	63.7
1999	33	42.7	18.4	12.5	77.8	22.2	30.9	38.7	55.6	69.7
2000	31	48.4	18.6	6.6	85.3	31.8	35.7	52.0	62.1	69.2
2001	27	42.2	17.9	9.4	72.9	17.5	29.9	39.8	56.9	67.7
2002	58	44.4	17.7	11.2	76.7	24.2	31.6	39.5	62.5	70.3
2003	61	43.3	19.0	6.1	85.1	21.3	30.7	39.9	57.6	69.1
2004	61	36.7	15.2	14.3	81.7	18.5	26.6	35.5	42.5	62.7
2005	62	43.9	21.9	12.6	84.7	17.3	23.3	39.9	65.5	72.7
2006	52	46.1	19.0	9.2	81.0	19.1	34.4	46.0	60.5	73.4
2007	63	42.8	20.1	5.2	80.4	19.3	26.3	40.0	61.8	71.3
2008	62	41.4	20.1	5.5	82.2	17.8	23.3	38.7	57.9	72.0
2009	59	46.5	20.1	7.9	80.0	21.1	30.4	44.8	68.6	74.0
2010	70	44.8	20.9	3.2	85.5	19.7	27.6	42.0	64.3	73.7
2011	65	45.1	20.0	6.9	96.6	21.9	26.8	44.0	57.9	73.1
2012	92	48.8	21.4	11.0	83.4	19.7	31.8	44.5	68.2	77.5
2013	39	47.0	20.2	8.1	89.9	22.8	33.0	44.9	60.6	73.7
1998-2013	885	44.2	19.7	3.2	96.6	19.5	28.8	40.6	60.5	72.6

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	35	37.0	19.2	12.4	87.5	17.2	23.9	30.7	56.7	64.0
1999	33	45.8	24.1	9.1	84.3	17.3	28.1	41.4	67.3	80.8
2000	30	34.2	18.3	11.4	79.5	17.2	21.7	29.7	35.1	66.0
2001	31	46.1	20.5	11.4	86.0	20.8	28.5	45.4	61.3	74.0
2002	42	41.3	21.2	7.5	82.6	20.0	23.0	36.7	60.6	77.5
2003	51	36.4	17.6	11.9	77.4	18.4	22.6	31.7	41.8	64.2
2004	49	43.7	20.0	11.2	85.7	21.4	25.4	39.3	61.1	70.1
2005	53	43.8	20.6	15.3	86.4	18.1	27.7	39.4	60.1	77.7
2006	35	39.3	23.7	11.2	89.9	13.8	22.0	30.8	58.8	78.3
2007	45	45.3	19.3	7.3	84.2	24.9	28.7	43.7	58.1	74.7
2008	54	46.3	23.3	11.8	87.7	17.1	28.1	41.6	69.7	78.1
2009	38	42.8	22.5	13.7	92.1	17.8	24.8	35.5	59.3	76.9
2010	49	44.8	22.6	9.8	84.8	19.2	24.3	41.7	66.2	76.0
2011	45	47.3	22.9	16.7	90.5	20.4	26.6	45.4	63.0	80.8
2012	53	44.6	24.4	13.0	93.4	19.4	25.0	34.6	67.3	80.7
2013	28	51.5	22.3	15.3	90.8	21.5	34.6	51.1	74.7	83.9
1998-2013	671	43.2	21.7	7.3	93.4	18.6	25.1	37.7	60.6	76.9

Table 4

Age distribution by 5-year age group and gender for period 1998-2013 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	2	0.1	0.1	2	0.2	0.2			0.0
5-9	19	1.2	1.3	15	1.7	1.9	4	0.6	0.6
10-14	41	2.6	4.0	23	2.6	4.5	18	2.7	3.3
15-19	114	7.3	11.3	53	6.0	10.5	61	9.1	12.4
20-24	154	9.9	21.2	71	8.0	18.5	83	12.4	24.7
25-29	159	10.2	31.4	74	8.4	26.9	85	12.7	37.4
30-34	149	9.6	41.0	87	9.8	36.7	62	9.2	46.6
35-39	145	9.3	50.3	104	11.8	48.5	41	6.1	52.8
40-44	124	8.0	58.3	75	8.5	56.9	49	7.3	60.1
45-49	77	4.9	63.2	49	5.5	62.5	28	4.2	64.2
50-54	80	5.1	68.4	54	6.1	68.6	26	3.9	68.1
55-59	90	5.8	74.2	52	5.9	74.5	38	5.7	73.8
60-64	85	5.5	79.6	48	5.4	79.9	37	5.5	79.3
65-69	88	5.7	85.3	61	6.9	86.8	27	4.0	83.3
70-74	87	5.6	90.9	55	6.2	93.0	32	4.8	88.1
75-79	77	4.9	95.8	37	4.2	97.2	40	6.0	94.0
80-84	41	2.6	98.5	17	1.9	99.1	24	3.6	97.6
85+	24	1.5	100.0	8	0.9	100.0	16	2.4	100.0
All ages	1556	100.0		885	100.0		671	100.0	

Included in the statistics are 18.9% multiple primaries in males and 16.2% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2013

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=26 %	Females DCO rate n=32 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4	2		0.1	0.0			0.6	
5- 9	15	4	1.0	0.3			8.5	3.2
10-14	23	18	1.5	1.2			13.9	10.6
15-19	53	61	3.4	4.1			15.0	20.9
20-24	71	83	4.0	4.7		2.4	11.6	15.7
25-29	74	85	3.7	4.2			7.7	7.7
30-34	87	62	3.8	2.8			5.8	3.0
35-39	104	41	4.2	1.7		2.4	4.6	1.1
40-44	75	49	2.9	2.0		4.1	2.3	0.8
45-49	49	28	2.1	1.2	4.1	3.6	0.9	0.3
50-54	54	26	2.7	1.3		7.7	0.6	0.2
55-59	52	38	2.8	2.0	1.9	2.6	0.4	0.3
60-64	48	37	2.7	2.0	6.3	5.4	0.2	0.2
65-69	61	27	3.9	1.6	6.6	7.4	0.2	0.1
70-74	55	32	4.3	2.1	10.9		0.2	0.2
75-79	37	40	4.5	3.4	5.4	17.5	0.2	0.2
80-84	17	24	3.4	2.6	29.4	20.8	0.1	0.2
85+	8	16	2.3	1.8	37.5	43.8	0.1	0.1
All ages	885	671			2.9	4.8	0.6	0.4
Incidence								
Raw			3.0	2.2				
WS			2.6	2.0				
ES			2.8	2.1				
BRD-S			3.0	2.3				

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	2	0.6	3.5	0.4	12.7		4.7	50.0
C18	Colon	2	1.3	1.5	0.2	5.5		2.2	
C19-C20	Rectum	2	0.9	2.3	0.3	8.3		3.7	
C25	Pancreas	3	0.5	6.1	1.3	17.9	#	8.3	33.3
C33-C34	Lung	11	1.7	6.3	3.2	11.3	#	30.6	
C43	Malign. melanoma	2	0.8	2.5	0.3	8.9		3.9	
C60	Penis	2	0.0	58.4	7.1	211.0	#	6.5	
C61	Prostate	8	4.0	2.0	0.9	3.9		13.2	
C73	Thyroid	2	0.2	10.1	1.2	36.4	#	5.9	
C82-C85	NHL	12	0.6	18.7	9.7	32.7	#	37.5	
C91-C96	Leukaemia	5	0.3	19.3	6.3	45.1	#	15.7	
Other primaries		4	1.0	4.0	1.1	10.3	#	9.9	
Not observed		0	3.6	0.0	0.0	1.0		-12.0	
All mult. primaries		55	15.6	3.5	2.7	4.6	#	130.2	3.6

Patients	579
Median age at second malignancy (years)	59.6
Person-years	3029
Mean observation time (years)	5.2
Median observation time (years)	4.5

The occurrence of second malignancy is statistically significant.

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

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
C18 Colon	2	0.8	2.7	0.3	9.6	5.0	
C33-C34 Lung	3	0.6	4.7	1.0	13.7	9.5	
C50 Breast	3	3.4	0.9	0.2	2.6	-1.6	
C73 Thyroid	2	0.4	5.4	0.7	19.6	6.6	
C82-C85 NHL	12	0.3	35.0	18.1	61.2 #	46.9	
C91-C96 Leukaemia	2	0.2	13.2	1.6	47.7 #	7.4	
Other primaries	5	1.0	5.2	1.7	12.0 #	16.2	
Not observed	0	3.4	0.0	0.0	1.1	-13.6	
All mult. primaries	29	10.0	2.9	1.9	4.2 #	76.4	

Patients	447
Median age at second malignancy (years)	64.3
Person-years	2485
Mean observation time (years)	5.6
Median observation time (years)	5.0

The occurrence of second malignancy is statistically significant.

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

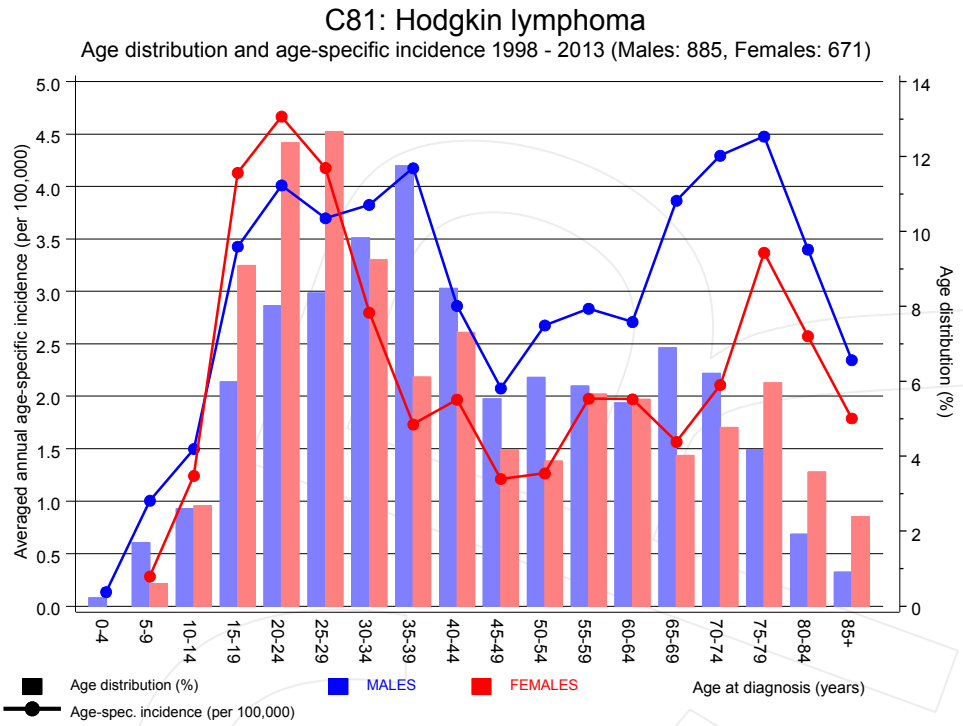


Figure 7. Age distribution and age-specific incidence

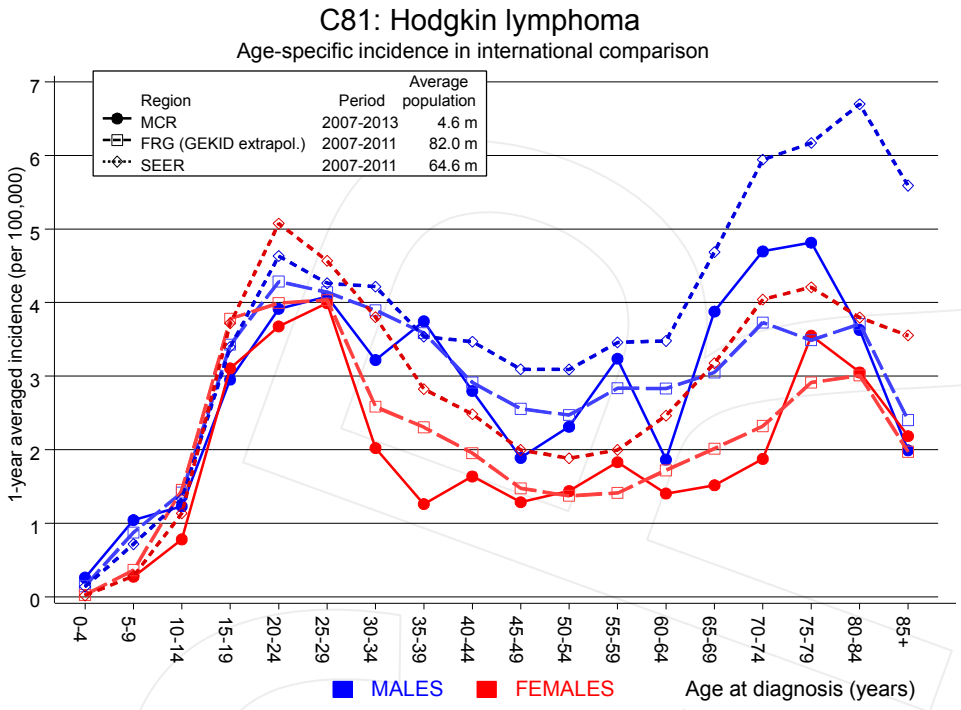


Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

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, 2014. http://www.gekid.de. Last access: 02/11/2015

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

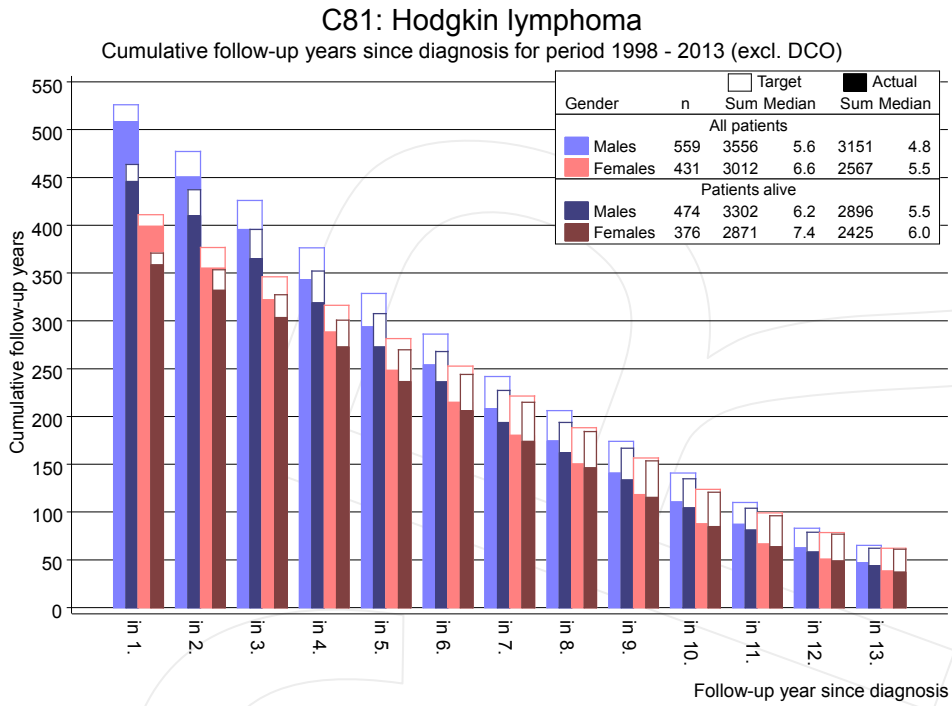
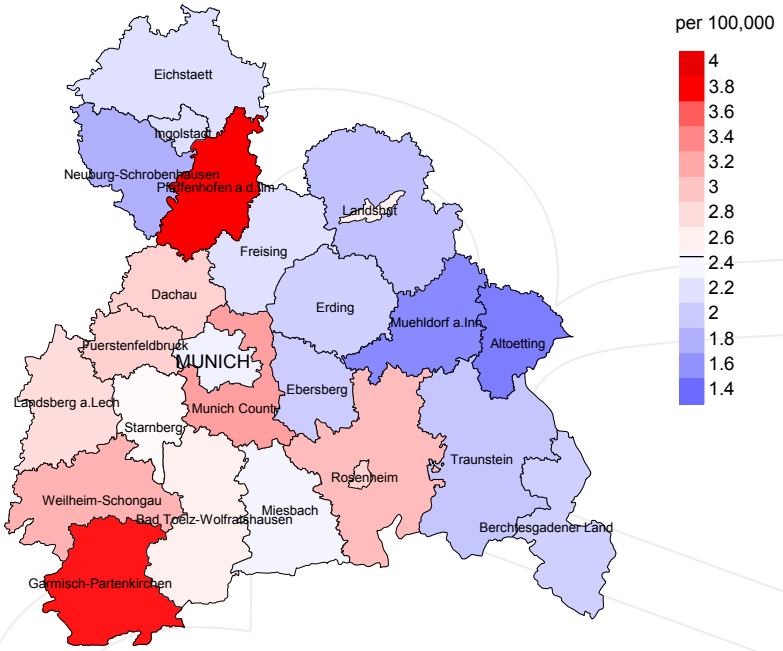


Figure 8. Cumulative follow-up years depending on time since diagnosis

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) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

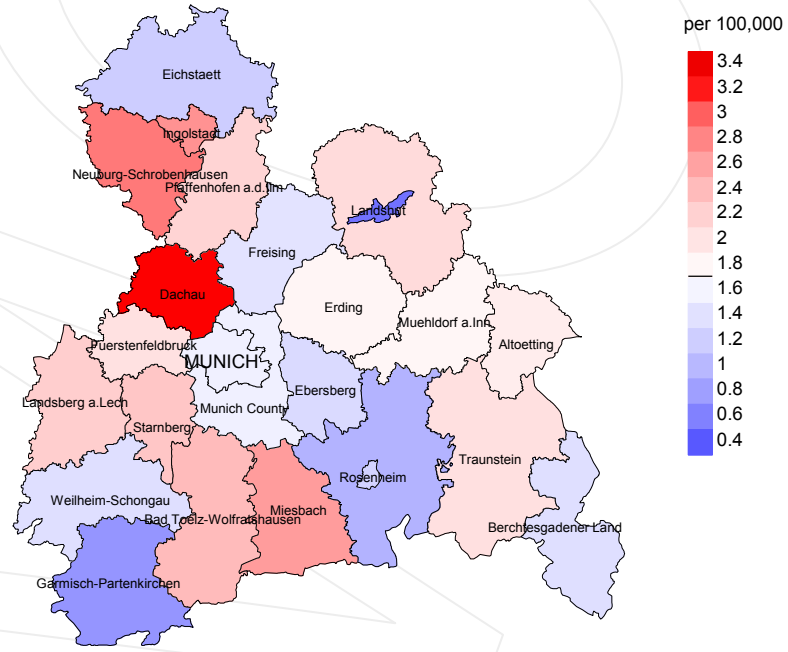
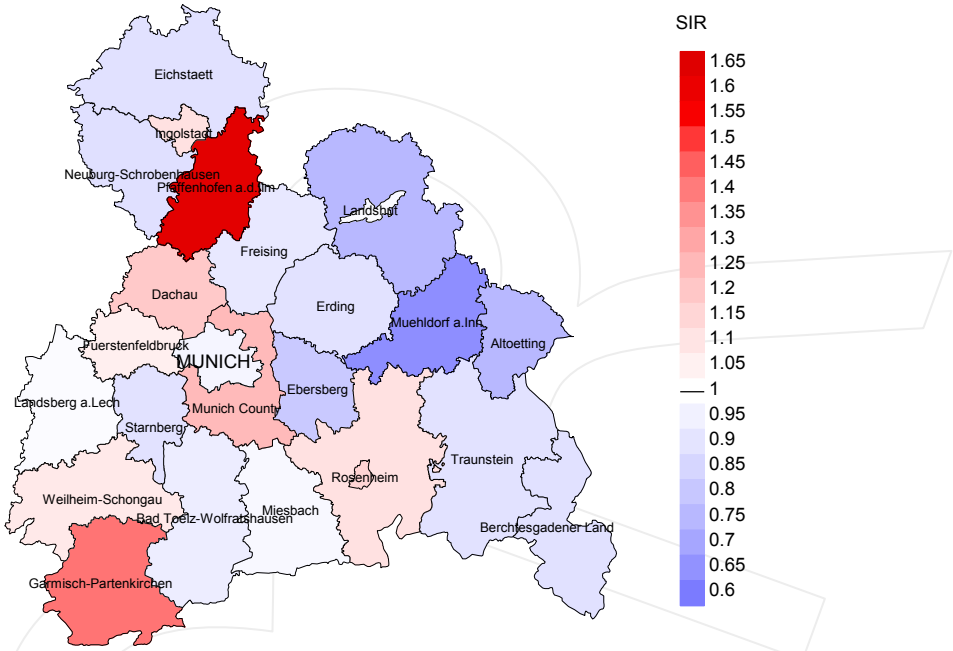


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 2.5/100,000 WS N=450, females 1.7/100,000 WS N=312).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 6 women were identified with newly diagnosed hodgkin lymphoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.3/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.2 and 4.1/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

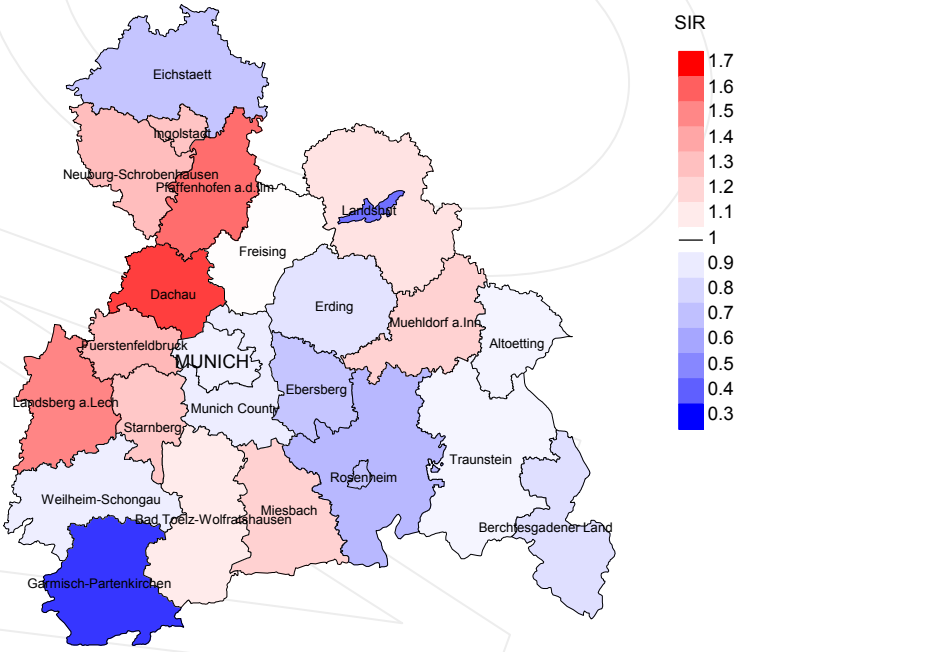


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=450, females N=312).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 6 women were identified with newly diagnosed hodgkin lymphoma. 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 0.19 and 1.89, 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	85	94.1	4.7	21	24.7	100.0
1999	66	90.9	9.1	23	34.8	100.0
2000	61	95.1	8.2	17	27.9	94.1
2001	58	86.2	5.2	16	27.6	93.8
2002	100	90.0	6.0	28	28.0	96.4
2003	112	91.1	3.6	22	19.6	95.5
2004	110	95.5	2.7	18	16.4	100.0
2005	115	87.8	2.6	19	16.5	100.0
2006	87	98.9	2.3	23	26.4	100.0
2007	108	75.9	1.9	20	18.5	95.0
2008	116	44.0	0.9	21	18.1	95.2
2009	97	49.5	3.1	15	15.5	93.3
2010	119	47.9	1.7	17	14.3	100.0
2011	110	50.9	2.7	16	14.5	93.8
2012	145	65.5	3.4	24	16.6	100.0
2013	67	100.0	9.0	11	16.4	90.9
1998-2013	1556	76.3	3.7	311	20.0	97.1

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	85	23	82.6	4	4.7
1999	66	28	92.9	8	12.1
2000	61	22	100.0	8	13.1
2001	58	18	94.4	4	6.9
2002	100	36	100.0	8	8.0
2003	112	34	97.1	5	4.5
2004	110	33	97.0	5	4.5
2005	115	36	94.4	8	7.0
2006	87	28	100.0	5	5.7
2007	108	38	97.4	7	6.5
2008	116	46	97.8	7	6.0
2009	97	37	100.0	6	6.2
2010	119	47	95.7	7	5.9
2011	110	50	98.0	9	8.2
2012	145	53	100.0	15	10.3
2013	67	52	100.0	10	14.9
1998-2013	1556	581	97.2	116	7.5

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	23	56.5	43.5	89.5
1999	28	67.9	32.1	88.5
2000	22	54.5	45.5	90.9
2001	18	55.6	44.4	70.6
2002	36	69.4	30.6	86.1
2003	34	55.9	44.1	87.9
2004	33	72.7	27.3	81.3
2005	36	80.6	19.4	91.2
2006	28	64.3	35.7	82.1
2007	38	60.5	39.5	78.4
2008	46	67.4	32.6	82.2
2009	37	81.1	18.9	94.6
2010	47	70.2	29.8	93.3
2011	50	72.0	28.0	81.6
2012	53	66.0	34.0	84.9
2013	52	73.1	26.9	86.5
1998-2013	581	68.0	32.0	85.8

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	11	43.0	38.7	43.8	44.9
1999	13	56.8	56.4	61.5	60.0
2000	13	64.8	59.2	67.2	66.1
2001	10	58.0	71.3	55.6	59.3
2002	20	63.0	65.0	55.4	65.8
2003	23	64.3	64.3	64.7	64.3
2004	16	70.8	59.2	78.2	72.5
2005	18	69.3	67.9	71.9	69.3
2006	17	72.3	68.7	74.3	72.3
2007	21	67.8	66.2	71.1	64.7
2008	23	61.1	61.1	59.7	61.6
2009	20	66.9	68.7	65.0	66.9
2010	30	67.8	71.9	63.6	71.9
2011	34	72.0	72.0	68.6	72.0
2012	29	68.9	72.5	58.5	65.8
2013	29	61.7	68.2	58.7	66.6
1998-2013	327	65.6	66.6	63.5	66.9

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	12	52.3	46.3	67.3	63.5
1999	15	53.2	41.4	69.8	50.7
2000	9	50.2	47.8	50.3	50.3
2001	8	79.1	77.2	83.9	79.1
2002	16	63.4	59.5	80.9	63.4
2003	11	52.6	44.6	55.5	54.0
2004	17	71.7	71.7	74.6	71.5
2005	18	73.3	71.5	76.5	71.6
2006	11	81.0	81.0	79.9	79.7
2007	17	76.8	76.8	73.8	73.3
2008	23	66.8	65.6	67.6	66.8
2009	17	70.5	70.5	71.6	70.5
2010	17	72.1	71.0	75.1	71.5
2011	16	67.9	67.9	60.2	67.9
2012	24	69.2	69.2	70.6	68.5
2013	23	65.4	65.2	73.0	65.2
1998-2013	254	69.5	68.2	71.9	68.8

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	6	0.5	0.12	0.5	0.12	0.5	0.12	0.6	0.12
1999	10	0.9	0.30	0.6	0.26	0.8	0.30	0.9	0.31
2000	5	0.4	0.16	0.3	0.17	0.4	0.17	0.5	0.20
2001	4	0.3	0.15	0.2	0.09	0.3	0.14	0.5	0.21
2002	13	0.7	0.22	0.4	0.16	0.6	0.22	0.7	0.24
2003	13	0.7	0.21	0.4	0.15	0.6	0.19	0.7	0.23
2004	11	0.6	0.18	0.3	0.11	0.5	0.15	0.6	0.18
2005	13	0.7	0.21	0.4	0.13	0.5	0.17	0.7	0.19
2006	11	0.6	0.21	0.3	0.15	0.5	0.19	0.6	0.21
2007	12	0.5	0.19	0.3	0.12	0.4	0.16	0.5	0.17
2008	15	0.7	0.24	0.4	0.16	0.6	0.20	0.6	0.20
2009	15	0.7	0.25	0.4	0.17	0.5	0.21	0.6	0.25
2010	20	0.9	0.29	0.5	0.17	0.7	0.23	0.9	0.28
2011	24	1.1	0.37	0.5	0.20	0.7	0.27	1.0	0.34
2012	17	0.7	0.18	0.4	0.11	0.5	0.15	0.7	0.17
2013	22	1.0	0.56	0.5	0.37	0.7	0.47	0.9	0.56
1998-2013	211	0.7	0.24	0.4	0.16	0.6	0.21	0.7	0.24

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	7	0.6	0.20	0.6	0.18	0.6	0.19	0.7	0.21
1999	9	0.8	0.27	0.6	0.22	0.7	0.26	0.8	0.25
2000	7	0.6	0.23	0.5	0.18	0.6	0.21	0.6	0.21
2001	6	0.5	0.19	0.2	0.07	0.3	0.11	0.4	0.16
2002	12	0.6	0.29	0.4	0.18	0.5	0.23	0.6	0.26
2003	6	0.3	0.12	0.2	0.08	0.3	0.10	0.3	0.11
2004	13	0.7	0.27	0.3	0.14	0.5	0.19	0.6	0.21
2005	16	0.8	0.30	0.4	0.16	0.5	0.21	0.7	0.25
2006	7	0.3	0.20	0.1	0.08	0.2	0.11	0.3	0.16
2007	11	0.5	0.24	0.2	0.12	0.3	0.15	0.4	0.19
2008	16	0.7	0.30	0.4	0.21	0.5	0.25	0.6	0.26
2009	15	0.6	0.39	0.3	0.21	0.4	0.27	0.5	0.30
2010	13	0.6	0.27	0.2	0.13	0.3	0.17	0.4	0.19
2011	12	0.5	0.27	0.3	0.16	0.3	0.20	0.4	0.21
2012	18	0.8	0.34	0.3	0.16	0.5	0.23	0.6	0.26
2013	16	0.7	0.57	0.3	0.38	0.5	0.44	0.5	0.46
1998-2013	184	0.6	0.27	0.3	0.16	0.4	0.20	0.5	0.23

Table 13

Age distribution of age at death (cancer-related) for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
15-19	3	0.8	0.8		0.0		3	1.6	1.6
20-24	7	1.8	2.5	2	0.9	0.9	5	2.7	4.3
25-29	10	2.5	5.1	6	2.8	3.8	4	2.2	6.5
30-34	12	3.0	8.1	5	2.4	6.2	7	3.8	10.3
35-39	15	3.8	11.9	6	2.8	9.0	9	4.9	15.2
40-44	21	5.3	17.2	14	6.6	15.6	7	3.8	19.0
45-49	36	9.1	26.3	21	10.0	25.6	15	8.2	27.2
50-54	23	5.8	32.2	15	7.1	32.7	8	4.3	31.5
55-59	22	5.6	37.7	16	7.6	40.3	6	3.3	34.8
60-64	29	7.3	45.1	15	7.1	47.4	14	7.6	42.4
65-69	47	11.9	57.0	24	11.4	58.8	23	12.5	54.9
70-74	50	12.7	69.6	30	14.2	73.0	20	10.9	65.8
75-79	53	13.4	83.0	27	12.8	85.8	26	14.1	79.9
80-84	42	10.6	93.7	18	8.5	94.3	24	13.0	92.9
85+	25	6.3	100.0	12	5.7	100.0	13	7.1	100.0
All ages	395	100.0		211	100.0		184	100.0	

Included in the statistics are 18.9% multiple primaries in males and 16.2% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19		3	0.0		0.2	0.05		8.1
20-24	2	5	0.1	0.03	0.3	0.06	2.2	9.8
25-29	6	4	0.3	0.08	0.2	0.05	5.6	3.5
30-34	5	7	0.2	0.06	0.3	0.11	2.7	3.1
35-39	6	9	0.2	0.06	0.4	0.22	1.5	1.7
40-44	14	7	0.5	0.19	0.3	0.14	1.6	0.6
45-49	21	15	0.9	0.43	0.6	0.54	1.2	0.7
50-54	15	8	0.7	0.28	0.4	0.31	0.5	0.3
55-59	16	6	0.9	0.31	0.3	0.16	0.3	0.1
60-64	15	14	0.8	0.31	0.7	0.38	0.2	0.2
65-69	24	23	1.5	0.39	1.3	0.85	0.2	0.3
70-74	30	20	2.3	0.55	1.3	0.63	0.2	0.2
75-79	27	26	3.3	0.73	2.2	0.65	0.2	0.2
80-84	18	24	3.6	1.06	2.6	1.00	0.2	0.2
85+	12	13	3.5	1.50	1.5	0.81	0.1	0.1
All ages	211	184					0.3	0.3
Mortality								
Raw			0.7	0.24	0.6	0.27		
WS			0.4	0.16	0.3	0.16		
ES			0.6	0.21	0.4	0.20		
BRD-S			0.7	0.24	0.5	0.23		
PYLL-70								
per 100,000			8.3		7.6			
ES			7.4		7.1			
AYLL-70			17.9		20.1			

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

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	2	1.2	1	50.0			1	50.0
C09-C10 Oropharynx	2	1.2					2	100.0
C11 Nasopharynx	2	1.2	2	100.0				
C12-C13 Hypopharynx	2	1.2					2	100.0
C15 Oesophagus	7	4.1					7	100.0
C16 Stomach	7	4.1			1	14.3	6	85.7
C18 Colon	4	2.4					4	100.0
C19-C20 Rectum	6	3.6	2	33.3			4	66.7
C23-C24 Bile	2	1.2					2	100.0
C25 Pancreas	4	2.4					4	100.0
C33-C34 Lung	32	18.9			1	3.1	31	96.9
C43 Malign. melanoma	3	1.8	1	33.3			2	66.7
C44 Skin others	15	8.9	7	46.7			8	53.3
C61 Prostate	15	8.9	6	40.0	1	6.7	8	53.3
C64 Kidney	3	1.8					3	100.0
C67 Bladder	3	1.8	2	66.7			1	33.3
C70-C72 CNS cancer	2	1.2					2	100.0
C76-C79 CUP	5	3.0					5	100.0
C82-C85 NHL	33	19.5	12	36.4	4	12.1	17	51.5
C90 Mult. myeloma	5	3.0	3	60.0			2	40.0
C91-C96 Leukaemia	6	3.6	1	16.7	1	16.7	4	66.7
Other primaries	9	5.3	1	11.1	1	11.1	7	77.8
All mult. primaries	169	100.0	38	22.5	9	5.3	122	72.2

Multiple primaries with number of cases 1 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 1998-2013
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C18	Colon	8	7.1			1	12.5	7	87.5
C19-C20	Rectum	3	2.7	1	33.3			2	66.7
C22	Liver	2	1.8					2	100.0
C25	Pancreas	5	4.4					5	100.0
C33-C34	Lung	13	11.5			1	7.7	12	92.3
C43	Malign. melanoma	2	1.8					2	100.0
C44	Skin others	8	7.1			1	12.5	7	87.5
C50	Breast	29	25.7	11	37.9			18	62.1
C51	Vulva	2	1.8					2	100.0
C54	Corpus uteri	3	2.7	2	66.7			1	33.3
C56	Ovary	3	2.7			1	33.3	2	66.7
C70-C72	CNS cancer	2	1.8	1	50.0			1	50.0
C76-C79	CUP	2	1.8					2	100.0
C82-C85	NHL	13	11.5	2	15.4			11	84.6
C91-C96	Leukaemia	7	6.2			1	14.3	6	85.7
Other primaries		11	9.7					11	100.0
All mult. primaries		113	100.0	17	15.0	5	4.4	91	80.5

Multiple primaries with number of cases 1 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 1998-2013
(**Singular primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19		3	0.0		0.2	0.05		9.1
20-24	2	5	0.1	0.03	0.3	0.06	2.4	10.6
25-29	6	3	0.3	0.08	0.1	0.04	6.1	2.8
30-34	5	5	0.2	0.06	0.2	0.09	2.8	2.5
35-39	6	9	0.2	0.06	0.4	0.23	1.6	1.9
40-44	14	6	0.5	0.20	0.2	0.13	1.8	0.6
45-49	18	15	0.8	0.39	0.6	0.58	1.1	0.9
50-54	14	8	0.7	0.30	0.4	0.36	0.5	0.3
55-59	15	6	0.8	0.30	0.3	0.17	0.3	0.1
60-64	11	14	0.6	0.28	0.7	0.47	0.1	0.3
65-69	16	21	1.0	0.38	1.2	0.88	0.2	0.3
70-74	26	18	2.0	0.59	1.2	0.64	0.2	0.2
75-79	18	22	2.2	0.78	1.9	0.69	0.2	0.3
80-84	12	22	2.4	1.00	2.4	1.05	0.1	0.2
85+	9	8	2.6	3.00	0.9	0.73	0.1	0.1
All ages	172	165					0.3	0.3
Mortality								
Raw			0.6	0.22	0.5	0.27		
WS			0.3	0.14	0.3	0.15		
ES			0.5	0.19	0.4	0.20		
BRD-S			0.6	0.21	0.5	0.22		
PYLL-70								
per 100,000			7.8		7.1			
ES			6.9		6.6			
AYLL-70			19.4		19.8			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19		1	0.0		0.1	0.02		3.6
20-24	1	4	0.1	0.01	0.2	0.05	1.3	9.1
25-29	4	1	0.2	0.05	0.0	0.01	4.3	1.0
30-34	4	3	0.2	0.05	0.1	0.05	2.3	1.6
35-39	5	3	0.2	0.05	0.1	0.08	1.4	0.7
40-44	6	2	0.2	0.09	0.1	0.04	0.8	0.2
45-49	6	7	0.3	0.13	0.3	0.29	0.4	0.5
50-54		3	0.0		0.1	0.15		0.1
55-59	5	3	0.3	0.11	0.2	0.11	0.1	0.1
60-64	4	8	0.2	0.12	0.4	0.35	0.1	0.2
65-69	9	10	0.6	0.25	0.6	0.43	0.1	0.2
70-74	17	12	1.3	0.40	0.8	0.48	0.2	0.2
75-79	9	16	1.1	0.41	1.3	0.50	0.1	0.2
80-84	8	16	1.6	0.80	1.7	0.89	0.1	0.2
85+	3	7	0.9	1.00	0.8	0.64	0.1	0.1
All ages	81	96					0.1	0.2
Mortality								
Raw			0.3	0.11	0.3	0.17		
WS			0.2	0.07	0.2	0.08		
ES			0.2	0.09	0.2	0.11		
BRD-S			0.3	0.11	0.3	0.13		
PYLL-70								
per 100,000			3.5		3.3			
ES			3.1		3.2			
AYLL-70			21.5		19.6			

* See corresponding tables with multiple primaries.

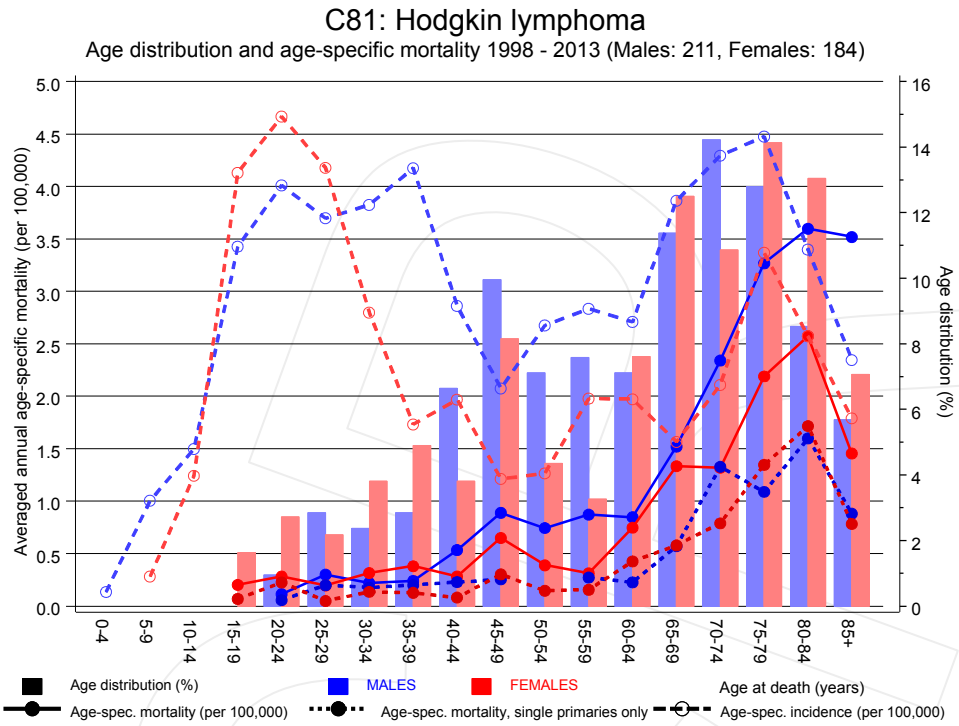
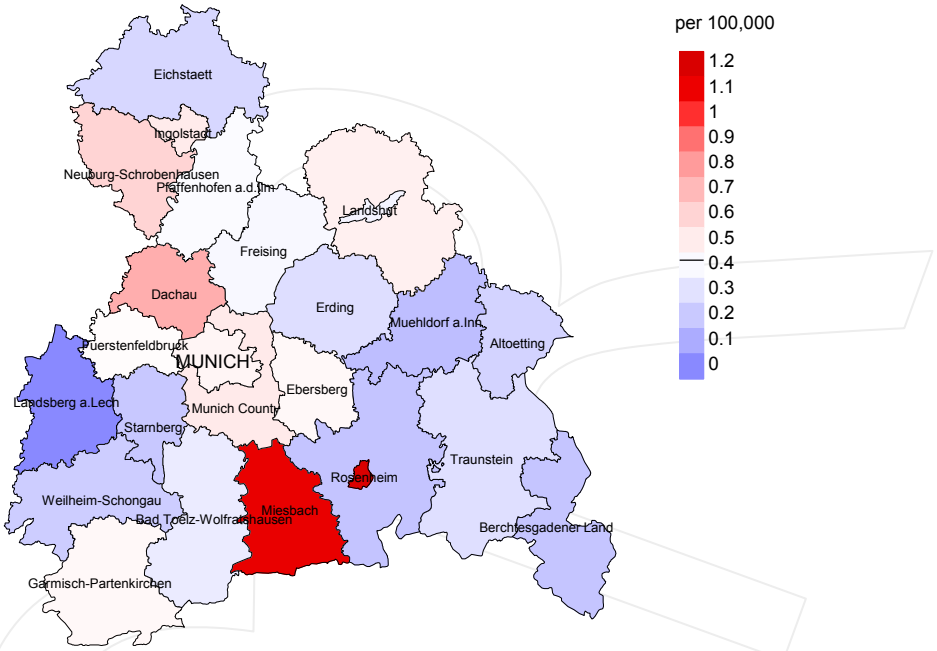


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

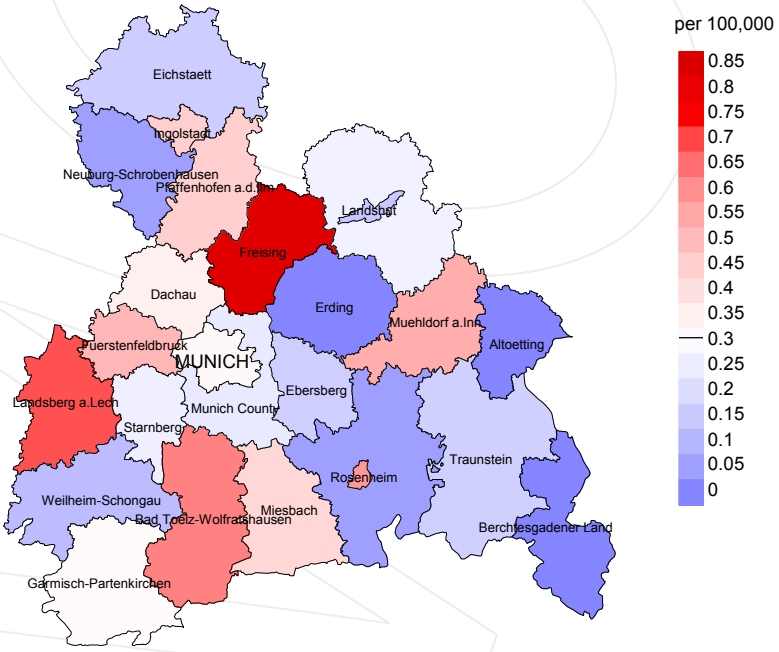
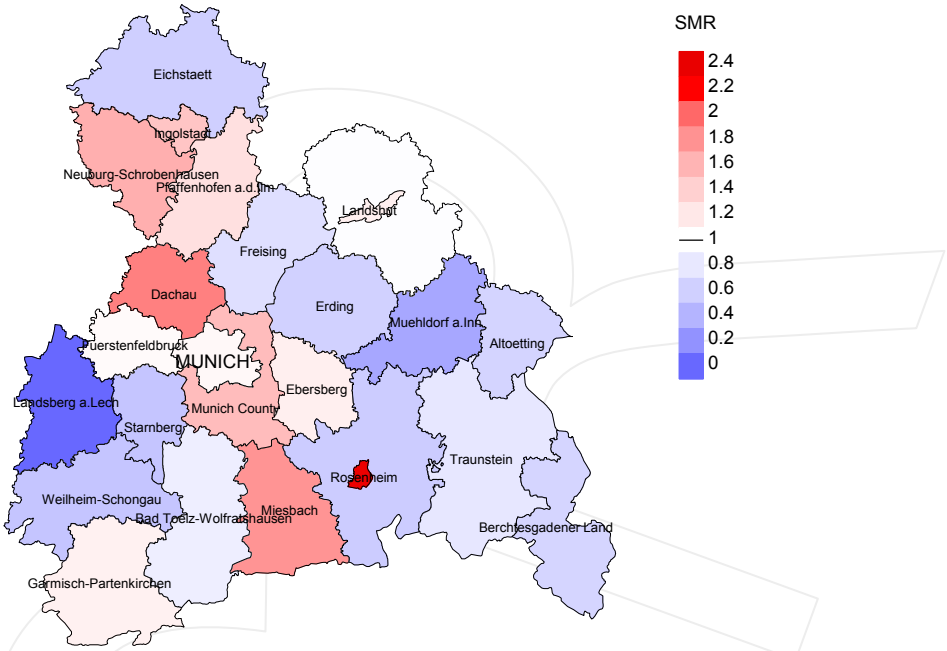


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.4/100,000 WS N=124, females 0.3/100,000 WS N=100).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 1 women died from hodgkin lymphoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.2/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

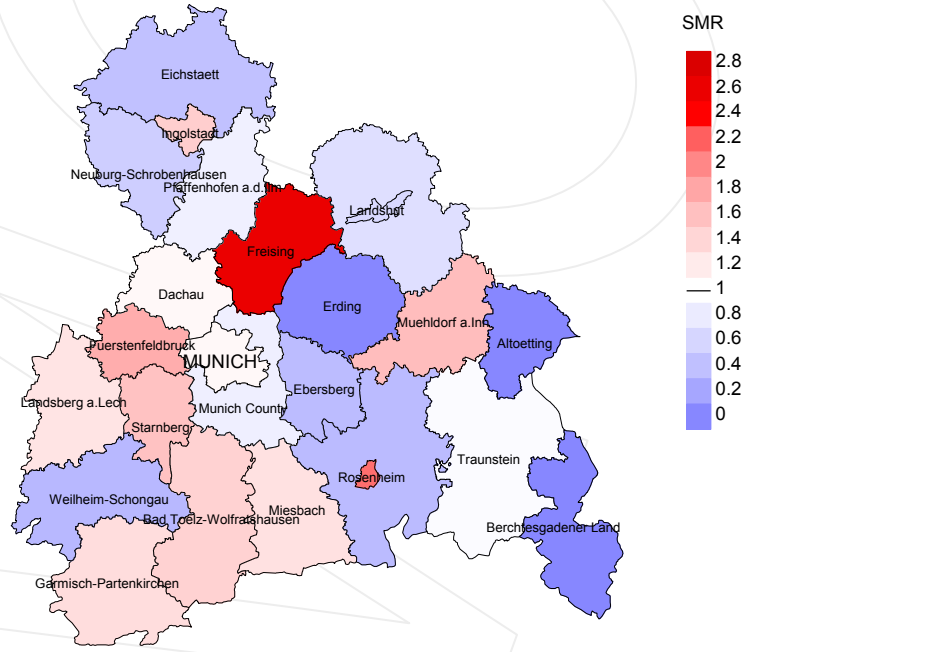


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=124, females N=100).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 1 women died from hodgkin lymphoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.37. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 2.78, 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 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

Munich Cancer Registry. Baseline statistics C81: Hodgkin lymphoma [Internet]. 2015 [updated 2015 May 19; cited 2015 Jul 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C81__E.pdf

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