Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage
- *Deutsch*

ICD-10 D46: Myelodysplastic syndrome

Incidence and Mortality

Year of diagnosis	1998-2019
Patients	3,138
Diseases	3,143
Creation date	01/26/2021
Database export	01/07/2021
Population	4.92 m

Munich Cancer Registry
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Marchioninistr. 15
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https://www.tumorregister-muenchen.de/en

https://www.tumorregister-muenchen.de/en/facts/base/bD46__E-ICD-10-D46-Myelodysplastic-syndrome-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, January 2021

[#] 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
D46.-	Myelodysplastic syndromes
D46.0	Refractory anaemia without ring sideroblasts, so stated
D46.1	Refractory anaemia with ring sideroblasts
D46.2	Refractory anaemia with excess of blasts [RAEB]
D46.4	Refractory anaemia, unspecified
D46.5	Refractory anaemia with multi-lineage dysplasia
D46.6	Myelodysplastic syndrome with isolated del(5q) chromosomal abnormality
D46.7	Other myelodysplastic syndromes
D46.9	Myelodysplastic syndrome, unspecified

INCIDENCE

Table 1

Cases by year of diagnosis, proportions of DCO, further malignancies, deaths, and active follow-up (ALL PATIENTS) (incl. DCO)

Year of diagnosis	All cases n	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	51	27	52.9	15.7	13.6	96.1	100.0
1999	57	27	47.4	15.7	13.7	96.5	100.0
2000	68	41	60.3	17.0	13.9	95.6	100.0
2001	60	37	61.7	15.7	14.1	95.0	100.0
2002	110	60	54.5	16.8	13.9	97.3	100.0 #
2003	99	56	56.6	18.0	14.0	96.0	99.0
2004	111	68	61.3	19.4	13.9	92.8	98.2
2005	144	95	66.0	19.4	14.3	96.5	98.6
2006	150	84	56.0	20.8	14.6	90.0	96.0
2007	195	98	50.3	20.8	14.8	88.7	96.4 #
2008	205	98	47.8	21.1	14.7	90.7	98.5
2009	203	83	40.9	21.6	14.7	84.7	99.5
2010	206	91	44.2	22.3	13.6	88.8	99.5
2011	246	110	44.7	23.3	13.4	89.4	99.6
2012	210	108	51.4	24.2	12.2	91.0	99.5
2013	221	92	41.6	24.3	11.6	84.6	100.0
2014	172	94	54.7	24.6	10.8	89.0	98.3
2015	178	100	56.2	25.1	9.5	90.4	99.4
2016	194	116	59.8	24.9	9.1	86.1	99.5
2017	162	99	61.1	25.5	6.9	82.7	99.4
2018	72	25	34.7	25.9	7.1	63.9	98.6
2019	29	2	6.9	26.2	3.4	55.2	82.8 ##
1998–2019	3143	1611	51.3	26.2	13.6	88.9	98.8

3,143 cases diagnosed 1998-2019 are related to a total of 3,138 patients. Currently, in 1,308 (41.7 %) of these 3,138 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 1,002 / 244 / 62 (31.9 % / 7.8 % / 2.0 %) 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 2017, a subgroup of 162 cases has been diagnosed, of which 25.5 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 6.9 % 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 by year of diagnosis, proportions of
DCO, further malignancies, deaths, and active follow-up (MALES)
(incl. DCO)

Year of diagnosis	Males n	Males %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	17	33.3	8	47.1	17.6	15.5	88.2	100.0
1999	29	50.9	13	44.8	17.4	15.7	93.1	100.0
2000	37	54.4	18	48.6	18.1	15.8	91.9	100.0
2001	21	35.0	14	66.7	17.3	16.1	95.2	100.0
2002	61	55.5	28	45.9	18.2	16.0	98.4	100.0 #
2003	51	51.5	27	52.9	17.1	16.1	96.1	98.0
2004	66	59.5	34	51.5	18.8	15.9	92.4	98.5
2005	70	48.6	42	60.0	18.8	16.3	98.6	100.0
2006	87	58.0	44	50.6	20.3	16.5	90.8	95.4
2007	107	54.9	47	43.9	21.2	16.7	84.1	96.3 #
2008	93	45.4	40	43.0	21.9	16.4	91.4	96.8
2009	105	51.7	38	36.2	22.3	16.2	81.0	99.0
2010	116	56.3	49	42.2	23.5	15.0	88.8	100.0
2011	120	48.8	46	38.3	24.7	14.6	89.2	99.2
2012	111	52.9	50	45.0	25.8	13.5	91.0	99.1
2013	123	55.7	49	39.8	26.0	12.6	87.0	100.0
2014	95	55.2	47	49.5	26.3	11.5	85.3	96.8
2015	86	48.3	42	48.8	26.7	10.4	86.0	100.0
2016	111	57.2	60	54.1	26.6	10.5	85.6	100.0
2017	97	59.9	50	51.5	27.1	7.4	78.4	99.0
2018	49	68.1	19	38.8	27.6	6.3	65.3	98.0
2019	15	51.7	1	6.7	27.9	6.7	40.0	86.7 ##
1998-2019	1667	53.0	766	46.0	27.9	15.5	87.3	98.6

1,667 cases diagnosed 1998-2019 are related to a total of 1,663 patients. Currently, in 756 (45.5 %) of these 1,663 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 570 / 142 / 44 (34.3 % / 8.5 % / 2.6 %) 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 2017, a subgroup of 97 cases has been diagnosed, of which 27.1 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 7.4 % 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 by year of diagnosis, proportions of
DCO, further malignancies, deaths, and active follow-up (FEMALES)
(incl. DCO)

Year of diagnosis	Females n	Females %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %	
1998	34	66.7	19	55.9	14.7	11.5	100.0	100.0	
1999	28	49.1	14	50.0	14.5	11.6	100.0	100.0	
2000	31	45.6	23	74.2	16.1	11.7	100.0	100.0	
2001	39	65.0	23	59.0	14.4	11.8	94.9	100.0	
2002	49	44.5	32	65.3	15.5	11.4	95.9	100.0	#
2003	48	48.5	29	60.4	18.8	11.6	95.8	100.0	
2004	45	40.5	34	75.6	20.1	11.7	93.3	97.8	
2005	74	51.4	53	71.6	20.1	12.0	94.6	97.3	
2006	63	42.0	40	63.5	21.4	12.5	88.9	96.8	
2007	88	45.1	51	58.0	20.2	12.8	94.3	96.6	#
2008	112	54.6	58	51.8	20.3	12.7	90.2	100.0	
2009	98	48.3	45	45.9	20.9	12.9	88.8	100.0	
2010	90	43.7	42	46.7	21.0	12.0	88.9	98.9	
2011	126	51.2	64	50.8	21.7	11.9	89.7	100.0	
2012	99	47.1	58	58.6	22.5	10.6	90.9	100.0	
2013	98	44.3	43	43.9	22.4	10.4	81.6	100.0	
2014	77	44.8	47	61.0	22.9	9.9	93.5	100.0	
2015	92	51.7	58	63.0	23.4	8.3	94.6	98.9	
2016	83	42.8	56	67.5	23.1	7.0	86.7	98.8	
2017	65	40.1	49	75.4	23.8	6.3	89.2	100.0	
2018	23	31.9	6	26.1	23.9	8.6	60.9	100.0	
2019	14	48.3	1	7.1	24.2	0.0	71.4	78.6	##
1998-2019	1476	47.0	845	57.2	24.2	11.5	90.7	99.1	

1,476 cases diagnosed 1998-2019 are related to a total of 1,475 patients. Currently, in 552 (37.4 %) of these 1,475 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 432 / 102 / 18 (29.3 % / 6.9 % / 1.2 %) 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 2017, a subgroup of 65 cases has been diagnosed, of which 23.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 6.3 % 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 including DCO cases
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.92 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	17	34	1.5	2.9	1.2	1.1	1.5	1.7	1.9	2.4
1999	29	28	2.6	2.4	1.7	0.6	2.5	1.1	3.8	1.7
2000	37	31	3.2	2.6	1.9	0.8	2.9	1.3	4.1	1.8
2001	21	39	1.8	3.2	0.9	1.1	1.6	1.7	2.5	2.3
2002	61	49	3.3	2.5	1.6	0.7	2.7	1.3	4.0	1.9
2003	51	48	2.7	2.4	1.4	0.7	2.2	1.2	3.3	1.7
2004	66	45	3.5	2.3	1.7	0.7	2.9	1.1	4.1	1.7
2005	70	74	3.7	3.7	1.6	1.2	2.8	1.8	4.3	2.6
2006	87	63	4.5	3.1	2.3	0.9	3.6	1.5	4.9	2.2
2007	107	88	4.8	3.8	2.6	1.3	3.8	2.0	5.1	2.8
2008	93	112	4.2	4.8	2.0	1.8	3.0	2.6	4.3	3.4
2009	105	98	4.7	4.2	2.3	1.5	3.4	2.3	4.7	3.2
2010	116	90	5.1	3.8	2.2	1.1	3.6	1.8	5.2	2.7
2011	120	126	5.4	5.4	2.2	1.6	3.5	2.6	5.2	3.6
2012	111	99	4.9	4.2	2.2	1.4	3.4	2.0	4.8	2.8
2013	123	98	5.3	4.1	2.3	1.4	3.5	2.1	5.1	2.9
2014	95	77	4.1	3.2	1.7	0.9	2.6	1.4	3.7	2.1
2015	86	92	3.6	3.8	1.5	1.0	2.3	1.7	3.3	2.4
2016	111	83	4.6	3.4	1.6	0.9	2.7	1.5	4.1	2.2
2017	97	65	4.0	2.6	1.5	0.7	2.5	1.1	3.5	1.6
2018	49	23	2.0	0.9	0.7	0.2	1.2	0.4	1.7	0.6
2019	15	14	0.6	0.6	0.2	0.2	0.4	0.3	0.5	0.4
1998-2019	1667	1476	3.8	3.2	1.7	1.0	2.7	1.6	3.8	2.2

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)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	51	73.7	16.4	4.5	93.4	62.4	67.2	74.2	84.8	87.9
1999	57	76.4	16.0	1.7	94.6	64.6	73.4	80.9	85.0	89.4
2000	68	75.2	14.4	10.2	101	58.3	67.1	76.7	87.1	90.9
2001	60	76.4	13.1	31.7	96.0	61.2	71.3	78.6	85.1	90.5
2002	110	77.2	10.3	41.0	97.4	65.0	72.9	77.6	83.2	90.1
2003	99	76.1	13.6	12.2	93.9	63.1	69.0	78.4	84.5	89.4
2004	111	76.9	12.2	12.0	103	63.6	69.5	78.5	85.4	90.2
2005	144	77.2	12.1	6.0	97.1	64.6	70.5	80.4	84.6	90.0
2006	150	74.9	14.2	4.5	96.5	59.0	68.8	78.6	84.7	88.9
2007	195	74.9	17.8	3.0	100	58.5	69.2	78.3	85.6	89.9
2008	205	74.9	15.4	3.9	99.5	60.3	69.4	77.9	84.8	88.9
2009	203	73.8	14.7	2.6	100	58.1	67.0	77.3	83.4	88.1
2010	206	77.1	13.2	3.7	98.9	65.5	72.1	79.4	85.1	89.0
2011	246	76.9	12.5	3.7	95.8	64.8	72.0	78.8	85.4	88.5
2012	210	76.5	15.5	4.6	99.0	62.7	71.1	79.8	86.6	90.2
2013	221	75.2	14.5	7.6	97.5	62.5	71.0	77.4	83.7	88.2
2014	172	77.8	13.4	3.9	99.3	67.1	73.4	79.1	86.1	90.0
2015	178	78.3	11.6	5.2	96.0	63.7	73.1	79.9	86.2	90.2
2016	194	79.7	9.5	35.7	96.7	66.0	75.6	81.2	86.7	90.4
2017	162	78.3	12.3	25.8	98.5	64.2	73.0	80.1	86.1	91.6
2018	72	77.8	9.4	49.8	94.8	66.1	71.9	78.5	84.5	89.1
2019	29	75.1	11.8	28.4	91.2	61.8	72.3	75.9	80.8	87.9
1998–2019	3143	76.5	13.7	1.7	103	62.7	71.1	78.8	85.1	89.6

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	17	66.2	23.4	4.5	90.1	11.6	63.8	72.2	78.3	86.2
1999	29	70.7	19.7	1.7	90.6	47.2	67.7	74.2	81.4	85.0
2000	37	71.0	15.4	10.2	93.8	55.2	62.5	74.0	80.5	88.5
2001	21	74.3	9.6	49.9	89.1	62.1	70.7	76.7	80.8	82.7
2002	61	75.3	11.0	41.0	92.1	62.8	69.9	76.4	82.6	86.8
2003	51	73.4	15.0	12.2	93.9	61.8	65.7	76.2	82.5	87.1
2004	66	76.4	10.1	54.9	93.7	62.5	68.6	77.4	85.4	89.2
2005	70	76.0	10.1	27.1	95.6	66.0	71.0	77.7	81.4	86.0
2006	87	72.2	14.3	4.5	96.5	56.4	63.1	72.8	82.4	88.8
2007	107	72.1	19.6	3.0	100	50.3	68.5	76.5	84.1	87.8
2008	93	72.7	14.2	14.0	94.6	55.7	67.9	74.7	82.2	87.2
2009	105	72.4	14.1	2.6	92.5	60.3	66.9	73.6	82.1	86.1
2010	116	76.3	14.0	3.7	98.9	63.2	70.6	79.2	84.9	88.8
2011	120	75.2	12.1	3.7	89.0	66.1	71.4	76.7	82.5	85.6
2012	111	74.9	15.6	10.0	96.8	62.5	68.1	77.4	84.7	89.7
2013	123	74.0	15.2	7.6	93.0	62.1	70.8	76.5	83.3	85.8
2014	95	75.8	14.6	3.9	99.3	64.7	71.1	78.4	83.4	89.3
2015	86	76.8	12.3	5.2	93.7	63.7	72.1	78.0	85.1	89.2
2016	111	79.5	10.0	35.7	96.7	66.0	74.6	82.0	86.7	90.1
2017	97	76.9	11.9	33.1	97.5	60.2	70.9	79.1	85.2	90.4
2018	49	76.9	9.9	49.8	94.8	64.6	70.4	77.8	84.4	88.6
2019	15	75.7	7.3	61.8	87.9	64.9	70.2	77.0	80.4	86.6
1998–2019	1667	74.8	14.0	1.7	100	61.3	69.5	77.2	83.4	88.2

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	34	77.4	10.1	56.3	93.4	65.5	67.8	79.1	84.9	89.6
1999	28	82.2	7.8	64.6	94.6	66.4	78.4	83.7	87.2	92.3
2000	31	80.4	11.2	53.3	101	64.9	74.7	80.7	89.2	91.2
2001	39	77.6	14.6	31.7	96.0	61.0	72.9	81.0	88.4	90.8
2002	49	79.5	8.8	62.8	97.4	66.2	74.2	78.2	85.0	92.4
2003	48	78.9	11.4	39.6	92.7	66.4	76.3	82.0	86.5	89.7
2004	45	77.7	14.9	12.0	103	64.1	75.1	80.1	86.4	90.6
2005	74	78.3	13.6	6.0	97.1	63.2	69.5	82.8	85.5	92.5
2006	63	78.5	13.3	12.5	92.4	66.9	71.7	82.2	86.2	90.2
2007	88	78.2	14.6	7.4	98.1	62.9	73.2	81.3	87.6	92.4
2008	112	76.8	16.3	3.9	99.5	63.1	72.3	80.4	86.3	90.7
2009	98	75.2	15.3	12.9	100	57.4	69.1	78.6	85.1	88.9
2010	90	78.2	12.1	13.3	93.4	68.8	72.9	80.8	86.2	89.2
2011	126	78.5	12.7	10.1	95.8	63.0	72.9	81.8	87.4	90.3
2012	99	78.2	15.4	4.6	99.0	63.0	72.0	81.7	88.1	90.3
2013	98	76.7	13.6	11.3	97.5	62.7	72.7	78.6	86.4	91.1
2014	77	80.3	11.3	12.6	97.2	70.6	75.1	79.6	87.8	91.9
2015	92	79.7	10.8	43.6	96.0	66.8	75.5	80.7	87.4	90.4
2016	83	79.8	8.9	52.6	96.4	66.0	75.7	79.9	86.8	90.4
2017	65	80.4	12.7	25.8	98.5	67.6	75.2	82.9	86.5	93.4
2018	23	79.8	8.1	60.4	94.7	69.3	76.9	80.6	85.1	90.7
2019	14	74.5	15.6	28.4	91.2	59.4	72.3	75.9	83.7	89.5
1998–2019	1476	78.4	13.0	3.9	103	64.5	73.0	80.8	86.8	90.7

Table 4

Age distribution by 5-year age group and sex for period 2007-2019
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	7	0.3	0.3	5	0.4	0.4	2	0.2	0.2
5-9	6	0.3	0.6	4	0.3	0.7	2	0.2	0.4
10-14	20	0.9	1.4	12	1.0	1.7	8	0.8	1.1
15-19	7	0.3	1.7	5	0.4	2.1	2	0.2	1.3
20-24	0	0.0	1.7			2.1			1.3
25-29	6	0.3	2.0	2	0.2	2.3	4	0.4	1.7
30-34	3	0.1	2.1	3	0.2	2.5			1.7
35-39	9	0.4	2.5	2	0.2	2.7	7	0.7	2.3
40-44	13	0.6	3.1	9	0.7	3.4	4	0.4	2.7
45-49	17	0.7	3.8	12	1.0	4.4	5	0.5	3.2
50-54	26	1.1	5.0	14	1.1	5.5	12	1.1	4.3
55-59	59	2.6	7.5	30	2.4	8.0	29	2.7	7.0
60-64	107	4.7	12.2	66	5.4	13.4	41	3.8	10.9
65-69	206	9.0	21.2	137	11.2	24.5	69	6.5	17.4
70-74	319	13.9	35.1	188	15.3	39.8	131	12.3	29.7
75-79	453	19.8	54.9	247	20.1	59.9	206	19.3	49.0
80-84	436	19.0	73.9	242	19.7	79.6	194	18.2	67.2
85+	599	26.1	100.0	250	20.4	100.0	349	32.8	100.0
All ages	2293	100.0		1228	100.0		1065	100.0	

Table 5

Age-specific incidence and DCO rate
for period 2007-2019

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=538 %	Females DCO rate n=577 %
0- 4	5	2	0.3	0.1		
5- 9	4	2	0.3	0.1		
10-14	12	8	0.8	0.6		
15-19	5	2	0.3	0.1		
20-24						
25-29	2	4	0.1	0.2		
30-34	3		0.1			
35-39	2	7	0.1	0.3		14.3
40-44	9	4	0.4	0.2		
45-49	12	5	0.5	0.2		
50-54	14	12	0.6	0.5	7.1	8.3
55-59	30	29	1.5	1.5	20.0	13.8
60-64	66	41	4.0	2.3	27.3	19.5
65-69	136	69	8.9	4.1	33.1	27.5
70-74	188	131	13.4	8.2	26.1	31.3
75-79	247	206	22.3	15.0	34.8	45.1
80-84	241	193	36.7	19.8	56.8	63.7
85+	250	349	58.6	36.2	78.4	82.2
All ages	1226	1064			43.9	54.2
Incidence						
Raw			4.1	3.4		
WS			1.7	1.0		
ES			2.7	1.6		
BRD-S			3.8	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).

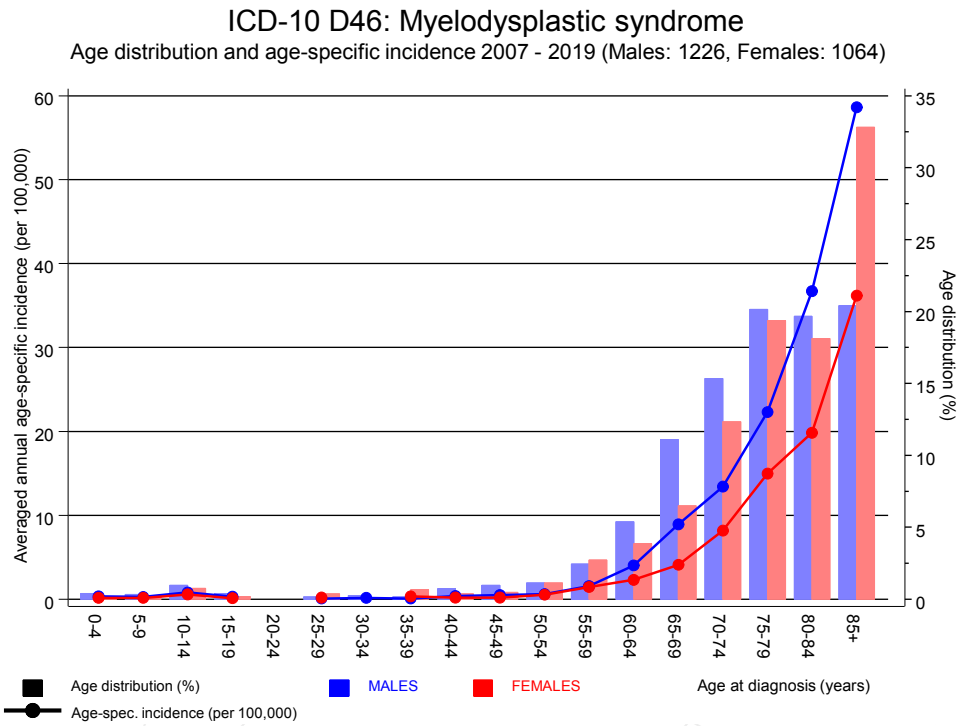


Figure 6. Age distribution (males: mean=75.2 yrs, median=77.8 yrs; females: mean=78.2 yrs, median=80.5 yrs) and age-specific incidence.

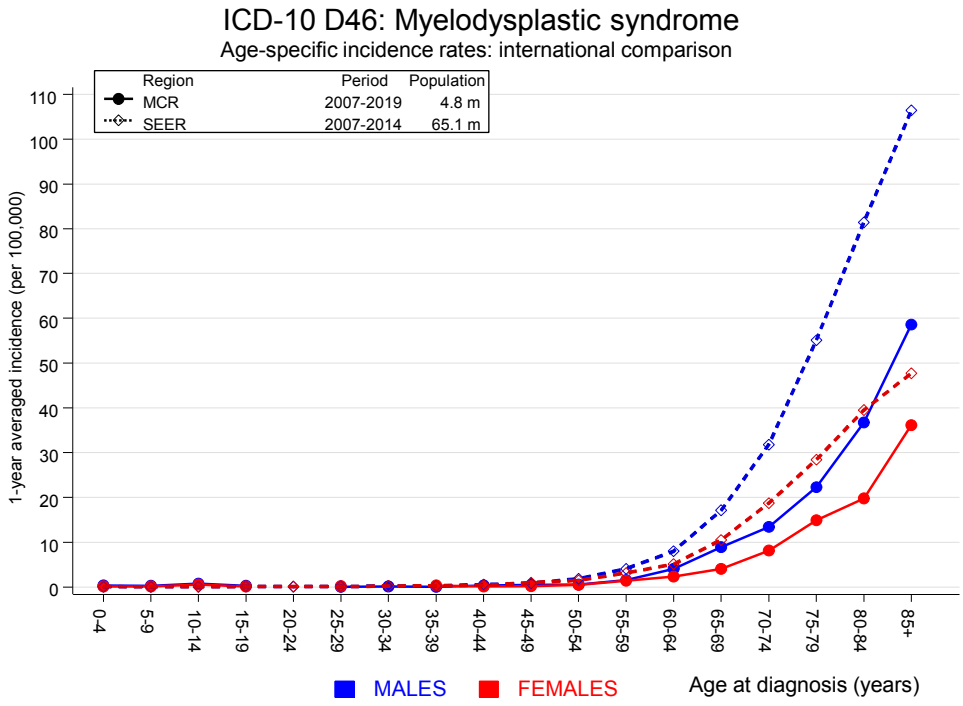


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2019, based on the November 2018 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 1998-2019

MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C03-C06	Oral cavity	1	0.3	3.4	0.1	19.2		3.0	
C12-C13	Hypopharynx	1	0.2	5.3	0.1	29.3		3.4	100.0
C15	Oesophagus	3	0.8	3.8	0.8	11.1		9.4	
C16	Stomach	4	1.9	2.2	0.6	5.5		9.1	
C17	Small intestine	2	0.3	7.7	0.9	28.0		7.4	
C18	Colon	7	4.5	1.6	0.6	3.2		10.7	14.3
C19-C20	Rectum	7	2.3	3.1	1.3	6.4	#	20.2	
C21	Anus/canal	1	0.1	10.3	0.3	57.1		3.8	
C22	Liver	5	1.3	3.9	1.3	9.1	#	15.9	20.0
C25	Pancreas	2	1.8	1.1	0.1	4.0		0.9	
C32	Larynx	3	0.4	7.7	1.6	22.6	#	11.1	
C33-C34	Lung	24	5.1	4.7	3.0	6.9	#	80.3	20.8
C38,C45	Mesothelioma	1	0.3	3.1	0.1	17.2		2.9	
C43	Malign. melanoma	2	1.9	1.0	0.1	3.8		0.4	
C61	Prostate	14	12.4	1.1	0.6	1.9		7.0	14.3
C64	Kidney	4	1.5	2.8	0.8	7.0		10.8	
C67	Bladder	7	2.3	3.1	1.2	6.3	#	20.1	28.6
C70-C72	CNS cancer	1	0.5	1.9	0.0	10.5		2.0	
C76-C79	CUP	4	0.8	5.1	1.4	13.1	#	13.7	25.0
C81	Hodgkin lymphoma	1	0.1	10.7	0.3	59.4		3.9	
C82-C85	NHL	23	1.9	11.9	7.6	17.9	#	89.7	8.7
C90	Mult. myeloma	10	0.6	16.3	7.8	29.9	#	40.0	
C91-C96	Leukaemia	129	0.7	175.1	146.2	208.1	#	546.3	19.4
Not observed		0	2.7	0.0	0.0	1.4		-11.4	
All further malignancies		256	44.5	5.8	5.1	6.5	#	900.8	15.6

Patients	1089
Median age at next malignancy (years)	75.8
Person-years	2348
Mean observation time (years)	2.2
Median observation time (years)	1.0

The occurrence of further specified malignancy is statistically significant.

Table 7b

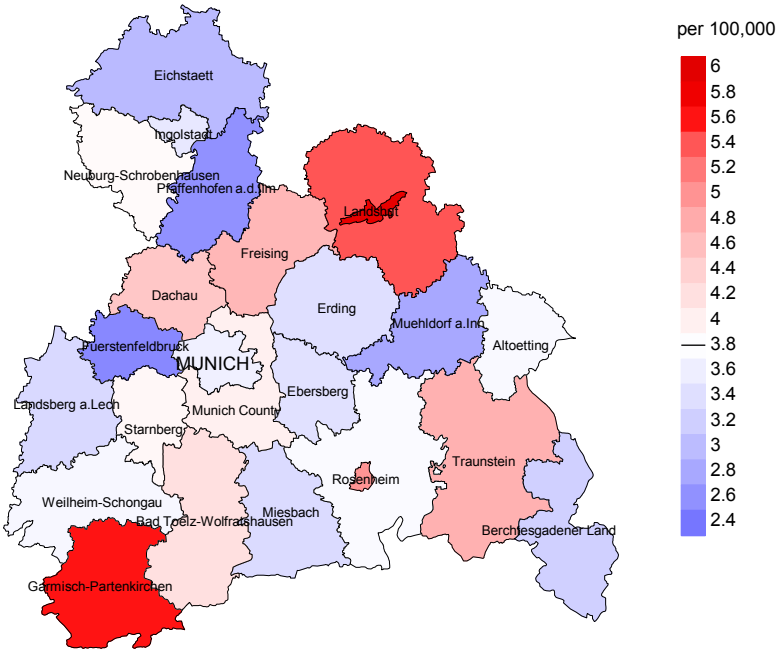
Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of further malignancies for period 1998–2019
FEMALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C00	Lip	1	0.0	46.9	1.2	261.4	#	5.0	
C15	Oesophagus	1	0.2	6.3	0.2	35.0		4.3	
C16	Stomach	2	0.9	2.1	0.3	7.7		5.5	
C18	Colon	5	2.6	1.9	0.6	4.4		12.2	20.0
C19–C20	Rectum	2	1.0	2.0	0.2	7.1		5.1	
C22	Liver	1	0.3	3.0	0.1	16.7		3.4	
C25	Pancreas	3	1.3	2.3	0.5	6.8		8.8	33.3
C26	GI cancer	1	0.1	18.2	0.5	101.7		4.9	
C33–C34	Lung	3	1.8	1.6	0.3	4.8		6.0	33.3
C37	Thymus	1	0.0	77.1	2.0	429.5	#	5.1	
C50	Breast	17	7.0	2.4	1.4	3.9	#	51.6	23.5
C51	Vulva	1	0.3	3.5	0.1	19.4		3.7	
C53	Cervix uteri	1	0.3	3.8	0.1	20.9		3.8	
C56	Ovary	1	1.0	1.0	0.0	5.7		0.1	100.0
C67	Bladder	3	0.6	5.4	1.1	15.9	#	12.6	33.3
C73	Thyroid	1	0.3	3.3	0.1	18.4		3.6	
C76–C79	CUP	1	0.5	1.9	0.0	10.8		2.5	
C82–C85	NHL	8	1.0	7.9	3.4	15.5	#	35.9	
C90	Mult. myeloma	7	0.3	21.3	8.6	44.0	#	34.3	
C91–C96	Leukaemia	104	0.4	263.3	215.1	319.0	#	533.0	16.3
Not observed		0	4.9	0.0	0.0	0.7	#	-25.4	
All further malignancies		164	24.9	6.6	5.6	7.7	#	715.8	15.9

Patients	838
Median age at next malignancy (years)	77.0
Person-years	1944
Mean observation time (years)	2.3
Median observation time (years)	1.1

The occurrence of further specified malignancy is statistically significant.

Average incidence (Germany 1987 standard population) 2007 - 2019: Males



Average incidence (Germany 1987 standard population) 2007 - 2019: Females

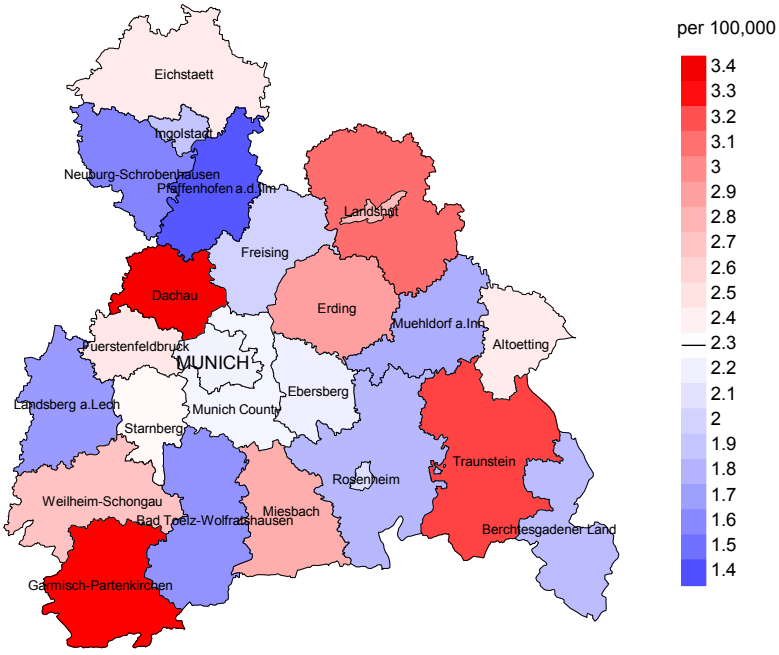
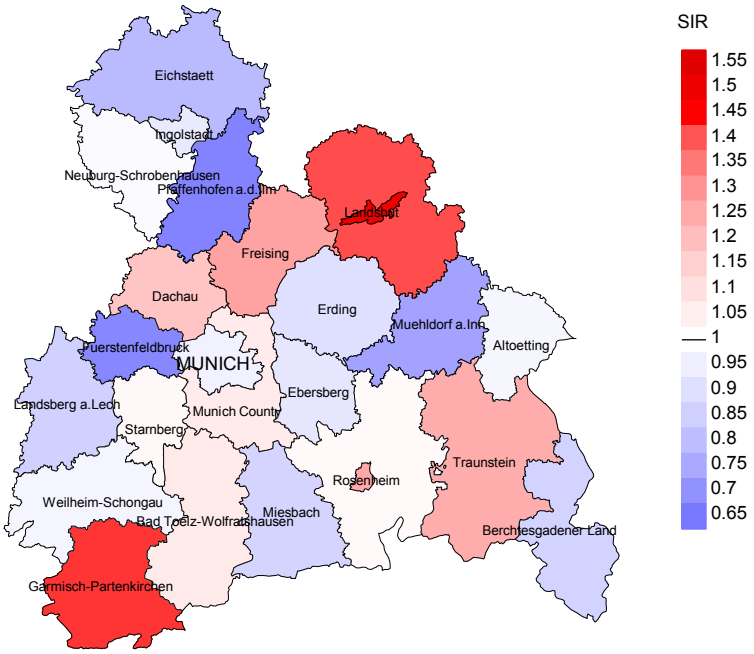


Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 3.8/100,000 WS N=1,226, females 2.3/100,000 WS N=1,064).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 25 women were identified with newly diagnosed myelodysplastic syndrome. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 2.2/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.2 and 3.7/100,000.

Standardized incidence ratio (SIR) 2007 - 2019: Males



Standardized incidence ratio (SIR) 2007 - 2019: Females

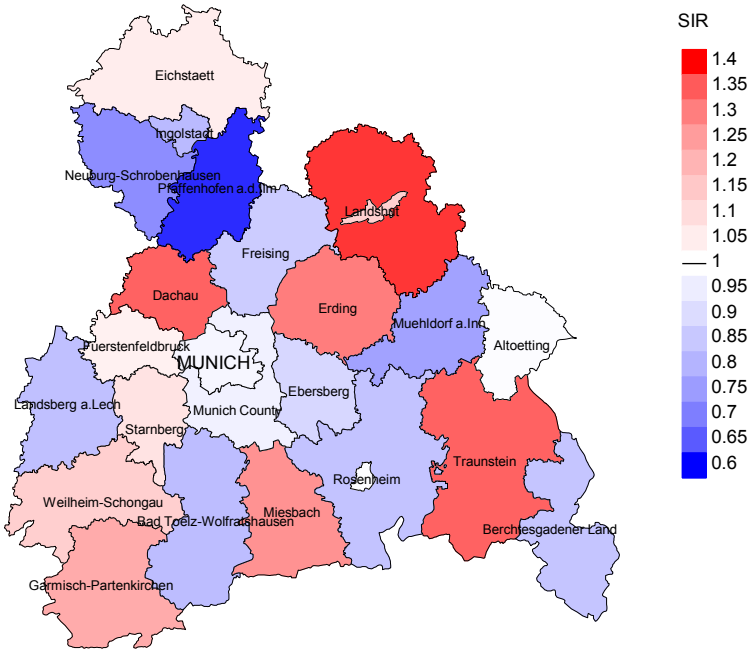


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=1,226, females N=1,064).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2019 a total of 25 women were identified with newly diagnosed myelodysplastic syndrome. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.89. Though, the value of this parameter may vary with an underlying probability of 99% between 0.50 and 1.46, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.92 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	51	100.0	52.9	49	96.1	98.0
1999	57	100.0	47.4	55	96.5	98.2
2000	68	100.0	60.3	65	95.6	100.0
2001	60	100.0	61.7	57	95.0	98.2
2002	110	100.0	54.5	107	97.3	99.1
2003	99	99.0	56.6	95	96.0	95.8
2004	111	98.2	61.3	103	92.8	99.0
2005	144	98.6	66.0	139	96.5	97.8
2006	150	96.0	56.0	135	90.0	99.3
2007	195	96.4	50.3	173	88.7	97.7
2008	205	98.5	47.8	186	90.7	98.9
2009	203	99.5	40.9	172	84.7	96.5
2010	206	99.5	44.2	183	88.8	98.4
2011	246	99.6	44.7	220	89.4	98.6
2012	210	99.5	51.4	191	91.0	97.9
2013	221	100.0	41.6	187	84.6	97.3
2014	172	98.3	54.7	153	89.0	96.1
2015	178	99.4	56.2	161	90.4	95.0
2016	194	99.5	59.8	167	86.1	92.8
2017	162	99.4	61.1	134	82.7	91.0
2018	72	98.6	34.7	46	63.9	69.6
2019	29	82.8	6.9	16	55.2	75.0
1998-2019	3143	98.8	51.3	2794	88.9	96.6

Table 9b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased within the same year of being diagnosed with cancer (incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002, and from 4.10 to 4.92 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	51	37	100.0	27	52.9
1999	57	52	98.1	35	61.4
2000	68	60	100.0	43	63.2
2001	60	41	100.0	31	51.7
2002	110	62	100.0	58	52.7
2003	99	72	98.6	56	56.6
2004	111	74	97.3	68	61.3
2005	144	90	96.7	94	65.3
2006	150	104	99.0	88	58.7
2007	195	108	99.1	98	50.3
2008	205	120	98.3	108	52.7
2009	203	122	99.2	89	43.8
2010	206	120	99.2	100	48.5
2011	246	139	98.6	121	49.2
2012	210	138	98.6	113	53.8
2013	221	129	100.0	100	45.2
2014	172	143	99.3	97	56.4
2015	178	157	100.0	110	61.8
2016	194	155	100.0	127	65.5
2017	162	132	100.0	110	67.9
2018	72	90	43.3	30	41.7
2019	29	43	48.8	8	27.6
1998–2019	3143	2188	95.8	1711	54.4

Table 9c

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 2.65 to 4.10 m as of 2002, and from 4.10 to 4.92 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	37	48.6	51.4	97.3
1999	52	57.7	42.3	96.1
2000	60	65.0	35.0	96.7
2001	41	41.5	58.5	100.0
2002	62	72.6	27.4	98.4
2003	72	68.1	31.9	94.4
2004	74	64.9	35.1	100.0
2005	90	66.7	33.3	94.3
2006	104	73.1	26.9	97.1
2007	108	74.1	25.9	97.2
2008	120	73.3	26.7	96.6
2009	122	77.0	23.0	91.7
2010	120	72.5	27.5	91.6
2011	139	78.4	21.6	96.4
2012	138	78.3	21.7	94.1
2013	129	81.4	18.6	94.6
2014	143	68.5	31.5	87.3
2015	157	73.2	26.8	91.1
2016	155	72.9	27.1	91.6
2017	132	68.2	31.8	86.4
2018	90	41.1	58.9	82.1
2019	43	30.2	69.8	71.4
1998-2019	2188	69.4	30.6	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	13	73.0	72.3	73.9	73.0
1999	26	81.1	77.6	85.2	80.9
2000	28	74.7	75.3	74.2	75.3
2001	18	78.9	75.4	81.7	78.9
2002	33	78.8	78.8	79.7	78.8
2003	39	77.4	77.2	81.6	77.3
2004	35	80.7	79.9	83.3	80.7
2005	41	77.9	76.5	79.8	78.2
2006	64	76.1	74.5	80.1	76.3
2007	59	78.5	79.3	77.5	79.0
2008	72	76.0	73.2	80.8	76.0
2009	59	76.7	76.7	77.2	77.4
2010	71	81.2	79.3	85.6	80.7
2011	69	77.8	77.8	78.1	77.8
2012	78	78.2	78.1	80.8	78.2
2013	73	79.4	79.0	82.1	78.8
2014	71	79.4	79.7	79.3	80.7
2015	81	78.1	76.7	83.1	78.2
2016	87	80.7	77.9	85.7	80.4
2017	74	79.6	79.3	80.7	79.6
2018	51	79.5	80.1	79.3	81.2
2019	27	79.9	76.1	82.2	76.7
1998–2019	1169	78.6	77.3	81.0	78.5

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 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	24	83.2	76.7	86.7	82.0
1999	26	84.9	84.2	85.6	84.4
2000	32	82.1	78.2	83.8	82.0
2001	23	84.9	81.0	88.2	84.9
2002	29	81.4	85.2	80.9	82.9
2003	33	84.5	82.2	84.8	84.5
2004	39	83.4	80.1	86.7	83.4
2005	49	83.4	81.2	85.8	83.6
2006	40	83.8	83.9	81.9	83.7
2007	49	84.2	83.7	85.6	84.2
2008	48	82.0	81.1	84.6	82.0
2009	63	78.5	78.5	80.3	80.7
2010	49	80.9	81.1	78.8	81.1
2011	70	82.1	81.0	83.3	82.6
2012	60	80.1	77.3	85.1	79.7
2013	56	80.3	81.3	78.7	81.3
2014	72	81.4	79.5	83.5	81.2
2015	76	80.8	79.0	86.6	80.8
2016	68	80.6	79.8	81.1	79.9
2017	58	82.6	82.6	82.6	82.6
2018	39	79.5	80.3	79.0	82.3
2019	16	79.4	77.7	79.5	77.7
1998–2019	1019	81.7	80.8	83.8	82.2

By 2018, Bavarians' life expectancy at birth is estimated at 79.3 years for boys and 83.8 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	6	0.5	0.35	0.3	0.26	0.5	0.32	0.6	0.33
1999	14	1.3	0.48	0.8	0.47	1.2	0.49	1.8	0.47
2000	19	1.7	0.51	0.9	0.47	1.5	0.50	2.1	0.52
2001	6	0.5	0.29	0.3	0.29	0.4	0.29	0.7	0.29
2002	20	1.1	0.33	0.5	0.32	0.9	0.34	1.4	0.34
2003	29	1.5	0.57	0.7	0.53	1.2	0.56	2.0	0.62
2004	25	1.3	0.38	0.6	0.32	1.0	0.35	1.7	0.42
2005	27	1.4	0.39	0.6	0.39	1.1	0.39	1.6	0.38
2006	47	2.5	0.54	1.1	0.48	1.8	0.50	2.6	0.54
2007	46	2.1	0.43	0.9	0.36	1.5	0.40	2.2	0.43
2008	54	2.4	0.58	1.1	0.56	1.7	0.57	2.4	0.56
2009	47	2.1	0.45	0.9	0.39	1.5	0.43	2.2	0.46
2010	50	2.2	0.43	0.9	0.41	1.5	0.43	2.2	0.42
2011	55	2.5	0.46	1.0	0.45	1.6	0.47	2.4	0.48
2012	64	2.8	0.58	1.2	0.52	1.9	0.56	2.7	0.57
2013	59	2.6	0.48	1.0	0.43	1.6	0.47	2.4	0.47
2014	49	2.1	0.52	0.7	0.43	1.3	0.48	1.9	0.51
2015	61	2.6	0.71	0.9	0.64	1.6	0.67	2.3	0.70
2016	65	2.7	0.59	1.0	0.65	1.6	0.61	2.4	0.60
2017	53	2.2	0.55	0.8	0.50	1.3	0.52	1.9	0.55
2018	20	0.8	0.41	0.3	0.37	0.5	0.38	0.7	0.40
2019	9	0.4	0.60	0.2	0.69	0.2	0.63	0.3	0.61
1998-2019	825	1.9	0.50	0.8	0.46	1.3	0.48	1.9	0.50

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	12	1.0	0.35	0.4	0.40	0.6	0.38	0.9	0.37
1999	16	1.3	0.57	0.4	0.59	0.7	0.58	1.0	0.57
2000	20	1.7	0.65	0.6	0.73	0.9	0.69	1.2	0.64
2001	11	0.9	0.28	0.3	0.25	0.5	0.27	0.7	0.30
2002	25	1.3	0.51	0.3	0.43	0.6	0.46	0.9	0.46
2003	20	1.0	0.42	0.3	0.37	0.5	0.40	0.7	0.41
2004	23	1.2	0.51	0.4	0.59	0.6	0.54	0.9	0.52
2005	33	1.7	0.45	0.5	0.39	0.8	0.43	1.2	0.46
2006	29	1.4	0.46	0.4	0.40	0.7	0.43	1.0	0.44
2007	34	1.5	0.39	0.4	0.30	0.7	0.34	1.0	0.36
2008	34	1.5	0.30	0.4	0.22	0.7	0.26	1.0	0.28
2009	47	2.0	0.48	0.6	0.43	1.0	0.44	1.5	0.46
2010	37	1.6	0.41	0.5	0.42	0.8	0.42	1.1	0.43
2011	54	2.3	0.43	0.6	0.37	1.0	0.40	1.5	0.41
2012	44	1.9	0.44	0.5	0.39	0.9	0.44	1.3	0.45
2013	46	1.9	0.47	0.6	0.47	1.0	0.47	1.3	0.47
2014	49	2.0	0.64	0.6	0.68	0.9	0.67	1.4	0.68
2015	54	2.2	0.59	0.7	0.72	1.1	0.64	1.5	0.63
2016	48	2.0	0.58	0.5	0.60	0.9	0.59	1.2	0.56
2017	37	1.5	0.57	0.4	0.54	0.6	0.55	0.9	0.56
2018	17	0.7	0.74	0.2	0.81	0.3	0.78	0.5	0.77
2019	4	0.2	0.29	0.0	0.22	0.1	0.26	0.1	0.31
1998-2019	694	1.5	0.47	0.4	0.44	0.7	0.46	1.0	0.47

Table 12

Age distribution of age at death (cancer-related) for period 2007-2019
(**incl. multiple malignancies**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9	1	0.1	0.1	1	0.2	0.2			0.0
10-14	1	0.1	0.2			0.2	1	0.2	0.2
15-19	2	0.2	0.4	1	0.2	0.3	1	0.2	0.4
20-24	0	0.0	0.4			0.3			0.4
25-29	0	0.0	0.4			0.3			0.4
30-34	0	0.0	0.4			0.3			0.4
35-39	3	0.3	0.6	2	0.3	0.6	1	0.2	0.6
40-44	4	0.4	1.0	1	0.2	0.8	3	0.6	1.2
45-49	10	0.9	1.8	6	0.9	1.7	4	0.8	2.0
50-54	9	0.8	2.6	4	0.6	2.4	5	1.0	3.0
55-59	22	1.9	4.6	12	1.9	4.3	10	2.0	5.0
60-64	57	5.0	9.6	37	5.9	10.1	20	4.0	8.9
65-69	103	9.1	18.6	69	10.9	21.0	34	6.7	15.6
70-74	186	16.4	35.0	109	17.2	38.3	77	15.2	30.9
75-79	216	19.0	54.0	126	19.9	58.2	90	17.8	48.7
80-84	237	20.8	74.8	135	21.4	79.6	102	20.2	68.9
85+	286	25.2	100.0	129	20.4	100.0	157	31.1	100.0
All ages	1137	100.0		632	100.0		505	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2019
(**incl. multiple malignancies**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index
0- 4						
5- 9	1		0.1	0.25		
10-14		1			0.1	0.13
15-19	1	1	0.1	0.20	0.1	0.50
20-24						
25-29						
30-34						
35-39	2	1	0.1	1.00	0.0	0.14
40-44	1	3	0.0	0.11	0.1	0.75
45-49	6	4	0.2	0.50	0.2	0.80
50-54	4	5	0.2	0.29	0.2	0.42
55-59	12	10	0.6	0.40	0.5	0.34
60-64	37	20	2.3	0.56	1.1	0.49
65-69	69	34	4.5	0.51	2.0	0.49
70-74	109	77	7.8	0.58	4.8	0.59
75-79	126	90	11.4	0.51	6.5	0.44
80-84	135	102	20.6	0.56	10.5	0.53
85+	129	157	30.3	0.52	16.3	0.45
All ages	632	505				
Mortality						
Raw			2.1	0.52	1.6	0.47
WS			0.8	0.47	0.5	0.44
ES			1.3	0.50	0.8	0.46
BRD-S			2.0	0.51	1.1	0.47
PYLL-70						
per 100,000			3.8		2.9	
ES			3.4		2.6	
AYLL-70			7.6		9.7	

Table 14a

Further malignancies in deaths in period 1998–2019
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
		1	0.2	1	100.0				
C00	Lip	1	0.2	1	100.0				
C03–C06	Oral cavity	3	0.6	2	66.7			1	33.3
C07–C08	Salivary gland	1	0.2	1	100.0				
C09–C10	Oropharynx	2	0.4	2	100.0				
C15	Oesophagus	5	1.0	2	40.0	1	20.0	2	40.0
C16	Stomach	11	2.3	8	72.7			3	27.3
C17	Small intestine	1	0.2					1	100.0
C18	Colon	31	6.4	23	74.2	1	3.2	7	22.6
C19–C20	Rectum	16	3.3	9	56.3	2	12.5	5	31.3
C21	Anus/canal	2	0.4	2	100.0				
C22	Liver	4	0.8	1	25.0	1	25.0	2	50.0
C25	Pancreas	3	0.6	1	33.3	1	33.3	1	33.3
C32	Larynx	6	1.2	4	66.7			2	33.3
C33–C34	Lung	26	5.3	5	19.2	6	23.1	15	57.7
C38,C45	Mesothelioma	1	0.2					1	100.0
C43	Malign. melanoma	14	2.9	13	92.9			1	7.1
C44	Skin others	34	7.0	20	58.8	1	2.9	13	38.2
C50	Breast	1	0.2	1	100.0				
C60	Penis	1	0.2	1	100.0				
C61	Prostate	76	15.6	64	84.2	5	6.6	7	9.2
C62	Testis	1	0.2	1	100.0				
C64	Kidney	5	1.0	5	100.0				
C65	Renal pelvis	1	0.2	1	100.0				
C66	Ureter	2	0.4	2	100.0				
C67	Bladder	18	3.7	14	77.8			4	22.2
C69	Eye melanoma	2	0.4	2	100.0				
C70–C72	CNS cancer	3	0.6	2	66.7	1	33.3		
C73	Thyroid	4	0.8	4	100.0				
C74–C80	Cancer others	1	0.2			1	100.0		
C76–C79	CUP	4	0.8			1	25.0	3	75.0
C81	Hodgkin lymphoma	2	0.4	1	50.0			1	50.0
C82–C85	NHL	43	8.8	24	55.8	11	25.6	8	18.6
C90	Mult. myeloma	11	2.3	7	63.6	2	18.2	2	18.2
C91–C96	Leukaemia	149	30.7			52	34.9	97	65.1
All further malignancies		486	100.0	224	46.1	86	17.7	176	36.2

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 1998–2019
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C00	Lip	1	0.3					1	100.0
C03–C06	Oral cavity	2	0.6	1	50.0			1	50.0
C09–C10	Oropharynx	1	0.3	1	100.0				
C16	Stomach	2	0.6	1	50.0			1	50.0
C17	Small intestine	1	0.3	1	100.0				
C18	Colon	18	5.3	16	88.9			2	11.1
C19–C20	Rectum	4	1.2	2	50.0	1	25.0	1	25.0
C21	Anus/canal	2	0.6	2	100.0				
C22	Liver	1	0.3			1	100.0		
C23–C24	Bile	1	0.3	1	100.0				
C25	Pancreas	2	0.6			1	50.0	1	50.0
C26	GI cancer	1	0.3					1	100.0
C33–C34	Lung	14	4.2	7	50.0	5	35.7	2	14.3
C37	Thymus	1	0.3			1	100.0		
C43	Malign. melanoma	5	1.5	5	100.0				
C44	Skin others	18	5.3	12	66.7			6	33.3
C46,C49	Soft tissue	2	0.6	1	50.0			1	50.0
C48	Peritoneal	1	0.3	1	100.0				
C50	Breast	66	19.6	51	77.3	5	7.6	10	15.2
C51	Vulva	3	0.9	3	100.0				
C53	Cervix uteri	4	1.2	3	75.0			1	25.0
C54	Corpus uteri	14	4.2	14	100.0				
C56	Ovary	4	1.2	4	100.0				
C57.9	Fem. urogen.	1	0.3	1	100.0				
C64	Kidney	7	2.1	7	100.0				
C66	Ureter	1	0.3	1	100.0				
C67	Bladder	3	0.9	2	66.7	1	33.3		
C68	Urinary org.	1	0.3			1	100.0		
C69	Eye lymphoma	1	0.3	1	100.0				
C70–C72	CNS cancer	1	0.3			1	100.0		
C73	Thyroid	7	2.1	6	85.7			1	14.3
C81	Hodgkin lymphoma	1	0.3	1	100.0				
C82–C85	NHL	15	4.5	9	60.0	5	33.3	1	6.7
C90	Mult. myeloma	4	1.2	1	25.0	2	50.0	1	25.0
C91–C96	Leukaemia	127	37.7			41	32.3	86	67.7
All further malignancies		337	100.0	155	46.0	65	19.3	117	34.7

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 2007-2019
(**First primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index
0- 4						
5- 9	1		0.1	0.25		
10-14		1			0.1	0.13
15-19	1		0.1	0.20		
20-24						
25-29						
30-34						
35-39	2	1	0.1	1.00	0.0	0.20
40-44	1	2	0.0	0.13	0.1	0.67
45-49	5	2	0.2	0.45	0.1	0.50
50-54	4	3	0.2	0.31	0.1	0.50
55-59	10	5	0.5	0.45	0.3	0.25
60-64	31	15	1.9	0.58	0.9	0.56
65-69	44	21	2.9	0.51	1.2	0.50
70-74	70	51	5.0	0.59	3.2	0.62
75-79	75	59	6.8	0.50	4.3	0.42
80-84	67	71	10.2	0.54	7.3	0.54
85+	81	120	19.0	0.52	12.4	0.44
All ages	392	351				
Mortality						
Raw			1.3	0.51	1.1	0.47
WS			0.5	0.45	0.3	0.44
ES			0.9	0.49	0.5	0.46
BRD-S			1.2	0.51	0.7	0.47
PYLL-70						
per 100,000			3.2		1.8	
ES			2.9		1.6	
AYLL-70			8.7		9.4	

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2019
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index
0- 4						
5- 9	1		0.1	0.25		
10-14		1			0.1	0.13
15-19	1		0.1	0.20		
20-24						
25-29						
30-34						
35-39	1	1	0.0	0.50	0.0	0.25
40-44	1		0.0	0.14		
45-49	3		0.1	0.38		
50-54	1	2	0.0	0.14	0.1	0.50
55-59	7	3	0.4	0.37	0.2	0.21
60-64	24	12	1.5	0.57	0.7	0.52
65-69	30	13	2.0	0.54	0.8	0.42
70-74	44	30	3.1	0.50	1.9	0.48
75-79	49	45	4.4	0.39	3.3	0.38
80-84	55	58	8.4	0.50	6.0	0.51
85+	64	107	15.0	0.46	11.1	0.41
All ages	281	272				
Mortality						
Raw			0.9	0.44	0.9	0.42
WS			0.4	0.40	0.2	0.37
ES			0.6	0.43	0.4	0.40
BRD-S			0.9	0.44	0.6	0.42
PYLL-70						
per 100,000			2.3		1.1	
ES			2.1		1.0	
AYLL-70			8.7		8.9	

* See corresponding tables with multiple malignancies.

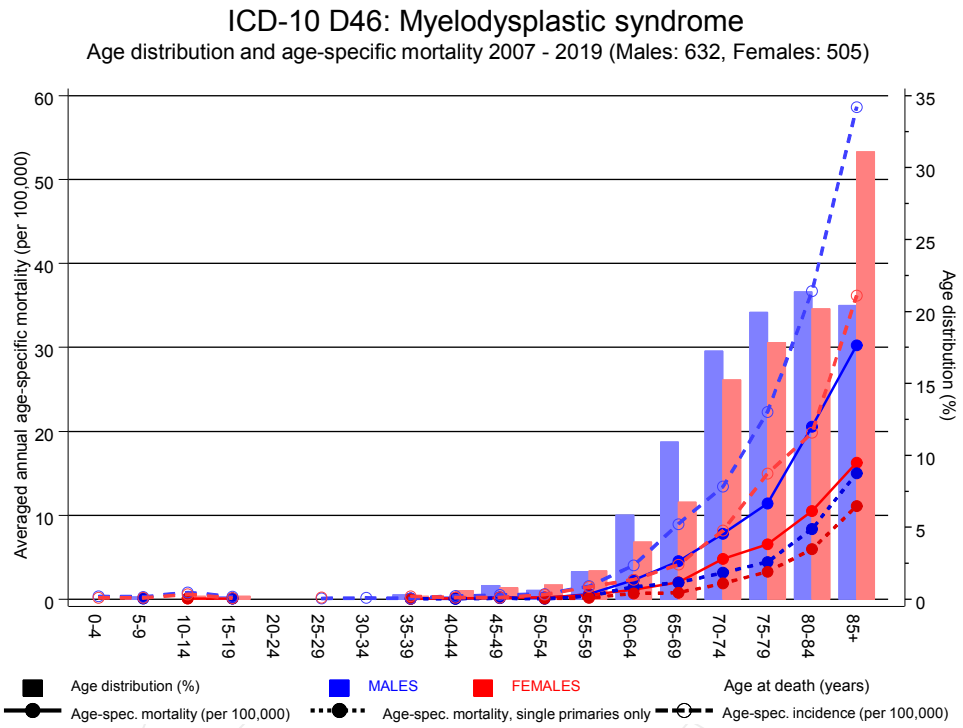


Figure 17. Distribution of age at death (bars; males: mean=75.1 yrs, median=75.9 yrs; females: mean=77.1 yrs, median=78.9 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

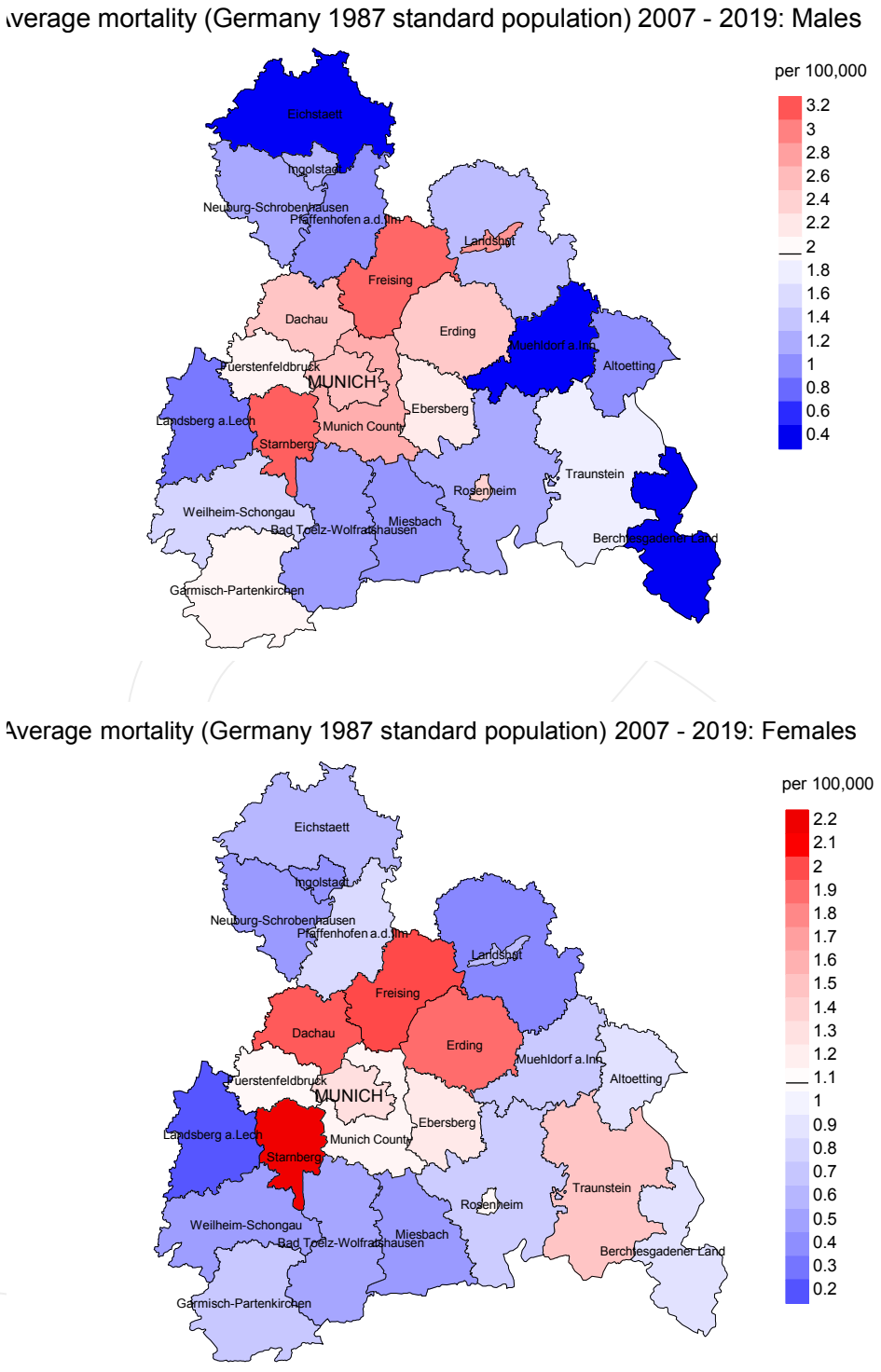
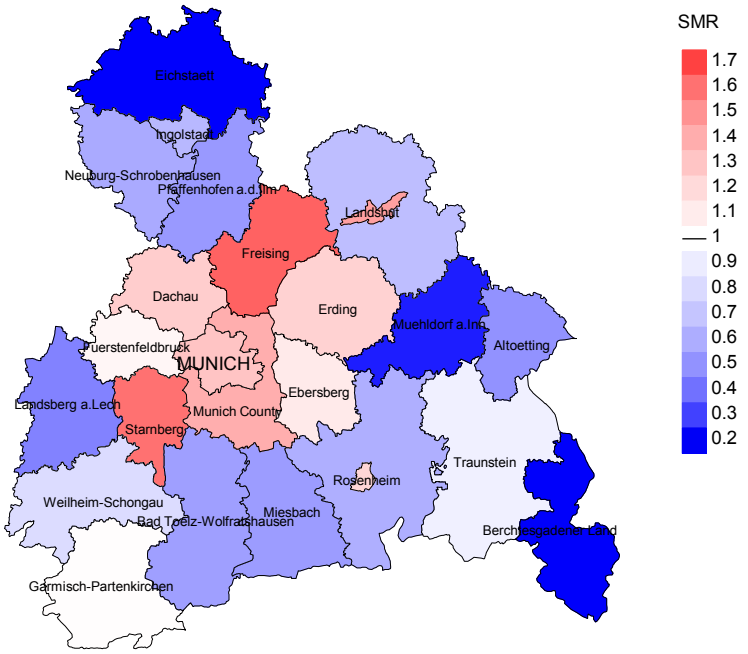


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 2.0/100,000 WS N=632, females 1.1/100,000 WS N=505).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 14 women died from myelodysplastic syndrome. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 1.3/100,000 (german 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 mortality ratio (SMR) 2007 - 2019: Males



Standardized mortality ratio (SMR) 2007 - 2019: Females

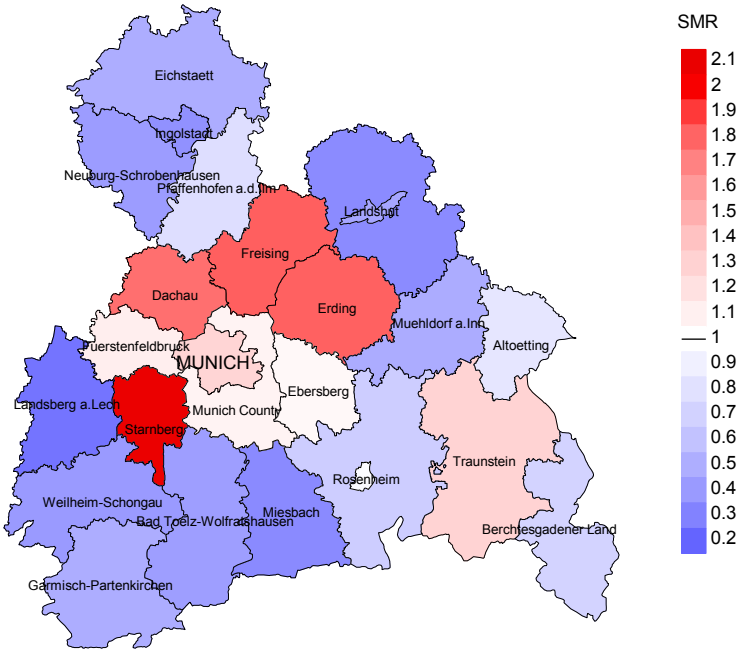


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=632, females N=505).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2019 a total of 14 women died from myelodysplastic syndrome. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.05. Though, the value of this parameter may vary with an underlying probability of 99% between 0.47 and 2.01, 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 ratio of mortality and incidence (mortality-to-incidence ratio, **MIR**, **MI-Index**) is a statistical index 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 MIR. 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 (FRG) 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 of mortality to incidence, MIR
FRG	Federal Republic of Germany

Recommended Citation

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