Munich Cancer Registry

- Survival
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- *Deutsch*

ICD-10 C22.0: Liver cell carcinoma

Incidence and Mortality

Year of diagnosis	1998-2016
Patients	3,781
Diseases	3,781
Creation date	08/21/2018
Export date	08/09/2018
Population	4.81 m

Munich Cancer Registry
Cancer Registry Bavaria - Upper Bavaria Regional Center
at Klinikum Grosshadern/IBE
Marchioninistr. 15
Munich, 81377
Germany

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

https://www.tumorregister-muenchen.de/en/facts/base/bC220_E-ICD-10-C22.0-Liver-cell-carcinoma-incidence-and-mortality.pdf

Index of figures and tables

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 4.69 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, August 2018

[#] 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 2.65 million to 4.10 in 2002, and to 4.69 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.

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

Code	Description
C22.-	Malignant neoplasm of liver and intrahepatic bile ducts

... in case of coexisting one of the following ...

Morphology codes (ICD-O-3 2014) used for specifying cancer site

Code	Description
8170/3	Hepatocellular carcinoma, NOS
8171/3	Hepatocellular carcinoma, fibrolamellar
8172/3	Hepatocellular carcinoma, scirrhous
8173/3	Hepatocellular carcinoma, spindle cell variant
8174/3	Hepatocellular carcinoma, clear cell type
8175/3	Hepatocellular carcinoma, pleomorphic type
8180/3	Combined hepatocellular carcinoma and cholangiocarcinoma

INCIDENCE

Table 1

Cases with invasive cancer by year of diagnosis, proportions of further malignancies, deaths, and active follow-up (ALL PATIENTS)

Year of diagnosis	All cases n	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	87	9.2	5.0	95.4	100.0
1999	92	8.4	5.0	95.7	97.8
2000	107	7.7	5.0	91.6	100.0
2001	102	9.0	4.9	96.1	98.0
2002	147	10.3	5.0	96.6	100.0 #
2003	155	10.4	4.9	92.3	98.7
2004	139	11.1	4.9	92.1	97.1
2005	179	11.9	4.8	95.0	98.9
2006	199	12.7	4.8	93.0	98.5
2007	252	13.0	4.7	90.1	94.0 #
2008	261	13.6	4.8	86.6	91.2
2009	259	14.5	4.6	83.4	90.0
2010	253	15.1	4.3	89.7	94.9
2011	254	15.6	4.2	81.9	92.9
2012	276	16.2	4.1	80.4	92.8
2013	269	16.2	3.3	74.7	90.3
2014	268	16.6	3.1	67.9	90.7
2015	267	16.8	2.3	56.2	97.4
2016	215	17.0	0.9	34.9	74.4 ##
1998-2016	3781	17.0	5.0	81.2	93.6

3,781 cases diagnosed 1998-2016 are related to a total of 3,781 patients. Currently, in 835 (22.1 %) of these 3,781 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 670 / 128 / 37 (17.7 % / 3.4 % / 1.0 %) patients exist having 2 / 3 / 4+ malignancies.

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 retreived from the respective headings.

How to interpret:
In 2014, a subgroup of 268 cases has been diagnosed, of which 16.6 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.1 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

Cases with invasive cancer by year of diagnosis, proportions of further malignancies, deaths, and active follow-up (MALES)

Year of diagnosis	Males n	Males %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	64	73.6	10.9	5.4	98.4	100.0
1999	66	71.7	9.2	5.4	97.0	97.0
2000	89	83.2	8.2	5.3	94.4	100.0
2001	91	89.2	9.7	5.3	96.7	98.9
2002	116	78.9	10.3	5.4	96.6	100.0 #
2003	113	72.9	10.2	5.3	92.0	98.2
2004	116	83.5	11.3	5.3	92.2	96.6
2005	148	82.7	12.3	5.2	95.3	99.3
2006	160	80.4	12.9	5.3	95.0	98.8
2007	202	80.2	13.2	5.1	90.1	94.1 #
2008	215	82.4	13.7	5.1	86.0	91.2
2009	214	82.6	14.4	4.9	84.6	91.1
2010	229	90.5	15.1	4.6	88.6	94.3
2011	211	83.1	15.7	4.5	81.5	92.9
2012	225	81.5	16.3	4.5	81.8	93.8
2013	213	79.2	16.3	3.4	74.2	90.6
2014	226	84.3	16.8	3.1	67.7	90.7
2015	218	81.6	17.0	2.1	58.3	97.7
2016	171	79.5	17.1	1.2	35.7	74.9 ##
1998-2016	3087	81.6	17.1	5.4	81.7	93.7

3,087 cases diagnosed 1998-2016 are related to a total of 3,087 patients. Currently, in 694 (22.5 %) of these 3,087 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 551 / 109 / 34 (17.8 % / 3.5 % / 1.1 %) patients exist having 2 / 3 / 4+ malignancies.

\# 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 retreived from the respective headings.

How to interpret:
In 2014, a subgroup of 226 cases has been diagnosed, of which 16.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.1 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1b

Cases with invasive cancer by year of diagnosis, proportions of further malignancies, deaths, and active follow-up (FEMALES)

Year of diagnosis	Females n	Females %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	23	26.4	4.3	3.3	87.0	100.0
1999	26	28.3	6.1	3.3	92.3	100.0
2000	18	16.8	6.0	3.3	77.8	100.0
2001	11	10.8	6.4	3.2	90.9	90.9
2002	31	21.1	10.1	3.1	96.8	100.0 #
2003	42	27.1	11.3	3.3	92.9	100.0
2004	23	16.5	10.3	3.0	91.3	100.0
2005	31	17.3	10.2	2.7	93.5	96.8
2006	39	19.6	11.9	2.7	84.6	97.4
2007	50	19.8	11.9	2.9	90.0	94.0 #
2008	46	17.6	13.2	3.0	89.1	91.3
2009	45	17.4	15.1	3.1	77.8	84.4
2010	24	9.5	15.4	2.9	100.0	100.0
2011	43	16.9	15.3	2.8	83.7	93.0
2012	51	18.5	15.7	2.5	74.5	88.2
2013	56	20.8	16.1	2.6	76.8	89.3
2014	42	15.7	15.8	3.0	69.0	90.5
2015	49	18.4	15.8	3.2	46.9	95.9
2016	44	20.5	16.4	0.0	31.8	72.7 ##
1998-2016	694	18.4	16.4	3.3	79.0	92.8

694 cases diagnosed 1998-2016 are related to a total of 694 patients. Currently, in 141 (20.3 %) of these 694 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 119 / 19 / 3 (17.1 % / 2.7 % / 0.4 %) patients exist having 2 / 3 / 4+ malignancies.

\# 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 retreived from the respective headings.

How to interpret:
In 2014, a subgroup of 42 cases has been diagnosed, of which 15.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.0 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 2

Incidence measures by year of diagnosis
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.81 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	64	23	5.8	2.0	3.7	1.0	5.2	1.4	6.3	1.8
1999	66	26	5.9	2.2	3.5	1.1	5.2	1.6	6.4	2.0
2000	89	18	7.8	1.5	4.8	0.7	6.9	1.0	8.2	1.3
2001	91	11	7.9	0.9	4.7	0.4	6.9	0.6	9.1	0.8
2002	116	31	6.2	1.6	3.6	0.8	5.2	1.1	6.3	1.4
2003	113	42	6.0	2.1	3.3	0.9	4.9	1.3	6.4	1.8
2004	116	23	6.2	1.2	3.5	0.6	5.1	0.8	6.3	1.0
2005	148	31	7.8	1.6	4.2	0.8	6.2	1.1	7.6	1.3
2006	160	39	8.4	1.9	4.5	0.9	6.7	1.3	8.5	1.6
2007	202	50	9.1	2.2	4.9	1.1	7.2	1.5	9.1	1.8
2008	215	46	9.7	2.0	5.4	0.9	7.6	1.3	9.2	1.6
2009	214	45	9.6	1.9	4.9	0.8	7.1	1.2	8.9	1.6
2010	229	24	10.2	1.0	5.2	0.4	7.6	0.6	9.5	0.7
2011	211	43	9.4	1.8	4.6	0.8	6.8	1.1	8.7	1.5
2012	225	51	9.9	2.2	4.9	0.9	7.1	1.4	8.9	1.8
2013	213	56	9.3	2.3	4.7	1.1	6.8	1.6	8.5	2.0
2014	226	42	9.7	1.7	5.0	0.8	7.1	1.1	8.8	1.4
2015	218	49	9.2	2.0	4.6	0.9	6.6	1.4	8.4	1.7
2016	171	44	7.1	1.8	3.5	0.8	5.1	1.1	6.5	1.4
1998-2016	3087	694	8.4	1.8	4.4	0.8	6.5	1.2	8.1	1.5

The computation of the incidence measures includes all cancers, irrespective of first or subsequent malignancy.

Table 3

Age distribution parameters by year of diagnosis (ALL PATIENTS)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	87	64.8	10.8	34.6	88.7	50.0	58.5	65.4	71.3	78.2
1999	92	66.7	8.9	38.4	84.0	57.0	60.4	67.8	73.2	78.2
2000	107	66.5	10.2	37.6	94.2	54.2	60.1	65.8	72.8	78.8
2001	102	66.4	11.8	31.6	84.8	49.5	60.2	68.3	75.6	80.4
2002	147	66.8	9.7	36.0	88.9	55.1	60.9	66.8	74.1	78.9
2003	155	68.6	11.6	22.0	91.0	56.9	63.0	68.3	77.9	81.7
2004	139	67.3	9.8	41.7	93.4	53.1	60.6	67.7	74.3	80.4
2005	179	67.5	10.2	1.0	87.5	56.9	62.8	67.6	74.5	79.2
2006	199	67.9	11.0	20.4	89.1	53.4	60.5	68.7	76.3	81.3
2007	252	67.6	10.3	25.9	88.4	54.5	60.5	68.9	74.8	79.8
2008	261	66.8	10.8	6.5	86.1	53.4	60.8	68.2	74.1	78.7
2009	259	68.8	9.9	29.5	94.7	55.8	62.6	69.8	75.0	81.6
2010	253	69.0	10.1	15.6	90.0	55.9	62.9	70.0	75.0	81.4
2011	254	68.9	10.5	18.5	89.9	54.9	63.5	70.5	76.2	81.0
2012	276	68.9	9.9	22.1	88.5	54.9	64.0	70.6	75.7	79.0
2013	269	68.0	11.1	7.7	90.7	54.7	60.2	69.1	76.1	81.3
2014	268	68.8	9.7	18.4	93.5	56.3	62.2	70.1	74.8	80.5
2015	267	68.7	10.6	22.1	89.3	54.7	62.2	70.8	76.1	81.2
2016	215	70.1	11.1	16.9	88.6	56.3	64.3	72.0	77.6	81.9
1998-2016	3781	68.1	10.5	1.0	94.7	54.9	61.9	69.2	75.4	80.5

Table 3a

Age distribution parameters by year of diagnosis (MALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	64	64.8	9.1	41.1	83.6	55.0	59.3	65.3	69.1	78.1
1999	66	66.4	8.7	38.4	84.0	56.4	60.0	68.4	72.4	76.4
2000	89	66.1	10.5	37.6	94.2	53.7	59.2	65.2	72.5	78.8
2001	91	66.2	11.6	31.6	84.8	49.5	60.2	68.3	75.4	78.1
2002	116	66.5	8.7	36.0	86.9	55.3	61.3	66.7	73.3	77.4
2003	113	67.7	11.5	25.1	91.0	54.0	62.6	68.1	75.7	81.6
2004	116	67.2	9.2	47.6	89.2	54.4	60.5	67.7	74.2	78.5
2005	148	67.5	8.2	37.2	86.0	57.5	63.0	67.4	73.9	77.8
2006	160	68.0	10.0	46.0	89.1	53.9	60.6	69.1	75.6	79.3
2007	202	67.5	9.5	28.0	85.2	56.0	60.6	68.3	74.2	79.3
2008	215	66.2	10.6	6.5	86.1	53.1	60.8	68.0	73.2	78.0
2009	214	68.6	9.6	29.5	94.7	56.5	62.4	69.4	74.6	80.2
2010	229	68.7	9.4	29.5	90.0	55.9	62.4	69.7	74.6	80.3
2011	211	68.7	9.6	31.0	88.3	55.2	63.1	70.3	75.7	79.8
2012	225	68.9	9.0	42.7	88.5	55.1	64.0	70.1	74.9	78.7
2013	213	68.2	11.0	7.7	90.7	55.2	60.3	69.5	76.1	81.1
2014	226	68.6	9.8	18.4	93.5	56.3	61.9	69.8	75.2	80.5
2015	218	69.0	9.9	28.1	88.1	56.6	63.0	71.1	76.0	80.2
2016	171	69.7	11.4	16.9	88.6	56.3	64.0	72.0	77.6	81.9
1998-2016	3087	67.9	9.9	6.5	94.7	55.5	61.8	68.9	74.8	79.7

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	23	64.8	14.6	34.6	88.7	47.3	52.8	65.5	77.1	78.2
1999	26	67.5	9.7	45.7	83.9	57.0	60.5	66.3	75.7	80.0
2000	18	68.5	8.6	51.3	83.0	55.8	63.6	67.9	75.3	82.7
2001	11	68.1	13.8	37.1	81.3	58.6	59.4	68.0	80.4	81.1
2002	31	68.0	12.7	38.8	88.9	49.8	59.9	70.1	78.9	81.5
2003	42	71.1	11.7	22.0	86.0	60.3	64.0	74.0	79.8	81.9
2004	23	68.1	12.7	41.7	93.4	49.6	61.3	69.2	74.9	84.2
2005	31	67.6	16.8	1.0	87.5	50.3	61.3	71.1	79.7	82.8
2006	39	67.6	14.4	20.4	86.0	52.6	57.1	68.6	79.5	83.0
2007	50	68.2	13.1	25.9	88.4	49.4	60.4	69.9	77.9	84.2
2008	46	69.5	11.5	40.7	85.6	55.7	62.9	70.5	78.6	83.2
2009	45	69.5	11.2	39.7	89.1	52.7	65.1	71.2	76.0	83.0
2010	24	72.2	15.6	15.6	88.8	54.8	68.6	71.7	84.2	86.9
2011	43	69.7	14.3	18.5	89.9	54.7	64.8	72.1	80.5	82.2
2012	51	69.0	13.3	22.1	86.0	54.2	64.3	74.2	77.7	80.9
2013	56	67.4	11.6	31.7	88.3	54.3	59.1	67.7	76.2	82.5
2014	42	69.7	9.2	38.7	86.7	57.0	66.7	71.1	74.5	78.6
2015	49	67.4	13.1	22.1	89.3	53.1	58.1	68.1	76.6	84.1
2016	44	71.4	9.8	45.7	88.4	59.9	65.7	72.4	77.5	81.8
1998-2016	694	68.8	12.5	1.0	93.4	53.1	62.1	70.7	77.8	82.7

Table 4

Age distribution by 5-year age group and sex for period 2007-2016

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9	2	0.1	0.1	2	0.1	0.1			0.0
10-14	0	0.0	0.1			0.1			0.0
15-19	5	0.2	0.3	3	0.1	0.2	2	0.4	0.4
20-24	4	0.2	0.4	1	0.0	0.3	3	0.7	1.1
25-29	5	0.2	0.6	4	0.2	0.5	1	0.2	1.3
30-34	5	0.2	0.8	4	0.2	0.7	1	0.2	1.6
35-39	9	0.3	1.2	5	0.2	0.9	4	0.9	2.4
40-44	18	0.7	1.9	12	0.6	1.5	6	1.3	3.8
45-49	53	2.1	3.9	42	2.0	3.4	11	2.4	6.2
50-54	146	5.7	9.6	118	5.6	9.0	28	6.2	12.4
55-59	248	9.6	19.2	212	10.0	19.0	36	8.0	20.4
60-64	342	13.3	32.5	306	14.4	33.4	36	8.0	28.4
65-69	462	17.9	50.5	383	18.0	51.4	79	17.6	46.0
70-74	582	22.6	73.1	490	23.1	74.5	92	20.4	66.4
75-79	392	15.2	88.3	324	15.3	89.7	68	15.1	81.6
80-84	230	8.9	97.2	173	8.1	97.9	57	12.7	94.2
85+	71	2.8	100.0	45	2.1	100.0	26	5.8	100.0
All ages	2574	100.0		2124	100.0		450	100.0	

Table 5

Age-specific incidence and proportion of all cancers
for period 2007-2016

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males Prop.all cancers n=113978 %	Females Prop.all cancers n=112253 %
0- 4						
5- 9	2		0.2		1.9	
10-14						
15-19	3	2	0.2	0.2	1.2	1.0
20-24	1	3	0.1	0.2	0.2	0.8
25-29	4	1	0.3	0.1	0.6	0.1
30-34	4	1	0.3	0.1	0.4	0.1
35-39	5	4	0.3	0.3	0.4	0.2
40-44	12	6	0.6	0.3	0.6	0.1
45-49	42	11	2.1	0.6	1.1	0.2
50-54	118	28	6.8	1.6	1.9	0.3
55-59	212	36	15.0	2.4	2.3	0.4
60-64	306	36	25.0	2.7	2.3	0.3
65-69	383	79	32.3	6.1	2.0	0.6
70-74	490	92	44.3	7.3	2.3	0.6
75-79	324	68	40.7	6.8	2.0	0.5
80-84	173	57	37.6	8.1	1.6	0.5
85+	45	26	14.7	3.5	0.6	0.2
All ages	2124	450			1.9	0.4
Incidence						
Raw			9.3	1.9		
WS			4.7	0.9		
ES			6.9	1.2		
BRD-S			8.6	1.5		

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).

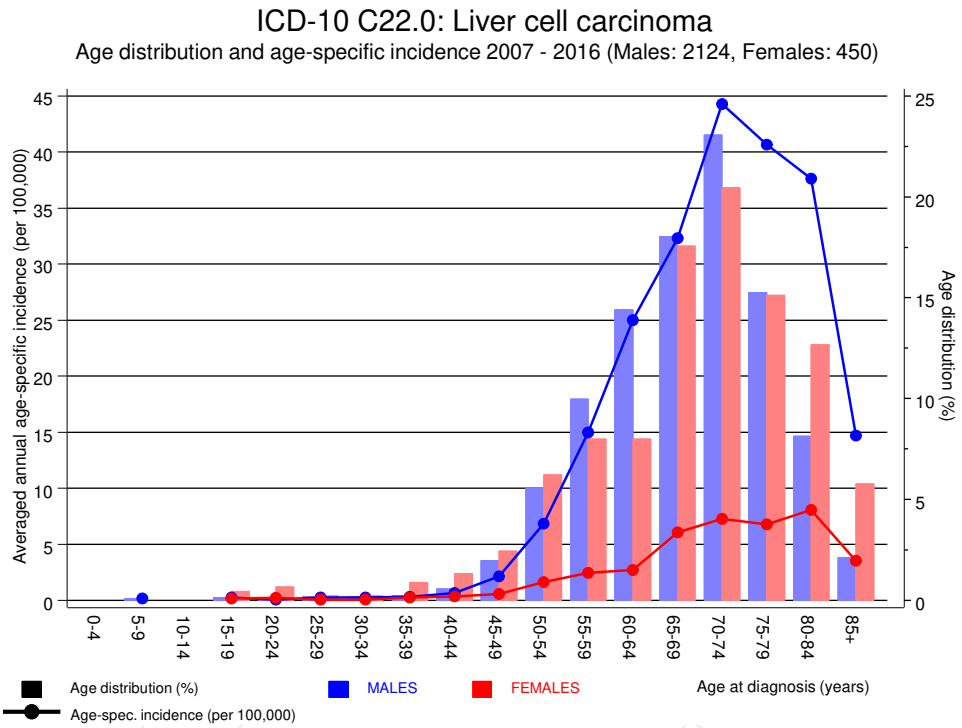


Figure 6. Age distribution (males: mean=68.4 yrs, median=69.6 yrs; females: mean=69.2 yrs, median=71.0 yrs) and age-specific incidence.

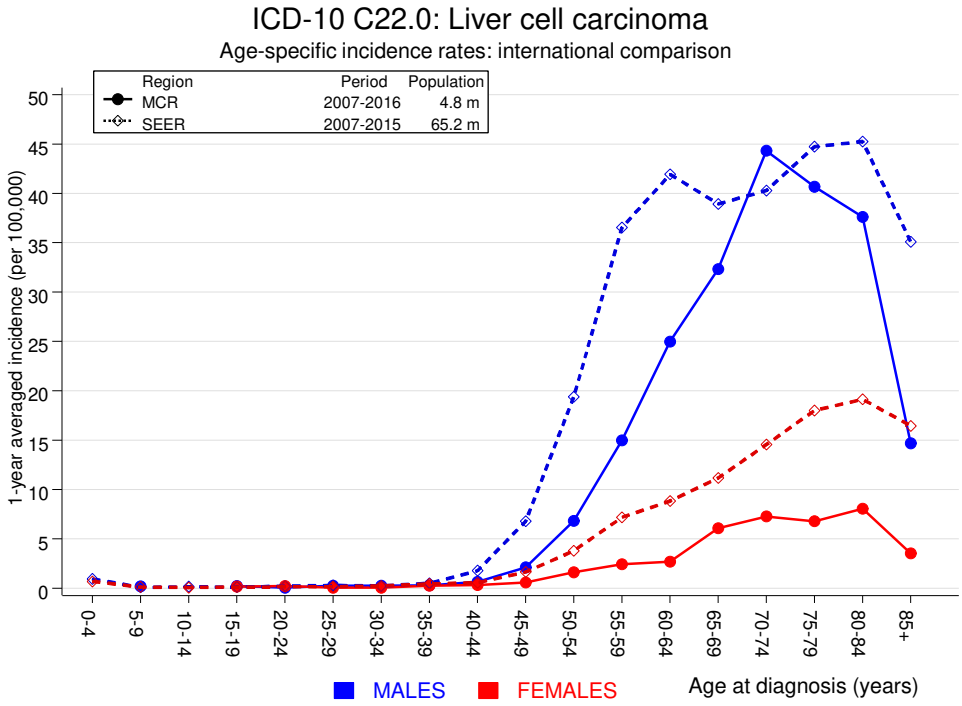


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

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.

Table 7a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998–2016
MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C03–C06	Oral cavity	5	0.6	7.8	2.5	18.1	#	9.5	
C12–C13	Hypopharynx	2	0.4	4.5	0.5	16.4		3.4	
C15	Oesophagus	8	1.5	5.3	2.3	10.5	#	14.2	12.5
C16	Stomach	7	3.0	2.3	0.9	4.8		8.8	
C18	Colon	19	7.3	2.6	1.6	4.1	#	25.7	10.5
C19–C20	Rectum	4	4.2	1.0	0.3	2.5		−0.3	50.0
C22	Liver	3	2.3	1.3	0.3	3.8		1.5	66.7
C23–C24	Bile	2	0.8	2.6	0.3	9.4		2.7	
C25	Pancreas	11	2.9	3.8	1.9	6.7	#	17.7	
C33–C34	Lung	34	9.4	3.6	2.5	5.1	#	54.0	23.5
C43	Malign. melanoma	3	3.4	0.9	0.2	2.5		−1.0	
C50	Breast	2	0.2	9.8	1.2	35.4	#	3.9	50.0
C61	Prostate	28	22.5	1.2	0.8	1.8		12.1	14.3
C64	Kidney	15	2.7	5.5	3.1	9.0	#	26.8	6.7
C67	Bladder	12	3.3	3.6	1.9	6.3	#	19.0	
C76–C79	CUP	3	1.3	2.4	0.5	6.9		3.8	
C82–C85	NHL	8	3.1	2.6	1.1	5.1	#	10.8	
C90	Mult. myeloma	3	1.0	3.0	0.6	8.8		4.4	66.7
C91–C96	Leukaemia	4	1.2	3.3	0.9	8.3		6.1	50.0
Others, specified		8	3.3	2.4	1.0	4.7	#	10.3	12.5
Not observed		0	3.6	0.0	0.0	1.0		−7.8	
All further malignancies		181	78.1	2.3	2.0	2.7	#	225.5	14.4

Patients	2887
Median age at next malignancy (years)	71.8
Person-years	4564
Mean observation time (years)	1.6
Median observation time (years)	0.7

The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category “Others, specified”.

Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998–2016
FEMALES

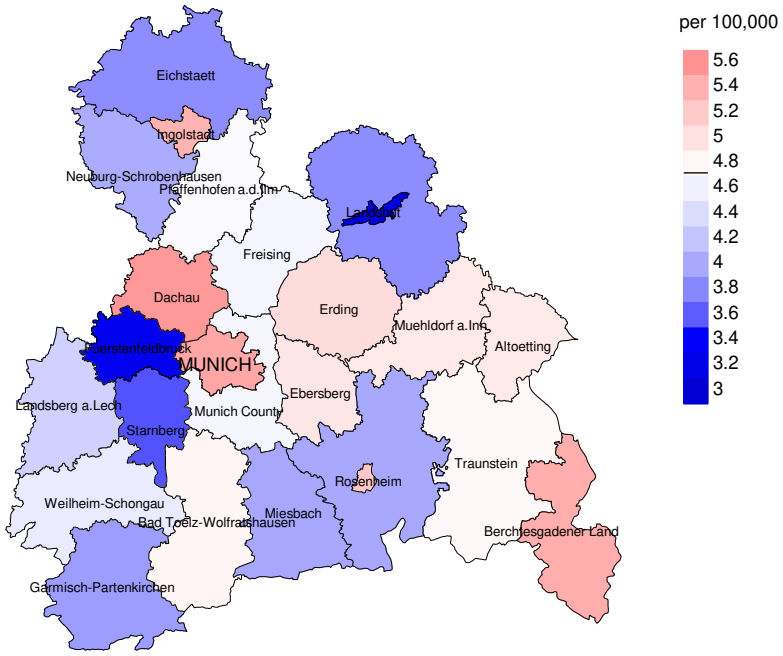
Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C09–C10	Oropharynx	2	0.0	40.6	4.9	146.5	#	18.3	
C16	Stomach	3	0.4	7.9	1.6	23.0	#	24.6	
C18	Colon	2	1.1	1.8	0.2	6.6		8.5	
C33–C34	Lung	2	0.9	2.2	0.3	8.0		10.3	
C50	Breast	5	3.6	1.4	0.5	3.2		13.2	
C54	Corpus uteri	2	0.7	3.0	0.4	10.7		12.5	
Others, specified		8	1.6	5.1	2.2	10.0	#	60.3	12.5
Not observed		0	3.4	0.0	0.0	1.1		−32.3	
All further malignancies		24	11.7	2.0	1.3	3.0	#	115.4	4.2

Patients	641
Median age at next malignancy (years)	70.8
Person-years	1065
Mean observation time (years)	1.7
Median observation time (years)	0.7

The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category “Others, specified”.

Average incidence (world standard population) 2007 - 2016: Males



Average incidence (world standard population) 2007 - 2016: Females

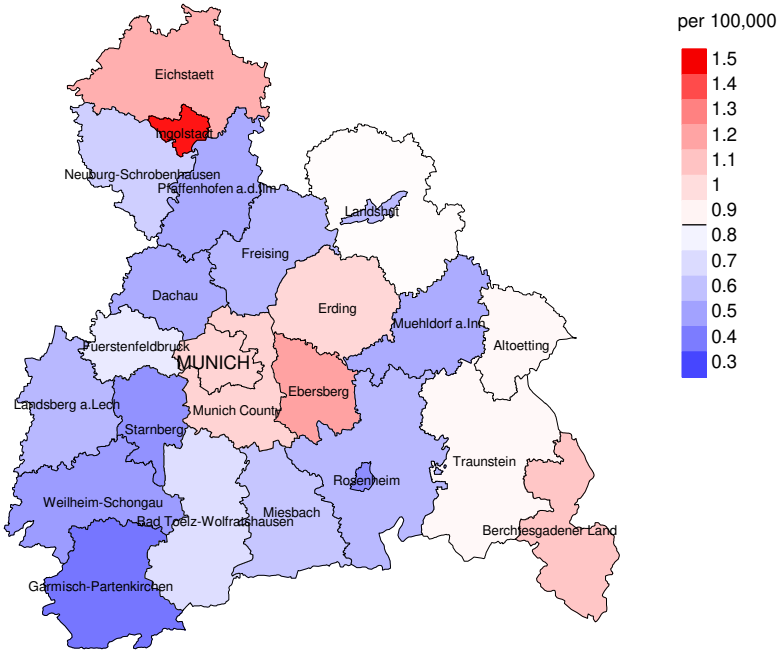
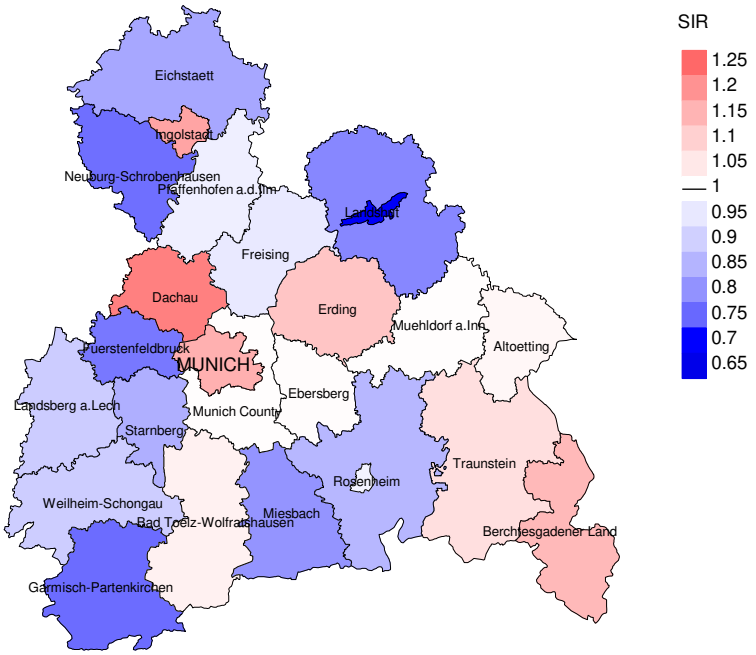


Figure 8a. Map of cancer incidence (world standard population) by county averaged for period 2007 to 2016. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 4.7/100,000 WS N=2,124, females 0.9/100,000 WS N=450).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 16 women were identified with newly diagnosed liver cell carcinoma. 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 2.5/100,000.

Standardized incidence ratio (SIR) 2007 - 2016: Males



Standardized incidence ratio (SIR) 2007 - 2016: Females

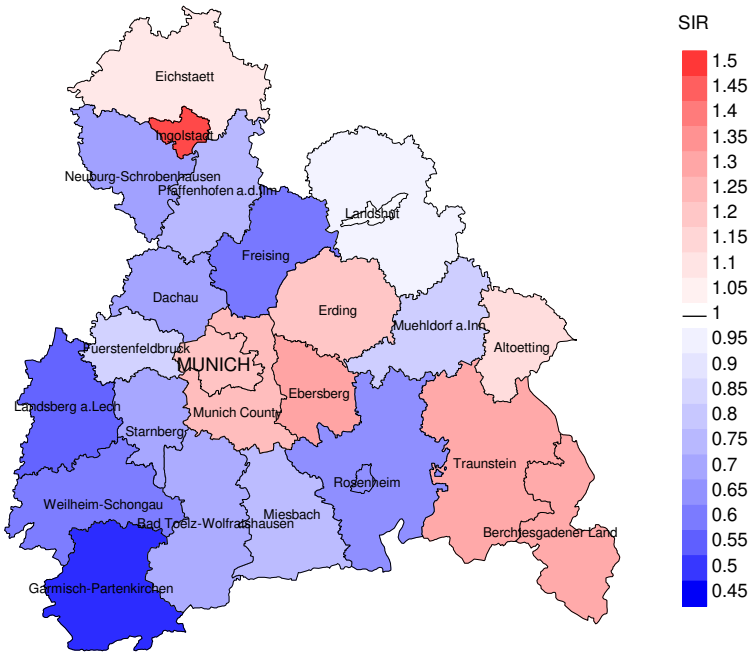


Figure 8b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2016. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=2,124, females N=450).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 16 women were identified with newly diagnosed liver cell carcinoma. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.30. Though, the value of this parameter may vary with an underlying probability of 99% between 0.62 and 2.40, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status,
and deaths among the annual cohorts

(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.81 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	87	100.0	83	95.4	94.0
1999	92	97.8	88	95.7	95.5
2000	107	100.0	98	91.6	91.8
2001	102	98.0	98	96.1	93.9
2002	147	100.0	142	96.6	96.5
2003	155	98.7	143	92.3	96.5
2004	139	97.1	128	92.1	96.9
2005	179	98.9	170	95.0	97.1
2006	199	98.5	185	93.0	98.4
2007	252	94.0	227	90.1	96.0
2008	261	91.2	226	86.6	98.7
2009	259	90.0	216	83.4	99.1
2010	253	94.9	227	89.7	98.2
2011	254	92.9	208	81.9	98.1
2012	276	92.8	222	80.4	97.3
2013	269	90.3	201	74.7	96.0
2014	268	90.7	182	67.9	97.8
2015	267	97.4	150	56.2	97.3
2016	215	74.4	75	34.9	84.0
1998-2016	3781	93.6	3069	81.2	96.7

Table 9b

Annual cohorts of incident cancers and deaths,
and cases deceased within the same year of being diagnosed with cancer

(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.81 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Deaths in same year n	Prop. deaths in same year %
1998	87	77	40	46.0
1999	92	69	35	38.0
2000	107	83	39	36.4
2001	102	93	40	39.2
2002	147	120	61	41.5
2003	155	129	56	36.1
2004	139	121	45	32.4
2005	179	144	62	34.6
2006	199	178	78	39.2
2007	252	191	80	31.7
2008	261	209	90	34.5
2009	259	179	86	33.2
2010	253	222	80	31.6
2011	254	223	82	32.3
2012	276	232	90	32.6
2013	269	216	78	29.0
2014	268	242	79	29.5
2015	267	275	85	31.8
2016	215	208	65	30.2
1998–2016	3781	3211	1271	33.6

Table 9c

Annual cohorts of deaths, and proportion of cancer-related and non-cancer-related deaths

(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.81 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	77	83.1	16.9	90.3
1999	69	87.0	13.0	89.1
2000	83	90.4	9.6	91.1
2001	93	94.6	5.4	98.9
2002	120	90.8	9.2	95.7
2003	129	94.6	5.4	96.8
2004	121	90.9	9.1	95.8
2005	144	90.3	9.7	97.8
2006	178	93.3	6.7	97.7
2007	191	89.0	11.0	92.4
2008	209	87.1	12.9	93.2
2009	179	93.3	6.7	97.2
2010	222	85.1	14.9	90.4
2011	223	87.4	12.6	91.3
2012	232	82.8	17.2	91.7
2013	216	85.6	14.4	91.0
2014	242	84.3	15.7	91.5
2015	275	85.8	14.2	91.5
2016	208	87.0	13.0	93.6
1998-2016	3211	88.0	12.0	93.3

Table 10a

Medians of age at death according to the grouping in Table 9
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	56	64.7	65.4	62.2	65.4
1999	53	69.2	68.3	74.3	70.1
2000	64	68.7	68.9	64.9	69.1
2001	80	67.9	68.4	64.2	68.5
2002	91	68.8	68.8	70.2	68.7
2003	102	67.5	68.1	63.1	68.1
2004	95	69.7	69.4	73.0	69.5
2005	114	68.0	67.8	68.8	67.7
2006	146	70.6	70.6	70.4	70.9
2007	161	70.9	70.9	71.7	70.9
2008	169	69.3	69.3	69.3	69.0
2009	145	69.5	69.3	76.1	69.5
2010	178	72.1	72.1	71.5	72.2
2011	192	70.7	71.1	67.7	71.2
2012	193	71.3	71.4	70.6	71.4
2013	183	72.4	72.7	71.7	72.8
2014	204	72.1	71.3	74.0	72.1
2015	226	72.5	72.6	71.4	72.7
2016	173	73.3	73.9	67.4	73.5
1998-2016	2625	70.5	70.5	70.2	70.7

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 10b

Medians of age at death according to the grouping in Table 9
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	21	70.0	69.5	83.5	71.2
1999	16	70.6	70.6		71.6
2000	19	71.8	71.2	75.3	67.8
2001	13	66.9	66.9		66.9
2002	29	70.8	68.6	83.3	70.2
2003	27	76.6	76.6		76.6
2004	26	75.8	75.3	79.7	75.3
2005	30	70.5	70.8	62.3	70.8
2006	32	74.1	74.1	77.1	74.1
2007	30	69.2	69.7	63.8	69.6
2008	40	74.3	73.7	78.1	74.7
2009	34	75.0	74.3	79.8	74.3
2010	44	76.0	76.4	72.3	76.0
2011	31	73.2	74.1	68.3	73.7
2012	39	72.0	74.2	70.4	75.5
2013	33	72.8	72.7	78.7	72.7
2014	38	73.5	73.4	74.3	73.4
2015	49	73.3	72.9	84.6	73.3
2016	35	74.6	74.6	74.6	74.3
1998-2016	586	73.2	72.9	75.2	73.2

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 11a

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	45	4.1	0.70	2.5	0.69	3.6	0.70	4.5	0.72
1999	44	3.9	0.67	2.3	0.66	3.5	0.68	4.6	0.72
2000	59	5.2	0.66	3.0	0.63	4.5	0.65	5.8	0.71
2001	75	6.5	0.82	3.8	0.80	5.7	0.83	7.5	0.82
2002	83	4.5	0.72	2.6	0.72	3.8	0.73	4.8	0.75
2003	95	5.1	0.84	2.8	0.84	4.2	0.85	5.3	0.82
2004	85	4.5	0.73	2.5	0.72	3.7	0.72	4.7	0.74
2005	101	5.3	0.68	2.9	0.68	4.3	0.69	5.3	0.70
2006	136	7.1	0.85	3.6	0.81	5.5	0.82	7.2	0.85
2007	142	6.4	0.70	3.3	0.66	4.9	0.68	6.5	0.71
2008	152	6.8	0.71	3.6	0.67	5.3	0.70	6.8	0.74
2009	137	6.1	0.64	3.2	0.64	4.6	0.65	5.8	0.65
2010	153	6.8	0.67	3.2	0.62	4.8	0.64	6.5	0.69
2011	168	7.5	0.80	3.5	0.77	5.3	0.78	7.0	0.81
2012	160	7.0	0.71	3.2	0.66	4.8	0.68	6.4	0.72
2013	155	6.7	0.73	3.0	0.64	4.6	0.68	6.2	0.73
2014	172	7.4	0.76	3.5	0.71	5.2	0.73	6.7	0.76
2015	192	8.1	0.88	3.8	0.83	5.6	0.84	7.3	0.87
2016	151	6.3	0.88	2.7	0.79	4.2	0.83	5.6	0.87
1998-2016	2305	6.3	0.75	3.2	0.71	4.7	0.73	6.2	0.76

Table 11b

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	19	1.6	0.83	0.9	0.86	1.2	0.86	1.5	0.85
1999	16	1.3	0.62	0.6	0.56	0.9	0.58	1.2	0.62
2000	16	1.3	0.89	0.6	0.86	0.9	0.88	1.2	0.91
2001	13	1.1	1.18	0.5	1.42	0.8	1.40	1.0	1.24
2002	26	1.3	0.84	0.7	0.88	0.9	0.84	1.2	0.85
2003	27	1.4	0.64	0.5	0.59	0.8	0.61	1.1	0.62
2004	25	1.3	1.09	0.5	0.81	0.7	0.89	1.0	1.01
2005	29	1.5	0.94	0.6	0.79	0.9	0.86	1.2	0.89
2006	30	1.5	0.77	0.6	0.68	0.9	0.69	1.2	0.74
2007	28	1.2	0.56	0.5	0.49	0.7	0.50	0.9	0.53
2008	30	1.3	0.65	0.5	0.62	0.8	0.63	1.0	0.63
2009	30	1.3	0.67	0.6	0.66	0.8	0.67	1.1	0.68
2010	36	1.5	1.50	0.5	1.15	0.8	1.36	1.2	1.61
2011	27	1.2	0.63	0.4	0.52	0.6	0.57	0.9	0.58
2012	32	1.4	0.63	0.6	0.60	0.8	0.61	1.1	0.60
2013	30	1.3	0.54	0.5	0.45	0.8	0.46	1.0	0.51
2014	32	1.3	0.76	0.6	0.71	0.8	0.71	1.0	0.76
2015	44	1.8	0.90	0.7	0.77	1.1	0.80	1.4	0.84
2016	30	1.2	0.68	0.5	0.61	0.7	0.64	0.9	0.65
1998-2016	520	1.4	0.75	0.6	0.68	0.8	0.70	1.1	0.73

Table 12

Age distribution of age at death (cancer-related) for period 2007-2016
(**incl. multiple malignancies**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9									
10-14	1	0.1	0.1	1	0.1	0.1			0.0
15-19	3	0.2	0.2	1	0.1	0.1	2	0.6	0.6
20-24	1	0.1	0.3			0.1	1	0.3	0.9
25-29	1	0.1	0.3	1	0.1	0.2			0.9
30-34	2	0.1	0.4	2	0.1	0.3			0.9
35-39	3	0.2	0.6	3	0.2	0.5			0.9
40-44	8	0.4	1.0	6	0.4	0.9	2	0.6	1.6
45-49	29	1.5	2.5	25	1.6	2.5	4	1.3	2.8
50-54	76	4.0	6.5	67	4.2	6.7	9	2.8	5.6
55-59	151	7.9	14.5	125	7.9	14.6	26	8.2	13.8
60-64	212	11.2	25.6	191	12.1	26.7	21	6.6	20.4
65-69	314	16.5	42.1	263	16.6	43.3	51	16.0	36.4
70-74	416	21.9	64.0	354	22.4	65.7	62	19.4	55.8
75-79	376	19.8	83.8	314	19.8	85.5	62	19.4	75.2
80-84	210	11.0	94.8	164	10.4	95.9	46	14.4	89.7
85+	98	5.2	100.0	65	4.1	100.0	33	10.3	100.0
All ages	1901	100.0		1582	100.0		319	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**incl. multiple malignancies**)

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								
5- 9								
10-14	1		0.1	1.00			4.3	
15-19	1	2	0.1	0.33	0.2	1.00	2.3	9.1
20-24		1			0.1	0.33		3.0
25-29	1		0.1	0.25			1.4	
30-34	2		0.1	0.50			1.9	
35-39	3		0.2	0.60			1.5	
40-44	6	2	0.3	0.50	0.1	0.33	1.2	0.3
45-49	25	4	1.3	0.60	0.2	0.36	2.2	0.3
50-54	67	9	3.9	0.57	0.5	0.32	3.3	0.5
55-59	125	26	8.8	0.59	1.8	0.72	3.7	0.9
60-64	191	21	15.6	0.62	1.6	0.58	3.8	0.6
65-69	263	51	22.2	0.69	3.9	0.65	3.6	1.0
70-74	354	62	32.0	0.72	4.9	0.67	3.8	0.9
75-79	314	62	39.4	0.97	6.2	0.91	3.5	0.9
80-84	164	46	35.7	0.95	6.5	0.81	2.2	0.7
85+	65	33	21.2	1.44	4.5	1.27	1.0	0.4
All ages	1582	319					3.0	0.7
Mortality								
Raw			6.9	0.74	1.3	0.71		
WS			3.3	0.70	0.5	0.63		
ES			4.9	0.72	0.8	0.65		
BRD-S			6.5	0.75	1.1	0.68		
PYLL-70								
per 100,000			29.1		5.3			
ES			25.4		4.7			
AYLL-70			8.6		9.2			

Table 14a

Further malignancies in deaths in period 1998–2016
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	14	2.5	10	71.4	1	7.1	3	21.4
C09–C10 Oropharynx	15	2.7	13	86.7	2	13.3		
C12–C13 Hypopharynx	9	1.6	6	66.7	2	22.2	1	11.1
C15 Oesophagus	20	3.6	7	35.0	6	30.0	7	35.0
C16 Stomach	14	2.5	5	35.7	6	42.9	3	21.4
C18 Colon	65	11.6	42	64.6	19	29.2	4	6.2
C19–C20 Rectum	38	6.8	30	78.9	6	15.8	2	5.3
C25 Pancreas	11	2.0			5	45.5	6	54.5
C32 Larynx	19	3.4	17	89.5	2	10.5		
C33–C34 Lung	62	11.1	22	35.5	18	29.0	22	35.5
C43 Malign. melanoma	17	3.0	13	76.5	1	5.9	3	17.6
C44 Skin others	42	7.5	28	66.7	1	2.4	13	31.0
C61 Prostate	103	18.5	84	81.6	5	4.9	14	13.6
C62 Testis	6	1.1	6	100.0				
C64 Kidney	34	6.1	22	64.7	7	20.6	5	14.7
C67 Bladder	25	4.5	11	44.0	5	20.0	9	36.0
C82–C85 NHL	21	3.8	15	71.4	3	14.3	3	14.3
C91–C96 Leukaemia	8	1.4	4	50.0			4	50.0
Others, specified	35	6.3	18	51.4	6	17.1	11	31.4
All further malignancies	558	100.0	353	63.3	95	17.0	110	19.7

Further malignancies with number of cases 1 to 5 are pooled in category “Others, specified”.

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 further malignancy.

Table 14b

Further malignancies in deaths in period 1998–2016
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06	Oral cavity	6	5.3	5	83.3	1	16.7		
C16	Stomach	4	3.5			3	75.0	1	25.0
C18	Colon	13	11.4	10	76.9	3	23.1		
C23–C24	Bile	2	1.8	1	50.0			1	50.0
C33–C34	Lung	3	2.6	2	66.7			1	33.3
C43	Malign. melanoma	3	2.6	3	100.0				
C44	Skin others	12	10.5	5	41.7	1	8.3	6	50.0
C50	Breast	34	29.8	28	82.4	1	2.9	5	14.7
C51	Vulva	3	2.6	3	100.0				
C53	Cervix uteri	3	2.6	3	100.0				
C54	Corpus uteri	4	3.5	1	25.0	1	25.0	2	50.0
C56	Ovary	3	2.6	3	100.0				
C64	Kidney	2	1.8	1	50.0	1	50.0		
C73	Thyroid	4	3.5	3	75.0			1	25.0
C76–C79	CUP	2	1.8	1	50.0			1	50.0
C82–C85	NHL	7	6.1	6	85.7	1	14.3		
Others, specified		9	7.9	6	66.7	1	11.1	2	22.2
All further malignancies		114	100.0	81	71.1	13	11.4	20	17.5

Further malignancies with number of cases 1 are pooled in category “Others, specified”.

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 further malignancy.

Table 15

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**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								
5- 9								
10-14	1		0.1	1.00			4.3	
15-19	1	2	0.1	0.33	0.2	1.00	2.4	10.0
20-24		1			0.1	0.33		3.2
25-29	1		0.1	0.25			1.5	
30-34	2		0.1	0.50			2.0	
35-39	3		0.2	0.60			1.6	
40-44	6	2	0.3	0.50	0.1	0.33	1.3	0.3
45-49	23	4	1.2	0.59	0.2	0.40	2.2	0.4
50-54	56	8	3.2	0.53	0.5	0.35	3.1	0.5
55-59	118	22	8.3	0.62	1.5	0.69	4.0	0.9
60-64	162	18	13.2	0.60	1.4	0.55	3.9	0.6
65-69	220	42	18.6	0.71	3.2	0.70	3.8	1.0
70-74	280	47	25.3	0.76	3.7	0.64	3.9	0.9
75-79	225	49	28.2	1.02	4.9	0.92	3.4	0.9
80-84	125	36	27.2	0.99	5.1	0.86	2.3	0.7
85+	47	23	15.4	1.47	3.1	1.28	1.0	0.3
All ages	1270	254					3.1	0.7
Mortality								
Raw			5.6	0.75	1.1	0.70		
WS			2.7	0.70	0.4	0.62		
ES			4.0	0.72	0.7	0.64		
BRD-S			5.2	0.76	0.9	0.68		
PYLL-70								
per 100,000			25.9		4.8			
ES			22.7		4.3			
AYLL-70			8.8		9.6			

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**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								
5- 9								
10-14	1		0.1	1.00			4.3	
15-19	1	2	0.1	0.33	0.2	1.00	2.4	10.5
20-24		1			0.1	0.33		3.2
25-29	1		0.1	0.33			1.5	
30-34	2		0.1	0.50			2.0	
35-39	3		0.2	0.60			1.6	
40-44	6	2	0.3	0.50	0.1	0.33	1.3	0.3
45-49	23	4	1.2	0.59	0.2	0.40	2.2	0.4
50-54	56	8	3.2	0.57	0.5	0.36	3.1	0.5
55-59	113	21	8.0	0.63	1.4	0.72	3.9	0.9
60-64	159	18	13.0	0.62	1.4	0.56	3.9	0.6
65-69	211	41	17.8	0.70	3.2	0.68	3.7	1.0
70-74	264	46	23.9	0.76	3.6	0.65	3.8	0.9
75-79	214	46	26.9	0.99	4.6	0.90	3.4	0.9
80-84	117	34	25.4	1.01	4.8	0.85	2.3	0.7
85+	39	23	12.7	1.26	3.1	1.28	0.9	0.3
All ages	1210	246					3.1	0.7
Mortality								
Raw			5.3	0.75	1.0	0.70		
WS			2.6	0.70	0.4	0.62		
ES			3.8	0.72	0.6	0.65		
BRD-S			4.9	0.76	0.8	0.68		
PYLL-70								
per 100,000			25.4		4.7			
ES			22.2		4.2			
AYLL-70			8.9		9.7			

* See corresponding tables with multiple malignancies.

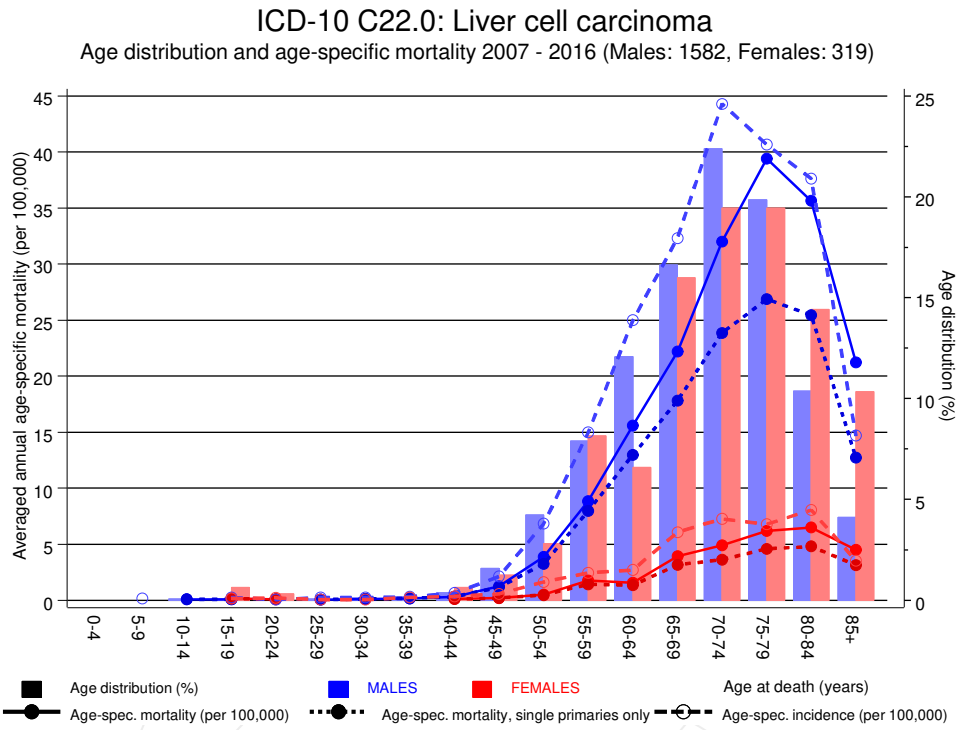


Figure 17. Distribution of age at death (bars; males: mean=68.9 yrs, median=70.1 yrs; females: mean=70.6 yrs, median=71.6 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

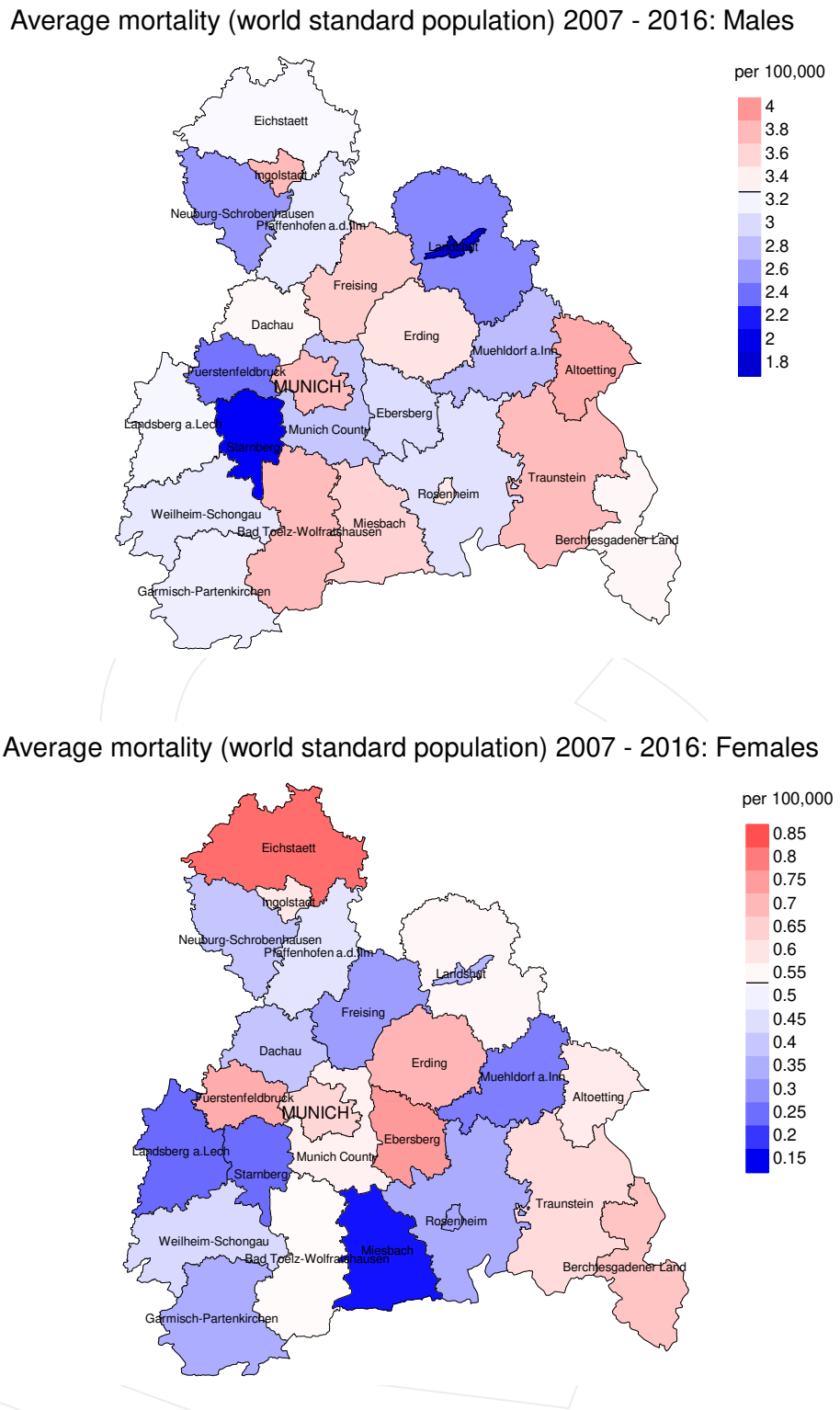
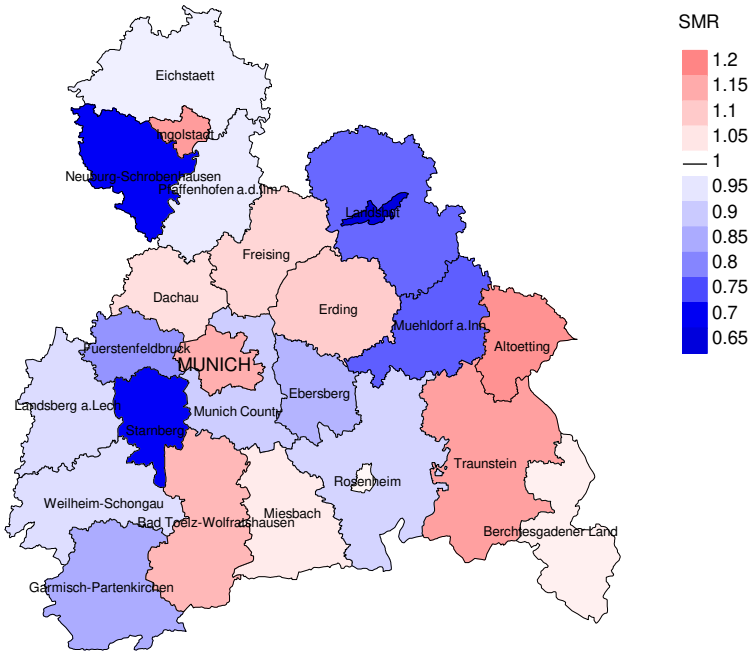


Figure 18a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2016. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 3.3/100,000 WS N=1,582, females 0.5/100,000 WS N=319).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 13 women died from liver cell carcinoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.8/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.3 and 1.8/100,000.

Standardized mortality ratio (SMR) 2007 - 2016: Males



Standardized mortality ratio (SMR) 2007 - 2016: Females

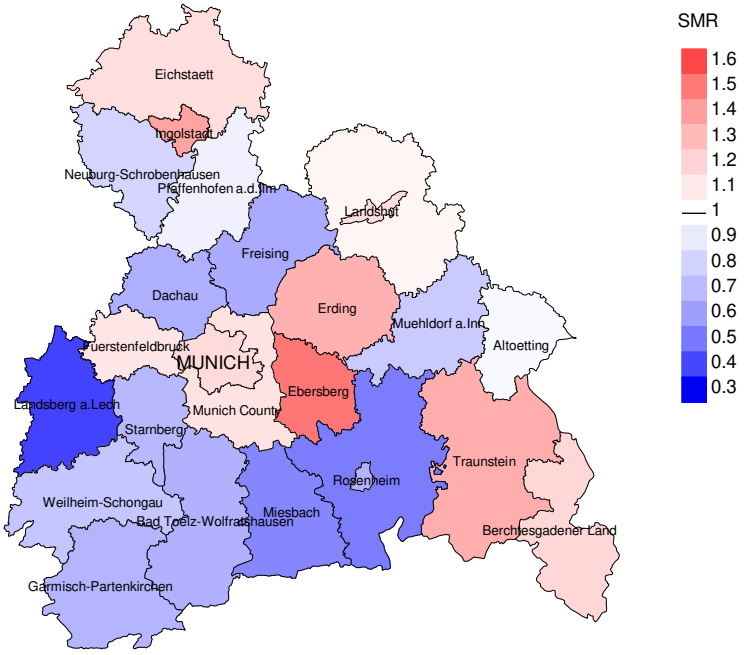


Figure 18b. Map of standardized mortality ratio (SMR) by county averaged for period 2007 to 2016. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,582, females N=319).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 13 women died from liver cell carcinoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.51. Though, the value of this parameter may vary with an underlying probability of 99% between 0.65 and 2.96, 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

MCR	Munich Cancer Registry (Tumorregister München)
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
SEER	Surveillance, Epidemiology, and End Results (USA)
DCO	Death certificate only
BRD-S	German standard population
ES	European standard population (old)
WS	World standard population
SIR	Standardized incidence ratio
CI	Confidence interval
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
SMR	Standardized mortality ratio
MI-index	Ratio between mortality and incidence
FRG	Federal Republic of Germany

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