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Cancer in Germany 2017/2018

GERMAN CENTRE FOR
CANCER REGISTRY DATA

GEKID

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Contents

Preface

For 25 years now, »Cancer in Germany« has been providing reliable answers to important questions about cancer epidemiology, such as the frequency of cancer cases and thus the need for oncological care. Incidence and mortality trends over time allow an assessment of primary and secondary prevention measures, while cancer survival is an indicator of the quality of outcomes of oncological treatments. The publication with its multitude of different analyses and information is the central source of data on cancer in the German population and an important instrument for evaluating the performance of our oncological care system.

The current, 13th edition is influenced by two circumstances. On the one hand, the reporting period coincides with the change from epidemiological to clinical-epidemiological cancer registration in Germany. After the Cancer Screening and Registry Act in 2013, the federal state legislation had to be adapted. The scope of reporting a tumour disease was expanded, now including detailed information about treatment and disease progression, while most cancer registries switched to purely electronic reporting. This not only implied additional burdens for practices and clinics, but also new challenges in the field of information technology for all involved. Initially, it was unclear whether these serious changes would lead to a temporary slump in reporting activity. Fortunately, this has not been confirmed. The completeness of the registration for the diagnosis years 2017/2018 has not only stabilised under the new framework, but has even improved further and reached the internationally required margin of at least 90 percent in most parts of Germany.

On the other hand, the Corona pandemic has influenced cancer incidence and cancer registration. According to a recent publication of the International Association for Cancer Registries, there were problems and restrictions in cancer registration almost everywhere in the world in 2020, partly associated with a decline in the number of reports. Although a large part of the data for the present reporting period had already been recorded at the beginning of the pandemic, the timely processing of reports in the federal state registries and in the children's cancer registry and the merging and processing of data in the German Centre for Cancer Registry Data (ZfKD) at the Robert Koch Institute presented a major challenge. The fact that »Cancer in Germany« could still be published on time is due to the rapid organisational changes in the registries and at the ZfKD. This newly gained effectiveness and flexibility must now be maintained beyond the Corona pandemic.

Even though this issue of »Cancer in Germany« does not yet focus on the years directly influenced by the pandemic, the German cancer registries are already providing initial indications of its impact on oncological care. For example, a temporary decline in reporting in the first lockdown in spring 2020 and a less favourable distribution of tumour stages for some tumour types due to delayed tumour detection could already be demonstrated. Whether these pandemic-related effects will actually have a relevant influence on cancer survival or cancer related mortality is already being investigated in various research projects using data from the cancer registries.

In order to further increase the usability of the increasingly meaningful cancer registry data at the federal level, the corresponding laws were amended in mid-2021. The ZfKD will have a special role in national data pooling. In future, the nationwide data set at the ZfKD will also contain essential clinical data on treatment and the course of the disease. This represents a quantum leap not only for health reporting, but especially for clinical and epidemiological research. High-quality data and large case numbers will allow, for example, analysis and evaluation of new therapeutic procedures or rare tumours. It is foreseeable that the oncological care in Germany can be sustainably improved with the cancer registry data now compiled.

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1 Population-based cancer registration in Germany

1.1 The aims and purposes of population-based cancer registries

Population-based (epidemiological) cancer registries are used to collect, store, process, analyse and interpret data on cancer incidence, prevalence, survival and, in some cases, care in a defined coverage area (such as a federal state). Additionally, data from these registries are indispensable as a basis for conducting detailed studies of the causes of carcinogenesis, for the evaluation of cancer screening programmes and for analysing cancer care in a particular region. Findings from population-based cancer registries include:

Almost 500,000 people are newly diagnosed with cancer in Germany every year.

Population-based cancer registries can provide information on annual cancer incidence – the frequency with which cancer occurs in a given population in a particular year. These statistics are stratified by type of cancer, a person's age and sex, and by other factors. Reliable figures on cancer incidence are essential for assessments of the extent and type of cancer burden that populations are exposed to.

For some years now, a similar incidence of lung cancer in Germany has been identified among women under the age of 45 as among men of the same age.

Reliable studies of time trends in incidence are only possible with data from population-based cancer registries. Consequently, cancer registries play a vital role in health monitoring to identify temporal changes in incidence.

The prevalence of malignant melanoma of the skin differs between regions in Europe and Germany.

Population-based cancer registries can analyse the spatial distribution of cancer and are responsible for monitoring cancers clusters. However, detailed assessments of clusters aimed at developing causal explanations usually require more targeted analytical studies.

In recent years, cancer survival estimates have almost converged in eastern and western Germany.

Population-based cancer registries analyse survival statistics for the cancer patients in their region. Survival rates derived from population-based data are important indicators of the effectiveness of cancer diagnosis, treatment and aftercare. Furthermore, registry data from Germany are also regularly included in large international comparative studies of survival rates.

Between 2015 and 2030, new cancer cases are expected to rise by around 23 % in Germany. This rise will mainly be due to demographics.

Estimates of the future number of new cancer cases play an important role in needs-based health planning, and they can be calculated using data from cancer registries.

Research into the causes of cancer, the evaluation of cancer screening programmes, and healthcare research also rely on data from population-based cancer registries. Studies from these fields focus on answering questions such as:

- What are the causes of childhood leukaemia?
- Do women who receive hormone replacement therapy for menopausal symptoms develop cancer more frequently?
- Are lung cancer rates higher among certain occupational groups?
- Do cancers occur more frequently in the vicinity of oil and gas production facilities?
- Does skin cancer screening lead to a decline in the numbers of advanced tumours in the population?
- Do differences exist in the care provided to oncological patients according to where they live (such as differences between urban and rural areas)?
- How quickly are new or updated healthcare guidelines implemented?

Data from population-based cancer registries enable researchers to study the entire breadth of the cancer cases that have occurred within a particular population. The protection of privacy and patients' rights to informational self-determination, however, mean that robust measures are needed to protect and safeguard personal data. Moreover, legislation is needed at federal-state level to ensure that all epidemiological registries uphold these rights. For certain studies, researchers must acquire the consent of the people affected; this is often the case when additional information must be obtained to supplement the cancer registry data. Such studies that maximise participation generally can provide reliable and robust results. Population-based case-control and cohort studies, for example, use data from population-based cancer registries to investigate the causes of cancer and the risk of developing the disease.

Data from cancer registries can also be used to conduct research into more detailed and specific issues including:

- Detailed analyses of cancer survival rates
- Studies into quality of life among long-term cancer survivors
- The risk of developing subsequent tumours after surviving a primary tumour
- Evaluations of cancer screening measures, such as mammography and colonoscopy screening
- Studies of the relationship between socioeconomic position and cancer incidence/mortality
- Cooperation with cancer centres, including the assessment of their patients' long-term survival rates

In recent years, cancer survival has become a focus of research using data from population-based cancer registries and is now a key parameter in oncological care. Together with the German Cancer Research Center (DKFZ) in Heidelberg, researchers from cancer registries and the German Centre for Cancer Registry Data (ZfKD) have examined cancer survival rates extensively. The results of their research have been published internationally. For the first time, studies have also been conducted into rare tumours in Germany, with findings published on 10-year survival statistics. The researchers have published about 50 papers on this topic and have also compared survival rates in Germany with results from other countries, particularly using data from the SEER registries (Surveillance, Epidemiology, and End Results) in the US. Overall, the studies identified very good results for Germany. Nevertheless, the researchers have also found cases, such as breast cancer in women over 75, where the results for Germany were poorer than those for the US. Such differences can have various causes, and in-depth studies can be used to analyse them in more detail.

The evaluation of the organised cancer screening programmes that have been introduced in Germany poses a particular challenge for population-based cancer registries. Data from the registries can be used to demonstrate whether and to what extent screening is leading to the intended decline in advanced-stage cancers in the population. Linking cancer registry data to data from screening programmes can also help show whether mortality is lower among screening participants. Breast cancer screening, which was introduced nationwide in Germany in 2009, is an initial focus in this area. Data from population-based cancer registries are routinely employed to evaluate breast cancer screening (https://fragen.mammoprogramm.de/en/), and the findings are used for quality assurance purposes and programme evaluation. The registries are also responsible for identifying interval cancers (the development of breast cancer within two years of a negative screening test result). Initial findings from some federal states have already been published and demonstrate that Germany is meeting the targets set out in the European guidelines.

Cancer registry data are being used to evaluate (opportunistic) skin cancer screening. Moreover, the usage of cancer registry data for the evaluation of the reorganised colorectal and cervical cancer screening programmes (with invitation and continuous monitoring of quality and success) according to the Cancer Screening and Registry Act (KFRG) is intended, in order to analyse the impact of both screening programmes (operating since July 2019 and January 2020) at the population level.

Population-based cancer registries also play a role in the long-term monitoring of the efficacy of the human papillomavirus (HPV) vaccination, which is currently recommended for both girls and boys between the ages of 9 and 14 years. This vaccine aims to reduce all HPV-related cancers and, in particular, is predicted to lead to a significant reduction in the number of new cases of cervical cancer and its precursors among girls.

Population-based cancer registries are also involved in the German National Cohort, a long-term, national health study with 200,000 participants. The cancer registries provide information on the incidence of new cancers among participants who have consented to such data linkage. This supports research into the causes of cancer in a substantial way.

Nationwide coverage of population-based cancer registries is crucial to fulfilling the aims and purposes of cancer registration. Since 2009, nationwide data collection has been established by federal-state law. In addition, the enactment of the 2009 Federal Cancer Registry Data Act (BKRG) and the establishment of the German Centre for Cancer Registry Data at the Robert Koch Institute (RKI) have provided greater opportunities to analyse anonymous cancer registry data at the national level.

In order to assemble data about individual cancer cases from various sources, data in the cancer registries are recorded in a manner that enables multiple reports to be linked to the same person.

Reliable studies require a high rate of registry completeness, defined as recoding at least 90% of all cancers occurring in the population. Therefore, the cooperation of all doctors involved in diagnosis, treatment and aftercare is vital to ensure the quality of data from population-based cancer registries. Patients should also be encouraged to actively participate in cancer registration and can request that their doctors report the relevant data on their illnesses to the respective cancer registry. Doing so enables patients to help improve epidemiological cancer analysis, cancer research and, thus, cancer detection, treatment and aftercare.

1.2 Current developments in cancer registration in Germany

Since 2009, all new cancer cases have been systematically recorded following federal-state and national legislation. Since the end of 2011, all federal state cancer registries have delivered their data annually in a uniform format to the German Centre for Cancer Registry Data (ZfKD) at the Robert Koch Institute (RKI). This data forms the basis for the evaluations carried out by the ZfKD, which are presented in this 13th edition of »Cancer in Germany«.

The Cancer Screening and Registry Act (KFRG) in 2013 constituted a further milestone in the development of cancer registration in Germany. With this law, all federal states were obliged to establish an extended clinical cancer registration for quality assurance purposes in addition to the epidemiological cancer registration. Detailed data on therapy and the course of the diseases are now also recorded. In the meantime, this has been established in all federal states, while in most of them the epidemiological and clinical cancer registrations have been combined into one integrated registration. The technical implementation of nationwide clinical cancer registration in clinics and practices has been largely completed, and diagnosis, treatment and also the course of the disease are comprehensively documented. This successful conversion was a great challenge not only for doctors and the documenters in practices and clinics, but also for the registries themselves. By the end of 2020, all registries were able to meet the funding criteria previously agreed with the statutory health insurance funds. This is also reflected in an improved data basis for the present report (see Chapter 2). However, it does not apply to the eastern German federal states at the moment, which is not due to insufficient registration but to a change in data flows: Last year, these federal states decided to transfer all cancer registration tasks (including epidemiological reporting at federal state level and data delivery to the ZfKD) to the federal state cancer registries, which were previously only responsible for clinical cancer registration. For this reason, the Joint Cancer Registry, which was founded in the mid-1990s as the successor institution to the epidemiological cancer registry of the GDR, will be dissolved. Since the legal basis in the affected federal states still has to be adapted for this, the ZfKD currently has only insufficiently complete data from the new federal states and Berlin: a major reason why the nationwide incidence still has to be estimated. It can be assumed that the corresponding data flows will be newly regulated and organised in two years at the latest, i.e. in time for the next edition of »Cancer in Germany«.

With the new amendment to the Act on Cancer Registry Data, which came into force at the end of August 2021, it was stipulated that from the end of 2022 essential data on therapy and disease progression collected within the framework of clinical cancer registration will also be merged nationwide at the ZfKD. Thereby, the data basis for reporting at the federal level will be considerably expanded and, by bringing forward the data delivery by one year, will also be significantly more up-to-date. The law is primarily intended to improve the possibilities for the scientific use of data from German cancer registries. The expanded data set can be applied for at the ZfKD from 2023. In a further step, a concept for a platform solution for the cross-regional use of high-resolution cancer data, which is available in the registries but not at the ZfKD, will be developed by the end of 2024 to allow project-specific merging of data. Also, by the end of 2024, a concept is to be developed for an improved coordination of cancer registration in the paediatric and adult sectors.

By mid-2022, the registries and the ZfKD will determine the final data set for the annual data delivery. The content framework for this is already specified in the law. Particularly for variables in which the cancer registries frequently combine information from several reports (so-called »best of procedures«), specifications must still be made to ensure the greatest possible comparability of the data from different registries.

In order to further standardise cancer registration in Germany and to coordinate state-specific regulations, the »Plattform §65c« was founded in 2015 with experts from all clinical cancer registries. In recent years, this platform has already accompanied the practical implementation of the KFRG across state borders, proposed a joint approach where possible in the case of outstanding issues, defined national standards and created synergies in IT implementation. The Association of Epidemiological Cancer Registries in Germany e. V. (GEKID) and the Association of German Tumour Centres (ADT) actively support the platform. Meanwhile, the ZfKD is also involved here, because the harmonisation of data is an important prerequisite for high quality and usability of the nationwide data set.

Data from the German cancer registries continue to be used at the international level. These data are presented together with those from other European countries on the websites of the ENCR (European Network of Cancer Registries) and the JRC (Joint Research Centre, European Commission) (see www.encr.eu). In ECIS – the European Cancer Information System – the German data can be compared with data from other European registries.

The GEKID, which includes all population-based cancer registries as well as researchers from the field of cancer epidemiology, has worked intensively on the

small-scale presentation of cancer registry data over the past two years. The GEKID's Interactive Cancer Atlas on current cancer incidence and cancer mortality in the federal states has been expanded by another atlas on cancer incidence at the level of districts and urban municipalities. For the first time, cancer data can be viewed and compared in the all-German synopsis with an interactive tool in fine regional resolution. The atlases can be accessed via the GEKID website at www.gekid.de/home and offer interactive comparisons for 26 cancer localisations in cartographic form.

Beyond the mere presentation of cancer registry data, the population-based cancer registries and the GEKID have been involved in the planning and implementation of cancer epidemiological research projects. Information on further research work or current publications can be found on the GEKID homepage and in the appendix of this report.

These examples illustrate that the focus of population-based cancer registration in Germany has shifted from pure data collection to the active scientific use of data. This development is of essential importance, because without in-depth scientific analyses, the knowledge gained from such painstakingly collected data would be limited. Finally, the anonymised data sets compiled from all registers can also be used by external scientists upon application to the ZfKD – an option that will certainly gain in importance with the expansion of the database. In certain cases, the renewed legal framework also allows scientific use of pseudonymised individual data. Numerous contributions of the cancer registries and the ZfKD have also become an important component in health reporting.

By collecting comprehensive clinical data, which now covers not only the occurrence but the entire course of oncological diseases, a completely new era has been introduced in Germany. Data from the cancer registries can now be used for comprehensive quality assurance and increasingly also for health services research. In recent years, these data will also allow, among other things, detailed analyses of cancer care under pandemic conditions, thus complementing the more readily available but inevitably limited data of statuary health insurances or hospitals.

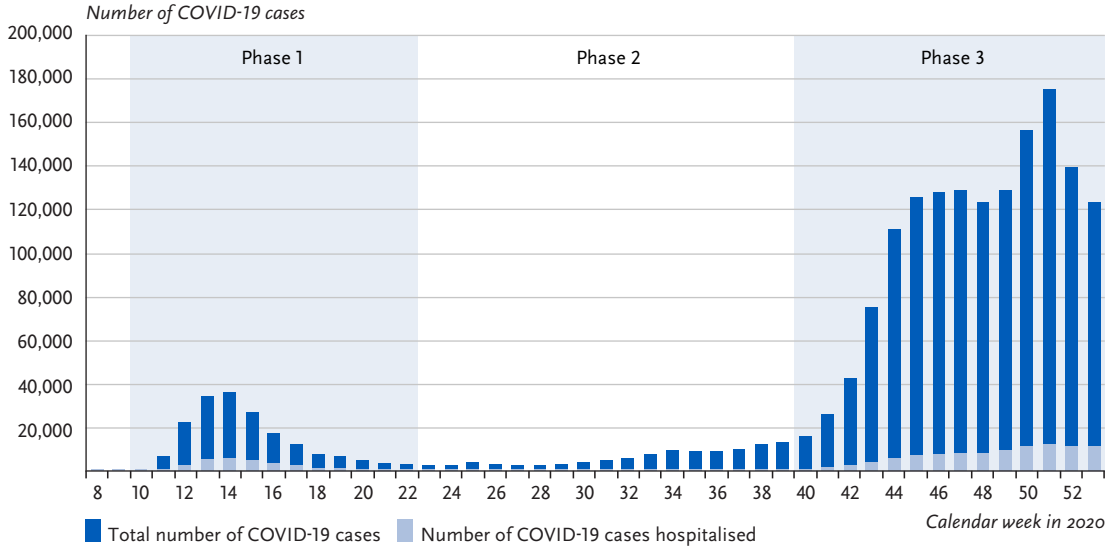
The importance of cancer registration for oncological research and care, and hence the benefit for patients with cancer, will continue to increase. Overall, the current development of cancer registration and the use of data on cancer incidence in Germany can be assessed positively and has considerable prospects for the future. With nationwide clinical cancer registration, Germany has risen to the top countries in this field.

1.3 SARS-CoV-2 infection in Germany in 2020 – Implications for cancer care

In January 2020 the novel corona virus (severe acute respiratory syndrome corona virus type 2, SARS-CoV-2), which first emerged in the Chinese province of Wuhan, caused the earliest documented outbreak of COVID-19 in Germany [1]. On 11 March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic [2]. At the beginning of April, infections peaked in Germany with more than 6,000 new COVID-19 cases recorded daily [3]. As the year progressed, the epidemic curve initially flattened out, rose again from October onwards and peaked by the end of December with more than 30,000 new cases recorded daily and more than 5,000 COVID-19 patients receiving intensive medical care [4, 5]. In the literature, three major stages of the epidemic are identified based on transmission intensity in Germany in 2020: two infection-waves of different intensity from March to May (phase 1, week 10 to week 22) and October to December (phase 3, week 40 to week 53), interrupted by a phase of comparatively low infection rates from June to September (phase 2, week 23 to week 39) (Figure 1) [6–8]. Over the course of the year, more than 1.7 million COVID-19 cases were recorded in the German reporting system [9]. However, results of antibody studies suggest that the actual number of infections is at least twice as high [10, 11]. One reason for the under-reporting of SARS-CoV-2 infections is the high proportion of asymptomatic presentations (15% to 60%, depending on the study) [11, 12].

The rapid spread of SARS-CoV-2 resulted in wide-ranging restrictions on public life and health care in March 2020. Where medically justifiable, scheduled admissions, surgeries and other inpatient procedures were cancelled, and existing capacity was directed towards the expected treatment needs of COVID-19 patients [13]. Demand for available care services such as general medical, dental and screening examinations declined [14–17]. From May onwards, it was possible to gradually resume scheduled procedures in hospitals. Likewise, care in the outpatient sector stabilised [15, 17, 19]. With the renewed increase in COVID-19 case numbers in October, treatment numbers in inpatient and outpatient sectors declined again, but less pronounced than in spring [6, 19]. Various data sources are used below to illustrate how SARS-CoV-2 infection and the associated adjustments within the German health care system have affected oncological care in 2020. The following aspects are taken into consideration: availability and utilisation of cancer screening examinations, the number of new cancer diagnoses and outpatient and inpatient treatment of cancer patients. In addition, risk factors for a severe COVID-19 disease course and their relevance for people with cancer are considered.

Figure 1
Number of COVID-19 cases reported nationwide in 2020 by calendar week (query IfSG reporting data, data status: 09/10/2021) [73]. The epidemic development in the course of 2020 can be roughly divided into three phases: two waves of infection of different intensity from March to May (phase 1, calendar weeks 10 to 22) and October to December (phase 3, calendar weeks 40 to 53), interrupted by a phase of comparatively low infection incidence from June to September (phase 2, calendar weeks 23 to 39). Classification based on [6–8].



Data sources

With the Second and Third »Act for the Protection of the Population in the Event of an Epidemic Situation of National Significance« (of May and November 2020), hospitals were obliged by amendments to the »Act for the Economic Security of Hospitals and for the Regulation of Hospital Nursing Rates (Hospital Financing Act, KHG)« to accelerate data-delivery over the course of the year to the Institute for the Hospital Remuneration System (InEK) in accordance with §21 of the Hospital Remuneration Act (KHEntgG). These case-related data, with the information they contain on procedures, principal and secondary diagnoses, form the basis of various evaluations of service provision in hospitals during the COVID-19 pandemic [20–22] and can be queried via a publicly accessible data browser (Table 1) [23, 24]. In addition, evaluations of billing data according to §301 SGB V provided by the research institute of Germany's biggest statutory health insurance fund (WIdO) were used [6, 25–27]. Information from the Associations of Statutory Health Insurance Physicians (KV) on billing data in certain service categories (including early cancer detection, qualified oncological treatment) is taken from the Tabular Trend Report of the Central Research Institute of Ambulatory Health Care (Zi) [19]. Supplementary data on the annual comparison 2019/2020 were provided by the Zi upon personal request, and information on early breast cancer detection was provided by the Cooperative Association of the German Mammography Screening Programme [28, 29]. Other evaluations used in this chapter are referenced in the text.

Cancer screening

COVID-19 containment measures also affected the availability and use of cancer screening to varying degrees [19, 26, 30, 31]. Evaluations are not yet available on all statutory screening services. The data presented here were available at the editorial deadline (15.10.2021).

As part of the mammography screening programme (MSP) for the early detection of breast cancer, women aged 50 to 69 years receive an invitation for

Table 1
Inpatient case numbers by admission date for selected main oncological diagnoses by phase of SARS-CoV-2 pandemic course in Germany 2020 and relative change to the respective comparison period 2019 (InEK data browser query, [23]). Comparison periods 2019: phase 0, calendar weeks 1 to 9; phase 1, calendar weeks 10 to 22; phase 2, calendar weeks 23 to 39; phase 3, calendar week 40 in 2019 to calendar week 1 in 2020; overall, calendar week 1 in 2019 to calendar week 1 in 2020. Additionally, COVID-19 case numbers are shown from calendar week 8 2020 onwards [73].

		Phase 0 CW 1 to CW 9 (12/30/2019–03/01/2020)	Phase 1 CW 10 to CW 22 (03/02/2020–05/31/2020)	Phase 2 CW 23 to CW 39 (06/01/2020–09/27/2020)	Phase 3 CW 40 to CW 53 (09/28/2020–01/03/2021)	Total 2020 CW 1 to CW 53 (12/30/2019–01/03/2021)
Main diagnosis C18.– Malignant neoplasms of the colon	**absolute**	**15,126**	**17,901**	**26,840**	**17,749**	**77,616**
	relative change compared to the same period of the previous year	–3.9 %	–17.9 %	–7.6 %	–9.9 %	–10.0 %
Main diagnosis C34.– Malignant neoplasms of bronchial tubes and lungs	**absolute**	**37,240**	**47,665**	**65,766**	**46,254**	**196,925**
	relative change compared to the same period of the previous year	–0.6 %	–9.1 %	–5.9 %	–4.9 %	–5.5 %
Main diagnosis C43 – C44 Melanoma and other malignant neoplasms of the skin	**absolute**	**21,710**	**24,253**	**39,161**	**29,747**	**114,871**
	relative change compared to the same period of the previous year	–3.4 %	–21.1 %	–7.9 %	–3.5 %	–9.2 %
Main diagnosis C50.– Malignant neoplasms of the breast [mammary gland]	**absolute**	**26,127**	**32,467**	**44,380**	**33,616**	**136,590**
	relative change compared to the same period of the previous year	–2.5 %	–12.8 %	–5.9 %	–5.3 %	–6.9 %
Main diagnosis C53.– Malignant neoplasms of the cervix uteri	**absolute**	**2,597**	**3,602**	**4,903**	**3,802**	**14,904**
	relative change compared to the same period of the previous year	–1.1 %	–7.8 %	–2.4 %	4.1 %	–2.0 %
Main diagnosis C61 Malignant neoplasms of the prostate	**absolute**	**16,561**	**20,596**	**28,599**	**20,428**	**86,184**
	relative change compared to the same period of the previous year	+2.7 %	–11.2 %	–5.2 %	–8.3 %	–6.1 %
No. of COVID-19 cases **	**total**	**143**	**181,803**	**105,089**	**1,496,676**	**1,783,732**
	thereof hospitalised (share in %)	30 (21.0 %)	28,709 (15.8 %)	6,788 (6.5 %)	101,421 (6.8 %)	136,964 (7.7 %)

** Query COVID-19 reporting data according to Infection Protection Act (data status: 09/10/2021). Reporting data from calendar week 8 onwards are considered (2020). Information on whether hospitalisation has occurred is available in the reporting system for about 78% of COVID-19 cases in the period week 8 to week 53 in 2020. For the remaining proportion of cases, the hospitalisation status is unknown [73].

examination every two years. On 25 March 2020, following a decision by the Federal Joint Committee (G-BA), the invitation system was temporarily suspended until 30 April 2020 and resumed from May 2020 [29].

According to the Zi's calculations, the number of mammography screening examinations nationwide fell by around 83% in the last week of March 2020 compared to the same period in the previous year. In the first week of April, hardly any examinations were performed (–97% compared to the previous year). After a marked recovery effect in June 2020 (+22% compared to the previous year), the number approached the previous year's values in the further course of the year (–2% to + 1%) [19]. Whether the observed increase in June 2020 is a result of catch-up investigations or rather an independent increase compared to the previous year cannot be assessed from the data. Overall, when comparing billed mammograms in 2019 and 2020, there was a decrease of around 9%, equivalent to 263,991 examinations [28].

Adults are entitled to a skin cancer screening examination every two years from the age of 35. The number of these examinations fell by almost 70% in the last week of March 2020 compared to the reference period. They also remained below the previous year's numbers in the second and third quarters [19]. In a year-on-year comparison, approximately 20% fewer skin cancer screening examinations were billed in 2020 than in 2019 [28]. Since 1 July 2019, health insurance services include colorectal cancer screening with an invitation programme [32]. Due to this new regulation, a comparison of the examination figures from 2019 and 2020 is only possible to a limited extent. The nationwide billing data of the statutory health insurance funds show a significant increase in screening colonoscopies for the first quarter of 2020, which may be related to the changes in the colorectal cancer screening programme. Thereafter, a drop in examination numbers can be observed, with a minimum point in the last week of March (42% compared to the same period last year). A brief catch-up effect began in June, and by the end of the year the numbers had fallen below the previous year's values (–10%) [19]. Overall, 11,506 more screening colonoscopies were performed in 2020 than in 2019 (+2%) [28].

No nationwide evaluations of SHI-accredited physicians' billing data are yet available for 2020 on the use of the immunological stool tests as part of colorectal cancer screening programme and on screening examinations for cervical cancer and prostate cancer.

New cancer cases

Evaluations of German and European cancer registries show that with the first increase in COVID-19 case numbers in spring 2020, the number of pathological findings or documented new cancer diagnoses mostly decreased significantly compared to the expected or comparable values of the previous year, then recovered during the summer months [33–39]. Final results for the year 2020 from Belgium show an overall decrease in new cancer diagnoses of 6% compared to the previous year's values [36].

Some evaluations of German and European cancer registries show pronounced differences in incident case numbers depending on localisation, stages, regions, age groups, and sex [33, 35, 36, 38, 39]. Observations from Germany between January and September 2020 range from slight increases in diagnoses to pronounced decreases in diagnoses, depending on the location [33, 35]. The latter are particularly marked in evaluations from Belgium and the Netherlands in the older age groups [36, 38, 39]. According to an evaluation of the Bavarian Cancer Registry, there were statistically significant decreases in diagnoses and surgical interventions in the period between January and September 2020 exclusively in stage I [35].

In contrast, the German Childhood Cancer Registry recorded significant increases in incidence rates in 2020, depending on the diagnosis and age group, compared to the reference period 2015–2019 [40]. At present no conclusive statement can be made on the possible causes; further developments remain to be seen.

Outpatient treatment

In the second half of March 2020, the number of patients cared for by an Oncology Association dropped by around –40% compared to the same period of the previous year [19]. In the following months, the number of patients stabilised. The number of oncological treatment cases fell again in the course of the second wave of infections (October to December), but this decline with up to –6% was less pronounced. Overall, only slightly fewer cancer patients were treated by SHI-accredited physicians in 2020 than in the previous year (relative decrease: 0.7%) [28].

Inpatient treatment

Within hospitals, the number of inpatient treatment cases during the first and second waves of SARS-CoV-2 infection in Germany fell significantly compared to the respective periods of the previous year, by up to 35% and up to 20% respectively [6, 26]. Over the year as a whole, the difference in cases billed at flat rates was about 13% [20, 26].

A wide range of recommendations for adjusting cancer treatments had been published early on in order to avoid visits and admissions as far as possible during surges of infection [41, 42]. Table 1 [23] shows the numerical trend in hospital admissions for selected primary oncological diagnoses (ICD-10 three-digit codes: C18, C34, C43–44, C53, C61) over

the year 2020 as well as their relative change compared to the previous year. Comparable to evaluations by other authors [21, 43, 44], diagnosis-dependent decreases in inpatient admissions of between 8% (C53) and 21% (C43, C44) are shown in the period from March to May (phase 1). Despite subsequent convergence and in some cases briefly exceeding the previous year's values, between 2% (C53) and 10% (C18) fewer people with a cancer diagnosis were treated in hospital over the entire year. A breakdown by age group was not made, but there are indications from other evaluations that especially persons in the age group over 75 years were less frequently treated in hospital due to cancer [43, 44]. There was no uniform trend in the surgical removal of malignant neoplasms: Colorectal resections decreased by –9% compared to 2019, and oesophageal resections were performed slightly more often at +4% [20].

Risk factors for severe COVID-19 progression

A large number of retrospective and prospective studies have investigated, and continue to investigate, which groups of people are particularly affected by a severe course of disease when infected with SARS-CoV-2. The severity of the course of the disease is measured, for example, by hospitalisation or mortality in a defined temporal relationship with a COVID-19 illness. Individual factors which, independently of each other and to varying degrees, favour a severe course of the disease are high age and certain underlying diseases (e.g. obesity, uncontrolled diabetes, coagulation disorders) [45–50]. People in need of care or burdened by several pre-existing illnesses have a particularly high risk of dying as a result of COVID-19 [51–56]. Women are less likely than men to die as a result of COVID-19 [45, 48, 51].

Oncology facilities have studied the frequency of SARS-CoV-2 infections in the patients they care for and found that there was no difference from the general population [57–61]. Within the population of cancer patients, women are also less likely to experience severe COVID-19 than men [50, 56, 62–67]. People with cancer are primarily at risk due to their usually advanced age and comorbidity [62–71]. COVID-19 mortality is particularly high in people with recently diagnosed, progressive or advanced cancer [45, 46, 56, 62, 63, 65–68, 70, 72] and in people with haematological neoplasms [50, 56, 67, 69, 71, 72]. The effect of current cancer treatment on COVID-19-associated mortality risk has not been conclusively determined [50, 62, 64, 65, 67–71].

Conclusion

In the first year of the COVID-19 pandemic, significant changes in Germany's health care system occurred. On the one hand, certain services were restricted in order to meet the required adaptation of the health care system to the treatment needs of COVID-19 patients, and on the other hand, people behaved more cautiously and visited general practitioners and specialists less frequently. Some measures were limited in time, such as the suspension of the mammography screening programme. For some diagnoses, decreases in inpatient case numbers compared to the previous year are still visible until the end of 2020, e.g. in the inpatient treatment of colorectal carcinoma. In the outpatient sector, no significant decline in oncological treatments can be observed over the entire year 2020.

The effects of delayed diagnostic clarifications and therapies, for example on the distribution of stages at diagnosis or on mortality, can only be assessed over time. The data provided by German cancer registries will make an important contribution here, also as they now document the treatment and course of the diseases in detail. Nationwide data for the pandemic years 2020 and 2021 will probably be available at the ZfKD from spring 2023 and can be requested there for scientific use.

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2 Methodological aspects

2.1 Estimating the completeness of case registration by the epidemiological cancer registries

The usefulness of population-based data on cancer largely depends on the extent to which all new cases of cancer are registered. Since 2010, the German Centre for Cancer Registry Data (ZfKD) has estimated the completeness of the data collected by the epidemiological cancer registries in all federal states. The estimate is made with the help of an internationally recognized indicator, the ratio of mortality to incidence. For a particular cancer diagnosis, this ratio (the M/I index) should be fairly constant from region to region, provided that diagnostics and therapy and thus also the survival prospects of cancer patients do not differ significantly between regions. With the help of the M/I index in a reference region that is assumed to be complete, and using mortality figures from the region in which registration completeness is to be estimated (the study region), the expected incidence for the study region is estimated and compared with the number of cases actually collected there. Cases only identified via death certificates (DCO) were not included in these calculations. The completeness of each registry in the reference region is also estimated by comparison with the respective expected values.

The following criteria were established a number of years ago for the selection of registries for the reference region:

- Comprehensive cancer registration for at least ten years
- Average completeness for all cancers combined over the last ten years above 90 % and over 80 % for each individual year
- Average proportion of DCO cases (cases registered only via death certificate) for all cancers combined below 15 % over the last ten years or from the sixth year after the start of registration

The composition of the reference region has been slightly modified several times in recent years based on the data situation; currently it consists of the cancer registries of Bavaria, Bremen, Hamburg, Lower Saxony, North Rhine-Westphalia, Saarland and Schleswig-Holstein.

According to the principle described above, sex-specific expected values are calculated for six age groups and 16 (for women) or 15 (for men) diagnosis groups.

If age-specific mortality in the study region averaged fewer than five deaths per year, the modelled incidence rate in the corresponding age group in the reference region was used to calculate the expected number of new cases instead of the quotient of incidence and mortality. The estimated completeness for each diagnosis group results from the quotient of the observed and expected case numbers summed up over age group and sex. The completeness for all cancers combined is in turn estimated by summing the observed and expected values for all diagnosis groups and calculating their quotient.

Limitations of the described procedure arise foremost when the cancer-specific mortality is low overall or in relation to the corresponding incidence (testicular cancer, malignant melanoma, thyroid cancer), or when the ratio of mortality to incidence in fact differs between regions. This can be the case, for example, if utilization of cancer screening differs among the federal states or, as in the case of mammography screening, an early detection program is introduced at different times. A regionally varying distribution of tumour stages at diagnosis or different subtypes of a cancer diagnosis (for example in the case of thyroid cancer) can also lead to incorrect estimates.

According to the current completeness estimate for diagnosis year 2018, eight cancer registries in western Germany achieved over 95 % completeness. Completeness in two other registries is between 90 % and 95 %. It was not yet possible to provide sufficient data from the Joint Cancer Registry for the new federal states and Berlin (GKR) for the years 2016 to 2018 (see Chapter 1.2). Therefore, on the basis of the data available to the ZfKD, no reliable statements can currently be made about the completeness of registration in these federal states. However, it can be assumed that in the course of the nationwide conversion to comprehensive clinical-epidemiological cancer registration, a sufficient completeness of cancer registration has already been or will soon be achieved in these federal states as well.

2.2 Estimating cancer incidence in Germany

The nationwide cancer incidence presented here comprise results partly from the counted cases and partly from the results of a mixed Poisson regression model. To estimate nationwide incidence, registries and diagnosis years were identified in which the following quality criteria regarding ›all cancers‹ were fulfilled: State-wide coverage for at least 10 years, and an estimated completeness of at least 90 % over

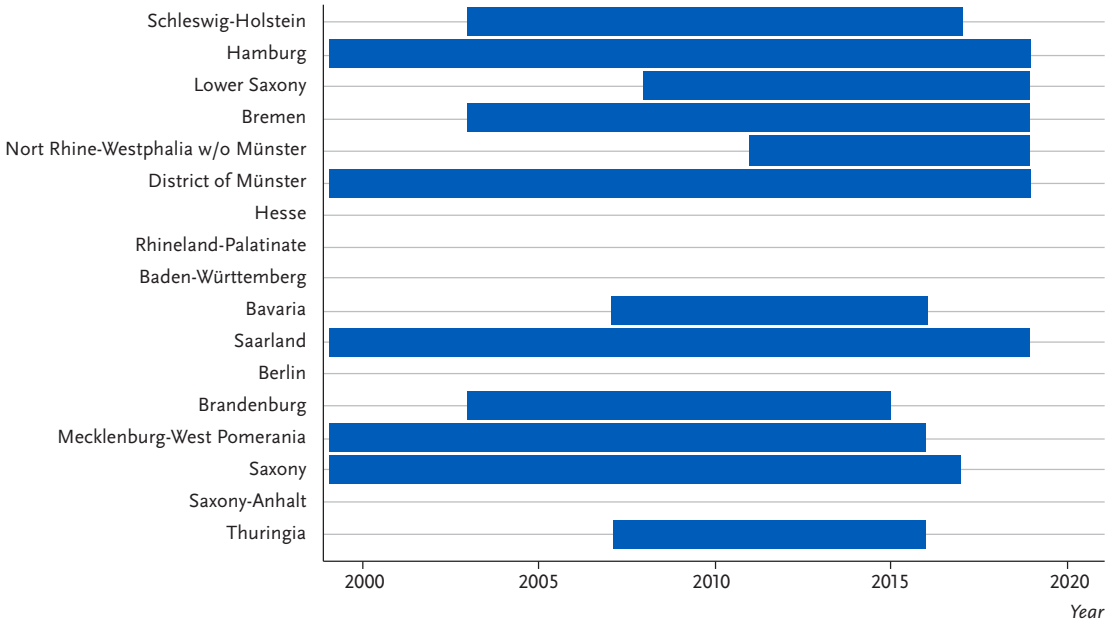
the last five years. In addition, the annual DCO proportion in these five years must not exceed 15 %. In years in which registries fulfilled these quality criteria, incident cases registered there were used as reference data for the regression and were directly counted for the nationwide incidence estimate. In years in which registries did not meet the quality criteria, incident cases were estimated using the regression model.

In the regression, incidence was modelled by cancer-specific mortality, population size and year of diagnosis. In addition, differences between incidence rates in the registries were accounted for by registry-specific parameters (axis intercepts as random effects) in the model. The regression was fitted to the reference data, stratified by sex, diagnosis and age group. Four registries did not yet meet the above quality criteria for any year: Baden-Württemberg, Berlin, Hesse and Saxony-Anhalt. For these registries, the incidences were first estimated for the years 2011 to 2013 using the ratio of incidence to mortality in the reference data and the mortality in the respective federal state. As with the reference data, these estimated incidences were used to fit the regression parameters so that specific characteristics of the registries could be considered.

The nationwide annual incidence is thus the sum of the counted cases from registries that fulfilled the quality criteria in the respective diagnosis year and the estimated incidence in the other registries. The proportion of counted cases in the nationwide incidence will increase as more registries meet the criteria for completeness, allowing a smooth transition from »estimating« to »counting« with an improvement in data quality.

The incidence of non-melanoma skin cancers (ICD-10 C44) was estimated with the same approach. However, due to the low mortality, there are no estimates for the completeness of coverage for these diagnoses. The reference region consisted of six registries (Schleswig-Holstein, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saarland and Mecklenburg-Western Pomerania) whose data were considered to be complete, at least for one period of time. Due to the data situation, nationwide incidence estimates were limited to the period 2006 to 2018. Estimated non-melanoma skin cancer incidence is associated with overall more uncertainty than the results for other cancers. Incidence of all cancers combined (Chapter 3.1), does not include non-melanoma skin cancer, as is customary internationally.

Figure 2.2.1
Time intervals for which cancer registries provided reference data on incidence for all cancer sites except non-melanoma skin cancer (C44)



2.3 Indicators and data presentation

The measures and graphical representations used in the results chapters are explained below.

Age-specific rates

The age-specific rate is calculated by dividing the number of cancer cases or deaths from cancer in a certain age group by the corresponding number of women or men of that age in the population. The graphical representation of these rates, stratified by sex, shows the correlation between age and incidence or mortality. The age-specific incidence rates are given as annual incident cases per 100,000 residents of the respective age group.

Age-standardised rates

As the presentation of age-specific incidence rates for women and men in this report shows, cancer incidence rates generally increase considerably with increasing age. Therefore, if one wants to compare incidence or mortality in different countries and regions or in the same population at different points in time, differences in the age structure of the populations to be compared must first be compensated for with the help of age standardisation. For this purpose, the observed age-specific rates are first weighted according to the proportion of a selected (fictitious) ›standard population‹ in the respective age groups. Then the weighted rates are summed up across all age groups. The age-standardised rate calculated in this way indicates how many incident cases or deaths per 100,000 persons would be observed in a population if it had the same age structure as the selected standard population. In this report, the ›old European standard population‹ was used.

Incidence and mortality risks

Age-specific incidence and mortality rates can also be interpreted as a measure of the age- and sex-specific risk of developing or dying from a specific cancer within one year. In order to make this form of risk communication more descriptive, the 10-year and lifetime risks of developing or dying from a certain cancer were calculated as a function of age and sex. In addition to the usual representation in percent, the results are also given as one per N persons of the same age and sex. So-called »competing risks« were included, i.e. it was taken into account that, for example, a 75-year-old man may, with a certain probability, die due to a cause other than cancer within the next ten years. Similarly, the lifetime risk was calculated, i.e. the risk of developing cancer within a person's remaining expected lifetime. Only current incidence and mortality rates as well as overall life expectancy are included in the calculations; possible future developments of these values were not considered. Furthermore, these results are to be seen as average values for the population in Germany; individual risks can differ considerably due to the presence or absence of relevant risk factors. The programme ›DevCan‹[1], developed by the National Cancer Institute in the USA, was used to calculate these risks.

International comparison

In order to assess the estimated cancer incidence and cancer mortality in Germany in an international context, current age-standardised incidence and mortality rates from Germany's neighbouring countries as well as from England, Finland, Sweden and the USA were used. References for data sources can be found in the appendix (Chapter 5.5), where any deviating time periods are also noted. International data were included without checking plausibility or completeness; an underestimation of some rates seems possible, especially regarding incidence. Some countries group ICD-10 codes somewhat differently from groups used in Germany, which may limit comparability (see corresponding footnotes).

Median age at diagnosis and death

Median ages at cancer diagnosis and at death were calculated using an approximation formula from the incidence estimates and from the official cause of death statistics of the Federal Statistical Office, which are only available for 5-year age groups.

Mortality

Cancer mortality is based on the annual number of deaths due to cancer according to the official cause of death statistics. For this purpose, each death is assigned an underlying cause of death, and nationwide age- and sex-specific statistics are published. The mortality rates are calculated by dividing the annual number of deaths by the size of the population and are presented per 100,000 persons. In this report, the absolute number of deaths as well as crude and age-standardised mortality rates (old European standard) are reported from 1999 to 2019. The data source is the official cause of death statistics of the Federal Statistical Office (www.gbe-bund.de).

Projected cancer incidence in 2022

In order to estimate the number of cancer cases for the year 2022, current trends in age- and sex-specific incidence rates were analysed for each diagnosis presented in this report. For this purpose, the joinpoint method was used, in which regression models are used to identify points in time at which a statistically significant change in temporal trends (›joinpoints‹) occurs. For the projections, the average annual change since the last trend change was extrapolated to 2022. The age- and sex-specific rates for 2022 determined in this way were multiplied by

the corresponding figures from the 14th coordinated population forecast of the Federal Statistical Office (Variant 2) in order to calculate the projected numbers of incident cases.

Regional comparison

The estimated age-standardised incidence rates (old European standard) in the federal states for the period 2017 to 2018 are shown in comparison with the corresponding estimates for Germany; for the reference regions the rates reflect the reported incidence (see Chapter 2.2). For the same period, age-standardised mortality rates by diagnosis and sex are presented for all federal states in comparison to nationwide mortality.

Crude rates

For a given cancer diagnosis and population, the crude rate of incidence or mortality is calculated by dividing the total number of cancer cases (incidence) or the total number of deaths due to cancer (mortality) in a given time period by the total number of all women or men in the respective population (here: resident population of Germany). The result is given as the number of cases or deaths per 100,000 residents per year. In contrast to the age-standardised rate, the crude rate is strongly dependent on the age structure of a population.

Survival rates

The results of the survival analyses in this report describe average survival prospects after a cancer diagnosis for people over 15 years old at the time of diagnosis. Absolute and relative survival rates from 1 to 10 years after diagnosis were calculated. Absolute survival rates represent the proportion of patients who are still alive a certain length of time after their diagnosis. For example, an absolute 5-year survival of 80 % means that 80 out of 100 people with a certain type of cancer survived the first five years after their diagnosis.

Relative survival rates, on the other hand, depict cancer-related mortality by calculating the quotient of the absolute survival of cancer patients and the expected survival of persons the same age and sex in the general population. A relative 5-year survival of 100 % thus means that within five years of diagnosis, just as many persons with cancer have died as would have been expected without this diagnosis. The relative survival is always higher than the corresponding absolute survival. The expected survival was calculated with the so-called Ederer II method using the German period mortality tables of the Federal Statistical Office.

On the basis of previously defined data quality criteria, data from Schleswig-Holstein, Hamburg, Lower Saxony, Saarland as well as from the administrative district of Münster (North Rhine-Westphalia) were included in the current survival time calculations.

Relative 5-year survival rates by tumour stage (and sex) are also presented. For these analyses, only those cases were included whose tumour stage had been coded according to the seventh edition of the TNM classification. For some diagnoses (e.g. leukaemias and lymphomas), other characteristics were chosen for stratification.

In order to estimate as up-to-date survival prospects as possible, the so-called period method was used. This method considers the survival of persons who lived during a certain period of time (here: 2017 to 2018).

The presented ranges of 5- and 10-year survival show the respective lowest and highest survival in the individual regions included. For these results, only regions with a standard error of estimated survival of less than 7.0 were considered. If this criterion was met by fewer than four regions, the range was not shown. This range is most likely only to a very small extent indicative of potential differences in the quality of care: Differences in data quality or in the proportion of DCO cases may play a role, as may fluctuations due to chance, especially in the smaller federal states. Methodological differences between the registries, especially the trace-back of DCO cases (›follow-back‹), which is not carried out everywhere, can also influence the results. Substantially fewer persons with cancer are alive 10 years after diagnosis than 5 years after diagnosis. For this reason, registry-specific 10-year survival has a greater statistical uncertainty than 5-year survival. Therefore, the values in the ranges of relative 10-year survival may be slightly higher than the corresponding values for 5-year survival.

Overall, it can be assumed that survival rates for Germany are slightly overestimated, at least for cancers with an unfavourable prognosis, although this probably also applies to most internationally published results.

Distribution of tumour stages

The spread of solid malignant tumours at diagnosis in 2017 to 2018 by sex was evaluated using the TNM classification. Since the 8th edition of the TNM classification was published in 2017 and contains far-reaching changes for some diagnoses, stage distribution was shown separately for the 7th and 8th editions. The proportion of cases with missing stage and the proportion of DCO cases cannot be reliably assigned to a specific edition, so these proportions were calculated using all cases diagnosed in 2017 and 2018; only cases with valid stages were included in the figures. In addition to the size or spread of the primary tumour (T), the UICC stages (I to IV) shown also consider the lymph node status (N) and any distant metastasis (M). UICC stages were assigned using

the SEER TNM Registrar Staging Assistant Version 1.9 (https://staging.seer.cancer.gov/tnm/home/1.9/). Here, missing information on M is evaluated as M0 (no metastases), while missing information on N leads to a missing UICC stage in most cases. The proportion of cases with missing stage also includes those cases for which no TNM or UICC stage is intended due to the histology; this pertains to sarcomas, among other cancers. For the distribution of tumour stage, the data from all registries except the Joint Cancer Registry of the new federal states and Berlin were included.

Prevalence (up to 25 years after diagnosis)

Prevalence refers to the number of people who are alive at a given point in time (here 31 December 2018) and have previously been diagnosed with cancer. For example, the 5-year prevalence only considers people who have been diagnosed with cancer within the last 5 years. The prevalence was estimated according to Pisani's method[2] using the incidence estimate for Germany (see Chapter 2.2) and survival rates derived according to the Kaplan-Meier method. To estimate the 25-year prevalence, the incidence estimate had to be extended to the year 1993. Survival rate estimates excluded data of persons who had most likely died, but whose death or date of death was not known to the cancer registry (e.g. after moving to another federal state). Furthermore, survival rates were corrected for the proportion of incident cases for which information was only available from death certificates (Death Certificate Only or DCO cases)[3]. Due to the corrections, all registries except Berlin and Saxony-Anhalt could be included in survival estimates.

Further analyses

Additional analyses, for example a breakdown of incidence by histology or more precise tumour location, can be found for some cancers in this report or on the website of the Centre for Cancer Registry Data (www.krebsdaten.de/english). In this edition, these analyses are based on data from all population-based cancer registries except the Joint Cancer Registry of the new federal states and Berlin (GKR).

References

1 DevCan: Probability of Developing or Dying of Cancer Software, Version 6.7.9. Surveillance Research Program, Statistical Methodology and Applications, National Cancer Institute, 2012. http://surveillance.cancer.gov/devcan/

2 Pisani, P., Bray, F., & Parkin, D. M. (2002). Estimates of the world-wide prevalence of cancer for 25 sites in the adult population. Int J Cancer, 97(1), 72–81. doi:10.1002/ijc.1571

3 Dahm S., Bertz J., Barnes B. & Kraywinkel K. (2018) A mixed linear model controlling for case underascertainment across multiple cancer registries estimated time trends in survival. Journal of Clinical Epidemiology, 97C, 2018, pp. 123–133

3 Results

3.0 Overview of incident cancer cases and cancer deaths

Figure 3.0.1
Most frequent tumour sites as percent of all new cancer cases in Germany 2018
not including non-melanoma skin cancer (C44)

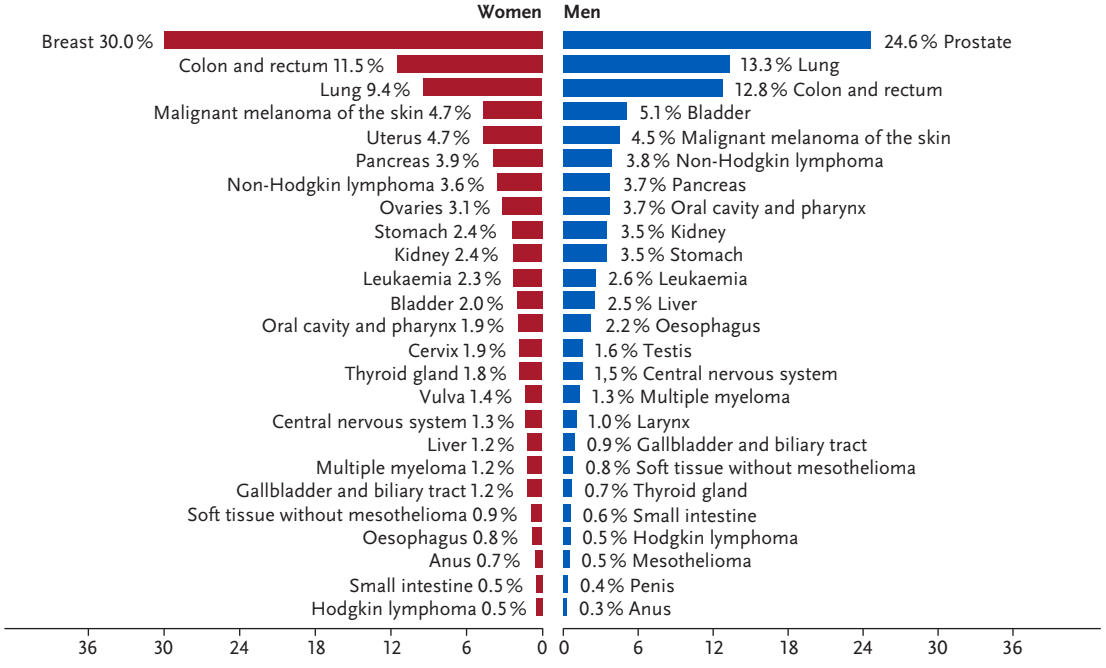


Figure 3.0.2
Most frequent tumour sites when cancer was cause of death in Germany 2018

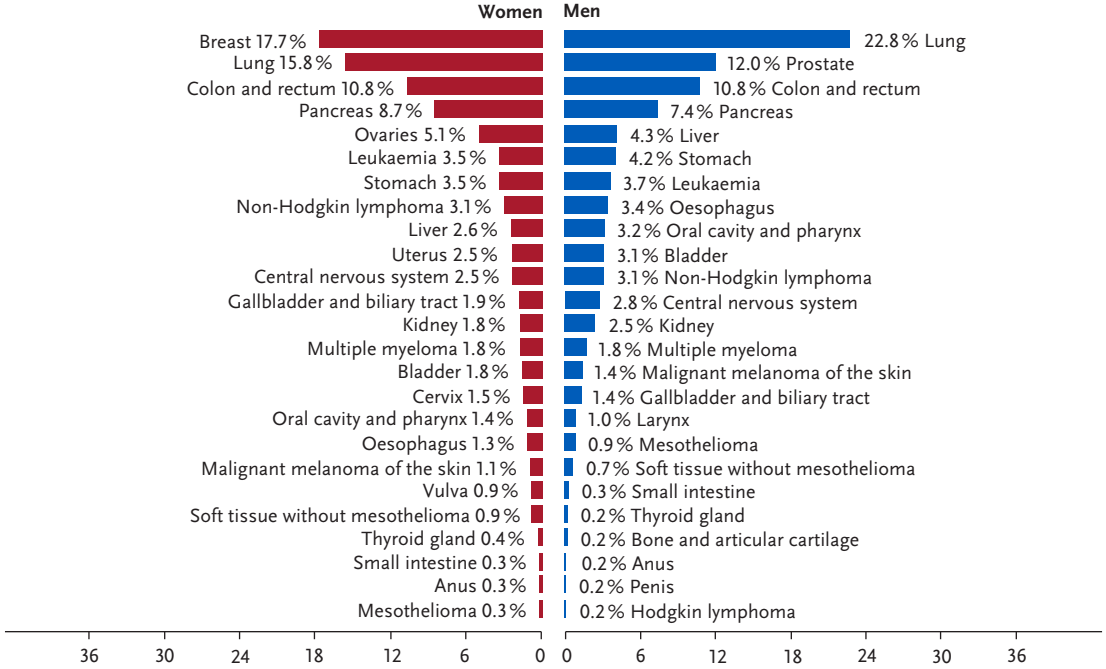


Table 3.0.1
Estimated numbers of incident cancer cases and numbers of deaths from cancer in Germany 2018
Source for numbers of deaths from cancer: Official cause of death statistics, Federal Statistical Office, Wiesbaden

		No. of incident cases		Incidence rate[1]		No. of deaths		Mortality rate[1]	
Cancer site	**ICD-10**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**
Oral cavity and pharynx	C00 – C14	4,490	9,820	6.8	17.2	1,442	3,970	1.9	6.6
Oesophagus	C15	1,840	5,710	2.4	9.3	1,358	4,278	1.6	6.8
Stomach	C16	5,560	9,200	6.8	14.3	3,674	5,187	4.1	7.7
Small intestine	C17	1,160	1,520	1.7	2.5	346	407	0.4	0.6
Colon and rectum	C18 – C20	26,710	33,920	32.7	52.1	11,008	13,240	11.3	18.9
Anus	C21	1,530	800	2.4	1.4	336	221	0.4	0.4
Liver	C22	2,820	6,690	3.5	10.3	2,689	5,301	3.0	7.7
Gallbladder and biliary tract	C23, C24	2,700	2,380	3.0	3.5	2,017	1,706	2.1	2.4
Pancreas	C25	9,160	9,860	10.8	15.1	9,143	9,189	9.9	13.5
Nasal cavity, nasal sinuses and middle ear	C30, C31	460	660	0.7	1.1	72	134	0.1	0.2
Larynx	C32	540	2,770	0.8	4.6	203	1,201	0.3	1.8
Lung	C33, C34	21,930	35,290	31.5	55.3	16,514	28,365	22.0	42.8
Bone and articular cartilage	C40, C41	360	500	0.7	1.1	184	268	0.3	0.5
Malignant melanoma of the skin	C43	10,880	12,010	18.9	20.2	1,176	1,766	1.4	2.6
Non-melanoma skin cancer	C44	94,200	105,230	122.4	152.2	430	536	0.3	0.7
Mesothelioma	C45	340	1,290	0.4	1.8	269	1,092	0.3	1.4
Soft tissue without mesothelioma	C46 – C49	2,160	2,140	3.4	3.8	943	913	1.3	1.5
Breast	C50	69,900	720	112.6	1.1	18,591	195	22.8	0.3
Vulva	C51	3,270		4.4		957		1.0	
Vagina	C52	470		0.6		186		0.2	
Cervix	C53	4,320		8.6		1,612		2.6	
Uterus	C54, C55	10,860		15.9		2,631		3.0	
Ovaries	C56	7,300		10.7		5,326		6.6	
Penis	C60		1,010		1.5		217		0.3
Prostate	C61		65,200		99.1		14,963		19.2
Testis	C62		4,160		10.4		178		0.4
Kidney	C64	5,480	9,350	7.6	15.4	1,931	3,108	1.9	4.5
Renal pelvis and ureter	C65, C66	790	1,310	0.9	1.9	113	170	0.1	0.2
Bladder	C67	4,770	13,500	5.5	19.7	1,840	3,862	1.7	5.1
Eye	C69	230	290	0.4	0.6	134	131	0.2	0.2
Central nervous system	C70 – C72	3,130	4,100	5.4	7.8	2,615	3,441	3.9	5.9
Thyroid gland	C73	4,270	1,930	9.1	3.9	390	300	0.4	0.4
Without specification of site	C80	5,020	4,700	5.5	7.0	5,424	5,462	5.7	7.9
Hodgkin lymphoma	C81	1,100	1,440	2.5	3.2	124	197	0.1	0.3
Non-Hodgkin lymphoma	C82 – C88	8,280	10,190	11.4	16.6	3,220	3,835	3.2	5.2
Multiple myeloma	C90	2,810	3,540	3.5	5.4	1,881	2,299	1.9	3.2
Leukaemia	C91 – C95	5,310	6,870	7.6	11.5	3,682	4,588	3.9	6.5
Other cancer sites		2,750	2,310	3.8	3.8	2,760	4,090	2.9	5.7
All cancers	C00 – C97	326,920	370,390	465.2	574.5	105,221	124,810	122.6	181.4
All cancers[2]	**C00–C97 w/oC44**	**232,720**	**265,170**	**342.9**	**422.3**	**104,791**	**124,274**	**122.3**	**180.7**

[1] per 100,000 persons, age-standardised (old European Standard)
[2] not including non-melanoma skin cancer (C44)

3.1 All cancers

Table 3.1.1
Overview of key epidemiological parameters for Germany, ICD-10 C00–C97 without C44

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	236,000	265,200	232,700	265,200	235,900	274,300
Crude incidence rate [1]	563.5	650.5	554.1	648.2	557.8	664.9
Age-standardised incidence rate [1, 2]	348.9	427.2	342.9	422.3	340.3	417.0
Median age at diagnosis	69	70	69	70		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	104,077	122,603	104,791	124,274	105,682	124,560
Crude mortality rate [1]	248.5	300.7	249.5	303.8	251.1	303.8
Age-standardised mortality rate [1, 2]	123.0	181.4	122.3	180.7	121.3	177.1
Median age at death	76	75	77	75	77	75
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	779,300	796,700	1,356,900	1,344,700	2,311,600	2,129,300
Absolute survival rate (2017–2018) [3]	59	51	48	39		
Relative survival rate (2017–2018) [3]	66	61	61	57		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent

Epidemiology

The term »all cancers« is used here to refer to all malignant neoplasms, including lymphomas and leukaemias. The definition of a malignant (invasive, i.e. invading surrounding tissue or spreading through the blood and lymphatic system) disease in this report is based solely on the current »International Statistical Classification of Diseases and Related Health Problems« (ICD-10, Chapter II). This classification into benign and malignant neoplasms is based on the biological behaviour of the neoplasm. It does not always reflect the clinical course of the diseases: some tumour diseases such as the non-invasive papillary carcinomas of the bladder and certain neoplasms of the haematopoietic organs (e.g. the myelodysplastic syndromes) are sometimes associated with greater risks and burdens for those affected than, for example, certain thyroid tumours which, although histologically malignant, have a very favourable prognosis. In the central nervous system, on the other hand, the threat of neoplasms depends less on their biological behaviour but on their localisation. The classification into benign, malignant and uncertain neoplasms also shows historical changes, for example in bladder tumours. For the sum of all malignant neoplasms (›all cancers‹), non-melanotic skin cancers were not taken into account to facilitate international comparisons and because, they contribute only very slightly to cancer mortality, despite their frequency (see Chapter 3.14).

Malignant neoplasms can originate from different cell types in the most diverse organs of the body. The starting point of most cancers are the internal and external body surfaces (epithelia). About 70% of tumours are adenocarcinomas originating from the glandular tissue alone. Another 15% or so are squamous cell carcinomas, malignant tumours of the transitional epithelium (urothelial carcinomas) and small cell carcinomas, which occur in the lungs, for example. Leukaemias and lymphomas originate from the blood-forming bone marrow and lymphatic tissues. In addition, malignant tumours can also originate in the connective and supporting tissue (including sarcomas), in the supporting cells of the nervous system (gliomas) or in the pigment-forming cells (melanomas).

According to estimates by the ZfKD, in 2018 a total of around 498,000 cancers were newly diagnosed in Germany. Of these, approximately 265,200 occurred in men and 232,700 in women. About half of the cases involved breast (70,600), prostate (65,200), colon (60,600) or lung (57,200) (Table 3.0.1). Between 2008 and 2018, the absolute number of new cancer cases has hardly changed for both sexes. Since for almost all types of cancer the risk of developing

▶ *Additional information: www.krebsdaten.de/all_cancers*

the disease increases with age, theoretically an increase of around 1% per year could have been expected in recent years due to the rising number of older people in the population. If one adjusts for these demographic changes by means of age standardisation, a decrease in the incidence rates of 13% is shown for men and 9% for women within the last 10 years. These differences are mainly due to the contrary trends between the two sexes in lung cancer and other cancers promoted by cigarette smoking (see Chapter 3.12). The favourable incidence trends for stomach and colorectal cancer with decreases of more than 20% in the last 10 years have a high share in the declining age-standardised incidence rates for total cancer.

About 1.6 million people in Germany are living with a cancer that was diagnosed in the last 5 years. It is estimated that more than 4.4 million people have been diagnosed with cancer in the last 25 years, and the number of people who have ever been diagnosed with cancer is probably another 10% higher. The age-standardised mortality rates from cancer in Germany decreased by 12% for men and 5% for women between 2009 and 2019. Compared to the European Union as a whole, cancer mortality in Germany in 2016 was 2% higher for women and 6% lower for men (more recent figures for the EU are not yet available).

The relative 5-year survival rates are a measure of the survival chances of cancer patients compared to the general population of the same age and sex. They are highly dependent on the type of tumour and range from results below 20% for malignant tumours of the lung, liver and pancreas to values above 90% for malignant melanoma of the skin, testicular cancer and thyroid cancer (Figure 3.1.0).

Risk factors and early detection

For many cancers, the aetiology is unknown or the known triggers cannot be influenced. Prevention strategies are therefore only available for certain tumour types. However, some of these highly or partially preventable cancers affect many people. The World Health Organization (WHO) assumes that 30 to 50% of all cancer cases worldwide could be avoided through prevention. According to estimates by the German Cancer Research Center (DKFZ), at least 37% of all new cancer cases in Germany can be explained by preventable or at least influenceable risk factors.

Among these, tobacco consumption has the greatest significance. About 19% of all cancer cases in Germany per year are attributable to smoking (attributable fraction). The role of obesity and lack of exercise has also been known for some time from observational, epidemiological studies. Possible biological mechanisms behind this association are becoming clearer through recent research on metabolic syndrome. This chronic »metabolic imbalance« is associated with high blood pressure, high blood lipid and blood sugar levels. Inflammatory processes in the fatty tissue are probably involved in the development of cancer.

Among the diet-related individual factors, alcohol consumption plays an important role. Low consumption of fruit, vegetables or dietary fibre with an often simultaneously high intake of red and processed meat could be identified as a risk factor for several common tumour types. In observational studies, however, the influence of individual foods and their ingredients cannot always be separated from that of energy balance and other possible factors.

Another cancer risk factor accessible by preventive measures is the ultraviolet component of sunlight (UV radiation).

Many people in Germany overestimate the influence of pollutants and contaminants in food, as well as that of environmental influences or stress at the workplace. In individual cases, however, these factors may also play a significant role in the development of cancer in this country. Examples are the regionally naturally occurring noble gas radon, which is held responsible for about 6% of lung cancer cases in Germany, or former occupational asbestos exposure, which still leads to mesothelioma of the thoracic or peritoneal pleura due to the long latency period. Medical procedures can also increase the risk of cancer in individual cases: for example, diagnostic and therapeutic procedures associated with radiation exposure, cytostatics for chemotherapy, or hormone therapy for women in the menopause, which has been identified as a risk factor for breast cancer.

Chronic infections are now known to be risk factors for some common cancers; about 4% of new cancer cases in Germany can be attributed to them. Vaccinations or causal therapies can contribute to reducing the risk of cancer. This has been proven, for example, for vaccination against hepatitis B viruses as a protective factor against liver cancer. A similar effect can be expected as a result of HPV vaccination: In addition to reducing the incidence of cervical cancer, it should also reduce the incidence of tumours of the oropharynx, penis and anus, as well as the vulva and vagina. The prerequisite is that enough young people get vaccinated. Studies have already shown a significantly reduced rate of pre-cancerous lesions of the cervix for those who have been vaccinated, as well as a decrease in cervical carcinomas in women up to 30 years of age.

In addition to preventable risk factors, genetic causes can also increase the risk of developing cancer. Certain hereditary genetic alterations have been clearly identified as the cause of certain types of tumours, such as breast and ovarian cancer or

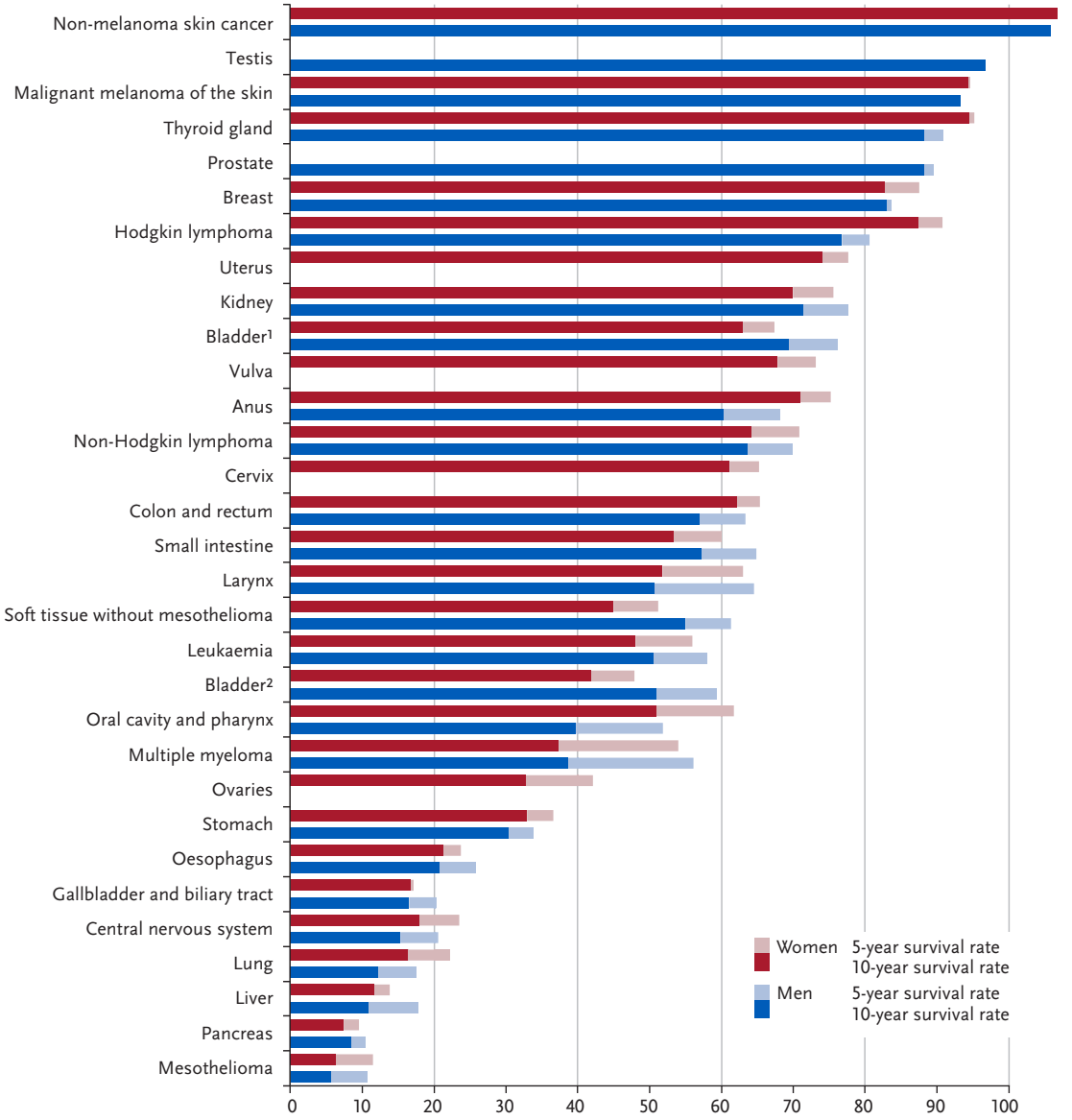
colorectal cancer. In the course of tumour genome sequencing, more and more hereditary mutations are being found that can significantly increase the risk of developing certain tumours.

The most important, non-preventable risk factor for cancer is age, since the probability of developing cancer-causing genetic changes in human cells increases with age.

The relevant risk factors for certain cancers are described in more detail in the individual chapters.

The statutory cancer screening programme in Germany aims at the early diagnosis of malignant tumours of the skin and colorectum as well as breast cancer and cancers of the reproductive organs (especially cervical cancer) in women and prostate cancer in men. These measures are described in the corresponding chapters.

Figure 3.1.0
Relative 5-/10-year survival rates, by tumour site and sex, Germany 2017–2018 (period analysis)



[1] including in situ tumours and neoplasms of uncertain or unknown behavior (D09.9, D41.4)
[2] malignant forms only (C67)

Figure 3.1.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C00–C97 without C44, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

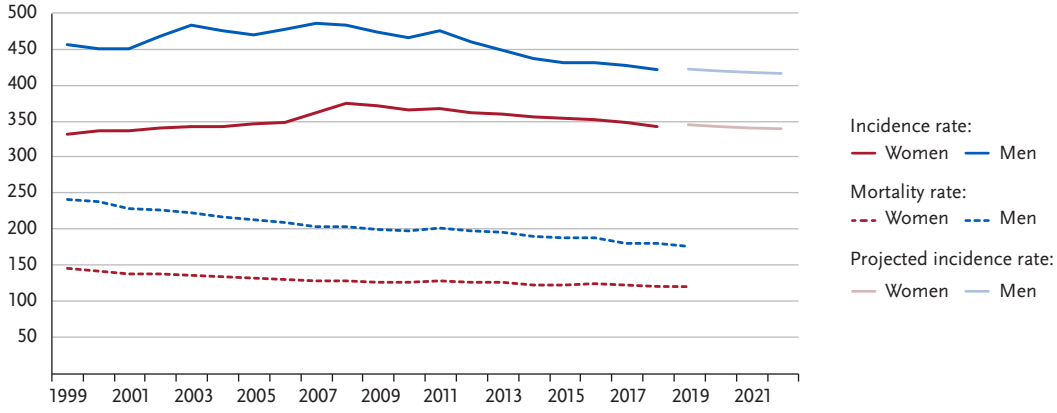


Figure 3.1.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C00–C97 without C44, Germany 1999–2018/2019, projection (incidence) through 2022

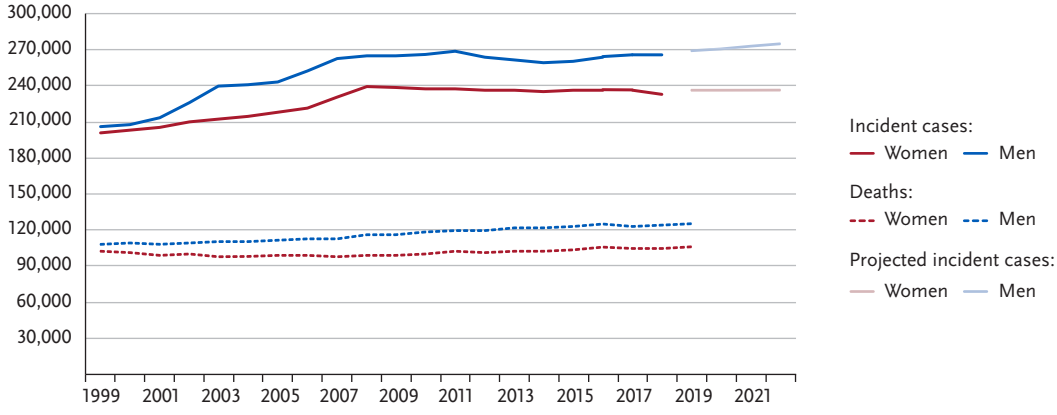


Figure 3.1.2
Age-specific incidence rates by sex, ICD-10 C00–C97 without C44, Germany 2017–2018
per 100,000

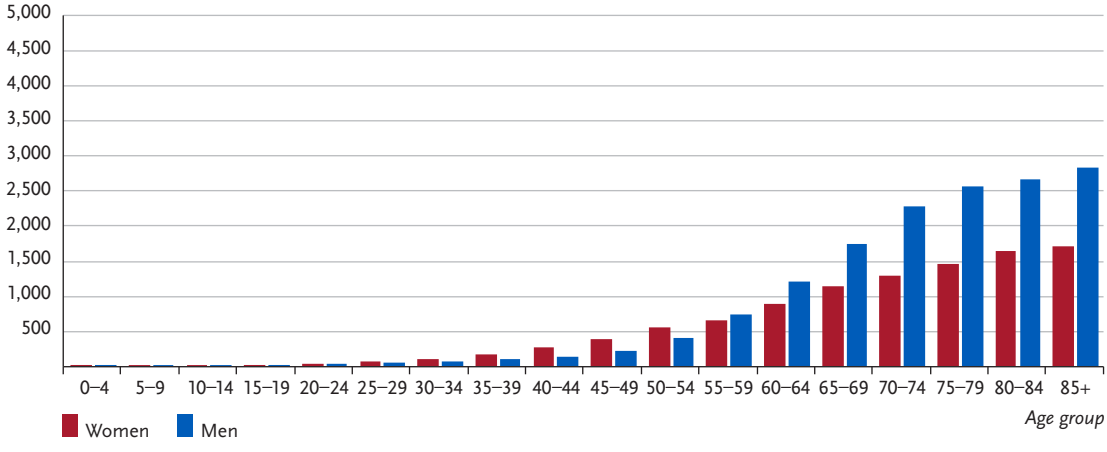


Table 3.1.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C00–C97 without C44, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	2.2 %	(1 in 45)	41.8 %	(1 in 2)	0.3 %	(1 in 330)	19.9 %	(1 in 5)
45 years	4.8 %	(1 in 21)	40.6 %	(1 in 2)	0.9 %	(1 in 110)	19.7 %	(1 in 5)
55 years	8.2 %	(1 in 12)	38.0 %	(1 in 3)	2.5 %	(1 in 40)	19.1 %	(1 in 5)
65 years	12.8 %	(1 in 8)	33.4 %	(1 in 3)	4.9 %	(1 in 21)	17.5 %	(1 in 6)
75 years	16.2 %	(1 in 6)	25.7 %	(1 in 4)	7.8 %	(1 in 13)	14.4 %	(1 in 7)
Lifetime risk			42.3 %	(1 in 2)			19.8 %	(1 in 5)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	1.2 %	(1 in 85)	49.3 %	(1 in 2)	0.2 %	(1 in 460)	24.7 %	(1 in 4)
45 years	3.3 %	(1 in 30)	49.2 %	(1 in 2)	1.0 %	(1 in 110)	24.8 %	(1 in 4)
55 years	9.7 %	(1 in 10)	48.7 %	(1 in 2)	3.4 %	(1 in 30)	24.7 %	(1 in 4)
65 years	20.0 %	(1 in 5)	46.2 %	(1 in 2)	7.4 %	(1 in 13)	23.6 %	(1 in 4)
75 years	26.7 %	(1 in 4)	38.7 %	(1 in 3)	12.0 %	(1 in 8)	20.4 %	(1 in 5)
Lifetime risk			49.3 %	(1 in 2)			24.5 %	(1 in 4)

Figure 3.1.3
Distribution of UICC stages at diagnosis by sex
Not included because UICC stages are site-specific.

Figure 3.1.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C00–C97 without C44, Germany 2017–2018

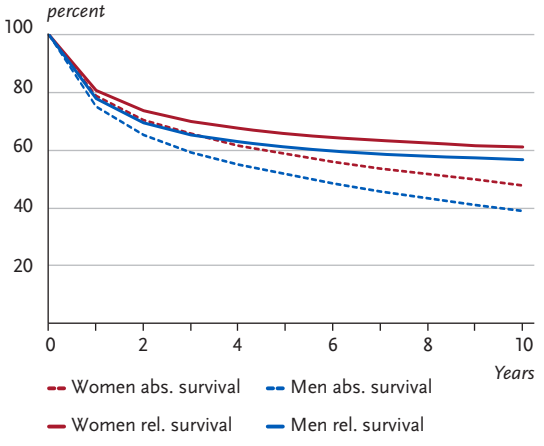


Figure 3.1.5
Relative 5-year survival by UICC stage and sex, ICD-10 C00–C97 without C44, Germany 2016–2018
Not included because UICC stages are site-specific.

Figure 3.1.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C00–C97 without C44, 2017–2018
per 100,000 (old European Standard)

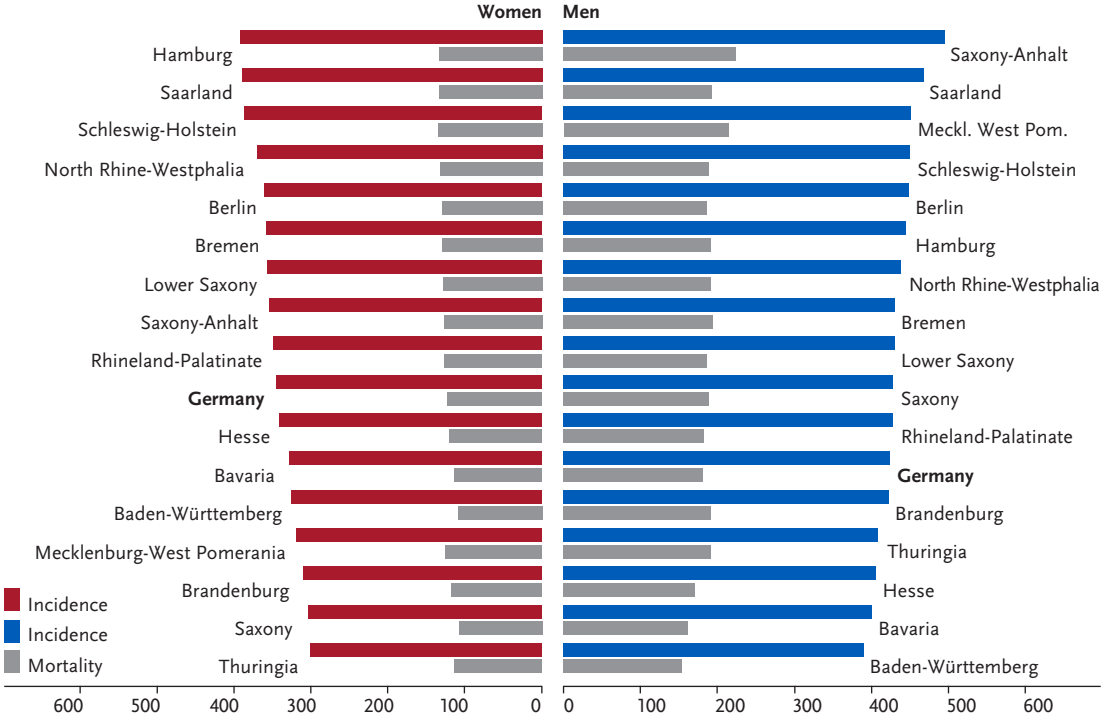
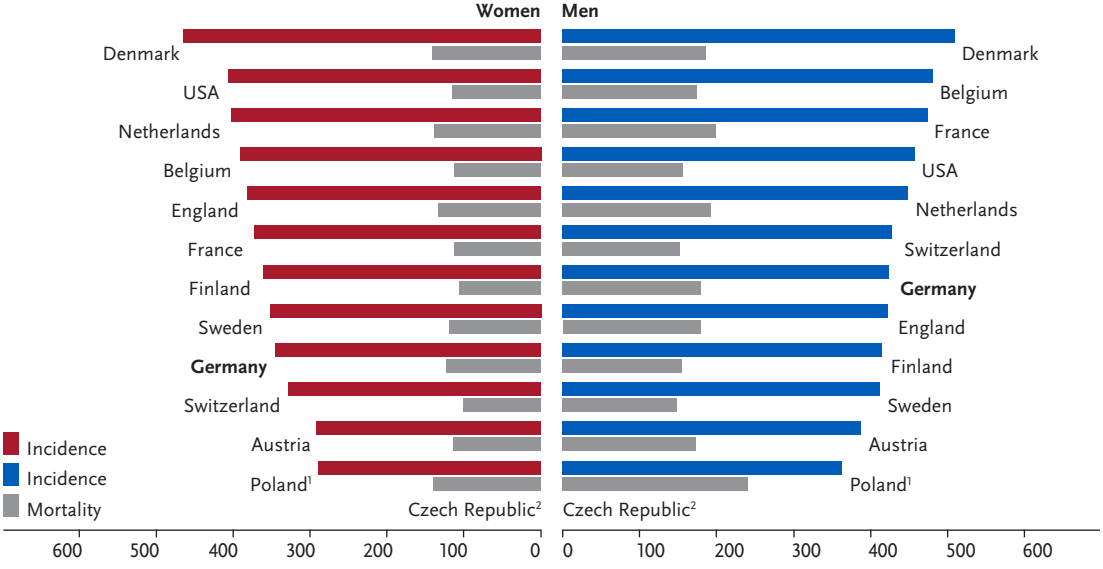


Figure 3.1.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C00–C97 without C44, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data for C00 to C97
[2] No data available

3.2 Oral cavity and pharynx

Table 3.2.1
Overview of key epidemiological parameters for Germany, ICD-10 C00–C14

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	4,560	9,800	4,490	9,820	4,900	9,700
Crude incidence rate [1]	10.9	24.0	10.7	24.0	11.6	23.5
Age-standardised incidence rate [1, 2]	7.0	17.4	6.8	17.2	7.0	16.0
Median age at diagnosis	66	63	66	64		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	1,402	3,963	1,442	3,970	1,479	3,888
Crude mortality rate [1]	3.3	9.7	3.4	9.7	3.5	9.5
Age-standardised mortality rate [1, 2]	1.8	6.7	1.9	6.6	1.9	6.3
Median age at death	72	66	72	66	73	67
Prevalence and survival rates		**5 years**		**10 years**		**25 Years**
	Women	Men	Women	Men	Women	Men
Prevalence	15,300	30,300	24,100	48,700	35,100	71,400
Absolute survival rate (2017–2018) [3]	55 (54–61)	46 (44–49)	40 (38–49)	31 (29–34)		
Relative survival rate (2017–2018) [3]	62 (61–67)	52 (50–56)	51 (49–62)	40 (38–44)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Cancers of the oral cavity and pharynx represent a heterogeneous group of malignant neoplasms. In terms of histology, 84% are squamous cell carcinomas, which originate in particular from the mucous membranes of the oral cavity, naso-, oropharynx and hypopharynx. About 3% of the neoplasms in the oral cavity and pharynx are adenocarcinomas, which occur mainly in the salivary glands. These cancers occur more frequently and two to three years earlier among men than among women. The age-standardised incidence rates increased in both sexes between 1999 and 2011. Since 2011, they have remained almost constant in women, and a slight decrease has even been observed in men. The corresponding mortality rates have declined slightly for men over the entire period, and remained almost unchanged for women.

Overall, women have a higher relative 5-year survival rate with 62% compared to men with 52%. The difference is due to a lower proportion of cancers of the floor of the mouth, tongue and pharynx in women which are promoted by tobacco and alcohol use and which are associated with lower survival rates. According to UICC tumour stage data which are currently available only for oral cavity cancers (C02 – C06), approximately one in three tumours of the oral cavity is diagnosed at early stage I in women, but only one in four cases in men.

▶ *Additional information: www.krebsdaten.de/oral_cavity*

Risk factors

The most important risk factors for developing cancer of the oral cavity and pharynx are all forms of tobacco and alcohol consumption. The effect is considerably increased if both factors are combined. Another main risk factor is chronic infections with human papillomavirus (HPV), especially with so-called high-risk viruses. HPV infections particularly cause cancers in the area of the oral pharynx (oropharynx), much less frequently in the oral cavity or other regions of the throat. Infections with Epstein-Barr viruses and the consumption of large quantities of food containing nitrosamines (e.g. salted fish) are also considered risk factors for nasopharyngeal carcinoma. Regarding carcinomas of the lip, UV radiation contributes to carcinogenesis.

There is evidence that an unbalanced diet low in vitamins with excessive consumption of meat and fried food may increase the risk.

Some rare pre-existing conditions increase the risk of cancer of the oral cavity and lips, among others.

A genetic predisposition for the development of carcinomas in the head and neck region is also assumed, since a clustered familial occurrence can sometimes be observed.

Figure 3.2.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C00–C14, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

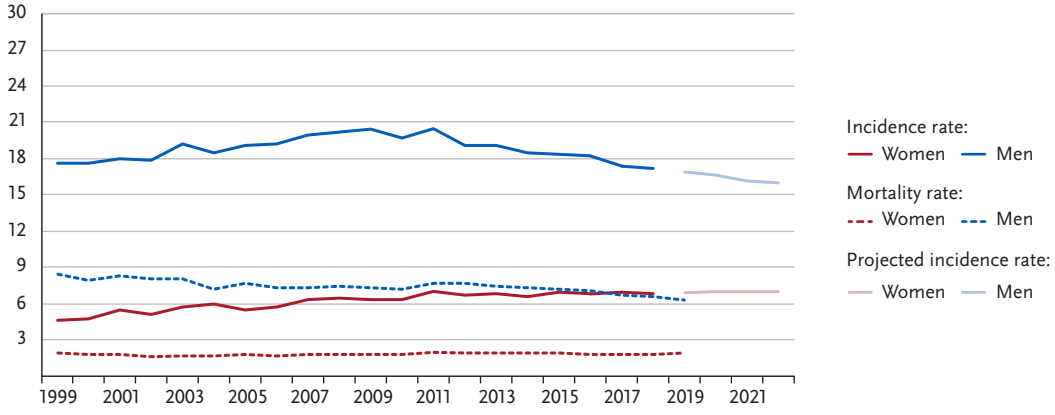


Figure 3.2.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C00–C14, Germany 1999–2018/2019, projection (incidence) through 2022

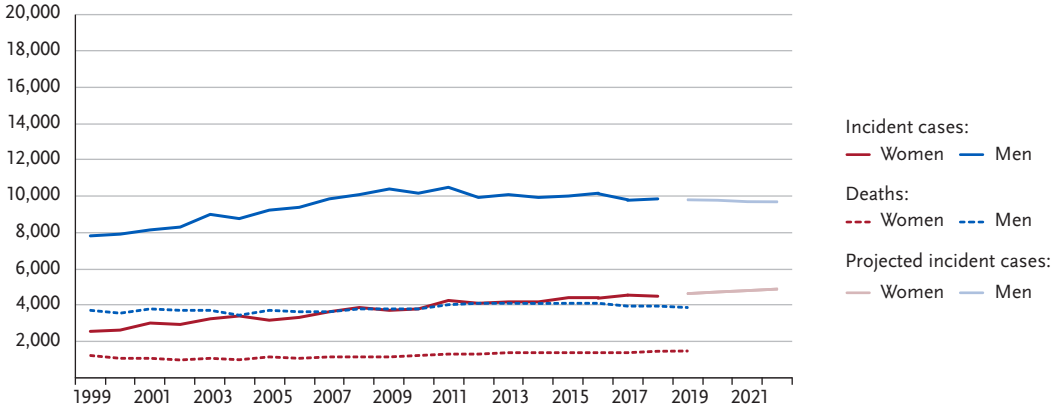


Figure 3.2.2
Age-specific incidence rates by sex, ICD-10 C00–C14, Germany 2017–2018
per 100,000

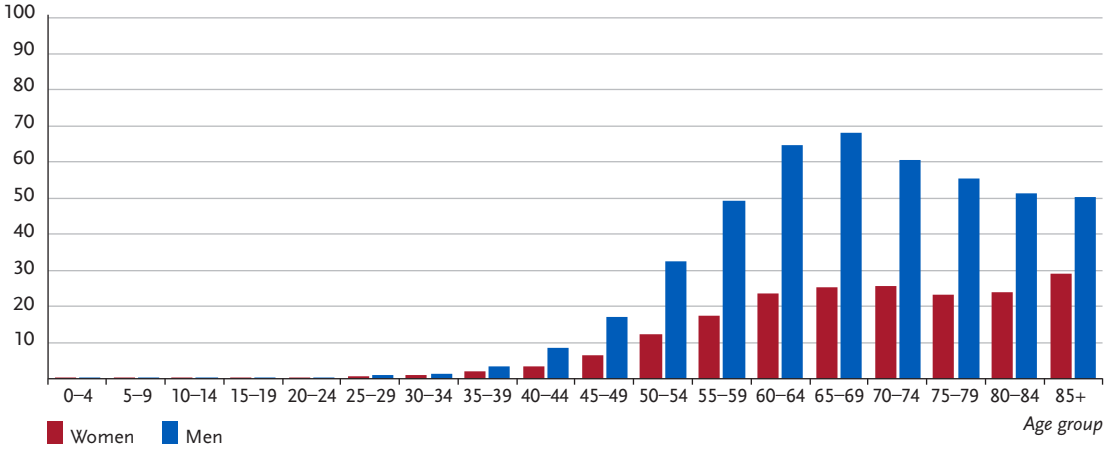


Table 3.2.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C00–C14, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 3,500)	0.8 %	(1 in 130)	< 0.1 %	(1 in 39,300)	0.3 %	(1 in 370)
45 years	0.1 %	(1 in 1,100)	0.8 %	(1 in 130)	< 0.1 %	(1 in 7,300)	0.3 %	(1 in 370)
55 years	0.2 %	(1 in 520)	0.7 %	(1 in 140)	0.1 %	(1 in 1,800)	0.3 %	(1 in 390)
65 years	0.2 %	(1 in 420)	0.5 %	(1 in 190)	0.1 %	(1 in 1,300)	0.2 %	(1 in 460)
75 years	0.2 %	(1 in 490)	0.3 %	(1 in 310)	0.1 %	(1 in 1,200)	0.2 %	(1 in 630)
Lifetime risk			0.8 %	(1 in 120)			0.3 %	(1 in 370)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,600)	1.7 %	(1 in 58)	< 0.1 %	(1 in 10,200)	0.7 %	(1 in 140)
45 years	0.2 %	(1 in 420)	1.7 %	(1 in 60)	0.1 %	(1 in 1,600)	0.7 %	(1 in 140)
55 years	0.5 %	(1 in 190)	1.5 %	(1 in 67)	0.2 %	(1 in 480)	0.7 %	(1 in 150)
65 years	0.6 %	(1 in 170)	1.1 %	(1 in 95)	0.3 %	(1 in 380)	0.5 %	(1 in 190)
75 years	0.4 %	(1 in 230)	0.6 %	(1 in 170)	0.2 %	(1 in 460)	0.3 %	(1 in 320)
Lifetime risk			1.7 %	(1 in 59)			0.7 %	(1 in 140)

Figure 3.2.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C02–C06, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 3%. For 30% of the remaining cases, no UICC stage could be assigned.

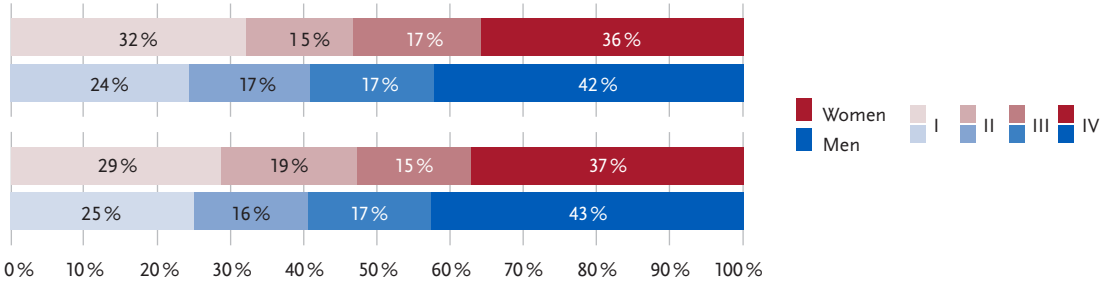


Figure 3.2.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C00–C14, Germany 2017–2018

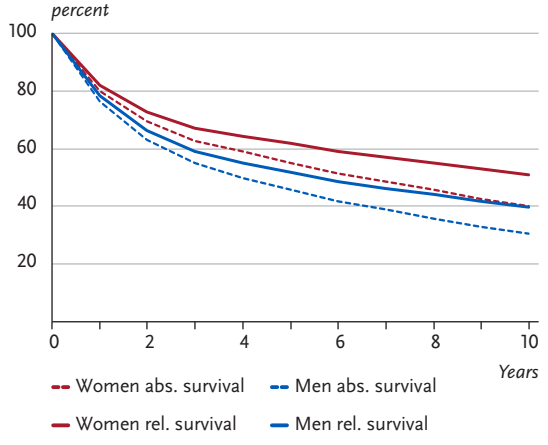


Figure 3.2.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C00–C14, Germany 2016–2018

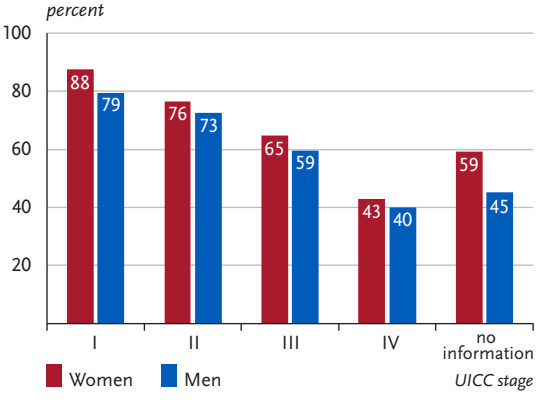


Figure 3.2.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C00–C14, 2017–2018
per 100,000 (old European Standard)

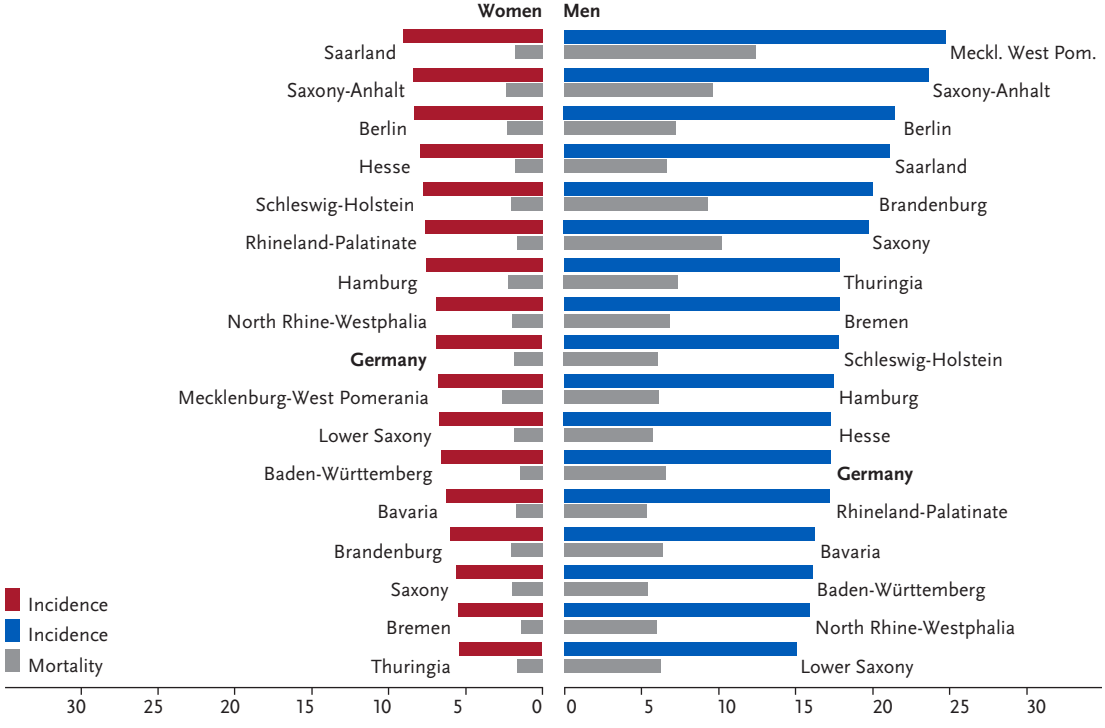
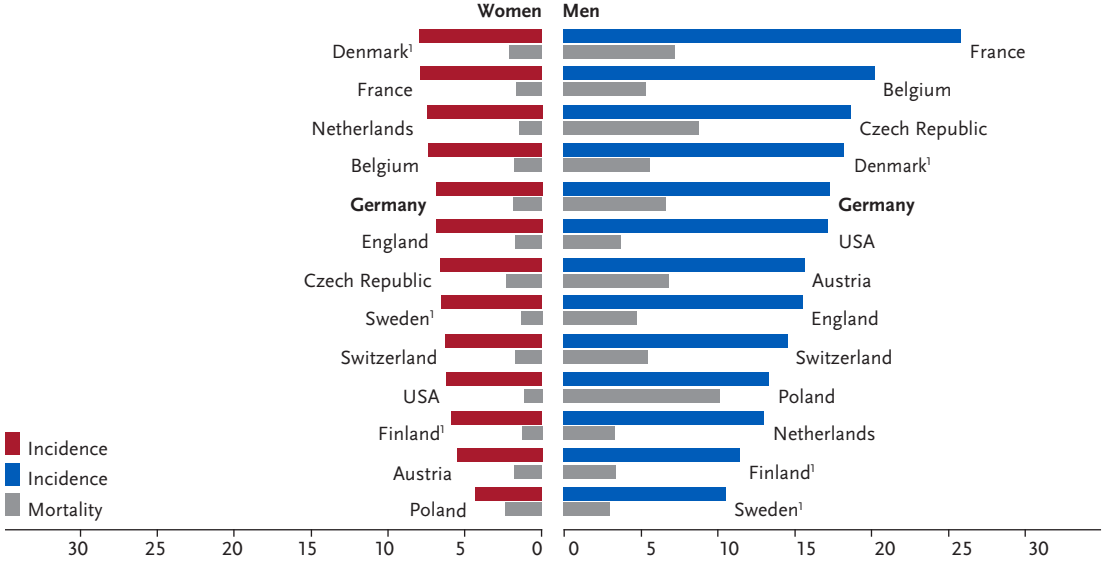


Figure 3.2.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C00–C14, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data without C10.1

3.3 Oesophagus

Table 3.3.1
Overview of key epidemiological parameters for Germany, ICD-10 C15

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	1,660	5,600	1,840	5,710	2,000	6,300
Crude incidence rate [1]	4.0	13.7	4.4	14.0	4.8	15.2
Age-standardised incidence rate [1, 2]	2.3	9.3	2.4	9.3	2.6	9.7
Median age at diagnosis	71	67	71	68		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	1,233	4,266	1,358	4,278	1,332	4,510
Crude mortality rate [1]	2.9	10.5	3.2	10.5	3.2	11.0
Age-standardised mortality rate [1, 2]	1.5	6.8	1.6	6.8	1.6	7.0
Median age at death	74	70	75	69	75	70
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	3,300	10,300	4,800	14,800	6,700	21,000
Absolute survival rate (2017–2018) [3]	21 (18–26)	22 (20–28)	16 (14–26)	15 (13–20)		
Relative survival rate (2017–2018) [3]	24 (20–28)	26 (23–33)	21 (19–34)	21 (17–27)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Cancer of the oesophagus accounts for about 1.3% of all cancer deaths in women and 3.4% in men. Since 1999, the age-standardised mortality rates have changed only marginally for both women and men. In Germany, men develop oesophageal cancer three times more frequently and, at 68 years of age (2018), on average three years earlier than women. For both sexes, the incidence rates decrease slightly for the age groups below 60 years, while they tend to increase in the higher age groups.

Squamous cell carcinomas account for 43% of all cancers of the oesophagus. The proportion of adenocarcinomas, which occur almost exclusively at the junction with the stomach, has risen to 47% in recent years. In men, the proportion of adenocarcinomas with 51%, is now even considerably higher than that of squamous cell carcinomas. Oesophageal carcinoma is one of the cancers with unfavourable survival prospects, with relative 5-year survival rates of 24% and 26% for women and men respectively. Only just under one in three tumours is diagnosed at an early stage (UICC I/II).

Risk factors

Oesophageal cancer can be divided into squamous cell carcinoma and the slightly more common adenocarcinoma. Adenocarcinomas often arise due to gastroesophageal reflux disease (persistent reflux of gastric juice into the oesophagus – chronic heartburn). These conditions lead to mucosal changes in the lower part of the oesophagus: A so-called Barrett's oesophagus can be developed, which is considered a precancerous condition. Other important risk factors are obesity and smoking.

The main risk factors for squamous cell carcinoma of the oesophagus in Germany are tobacco and alcohol consumption, especially in combination: If both factors act together, the harmful effect is considerably increased.

A motility disorder of the oesophagus and the sphincter between the oesophagus and the stomach (achalasia) significantly increases the risk of both squamous cell and adenocarcinoma. A familial accumulation of cases of the disease is also known. Whether and to what extent hereditary predisposition or environmental factors play a role is still unclear.

▶ *Additional information: www.krebsdaten.de/oesophagus*

Figure 3.3.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C15, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

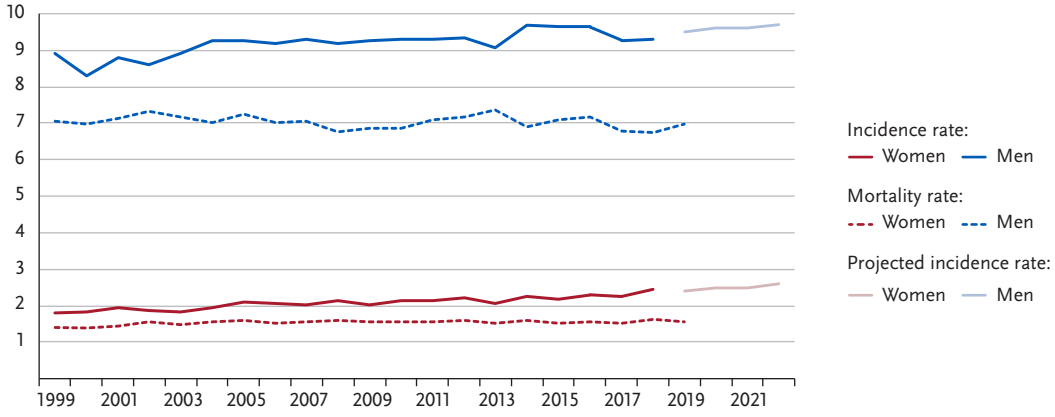


Figure 3.3.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C15, Germany 1999–2018/2019, projection (incidence) through 2022

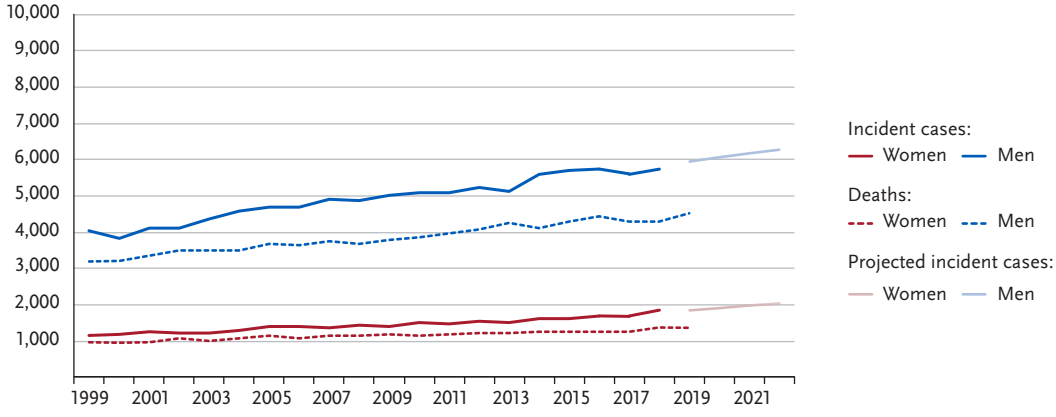


Figure 3.3.2
Age-specific incidence rates by sex, ICD-10 C15, Germany 2017–2018
per 100,000

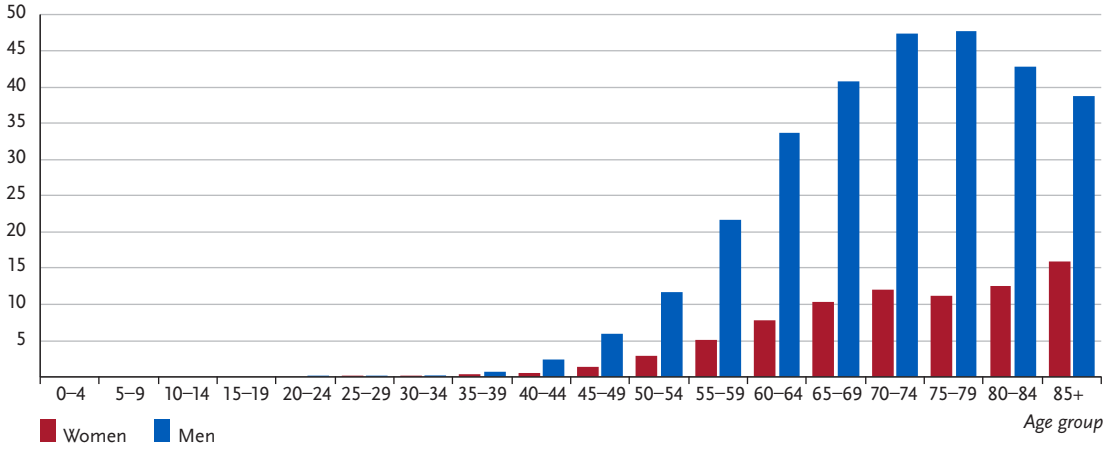


Table 3.3.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C15, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 19,100)	0.3 %	(1 in 290)	< 0.1 %	(1 in 39,500)	0.3 %	(1 in 390)
45 years	< 0.1 %	(1 in 4,600)	0.3 %	(1 in 300)	< 0.1 %	(1 in 8,200)	0.3 %	(1 in 390)
55 years	0.1 %	(1 in 1,500)	0.3 %	(1 in 310)	< 0.1 %	(1 in 2,700)	0.3 %	(1 in 400)
65 years	0.1 %	(1 in 920)	0.3 %	(1 in 370)	0.1 %	(1 in 1,400)	0.2 %	(1 in 440)
75 years	0.1 %	(1 in 930)	0.2 %	(1 in 550)	0.1 %	(1 in 1,100)	0.2 %	(1 in 570)
Lifetime risk			0.3 %	(1 in 300)			0.3 %	(1 in 390)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 6,100)	1.0 %	(1 in 96)	< 0.1 %	(1 in 11,700)	0.8 %	(1 in 130)
45 years	0.1 %	(1 in 1,100)	1.0 %	(1 in 97)	0.1 %	(1 in 1,700)	0.8 %	(1 in 130)
55 years	0.3 %	(1 in 380)	1.0 %	(1 in 100)	0.2 %	(1 in 560)	0.8 %	(1 in 130)
65 years	0.4 %	(1 in 250)	0.8 %	(1 in 130)	0.3 %	(1 in 350)	0.6 %	(1 in 160)
75 years	0.4 %	(1 in 270)	0.5 %	(1 in 200)	0.3 %	(1 in 330)	0.5 %	(1 in 220)
Lifetime risk			1.0 %	(1 in 98)			0.8 %	(1 in 130)

Figure 3.3.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C15, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 6%. For 51% of the remaining cases, no UICC stage could be assigned.

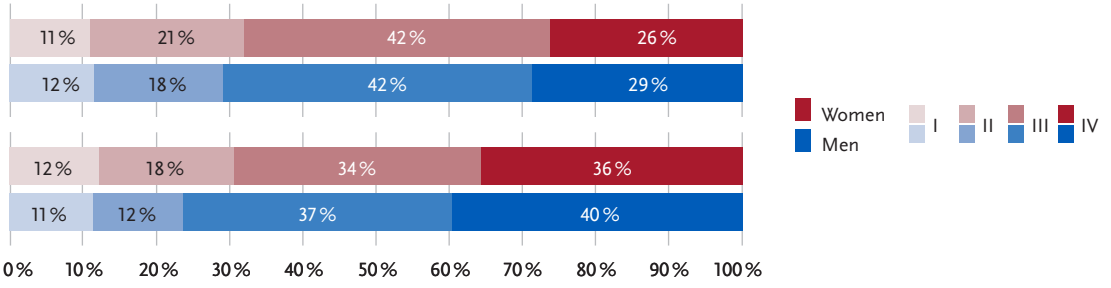


Figure 3.3.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C15, Germany 2017–2018

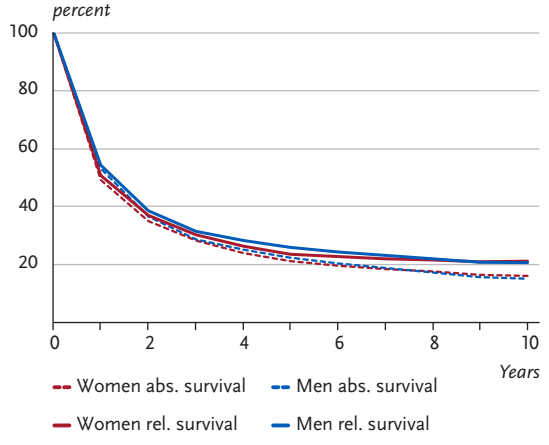


Figure 3.3.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C15, Germany 2016–2018

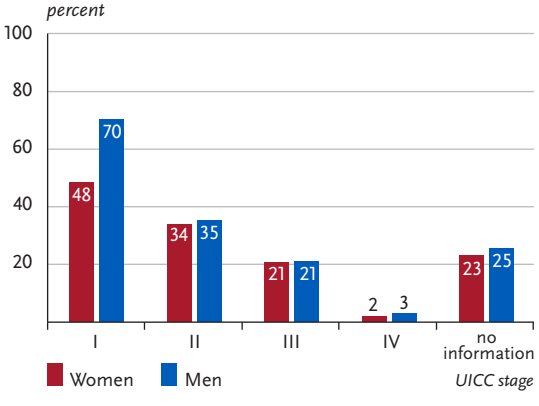


Figure 3.3.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C15, 2017–2018
per 100,000 (old European Standard)

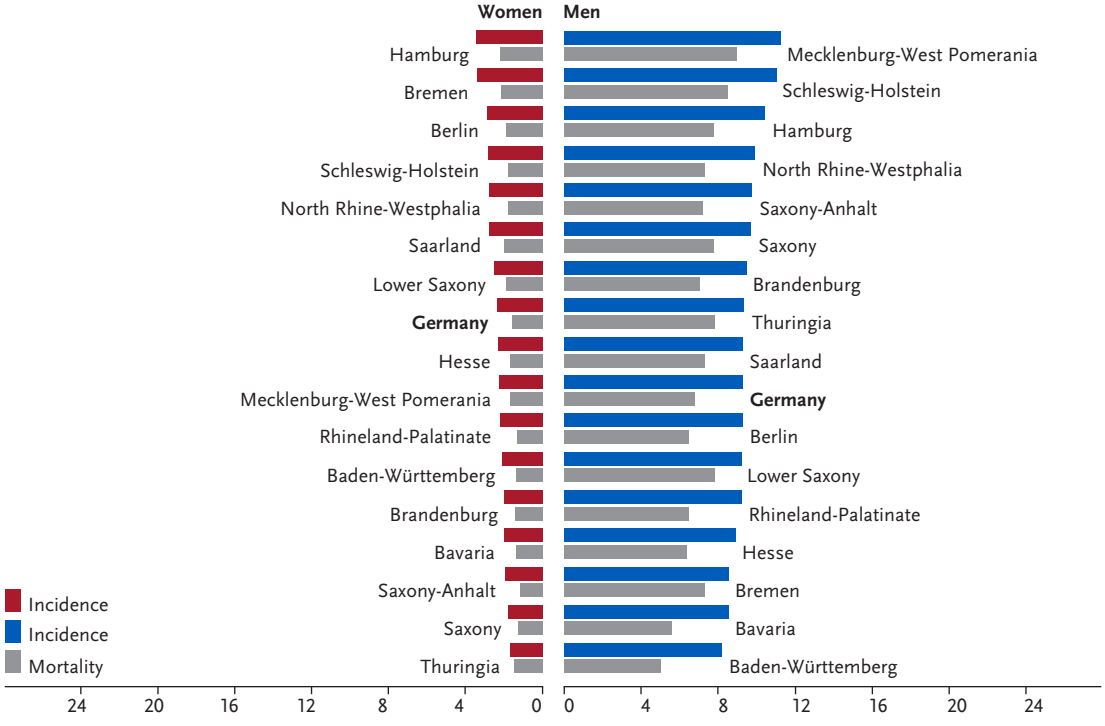
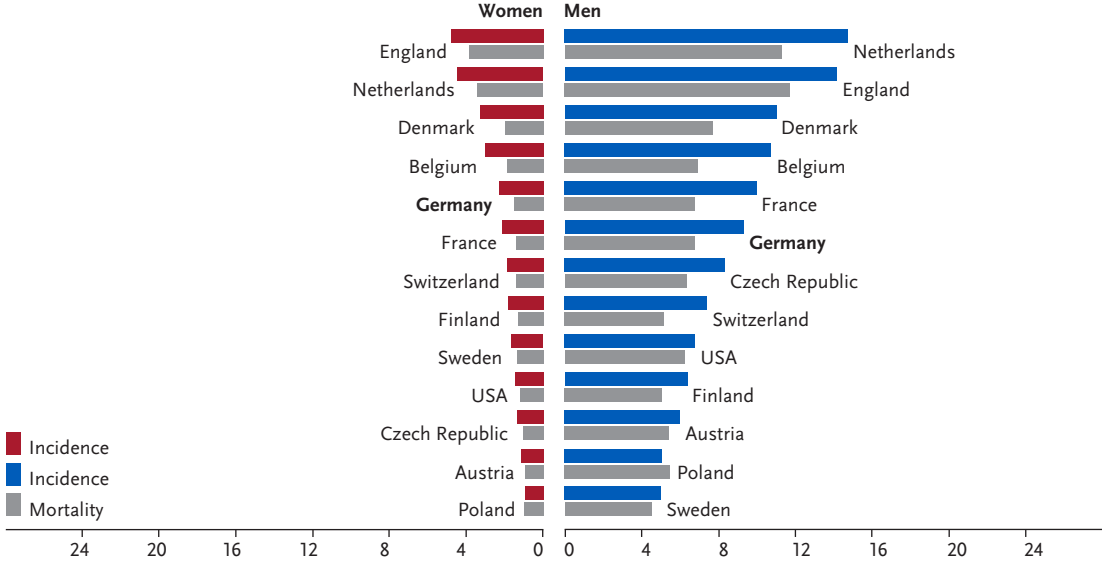


Figure 3.3.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C15, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.4 Stomach

Table 3.4.1
Overview of key epidemiological parameters for Germany, ICD-10 C16

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	6,190	9,490	5,560	9,200	5,300	8,800
Crude incidence rate [1]	14.8	23.3	13.2	22.5	12.4	21.2
Age-standardised incidence rate [1, 2]	7.8	14.9	6.8	14.3	6.4	12.9
Median age at diagnosis	75	71	76	71		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	3,700	5,266	3,674	5,187	3,428	5,099
Crude mortality rate [1]	8.8	12.9	8.7	12.7	8.1	12.4
Age-standardised mortality rate [1, 2]	4.1	7.9	4.1	7.7	3.8	7.4
Median age at death	78	75	78	74	79	75
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	12,700	20,300	21,400	32,000	35,000	49,500
Absolute survival rate (2017–2018) [3]	31 (29–35)	28 (25–31)	23 (20–27)	20 (19–23)		
Relative survival rate (2017–2018) [3]	37 (34–42)	34 (31–37)	33 (30–38)	30 (28–36)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

About 5,560 women and 9,200 men developed a malignant tumour of the stomach in 2018. Compared to women, the tumours in men occur about twice as often at the entrance to the stomach (cardia).

For decades, a steady decline in stomach cancer incidence and mortality rates has been observed in Germany – as in other industrialised nations. This trend continues in all age groups in both women and men. The tumours of the stomach outlet (antrum and pylorus) have declined the most.

The risk of developing the disease increases with age in both sexes. On average, men are diagnosed with stomach cancer at the age of 71, women at 76. Relative 5-year survival rates of 37% are currently calculated for women and 34% for men. This means that although the survival prospects have improved recently, they remain rather unfavourable compared to other cancers sites. In about 40% of cases, the disease is already metastasised at diagnosis (UICC IV).

Risk factors

The most important risk factor for stomach cancer is a bacterial infection of the stomach with Helicobacter pylori. About 5 to 10% of gastric cancers are attributed to infection with the Epstein-Barr virus. Smoking and alcohol consumption also increase the risk of cancer. Foods preserved by salting, high salt consumption and meat products are other risk factors. There is evidence that chronic heartburn or gastro-oesophageal reflux disease increases the risk of certain types of tumours in the transition from the stomach to the oesophagus. Furthermore, low socioeconomic status and previous stomach surgery are associated with an increased incidence of stomach cancer.

First-degree relatives of a person with the disease have a two to three times higher risk than the general population. If more than one first-degree relative has the disease, the risk is about 10-fold higher. It is unclear whether the familial risk is due to a common lifestyle, a common genetic predisposition or a combination of both factors. Some hereditary syndromes increase the risk of gastric cancer. Pernicious anaemia is a risk factor that affects only a few people.

▶ *Additional information: www.krebsdaten.de/stomach*

Figure 3.4.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C16, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

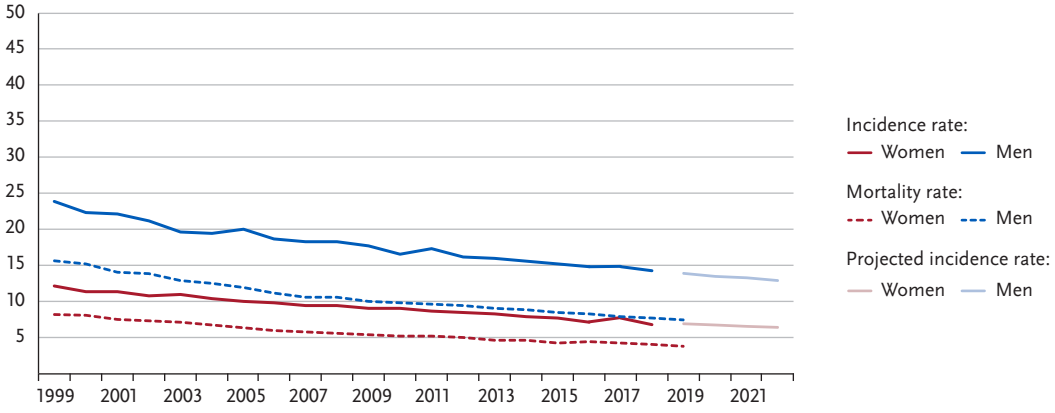


Figure 3.4.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C16, Germany 1999–2018/2019, projection (incidence) through 2022

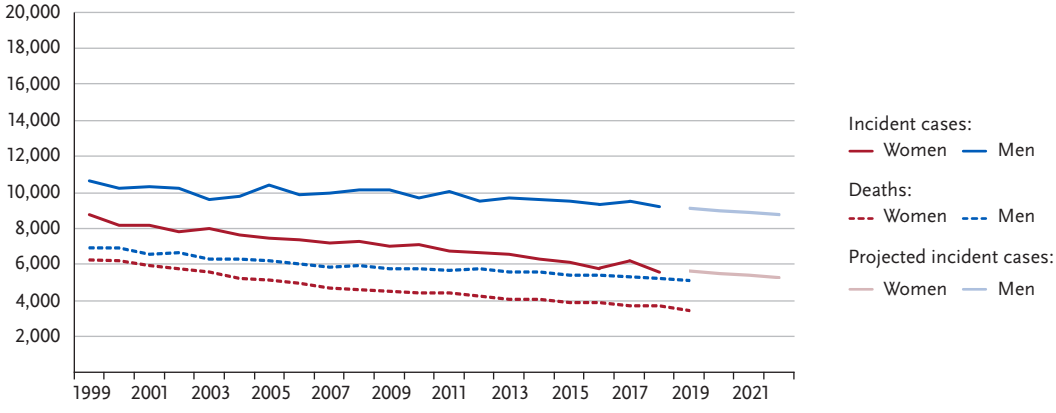


Figure 3.4.2
Age-specific incidence rates by sex, ICD-10 C16, Germany 2017–2018
per 100,000

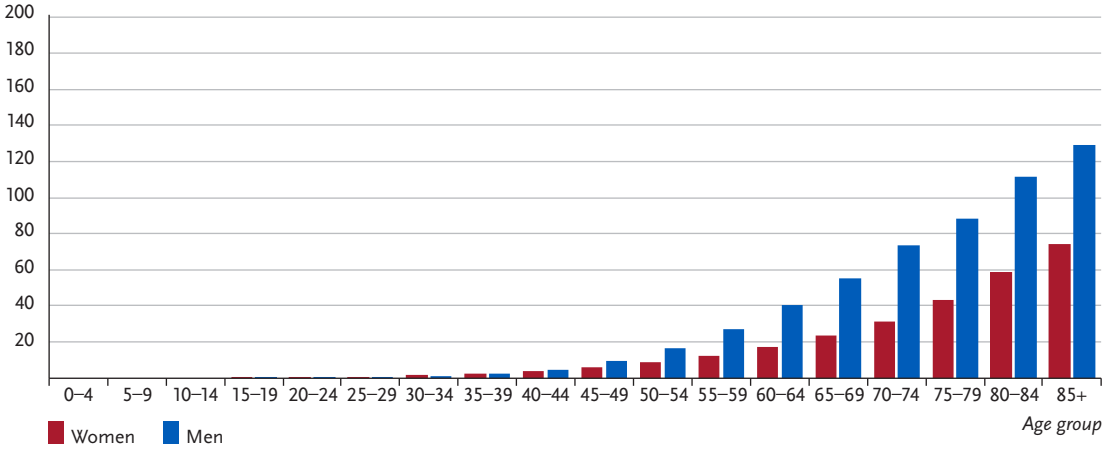


Table 3.4.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C16, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 3,500)	1.0 %	(1 in 96)	< 0.1 %	(1 in 7,900)	0.7 %	(1 in 140)
45 years	0.1 %	(1 in 1,500)	1.0 %	(1 in 98)	< 0.1 %	(1 in 3,100)	0.7 %	(1 in 140)
55 years	0.1 %	(1 in 740)	1.0 %	(1 in 100)	0.1 %	(1 in 1,400)	0.7 %	(1 in 150)
65 years	0.2 %	(1 in 420)	0.9 %	(1 in 110)	0.1 %	(1 in 710)	0.6 %	(1 in 160)
75 years	0.4 %	(1 in 240)	0.7 %	(1 in 140)	0.3 %	(1 in 360)	0.6 %	(1 in 180)
Lifetime risk			1.0 %	(1 in 96)			0.7 %	(1 in 140)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,900)	1.7 %	(1 in 57)	< 0.1 %	(1 in 7,300)	1.0 %	(1 in 98)
45 years	0.1 %	(1 in 790)	1.7 %	(1 in 58)	0.1 %	(1 in 1,800)	1.0 %	(1 in 98)
55 years	0.3 %	(1 in 310)	1.7 %	(1 in 60)	0.1 %	(1 in 670)	1.0 %	(1 in 100)
65 years	0.6 %	(1 in 180)	1.5 %	(1 in 68)	0.3 %	(1 in 340)	0.9 %	(1 in 110)
75 years	0.7 %	(1 in 130)	1.2 %	(1 in 86)	0.5 %	(1 in 210)	0.8 %	(1 in 120)
Lifetime risk			1.7 %	(1 in 58)			1.0 %	(1 in 99)

Figure 3.4.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C16, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 6%. For 49% of the remaining cases, no UICC stage could be assigned.

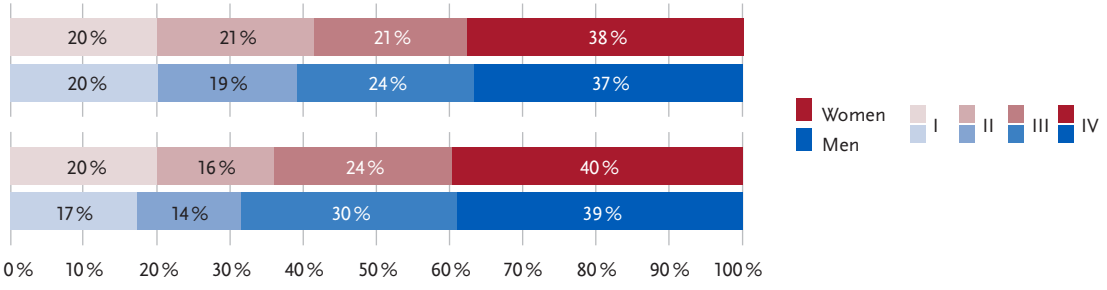


Figure 3.4.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C16, Germany 2017–2018

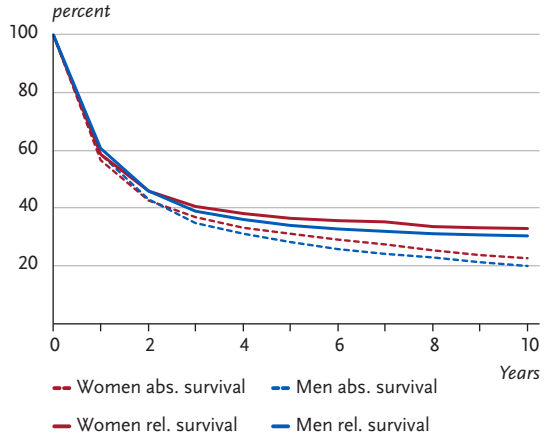


Figure 3.4.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C16, Germany 2016–2018

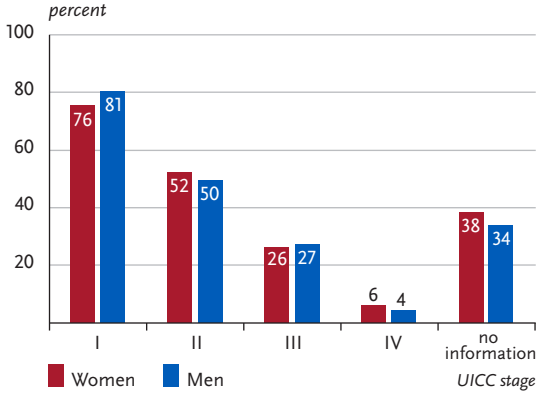


Figure 3.4.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C16, 2017–2018
per 100,000 (old European Standard)

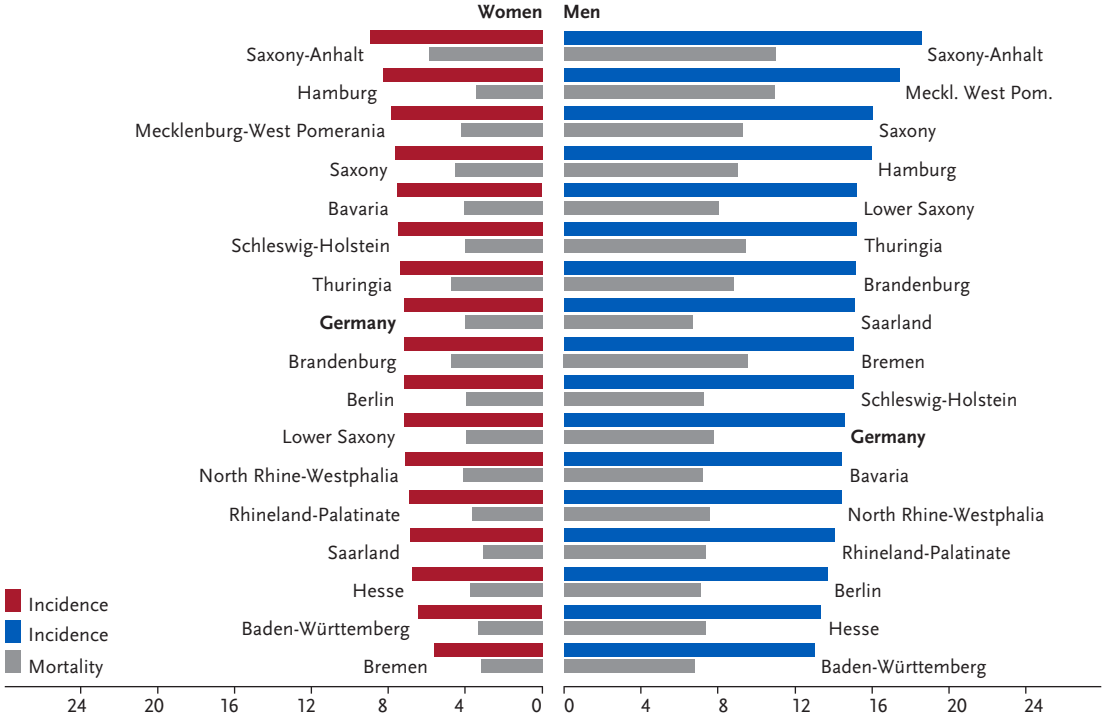
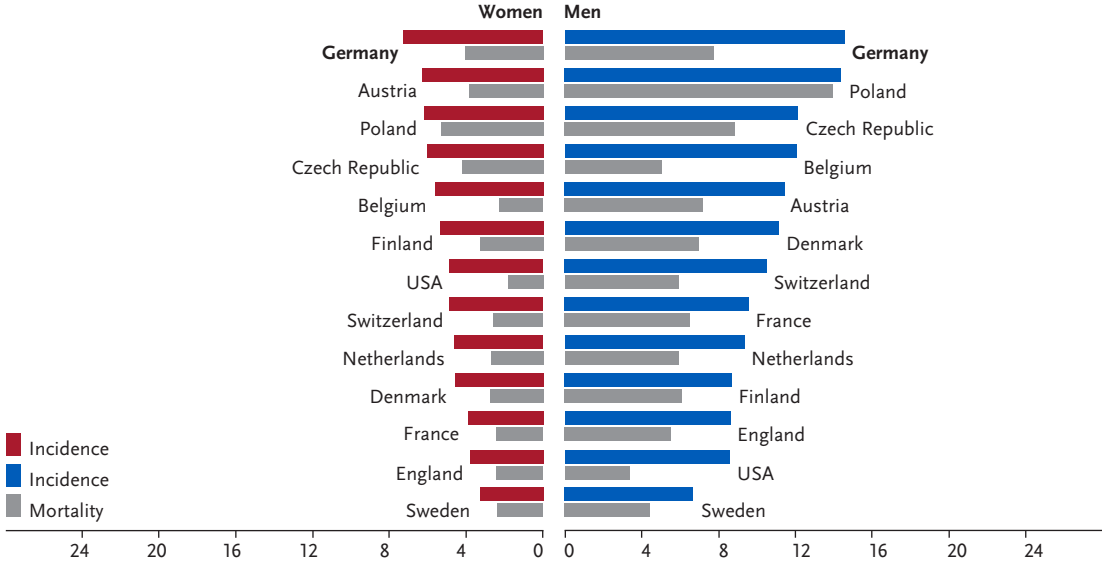


Figure 3.4.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C16, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.5 Small intestine

Table 3.5.1
Overview of key epidemiological parameters for Germany, ICD-10 C17

Incidence		2017		2018		Prediction for 2022
	Women	Men	Women	Men	Women	Men
Incident cases	1,130	1,470	1,160	1,520	1,500	1,900
Crude incidence rate [1]	2.7	3.6	2.8	3.7	3.5	4.6
Age-standardised incidence rate [1, 2]	1.6	2.4	1.7	2.5	2.0	2.9
Median age at diagnosis	69	68	70	68		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	313	345	346	407	314	377
Crude mortality rate [1]	0.7	0.8	0.8	1.0	0.7	0.9
Age-standardised mortality rate [1, 2]	0.4	0.5	0.4	0.6	0.4	0.6
Median age at death	76	75	77	76	77	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	3,700	4,500	6,100	7,100	8,500	9,700
Absolute survival rate (2017–2018) [3]	53	56	41	41		
Relative survival rate (2017–2018) [3]	60	65	53	57		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent

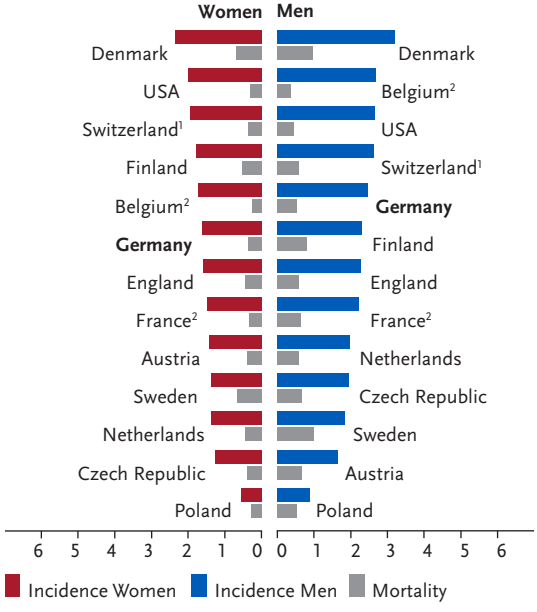
Epidemiology and risk factors

About half of the malignant tumours of the small intestine are neuroendocrine tumours (NET), which occur less frequently in other organs of the digestive tract, in the lungs or in the skin.

Gastrointestinal stromal tumours (GIST) account for a good 10 % of cases. In total, around 2,680 people, 1,160 of them women, were diagnosed with cancer of the small intestine in Germany in 2018. Incidence and mortality rates have increased significantly since 1999. Overall survival rates are slightly lower than for colon cancer, although 5-year survival rates for both GIST and NET are significantly higher than for other malignant small intestine tumours.

Little is known about risk factors for NET of the small intestine. Hereditary conditions such as Lynch syndrome, Peutz-Jeghers syndrome, familial juvenile polyposis and cystic fibrosis, as well as inflammatory bowel disease (Crohn's disease) increase the risk of adenocarcinoma of the small intestine. Patients with neurofibromatosis type 1 (Recklinghausen's disease) have an increased risk of gastrointestinal stromal tumours (GIST) of the small intestine. In addition, a small proportion of these tumours are due to a hereditary predisposition (familial GIST syndrome).

Figure 3.5.1
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C17, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality for 2013 to 2017
[2] Mortality for 2016

▶ *Additional information: www.krebsdaten.de/small_intestine*

Figure 3.5.2
Age-standardised incidence and mortality rates by sex, ICD-10 C17, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

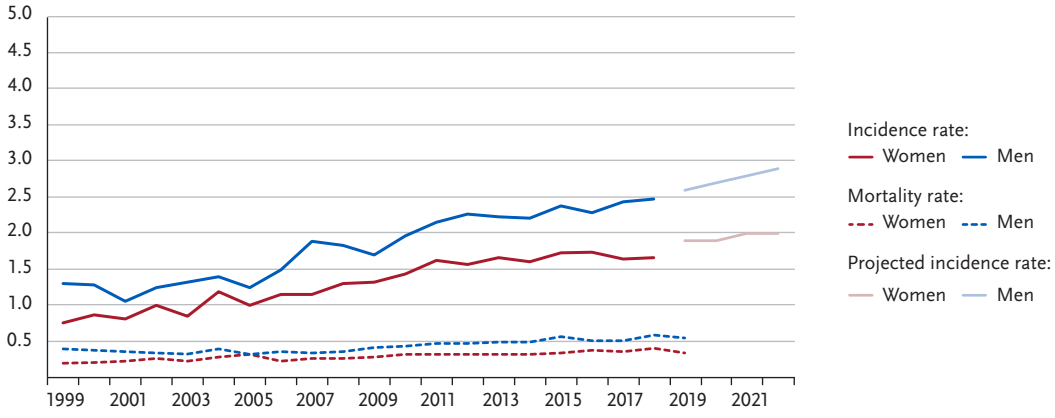


Figure 3.5.3
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C17, Germany 2017–2018

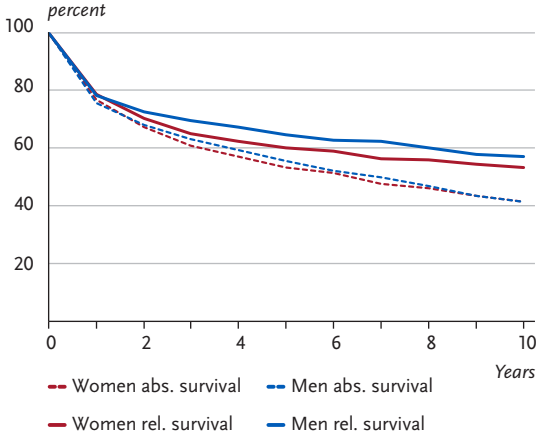


Figure 3.5.4
Relative 5-year survival by histology and sex, ICD-10 C17, Germany 2017–2018

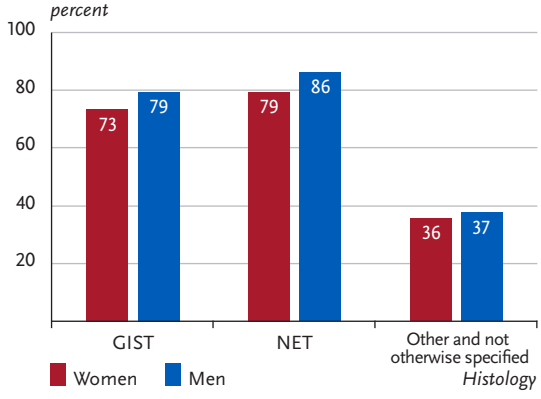
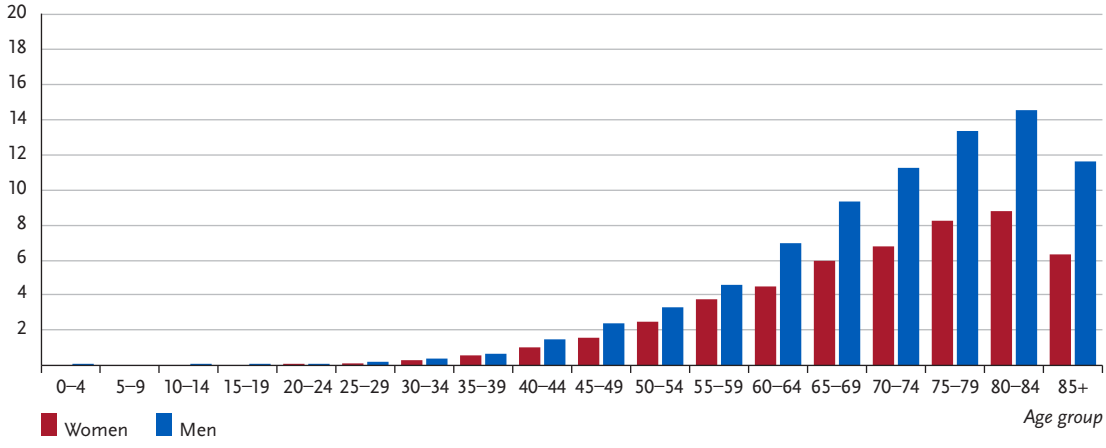


Figure 3.5.5
Age-specific incidence rates by sex, ICD-10 C17, Germany 2017–2018
per 100,000



3.6 Colon and rectum

Table 3.6.1
Overview of key epidemiological parameters for Germany, ICD-10 C18–C20

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	27,100	33,150	26,710	33,920	25,000	33,100
Crude incidence rate [1]	64.7	81.3	63.6	82.9	59.1	80.2
Age-standardised incidence rate [1, 2]	33.6	51.5	32.7	52.1	30.3	48.6
Median age at diagnosis	75	72	75	72		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	10,879	12,873	11,008	13,240	11,016	13,032
Crude mortality rate [1]	26.0	31.6	26.2	32.4	26.2	31.8
Age-standardised mortality rate [1, 2]	11.3	18.8	11.3	18.9	11.2	18.3
Median age at death	80	76	80	76	80	76
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	89,700	109,800	150,400	183,300	256,300	295,000
Absolute survival rate (2017–2018) [3]	54 (53–58)	52 (49–52)	40 (39–44)	36 (34–37)		
Relative survival rate (2017–2018) [3]	65 (64–70)	63 (60–65)	62 (61–69)	57 (54–58)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

About one in eight cancers in Germany affects the colon or rectum. In 2018, about 33,920 men and 26,710 women were diagnosed with colorectal cancer. Thus, one in 15 men and one in 19 women will develop this cancer during their lifetime. About two-thirds of cases are detected in the colon. The risk of developing colorectal cancer increases with age. More than half of the patients are diagnosed after the age of 70, only about 10% of the cancers occur before the age of 55. This corresponds to a comparatively high median age at diagnosis of 75 (women) and 72 (men). After a short-term increase, a decline in age-standardised incidence rates has been observed since about 2003. Except for the ascending colon, the rate of new cases is decreasing in all bowel segments. The annual decline in age-standardised mortality rates over the last 10 years is even more pronounced in both sexes, averaging 2.5% to 3%. The relative 5-year survival rates with colorectal cancer are around 65% and 63% for women and men, respectively.

Risk factors and early detection

The most important risk factors for colorectal cancer are tobacco use and obesity. They are followed by lack of exercise and a low-fibre diet. People who drink alcohol regularly or eat a lot of red or processed meat are also more likely to develop colorectal cancer. First-degree relatives of patients with colorectal cancer are themselves affected more often than average. For some rare hereditary diseases, there is a very high risk of developing the disease even at a younger age. Chronic inflammatory bowel diseases also increase the risk of developing the cancer of the large intestine. For the early detection of colorectal cancer, an immunological test for hidden blood in the stool can be carried out annually between the ages of 50 and 54, and every two years from the age of 55. From the age of 50 (men) and 55 (women), the statutory cancer screening programme provides for a colonoscopy. If necessary, intestinal polyps that could develop into cancer can be removed. If the findings are normal, an additional colonoscopy can be conducted years later. A stool test can be taken as an alternative to colonoscopy. If the test is abnormal, a colonoscopy is usually recommended. Special recommendations apply to people with an increased risk of disease.

▶ *Additional information: www.krebsdaten.de/colon_rectum*

Figure 3.6.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C18–C20, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

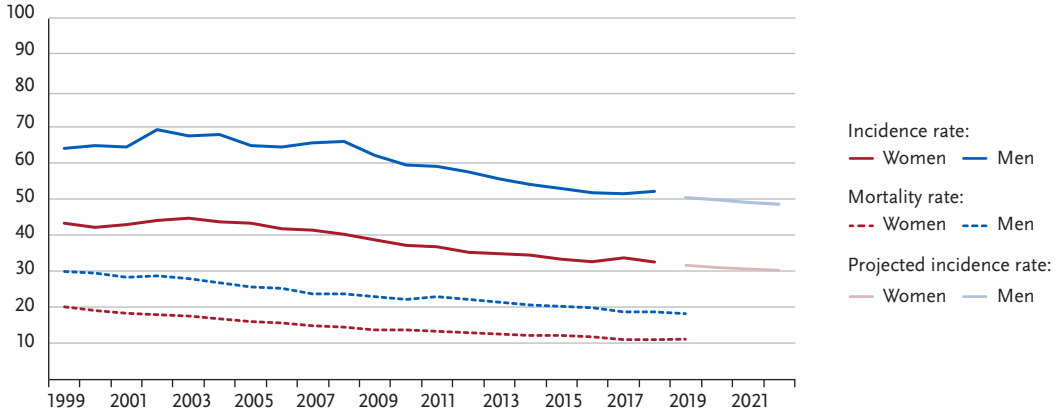


Figure 3.6.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C18–C20, Germany 1999–2018/2019, projection (incidence) through 2022

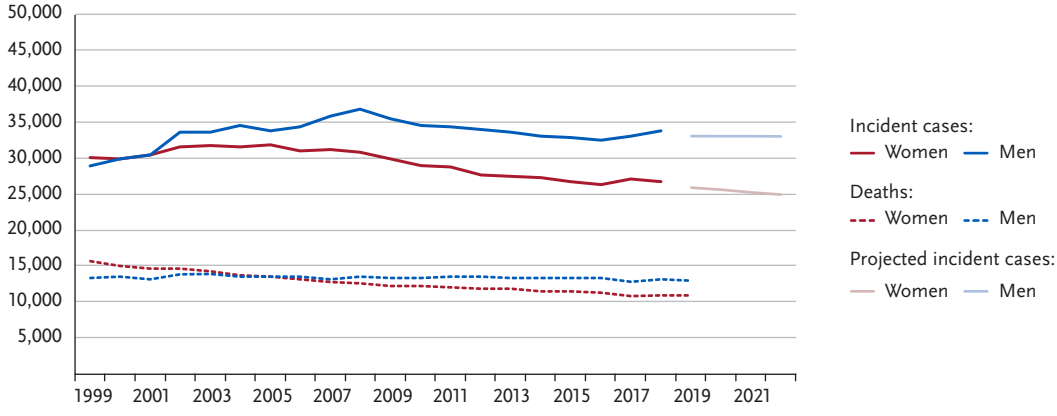


Figure 3.6.2
Age-specific incidence rates by sex, ICD-10 C18–C20, Germany 2017–2018
per 100,000

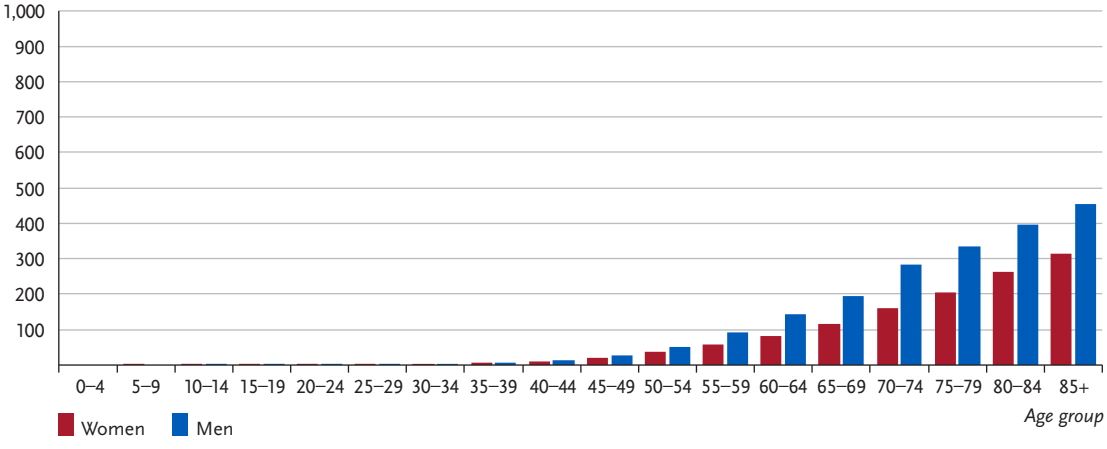


Table 3.6.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C18–C20, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 910)	5.2 %	(1 in 19)	< 0.1 %	(1 in 4,300)	2.2 %	(1 in 45)
45 years	0.3 %	(1 in 300)	5.2 %	(1 in 19)	0.1 %	(1 in 1,400)	2.2 %	(1 in 45)
55 years	0.8 %	(1 in 130)	4.9 %	(1 in 20)	0.2 %	(1 in 510)	2.2 %	(1 in 46)
65 years	1.4 %	(1 in 74)	4.4 %	(1 in 23)	0.4 %	(1 in 240)	2.1 %	(1 in 47)
75 years	2.1 %	(1 in 48)	3.5 %	(1 in 28)	0.9 %	(1 in 110)	1.9 %	(1 in 52)
Lifetime risk			5.3 %	(1 in 19)			2.2 %	(1 in 45)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 860)	6.6 %	(1 in 15)	< 0.1 %	(1 in 3,900)	2.7 %	(1 in 37)
45 years	0.4 %	(1 in 240)	6.5 %	(1 in 15)	0.1 %	(1 in 1,000)	2.7 %	(1 in 36)
55 years	1.2 %	(1 in 84)	6.4 %	(1 in 16)	0.3 %	(1 in 310)	2.7 %	(1 in 36)
65 years	2.2 %	(1 in 45)	5.8 %	(1 in 17)	0.8 %	(1 in 130)	2.7 %	(1 in 38)
75 years	3.0 %	(1 in 34)	4.5 %	(1 in 22)	1.3 %	(1 in 75)	2.4 %	(1 in 42)
Lifetime risk			6.5 %	(1 in 15)			2.7 %	(1 in 37)

Figure 3.6.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C18–C20, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 5%. For 25% of the remaining cases, no UICC stage could be assigned.

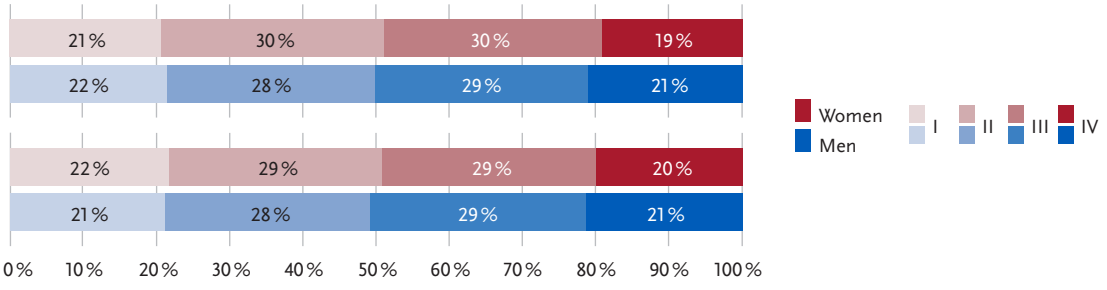


Figure 3.6.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C18–C20, Germany 2017–2018

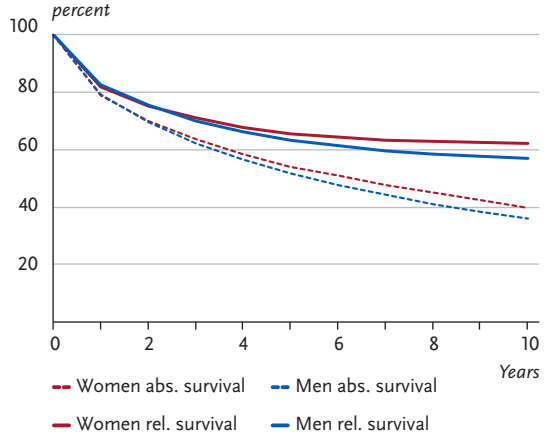


Figure 3.6.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C18–C20, Germany 2016–2018

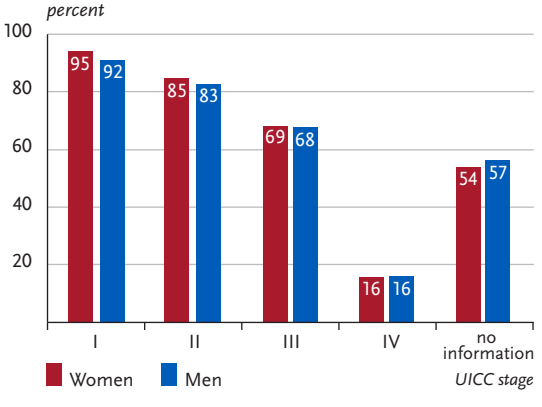


Figure 3.6.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C18 – C20, 2017 – 2018
per 100,000 (old European Standard)

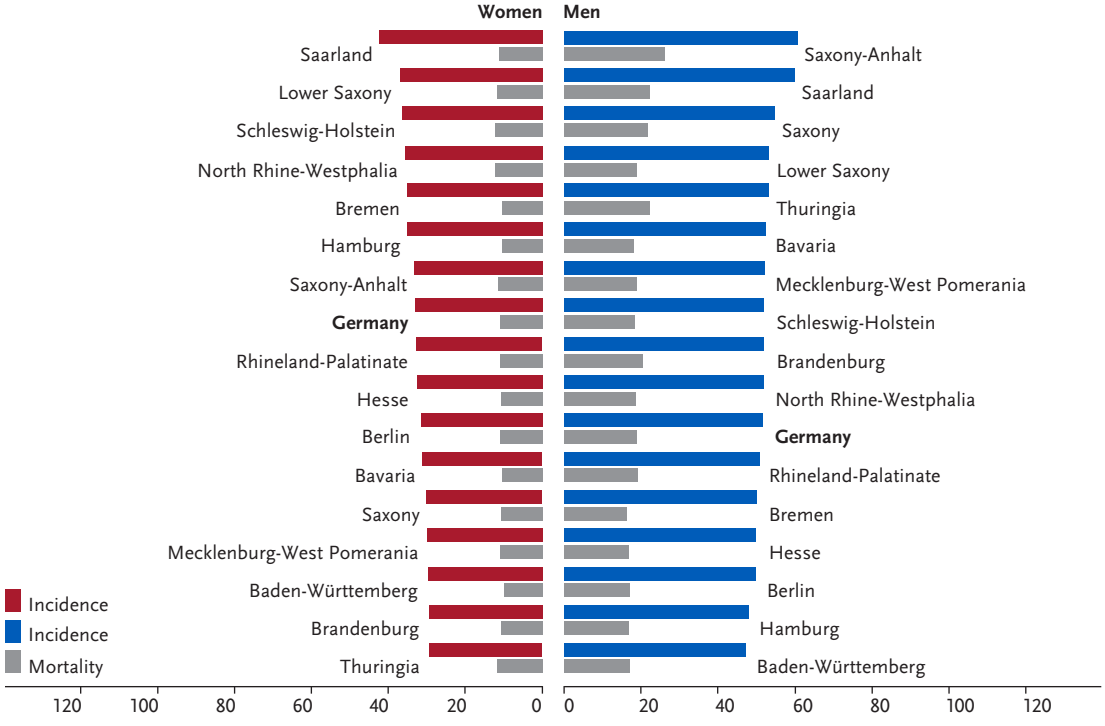
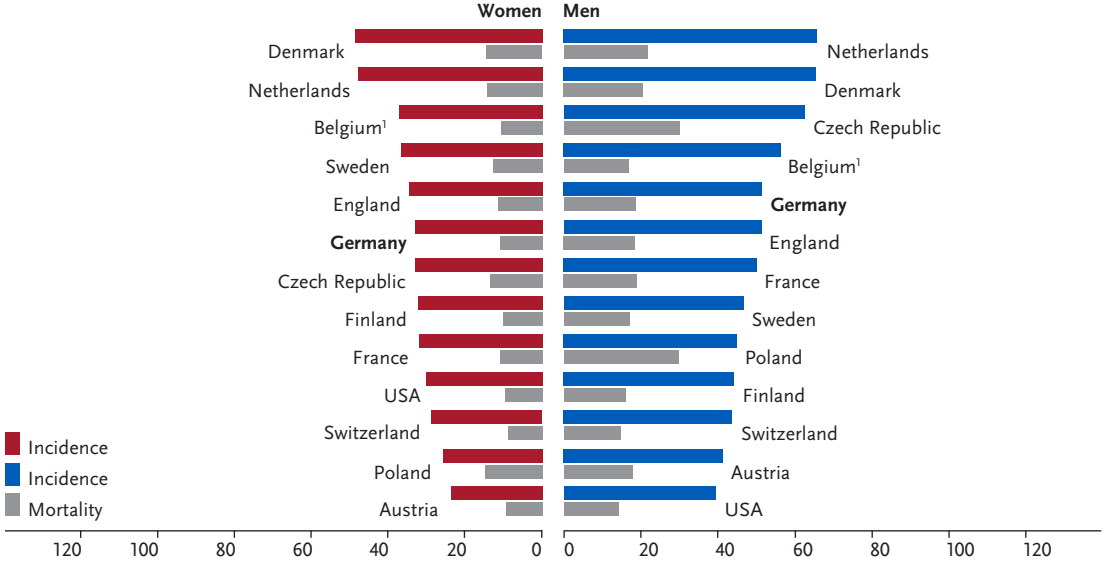


Figure 3.6.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C18 – C20, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality for 2016 and including C21

3.7 Anus

Table 3.7.1
Overview of key epidemiological parameters for Germany, ICD-10 C21

Incidence	2017		2018		Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	1,430	770	1,530	800	1,700	900
Crude incidence rate [1]	3.4	1.9	3.6	1.9	4.0	2.2
Age-standardised incidence rate [1, 2]	2.2	1.3	2.4	1.4	2.7	1.5
Median age at diagnosis	65	64	65	64		
Mortality	**2017**		**2018**		**2019**	
	Women	Men	Women	Men	Women	Men
Deaths	336	229	336	221	340	208
Crude mortality rate [1]	0.8	0.6	0.8	0.5	0.8	0.5
Age-standardised mortality rate [1, 2]	0.4	0.4	0.4	0.4	0.4	0.3
Median age at death	76	70	74	69	75	70
Prevalence and survival rates	**5 years**		**10 years**		**25 years**	
	Women	Men	Women	Men	Women	Men
Prevalence	5,500	2,800	8,600	4,500	12,400	6,400
Absolute survival rate (2017–2018) [3]	68 (66–72)	60	57	45		
Relative survival rate (2017–2018) [3]	75 (73–77)	68	71	60		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

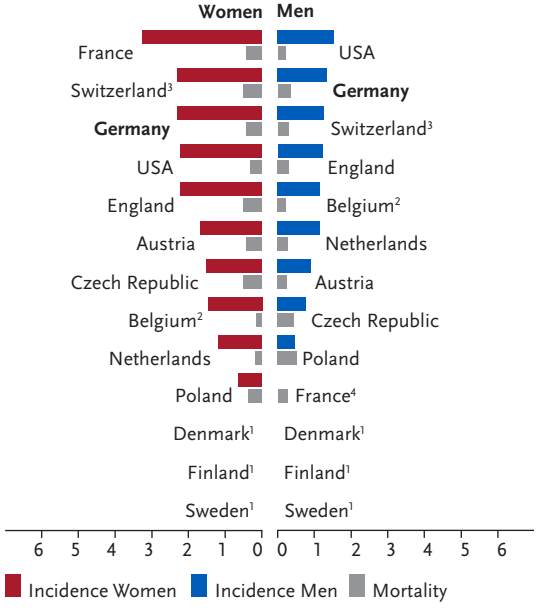
Epidemiology and risk factors

Cancers of the anus are predominantly squamous cell carcinomas. In 2018, around 2,330 people were diagnosed with anal cancer, 1,530 of them were women. Contrary to the trend of declining incidence rates of colorectal cancer incidence and mortality rates of anal cancer have increased substantially over the last 15 years. An increase in incidence is also described internationally. The relative 5-year survival rates of patients with the disease are around 75% for women and 68% for men.

In Germany, about 90% of anal carcinomas can be traced back to a persistent infection with human papillomaviruses (HPV). Related risk factors are certain sexual practices (frequently changing sexual partners, passive anal intercourse) and chronic immunosuppression (especially due to HIV infection or organ transplantation). HIV-positive men with same-sex partners have the highest risk of anal cancer.

The Standing Commission on Vaccination (STIKO) recommends vaccinating girls and boys against HPV, primarily between the ages of 9 and 14.

Figure 3.7.1
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C21, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] No comparable data available
[2] Mortality for 2016
[3] Mortality for 2013 to 2017
[4] No incidence data available for men

▶ *Additional information: www.krebsdaten.de/anus*

Figure 3.7.2
Age-standardised incidence and mortality rates by sex, ICD-10 C21, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

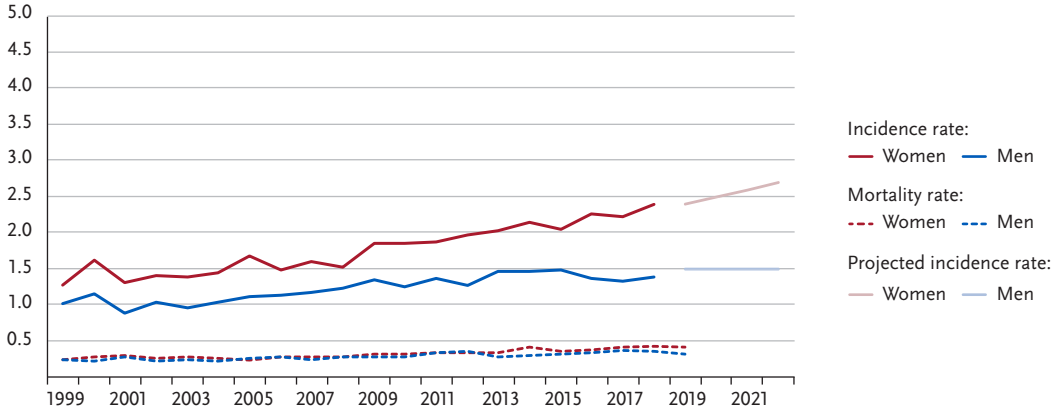


Figure 3.7.3
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C21, Germany 2017–2018

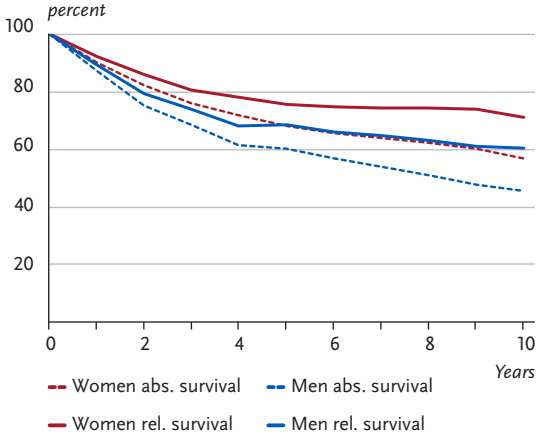


Figure 3.7.4
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C21, Germany 2016–2018

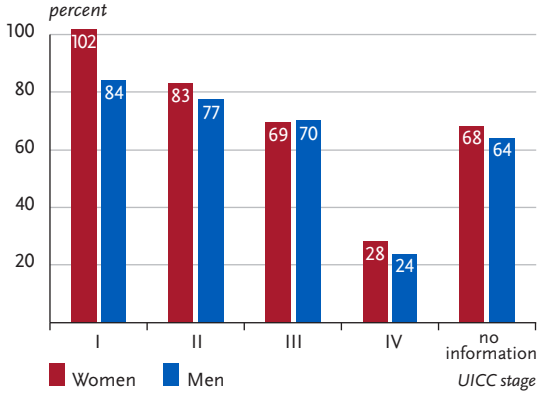
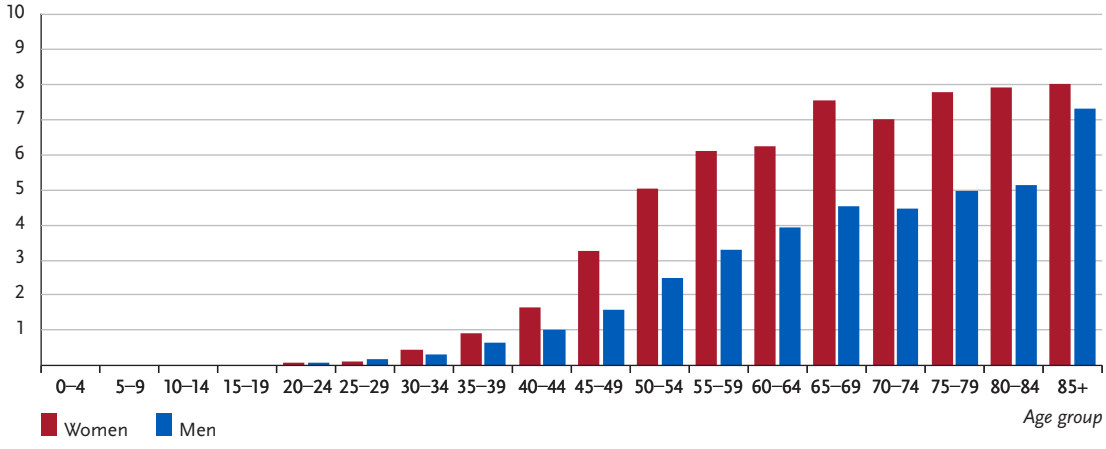


Figure 3.7.5
Age-specific incidence rates by sex, ICD-10 C21, Germany 2017–2018
per 100,000



3.8 Liver

Table 3.8.1
Overview of key epidemiological parameters for Germany, ICD-10 C22

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	3,030	6,350	2,820	6,690	3,100	7,400
Crude incidence rate [1]	7.2	15.6	6.7	16.3	7.4	17.9
Age-standardised incidence rate [1, 2]	3.8	9.9	3.5	10.3	3.7	10.8
Median age at diagnosis	75	71	75	71		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	2,697	5,213	2,689	5,301	2,649	5,519
Crude mortality rate [1]	6.4	12.8	6.4	13.0	6.3	13.5
Age-standardised mortality rate [1, 2]	3.1	7.8	3.0	7.7	3.0	7.9
Median age at death	77	74	77	74	77	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	3,900	9,300	5,700	12,000	7,900	14,600
Absolute survival rate (2017–2018) [3]	12 (7–18)	15 (13–20)	9 (4–14)	7 (6–11)		
Relative survival rate (2017–2018) [3]	14 (8–21)	18 (16–24)	12 (5–21)	11 (9–15)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Although liver cancer is relatively rare, it is one of the most common causes of cancer death due to its poor prognosis. In Germany, there are currently around 9,500 new cases per year, with almost 8,000 deaths. One in 190 women and one in 80 men in Germany will develop a malignant liver tumour in their lifetime. The relative 5-year survival rates of patients with the disease are around 14% for women and 18% for men. About 65% of malignant liver tumours arise from liver cells (hepatocellular carcinoma) and 26% from cells of the intrahepatic bile ducts (cholangiocarcinoma). The latter proportion is higher in women.

Since 1999, the age-standardised incidence and mortality rates have risen slightly in both sexes. For about 5 years, however, there have been signs of a decline in both rates for men.

The incidence and mortality rates in the north-western federal states are somewhat lower than in the rest of Germany. Internationally, France has high incidence and mortality rates, especially among men.

Risk factors and early detection

The main risk factor for liver cancer (hepatocellular carcinoma) is liver cirrhosis. In Germany, its most common causes are chronic hepatitis C virus infection and high alcohol consumption. Non-alcohol-related fatty liver diseases, which also increase the risk of liver cancer, are becoming more important. They can also be a consequence of diabetes mellitus or metabolic syndrome. The trigger of these is in turn very often obesity.

A chronic hepatitis B virus infection is a risk factor for liver cancer, even without liver cirrhosis. This applies mainly to Africa and South-East Asia. Smoking also increases the risk of disease. Hereditary metabolic diseases such as haemochromatosis, porphyria or alpha-1-antitrypsin deficiency can also increase the risk of liver cancer.

In addition to the risk factors mentioned, chronic inflammation or stones in the bile ducts can increase the risk of carcinoma of the bile ducts within the liver. There is no screening for the general population as part of the statutory screening services. Patients with liver cirrhosis or chronic hepatitis should be offered regular ultrasound checks.

▶ *Additional information: www.krebsdaten.de/liver*

Figure 3.8.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C22, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

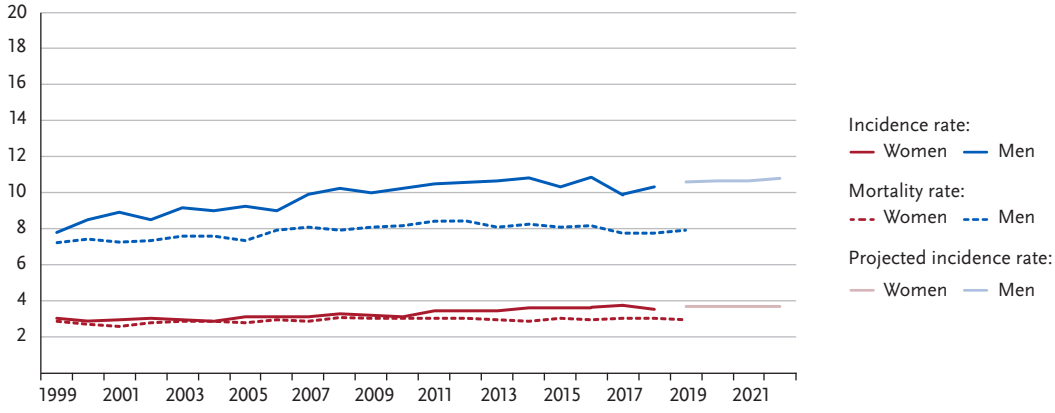


Figure 3.8.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C22, Germany 1999–2018/2019, projection (incidence) through 2022

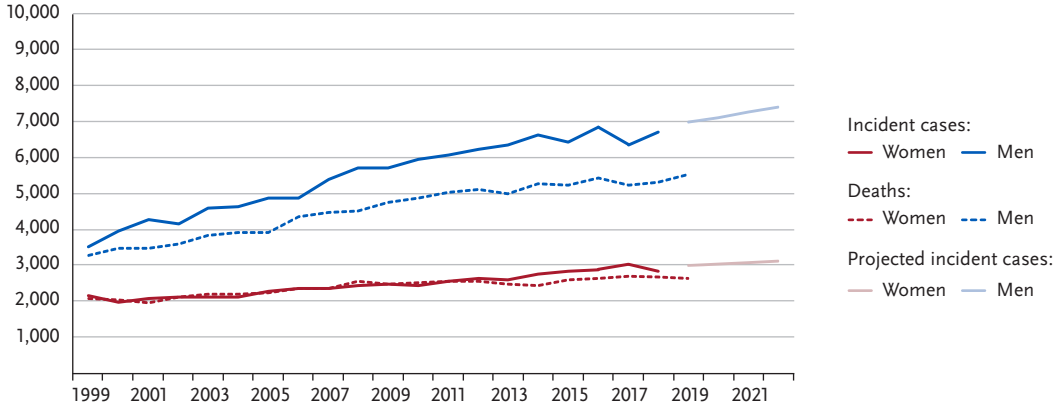


Figure 3.8.2
Age-specific incidence rates by sex, ICD-10 C22, Germany 2017–2018
per 100,000

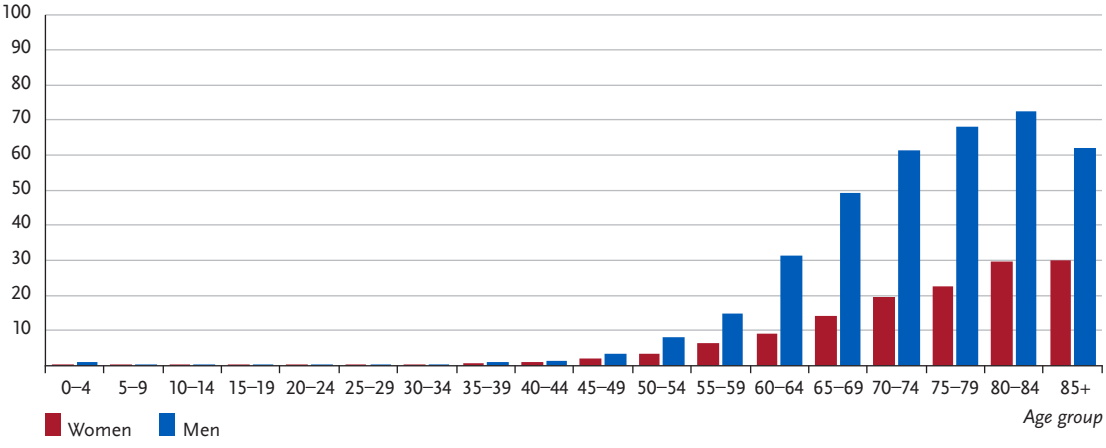


Table 3.8.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C22, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 12,500)	0.5 %	(1 in 190)	< 0.1 %	(1 in 20,700)	0.5 %	(1 in 200)
45 years	< 0.1 %	(1 in 3,700)	0.5 %	(1 in 190)	< 0.1 %	(1 in 5,700)	0.5 %	(1 in 200)
55 years	0.1 %	(1 in 1,400)	0.5 %	(1 in 200)	0.1 %	(1 in 1,900)	0.5 %	(1 in 200)
65 years	0.2 %	(1 in 650)	0.4 %	(1 in 220)	0.1 %	(1 in 710)	0.5 %	(1 in 210)
75 years	0.2 %	(1 in 470)	0.3 %	(1 in 300)	0.2 %	(1 in 460)	0.4 %	(1 in 270)
Lifetime risk			0.5 %	(1 in 190)			0.5 %	(1 in 200)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 7,700)	1.3 %	(1 in 80)	< 0.1 %	(1 in 19,000)	1.0 %	(1 in 98)
45 years	0.1 %	(1 in 1,700)	1.3 %	(1 in 80)	< 0.1 %	(1 in 2,700)	1.0 %	(1 in 97)
55 years	0.2 %	(1 in 430)	1.2 %	(1 in 81)	0.2 %	(1 in 660)	1.0 %	(1 in 97)
65 years	0.5 %	(1 in 200)	1.1 %	(1 in 90)	0.4 %	(1 in 270)	1.0 %	(1 in 100)
75 years	0.5 %	(1 in 180)	0.8 %	(1 in 130)	0.5 %	(1 in 190)	0.8 %	(1 in 130)
Lifetime risk			1.2 %	(1 in 80)			1.0 %	(1 in 99)

Figure 3.8.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C22, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 17%. For 68% of the remaining cases, no UICC stage could be assigned.

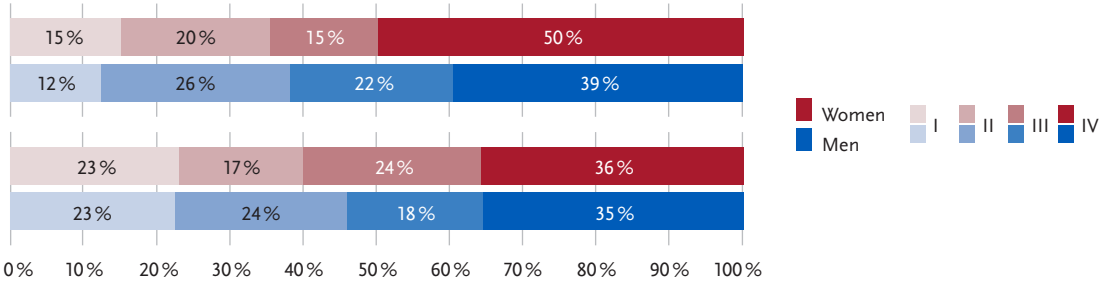


Figure 3.8.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C22, Germany 2017–2018

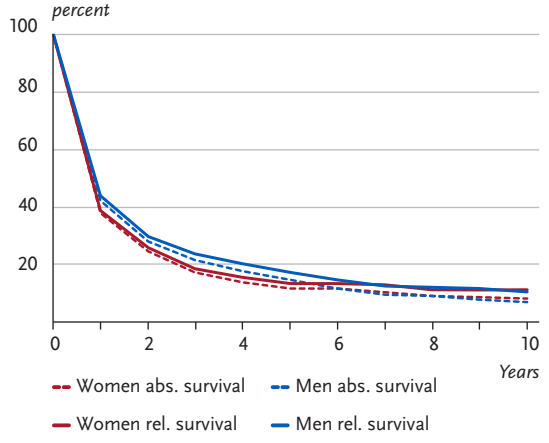


Figure 3.8.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C22, Germany 2016–2018

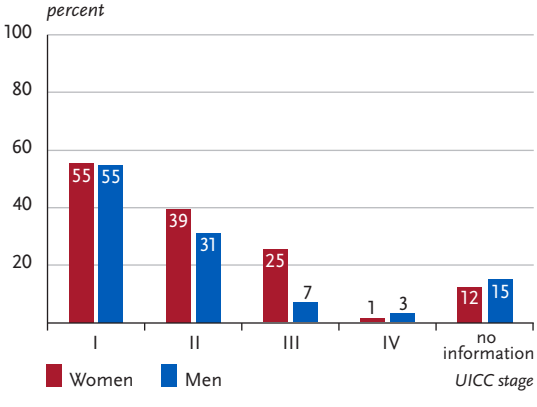


Figure 3.8.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C22, 2017–2018
per 100,000 (old European Standard)

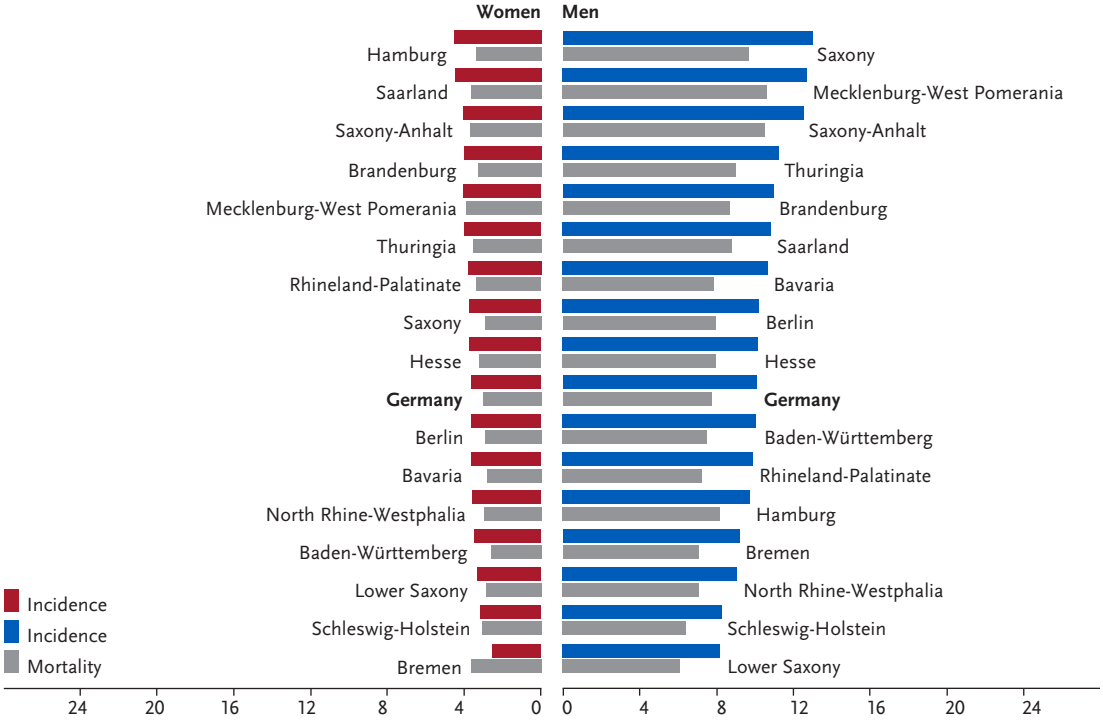
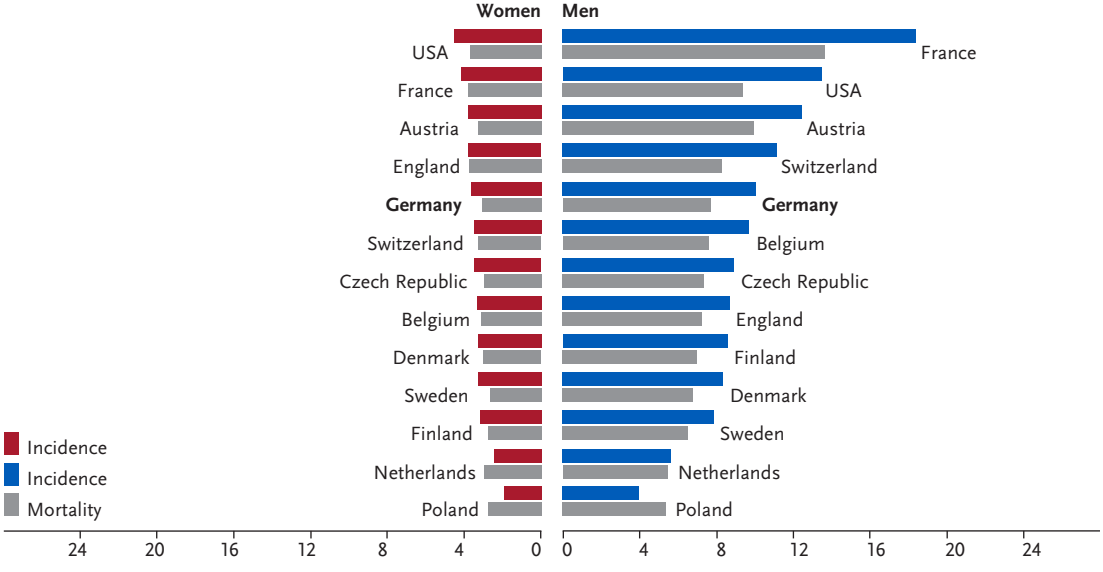


Figure 3.8.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C22, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.9 Gallbladder and biliary tract

Table 3.9.1
Overview of key epidemiological parameters for Germany, ICD-10 C23–C24

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	2,830	2,480	2,700	2,380	2,500	2,600
Crude incidence rate [1]	6.8	6.1	6.4	5.8	5.9	6.3
Age-standardised incidence rate [1, 2]	3.2	3.6	3.0	3.5	2.7	3.6
Median age at diagnosis	77	75	77	74		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	2,072	1,727	2,017	1,706	2,031	1,691
Crude mortality rate [1]	4.9	4.2	4.8	4.2	4.8	4.1
Age-standardised mortality rate [1, 2]	2.1	2.5	2.1	2.4	2.1	2.3
Median age at death	79	76	79	76	79	76
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	3,600	3,800	5,800	5,500	9,800	8,300
Absolute survival rate (2017–2018) [3]	14 (9–16)	17 (15–19)	11 (7–12)	11 (10–15)		
Relative survival rate (2017–2018) [3]	17 (11–20)	20 (18–24)	17 (11–20)	17 (15–24)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In Germany, about 5,080 new cases of malignant tumours of the gallbladder (about 27%) and extrahepatic bile ducts (73%) were diagnosed in 2018. The proportion of extrahepatic bile duct tumours was much higher in men (83%) than in women (64%). Histologically, these are predominantly adenocarcinomas. Of the tumours of the bile ducts, about 9% were so-called Klatskin tumours.

Similar to liver cancer, the risk of disease increases continuously with age. One in 200 women and one in 220 men will develop this tumour in the course of their lives.

Since 1999, age-standardised incidence and mortality rates have decreased in women, especially with regard to cancers of the gallbladder. In men, incidence has remained largely constant, with a slight decline in recent years. Age-standardised mortality rates declined until about 2009, then increased slightly.

Relative 5-year survival rates for malignant tumours of the gallbladder and extrahepatic bile ducts are rather low, at 17% for women and 20% for men.

Risk factors

The causes of bile duct and gallbladder tumours have not been clearly identified. The main risk factor is age. Primary sclerosing cholangitis (PSC) is also considered a risk factor for both cancers. Other possible risk factors for extrahepatic bile duct carcinomas are congenital abnormalities of the biliary tract (Caroli syndrome), bile duct stones in the main bile duct, choledochal cysts and chronic inflammatory bowel disease. Larger gallbladder polyps, inflammation of the gallbladder (and its sequela, the porcelain gallbladder), gallbladder stones as well as obesity can increase the risk of gallbladder carcinoma.

Screening examinations of the general population are not useful. For certain risk groups (such as patients with gallbladder polyps, stones or PSC), regular check-ups may be considered.

▶ *Additional information: www.krebsdaten.de/gallbladder*

Figure 3.9.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C23 – C24, Germany 1999 – 2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

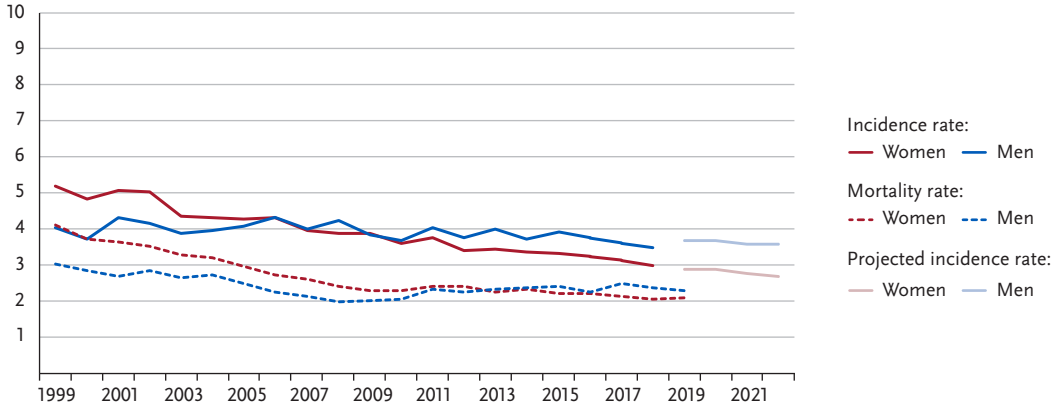


Figure 3.9.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C23 – C24, Germany 1999 – 2018/2019, projection (incidence) through 2022

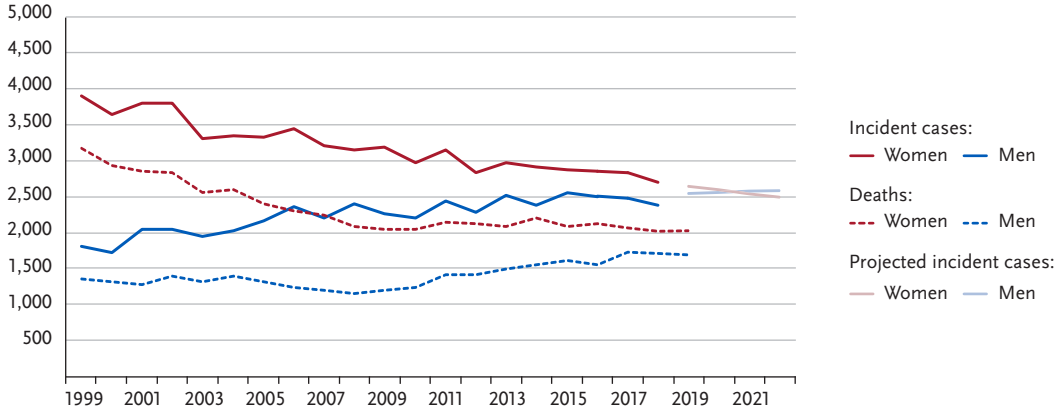


Figure 3.9.2
Age-specific incidence rates by sex, ICD-10 C23 – C24, Germany 2017 – 2018
per 100,000

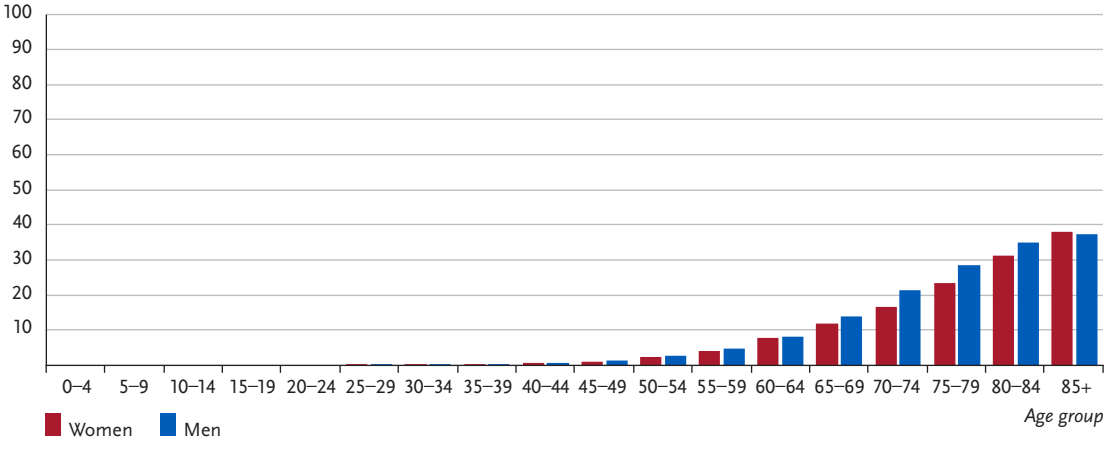


Table 3.9.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C23–C24, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 22,300)	0.5 %	(1 in 200)	< 0.1 %	(1 in 110,900)	0.4 %	(1 in 260)
45 years	< 0.1 %	(1 in 5,600)	0.5 %	(1 in 200)	< 0.1 %	(1 in 11,300)	0.4 %	(1 in 260)
55 years	0.1 %	(1 in 1,700)	0.5 %	(1 in 200)	< 0.1 %	(1 in 2,800)	0.4 %	(1 in 260)
65 years	0.1 %	(1 in 770)	0.5 %	(1 in 210)	0.1 %	(1 in 1,100)	0.4 %	(1 in 270)
75 years	0.2 %	(1 in 450)	0.4 %	(1 in 260)	0.2 %	(1 in 560)	0.3 %	(1 in 310)
Lifetime risk			0.5 %	(1 in 200)			0.4 %	(1 in 260)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 16,800)	0.5 %	(1 in 220)	< 0.1 %	(1 in 56,700)	0.3 %	(1 in 290)
45 years	< 0.1 %	(1 in 4,800)	0.5 %	(1 in 220)	< 0.1 %	(1 in 8,800)	0.3 %	(1 in 290)
55 years	0.1 %	(1 in 1,600)	0.5 %	(1 in 220)	< 0.1 %	(1 in 2,700)	0.3 %	(1 in 290)
65 years	0.2 %	(1 in 640)	0.4 %	(1 in 230)	0.1 %	(1 in 1,000)	0.3 %	(1 in 290)
75 years	0.2 %	(1 in 440)	0.3 %	(1 in 290)	0.2 %	(1 in 550)	0.3 %	(1 in 330)
Lifetime risk			0.5 %	(1 in 220)			0.3 %	(1 in 290)

Figure 3.9.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C23–C24.1, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 10%. For 37% of the remaining cases, no UICC stage could be assigned.

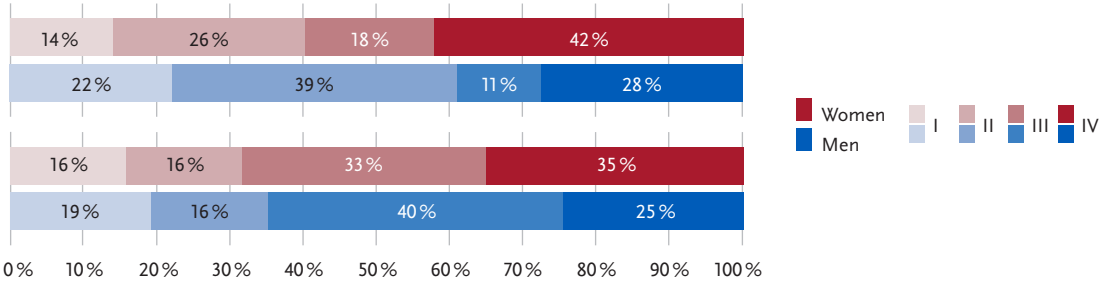


Figure 3.9.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C23–C24, Germany 2017–2018

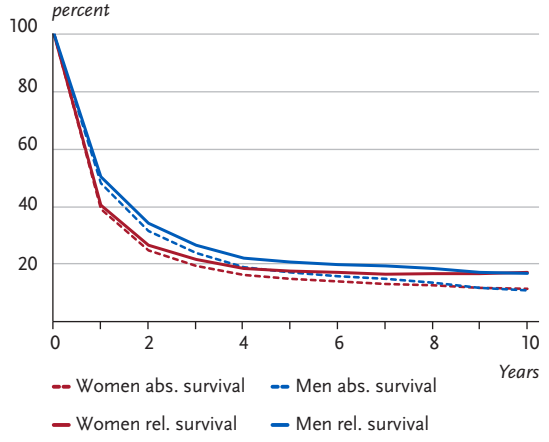


Figure 3.9.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C23–C24, Germany 2016–2018

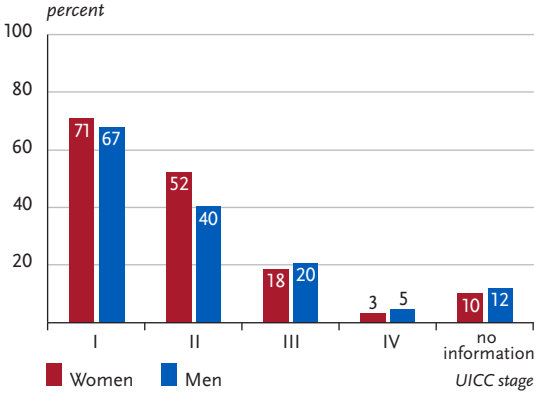


Figure 3.9.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C23 – C24, 2017 – 2018
per 100,000 (old European Standard)

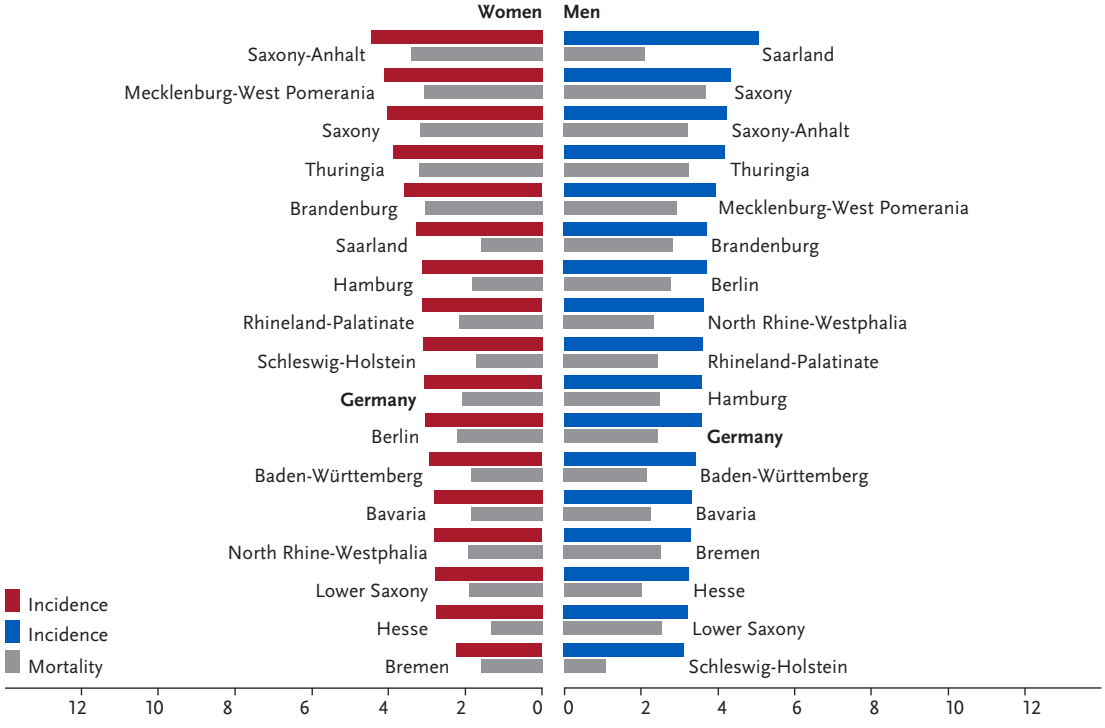
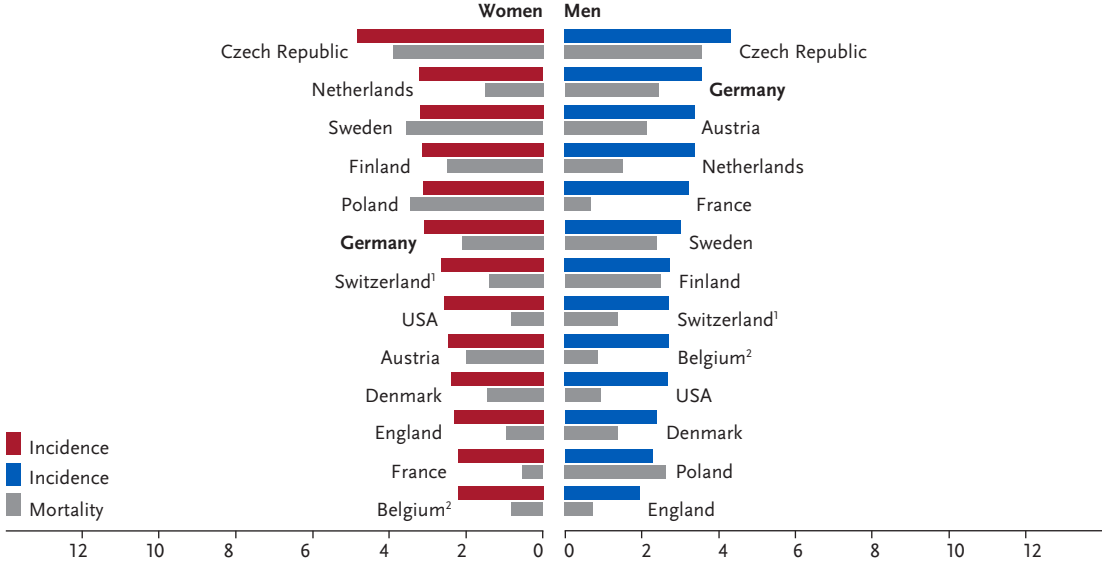


Figure 3.9.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C23 – C24, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality for 2013 to 2017
[2] Mortality for 2016

3.10 Pancreas

Table 3.10.1
Overview of key epidemiological parameters for Germany, ICD-10 C25

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	9,660	9,620	9,160	9,860	10,300	10,700
Crude incidence rate [1]	23.1	23.6	21.8	24.1	24.5	25.9
Age-standardised incidence rate [1, 2]	11.4	14.8	10.8	15.1	11.8	15.4
Median age at diagnosis	76	72	76	72		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	9,058	8,947	9,143	9,189	9,638	9,584
Crude mortality rate [1]	21.6	21.9	21.8	22.5	22.9	23.4
Age-standardised mortality rate [1, 2]	9.9	13.3	9.9	13.5	10.3	13.8
Median age at death	77	74	78	74	78	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	10,000	10,900	13,500	14,500	17,300	18,000
Absolute survival rate (2017–2018) [3]	8 (7–12)	9 (7–13)	6 (4–8)	6 (5–9)		
Relative survival rate (2017–2018) [3]	10 (8–13)	10 (8–15)	7 (6–11)	8 (6–13)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In 2018, approximately 19,000 people were diagnosed with pancreatic cancer (pancreatic carcinoma). Due to the unfavourable prognosis, almost as many people also died from this disease. Since the end of the 1990s, the age-standardised incidence and mortality rates have risen slightly, especially in the higher age groups from 65 years onwards. The absolute number of new cases and deaths has continuously increased over the years for both sexes, also due to the demographic development.

Malignant neoplasms of the pancreas often cause no or only unspecific symptoms in the early stages. Thus, the tumour is often only detected at an advanced stage. The relative 5-year survival rate is therefore extremely unfavourable. In Germany, it is 10% for women and men with pancreatic cancer. Therefore, pancreatic carcinoma has the lowest survival rate of all cancers, next to mesothelioma. With a share of 8.7% (women) and 7.4% (men), it is the fourth most frequent cause of cancer death in both sexes. The median age at diagnosis is 76 years for women and 72 years for men.

Risk factors

Smoking, both active and passive, and being very overweight (obesity) are considered to be established risk factors. Diabetes mellitus type 2 and chronic inflammation of the pancreas (pancreatitis) also increase the risk. This also applies to very high alcohol consumption. Infections with pathogens such as Helicobacter pylori and hepatitis B (or also HIV) are associated with the development of pancreatic carcinomas. First-degree relatives of patients with pancreatic cancer are themselves affected more often than average. This association may be due to hereditary factors, such as a BRCA-2 mutation, or a shared lifestyle. The consumption of large amounts of processed meats, smoked or grilled foods also increase the risk of pancreatic cancer.

The role played by environmental factors or occupational exposure to pollutants is not clearly understood.

▶ *Additional information: www.krebsdaten.de/pancreas*

Figure 3.10.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C25, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

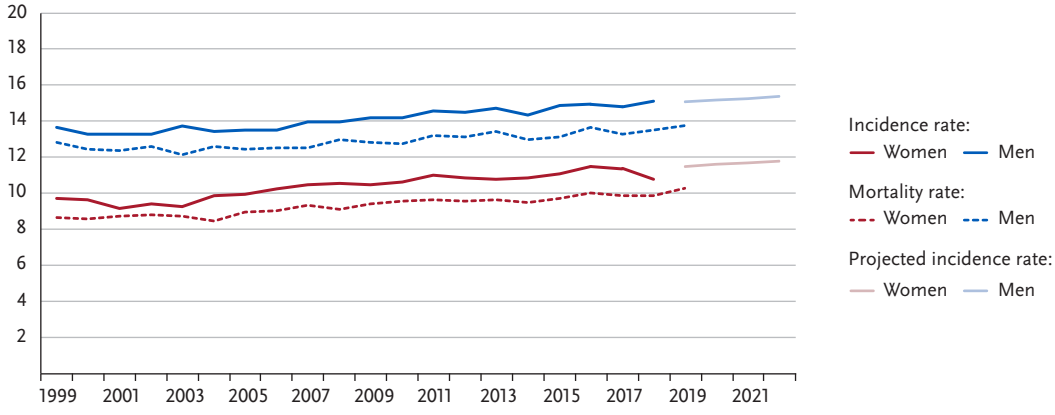


Figure 3.10.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C25, Germany 1999–2018/2019, projection (incidence) through 2022

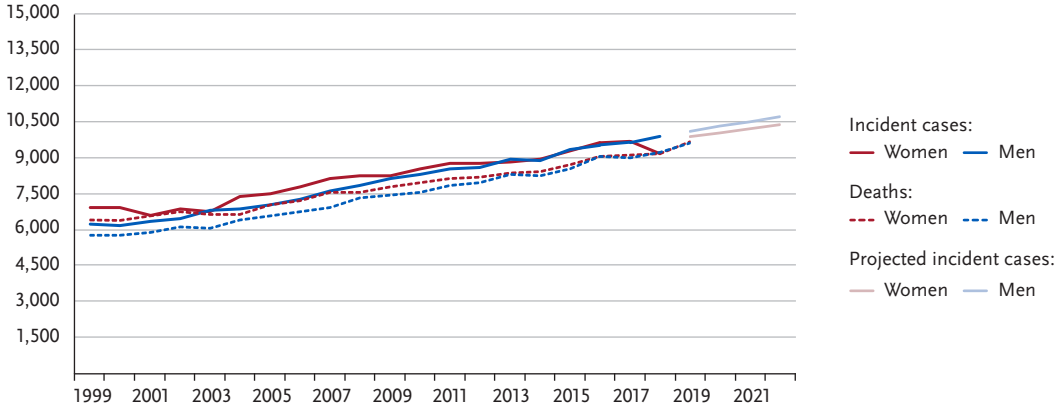


Figure 3.10.2
Age-specific incidence rates by sex, ICD-10 C25, Germany 2017–2018
per 100,000

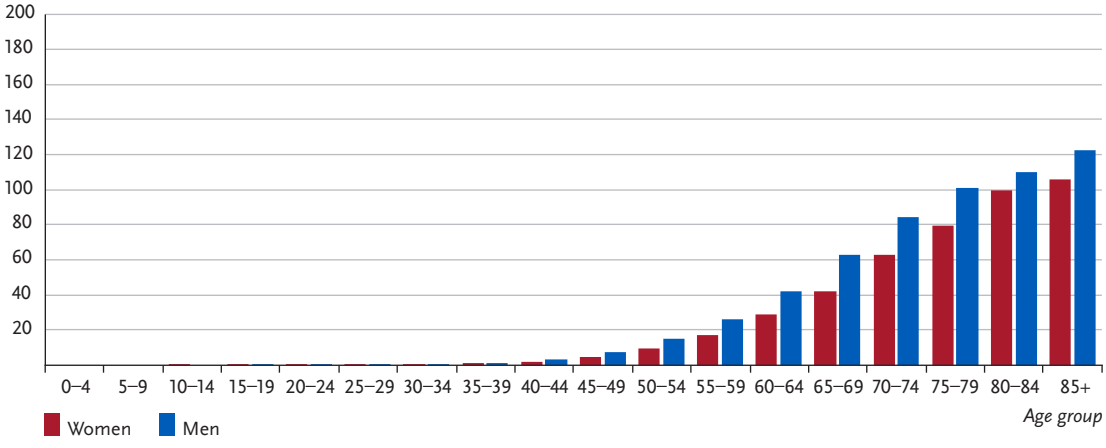


Table 3.10.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C25, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 5,300)	1.7 %	(1 in 58)	< 0.1 %	(1 in 10,400)	1.7 %	(1 in 57)
45 years	0.1 %	(1 in 1,300)	1.7 %	(1 in 58)	0.1 %	(1 in 2,000)	1.7 %	(1 in 57)
55 years	0.2 %	(1 in 450)	1.7 %	(1 in 60)	0.2 %	(1 in 550)	1.7 %	(1 in 58)
65 years	0.5 %	(1 in 200)	1.5 %	(1 in 66)	0.4 %	(1 in 220)	1.6 %	(1 in 61)
75 years	0.7 %	(1 in 140)	1.2 %	(1 in 85)	0.8 %	(1 in 130)	1.3 %	(1 in 74)
Lifetime risk			1.7 %	(1 in 58)			1.7 %	(1 in 58)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 4,100)	1.9 %	(1 in 53)	< 0.1 %	(1 in 7,400)	1.8 %	(1 in 56)
45 years	0.1 %	(1 in 850)	1.9 %	(1 in 53)	0.1 %	(1 in 1,230)	1.8 %	(1 in 56)
55 years	0.3 %	(1 in 300)	1.8 %	(1 in 55)	0.3 %	(1 in 360)	1.8 %	(1 in 56)
65 years	0.7 %	(1 in 150)	1.6 %	(1 in 61)	0.6 %	(1 in 170)	1.6 %	(1 in 61)
75 years	0.8 %	(1 in 120)	1.2 %	(1 in 82)	0.9 %	(1 in 120)	1.3 %	(1 in 75)
Lifetime risk			1.8 %	(1 in 54)			0.4 %	(1 in 57)

Figure 3.10.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C25, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 17%. For 33% of the remaining cases, no UICC stage could be assigned.

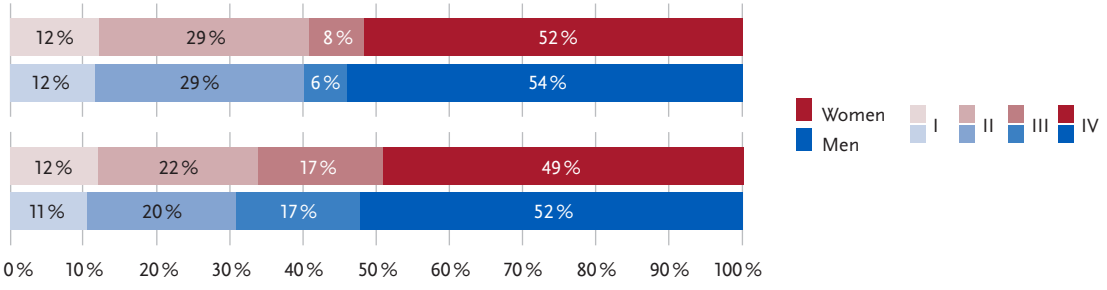


Figure 3.10.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C25, Germany 2017–2018

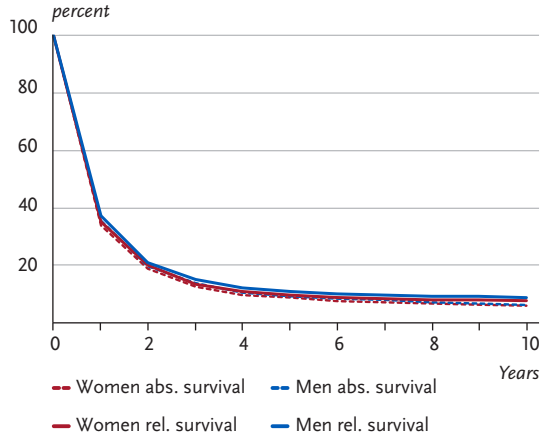


Figure 3.10.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C25, Germany 2016–2018

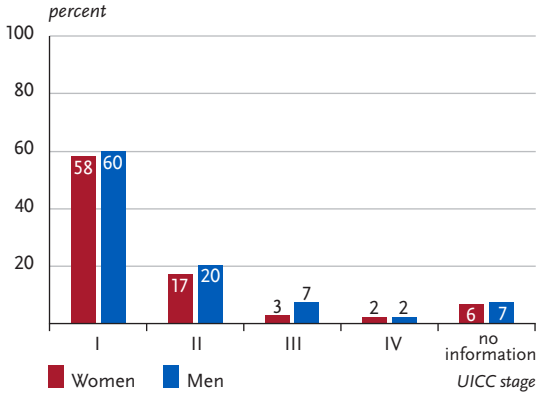


Figure 3.10.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C25, 2017–2018
per 100,000 (old European Standard)

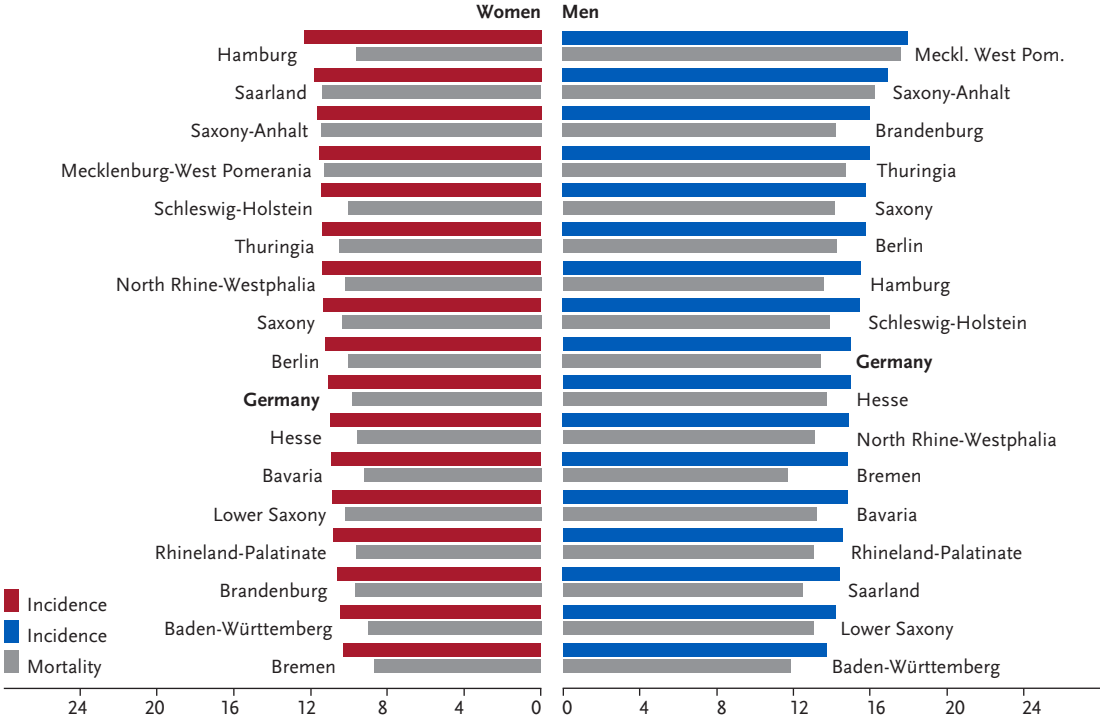
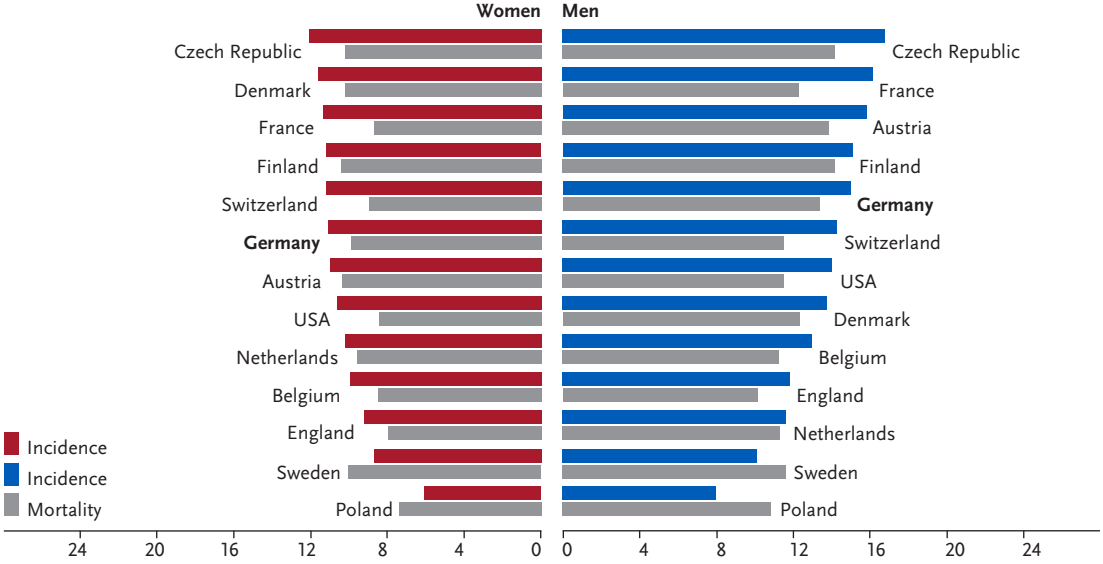


Figure 3.10.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C25, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.11 Larynx

Table 3.11.1
Overview of key epidemiological parameters for Germany, ICD-10 C32

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	570	2,820	540	2,770	640	2,600
Crude incidence rate [1]	1.4	6.9	1.3	6.8	1.5	6.4
Age-standardised incidence rate [1, 2]	0.9	4.7	0.8	4.6	1.0	4.1
Median age at diagnosis	65	67	66	67		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	201	1,182	203	1,201	213	1,217
Crude mortality rate [1]	0.5	2.9	0.5	2.9	0.5	3.0
Age-standardised mortality rate [1, 2]	0.3	1.9	0.3	1.8	0.3	1.8
Median age at death	71	70	72	72	73	70
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	2,000	10,400	3,300	17,700	5,400	30,000
Absolute survival rate (2017–2018) [3]	59	56 (48–62)	44	37 (30–41)		
Relative survival rate (2017–2018) [3]	63	64 (54–72)	52	51 (41–56)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

The larynx is almost only ever affected by squamous cell carcinomas. Men develop this cancer considerably more often than women: There were approximately 3,310 new cases in 2018, but only about one in five affected a woman. In the course of a lifetime, one in 200 men, but only one in 1,100 women in Germany will develop laryngeal cancer. The median age at diagnosis in 2018 was 66 for women and 67 for men, which is earlier than for cancer overall. The age-specific incidence rates show an age peak between 60 and 75 years for women, and between 65 and 75 years for men.

The incidence and mortality rates for men have decreased since the end of the 1990s. The rates for women, on the other hand, have remained almost constant.

The relative 5-year survival rates for women (63%) and men (64%) do not differ significantly. A higher proportion of early tumour stages (stages I/II) are diagnosed in men (52%) than in women (46%) (according to the 7th TNM edition).

Risk factors

Regular cigarette consumption and excessive consumption of alcohol are main risk factors for the development of laryngeal cancer. The combination of both factors is particularly harmful. It is also known that these tumours are associated with (occupational) exposure to asbestos, ionising radiation such as from uranium, aerosols containing sulphuric acid, polycyclic aromatic hydrocarbons and coal and tar products. Cement and wood dust appear to be less important.

Infections with human papillomaviruses (HPV), especially HPV 16, are responsible for the development of a small proportion of laryngeal carcinomas.

The influence of lifestyle and diet has not yet been clearly clarified, as tobacco and alcohol consumption override the influence of other factors in the majority of those affected. However, there are indications that an unbalanced, vitamin-poor diet with excessive consumption of meat and fried food can increase the risk.

A genetic predisposition is also assumed, as an increased incidence of laryngeal carcinoma has sometimes been observed within a family.

▶ *Additional information: www.krebsdaten.de/larynx*

Figure 3.11.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C32, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

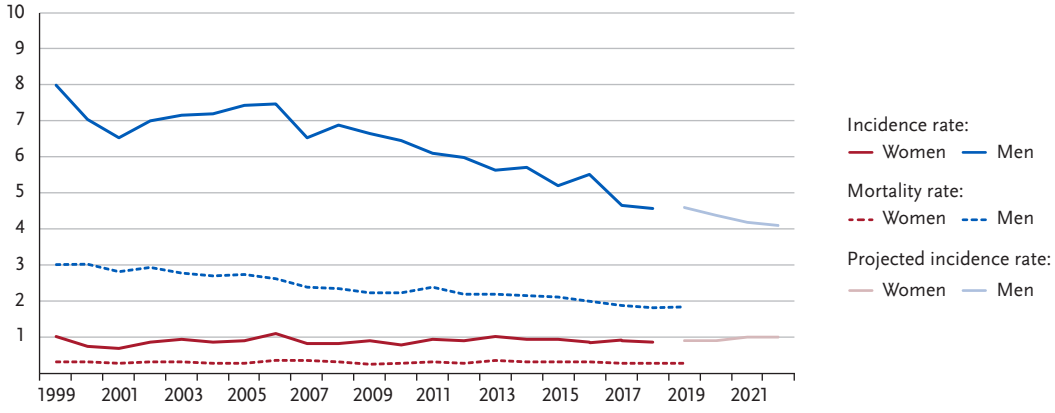


Figure 3.11.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C32, Germany 1999–2018/2019, projection (incidence) through 2022

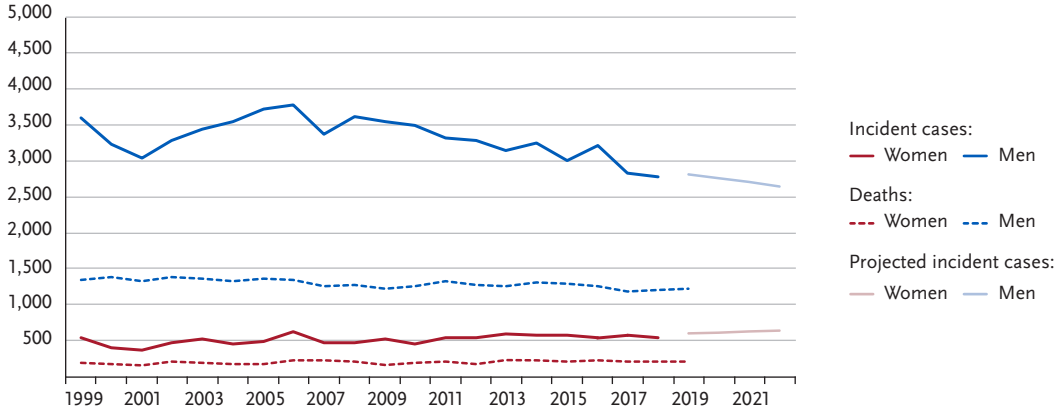


Figure 3.11.2
Age-specific incidence rates by sex, ICD-10 C32, Germany 2017–2018
per 100,000

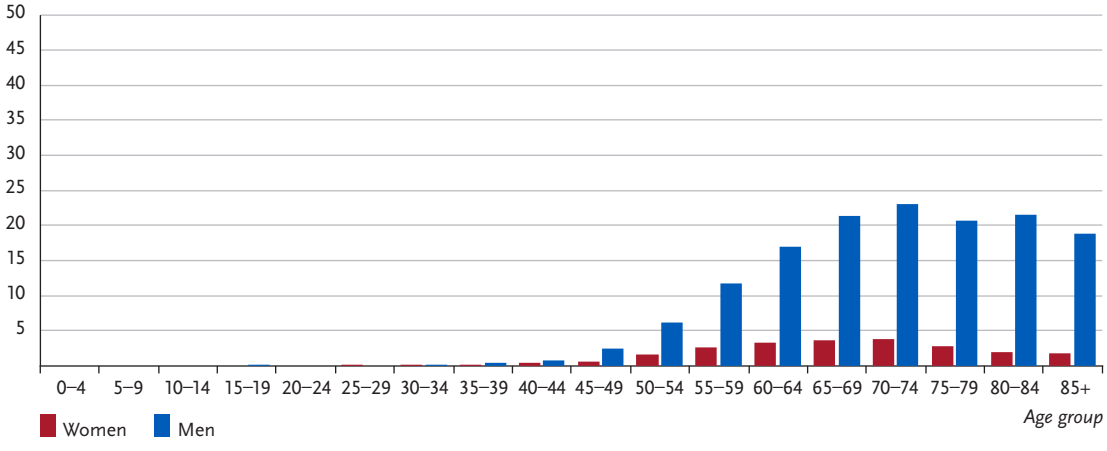


Table 3.11.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C32, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 46,500)	0.1 %	(1 in 1,000)	*		< 0.1 %	(1 in 2,600)
45 years	< 0.1 %	(1 in 9,500)	0.1 %	(1 in 1,100)	< 0.1 %	(1 in 67,200)	< 0.1 %	(1 in 2,600)
55 years	< 0.1 %	(1 in 3,600)	0.1 %	(1 in 1,200)	< 0.1 %	(1 in 15,300)	< 0.1 %	(1 in 2,600)
65 years	< 0.1 %	(1 in 2,900)	0.1 %	(1 in 1,700)	< 0.1 %	(1 in 7,400)	< 0.1 %	(1 in 3,000)
75 years	< 0.1 %	(1 in 4,900)	< 0.1 %	(1 in 3,400)	< 0.1 %	(1 in 8,500)	< 0.1 %	(1 in 4,500)
Lifetime risk			0.1 %	(1 in 1,100)			< 0.1 %	(1 in 2,600)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 14,800)	0.5 %	(1 in 200)	< 0.1 %	(1 in 69,100)	0.2 %	(1 in 430)
45 years	< 0.1 %	(1 in 2,400)	0.5 %	(1 in 200)	< 0.1 %	(1 in 9,900)	0.2 %	(1 in 430)
55 years	0.1 %	(1 in 740)	0.5 %	(1 in 210)	< 0.1 %	(1 in 2,300)	0.2 %	(1 in 440)
65 years	0.2 %	(1 in 490)	0.4 %	(1 in 260)	0.1 %	(1 in 1,200)	0.2 %	(1 in 490)
75 years	0.2 %	(1 in 630)	0.2 %	(1 in 450)	0.1 %	(1 in 1,000)	0.2 %	(1 in 640)
Lifetime risk			0.5 %	(1 in 200)			0.2 %	(1 in 440)

* No deaths in the period under consideration

Figure 3.11.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C32, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 5%. For 35% of the remaining cases, no UICC stage could be assigned.

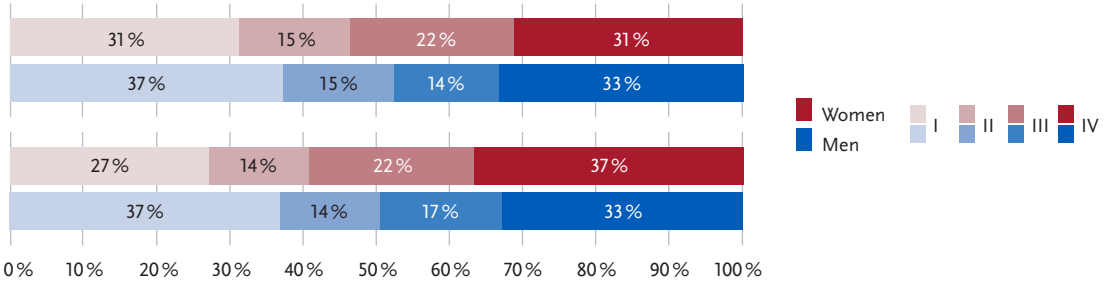


Figure 3.11.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C32, Germany 2017–2018

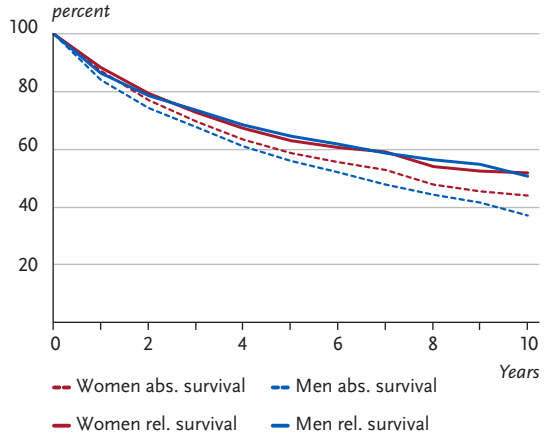


Figure 3.11.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C32, Germany 2016–2018

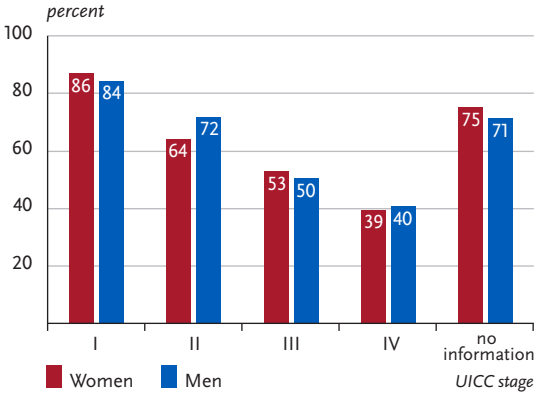


Figure 3.11.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C32, 2017–2018
per 100,000 (old European Standard)

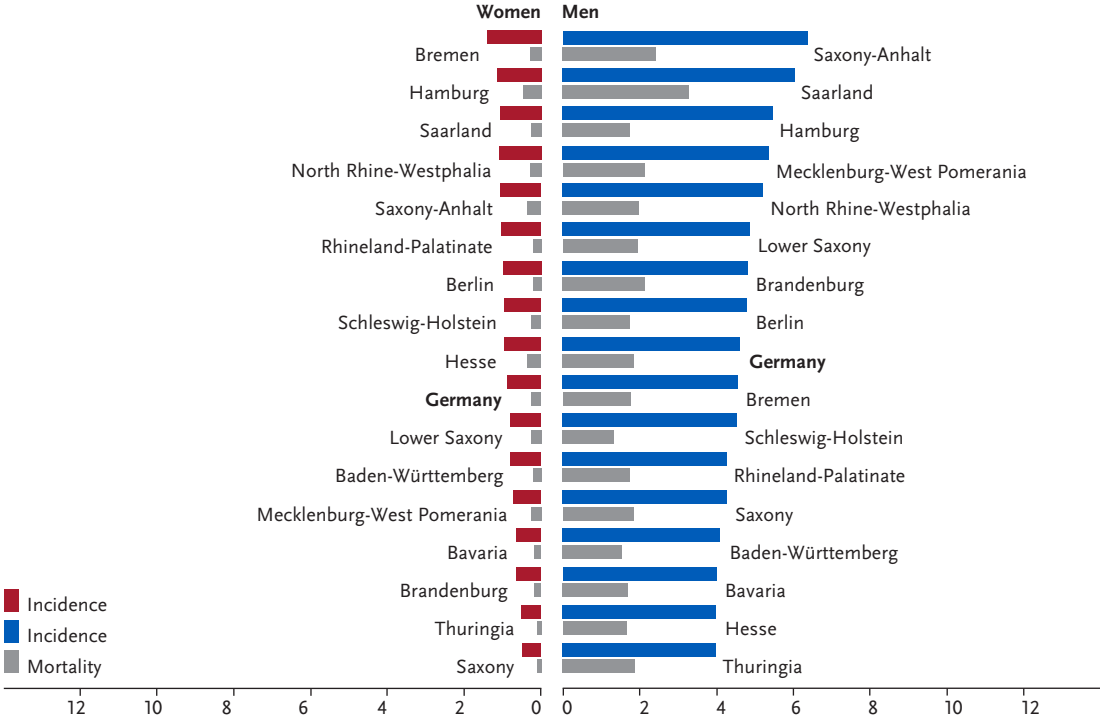
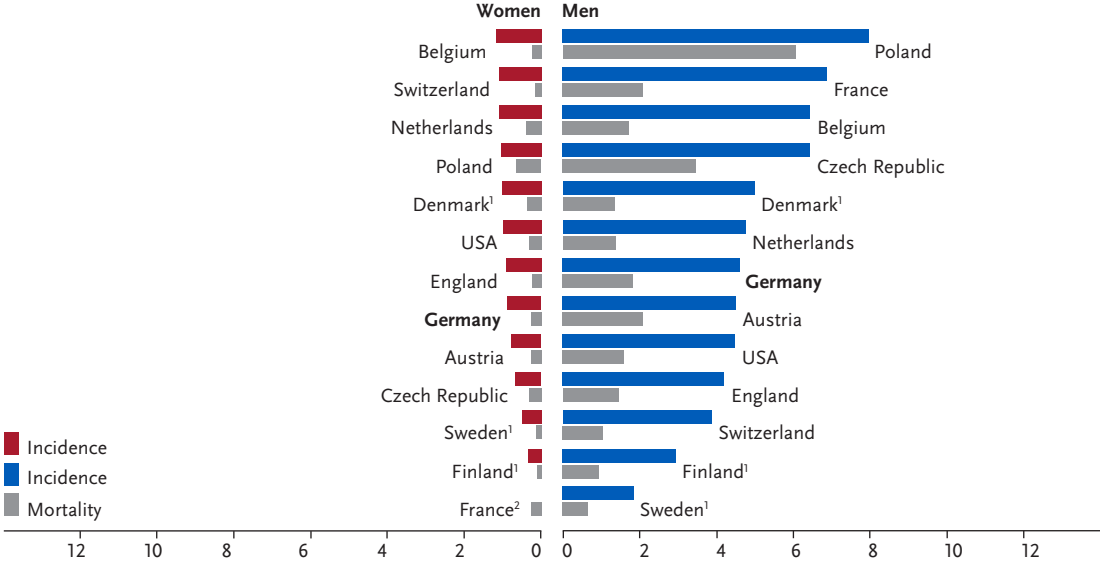


Figure 3.11.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C32, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data include C10.1
[2] Incidence for women not available

3.12 Lung

Table 3.12.1
Overview of key epidemiological parameters for Germany, ICD-10 C33–C34

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	21,870	36,740	21,930	35,290	25,000	34,700
Crude incidence rate [1]	52.2	90.1	52.2	86.3	59.0	84.1
Age-standardised incidence rate [1, 2]	31.7	58.2	31.5	55.3	34.4	52.1
Median age at diagnosis	69	70	69	70		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	16,382	28,692	16,514	28,365	16,999	27,882
Crude mortality rate [1]	39.1	70.4	39.3	69.3	40.4	68.0
Age-standardised mortality rate [1, 2]	22.1	43.9	22.0	42.8	22.2	41.1
Median age at death	71	72	71	72	72	72
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	37,600	54,000	51,800	75,800	68,000	106,300
Absolute survival rate (2017–2018) [3]	20 (19–25)	15 (13–18)	13 (12–16)	9 (7–12)		
Relative survival rate (2017–2018) [3]	22 (21–27)	17 (16–21)	16 (14–20)	12 (10–18)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In 2018, approximately 21,900 women and 35,300 men developed malignant tumours of the lung, and 16,514 women and 28,365 men died of this disease.

The age-standardised incidence and mortality rates progress in opposite directions for both sexes. Since the end of the 1990s, they have risen continuously for women, whereas the rates for men have declined over the same period and now have come very close to those of women. This different development can be attributed to the change in smoking habits that already occurred some time ago and will probably continue. Lung cancer belongs to the prognostically unfavourable tumours, which is expressed in a low relative 5-year survival rate of about 22% in women and 17% in men. Histologically, three main types are distinguished: Adenocarcinomas account for 43% of cases, squamous cell carcinoma for about 22% and small cell lung carcinoma for about 15%, which has the worst prognosis due to its early tendency to metastasise. In an international comparison among the selected countries, the highest incidence rates for women are seen in Denmark and for men in France.

Risk factors and early detection

Tobacco use is the main risk factor for lung cancer. In men, up to nine out of ten and in women at least six out of ten cases are due to active smoking. Passive smoking also increases the risk of cancer.

Other risk factors play a rather subordinate role. About 9 to 15% of lung carcinomas are caused by occupational exposure to carcinogenic substances and can be recognised as an occupational disease. These include asbestos, polycyclic aromatic hydrocarbons, arsenic and quartz dusts. Occupational or domestic exposure to radon, a naturally occurring radioactive noble gas, or other sources of ionising radiation also increases the risk.

Diesel exhaust and particulate matter are the most important risk factors among air pollutants.

An influence of hereditary factors is suspected. There is not yet a suitable method for the early detection of lung cancer for the entire population. However, it is currently being examined whether and in what form early detection examinations by means of low-dose computed tomography could be implemented for defined risk groups.

▶ *Additional information: www.krebsdaten.de/lung*

Figure 3.12.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C33–C34, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

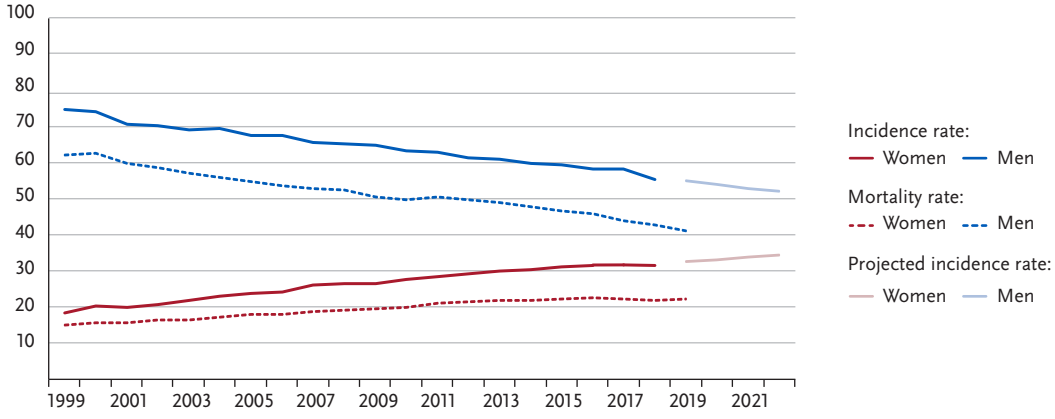


Figure 3.12.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C33–C34, Germany 1999–2018/2019, projection (incidence) through 2022

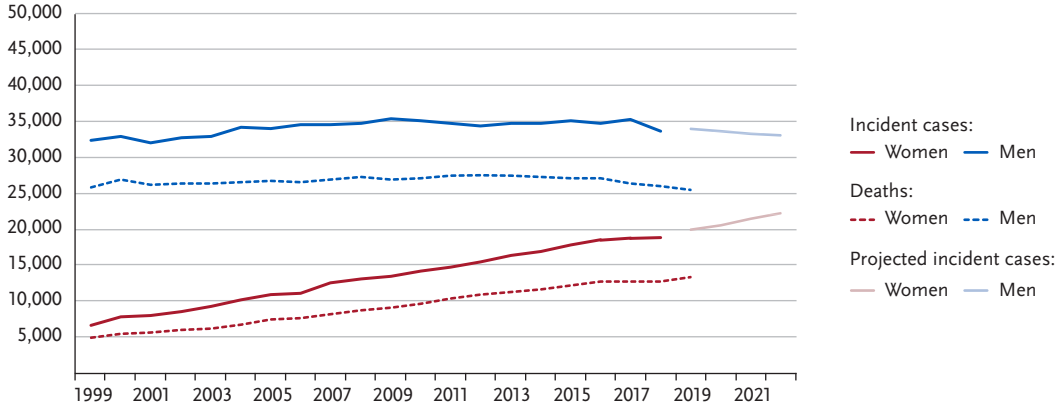


Figure 3.12.2
Age-specific incidence rates by sex, ICD-10 C33–C34, Germany 2017–2018
per 100,000

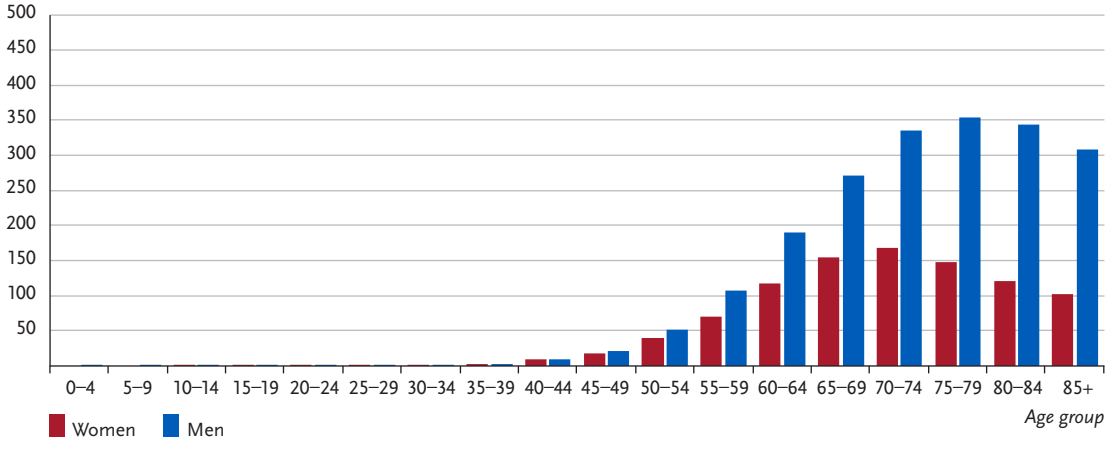


Table 3.12.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C33–C34, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,600)	4.0 %	(1 in 25)	< 0.1 %	(1 in 4,100)	3.0 %	(1 in 33)
45 years	0.3 %	(1 in 340)	3.9 %	(1 in 26)	0.2 %	(1 in 620)	3.0 %	(1 in 33)
55 years	0.9 %	(1 in 110)	3.7 %	(1 in 27)	0.6 %	(1 in 160)	2.9 %	(1 in 34)
65 years	0.9 %	(1 in 66)	2.9 %	(1 in 34)	1.1 %	(1 in 93)	2.4 %	(1 in 41)
75 years	1.2 %	(1 in 85)	1.6 %	(1 in 61)	1.0 %	(1 in 99)	1.5 %	(1 in 65)
Lifetime risk			3.9 %	(1 in 25)			3.0 %	(1 in 33)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,400)	6.5 %	(1 in 15)	< 0.1 %	(1 in 3,200)	5.4 %	(1 in 19)
45 years	0.4 %	(1 in 270)	6.6 %	(1 in 15)	0.2 %	(1 in 430)	5.4 %	(1 in 18)
55 years	1.4 %	(1 in 71)	6.4 %	(1 in 16)	1.0 %	(1 in 99)	5.4 %	(1 in 19)
65 years	2.7 %	(1 in 38)	5.5 %	(1 in 18)	2.0 %	(1 in 49)	4.8 %	(1 in 21)
75 years	2.7 %	(1 in 37)	3.6 %	(1 in 27)	2.4 %	(1 in 42)	3.5 %	(1 in 28)
Lifetime risk			6.5 %	(1 in 15)			5.3 %	(1 in 19)

Figure 3.12.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C33–C34, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 10%. For 32% of the remaining cases, no UICC stage could be assigned.

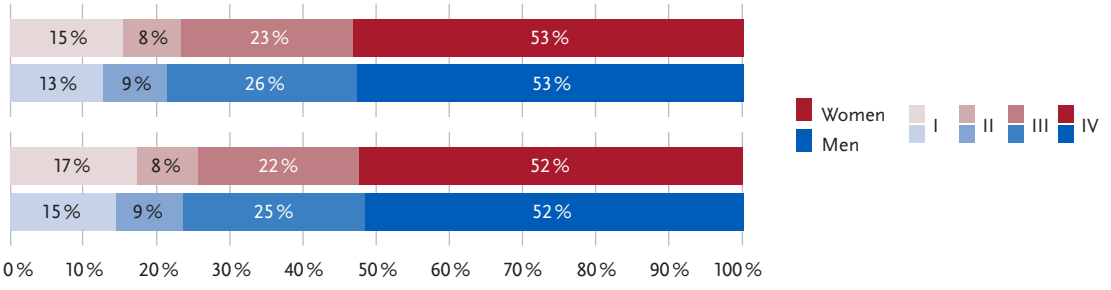


Figure 3.12.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C33–C34, Germany 2017–2018

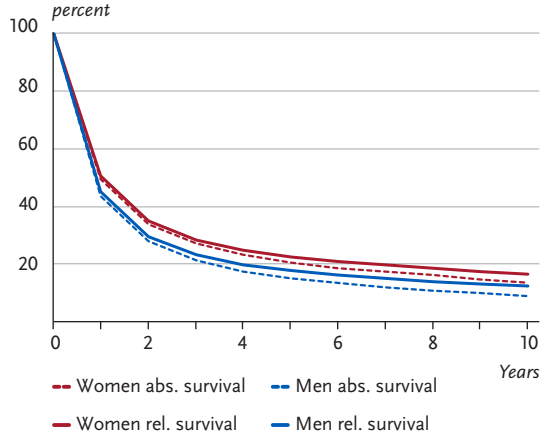


Figure 3.12.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C33–C34, Germany 2016–2018

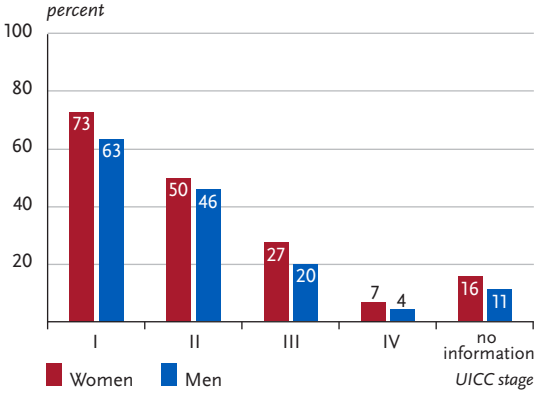


Figure 3.12.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C33 – C34, 2017 – 2018
per 100,000 (old European Standard)

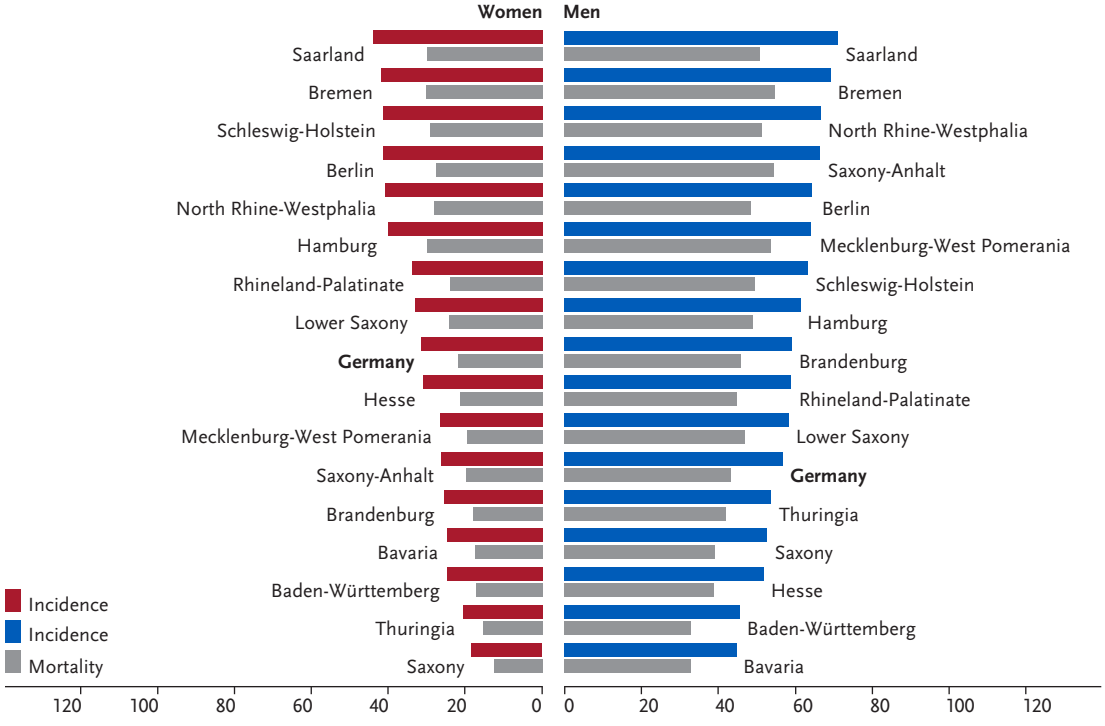
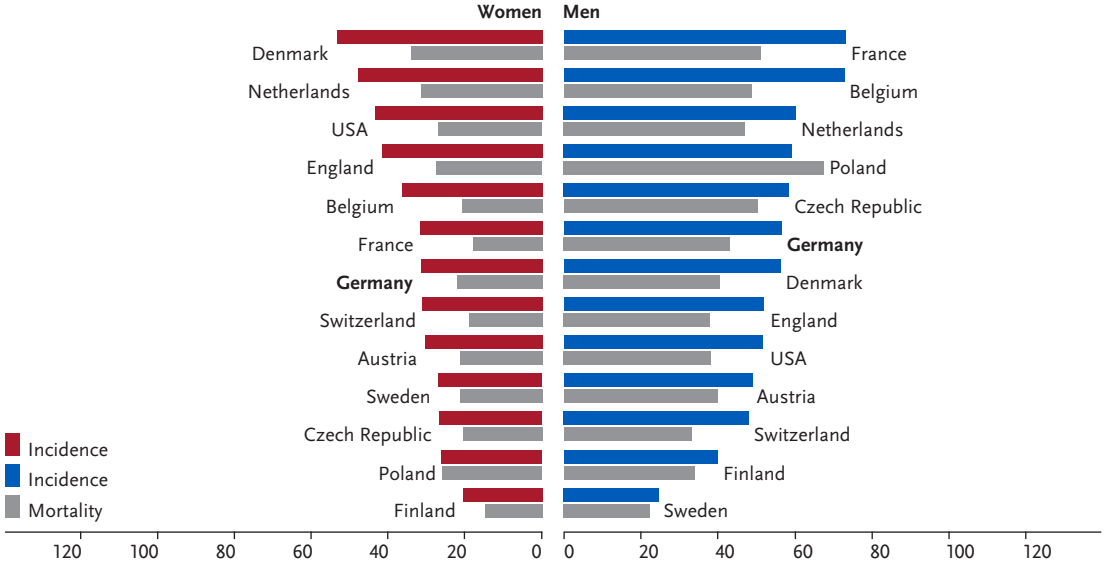


Figure 3.12.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C33 – C34, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.13 Malignant melanoma of the skin

Table 3.13.1
Overview of key epidemiological parameters for Germany, ICD-10 C43

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	11,220	12,120	10,880	12,010	11,300	13,900
Crude incidence rate [1]	26.8	29.7	25.9	29.4	26.8	33.6
Age-standardised incidence rate [1, 2]	19.5	20.5	18.9	20.2	18.8	22.0
Median age at diagnosis	62	69	62	68		
Mortality		**2017**		**2018**		**2019**
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Deaths	1,242	1,593	1,176	1,766	1,232	1,789
Crude mortality rate [1]	3.0	3.9	2.8	4.3	2.9	4.4
Age-standardised mortality rate [1, 2]	1.6	2.4	1.4	2.6	1.4	2.6
Median age at death	75	75	76	75	78	75
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Prevalence	49,200	49,400	90,800	86,200	158,300	134,200
Absolute survival rate (2017–2018) [3]	86 (79–88)	79 (73–81)	77 (69–79)	66 (59–68)		
Relative survival rate (2017–2018) [3]	95 (87–96)	93 (88–96)	94 (86–97)	93 (86–96)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In 2018, around 22,890 people in Germany were diagnosed with malignant melanoma of the skin, including 10,880 women. The median age at diagnosis for women is comparatively low at 62 years, while the median age at diagnosis for men is 68 years. The age-standardised incidence rates of women and men increased sharply around the year 2008. This is probably a consequence of the skin cancer screening introduced in Germany in July 2008. Since 2012, the incidence rate has declined slightly for women and remained almost constant for men. The mortality rates have remained almost unchanged in both sexes in the period under consideration. The predominant type of malignant melanoma is superficial spreading melanoma, which is associated with a favourable prognosis. Other forms, especially nodular and amelanotic melanoma, have a much less favourable prognosis. Currently, the relative 5-year survival rates for women with malignant melanoma of the skin in Germany are 95% and for men 93%. About 70% of all melanomas are detected in an early tumour stage (UICC I). In women, melanomas often occur on the lower extremities (legs and hips), in men mainly on the trunk.

Risk factors and early detection

The most important exogenous risk factor for malignant melanoma is ultraviolet (UV) radiation, especially recurrent intense sun exposure. This applies both to natural radiation from the sun and to artificial UV radiation, for example in a solarium. Sunburns at any age increase the risk.

The most important congenital risk factors include particularly large moles already present at birth and a light skin type. If you have already had melanoma yourself, the risk of getting another melanoma increases. If several first-degree relatives have malignant melanoma, this may indicate a familial increased risk due to inherited mutations. Depending on the type of mutation and the gene affected, the risk of melanoma can be increased to different degrees. A significant risk factor is also the number of benign moles that have appeared in the course of life, as well as the occurrence of atypical (dysplastic) moles.

The statutory cancer screening programme offers men and women from the age of 35 a skin examination every two years by a doctor with appropriate training (including dermatologists, general practitioners).

▶ *Additional information: www.krebsdaten.de/melanoma*

Figure 3.13.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C43, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

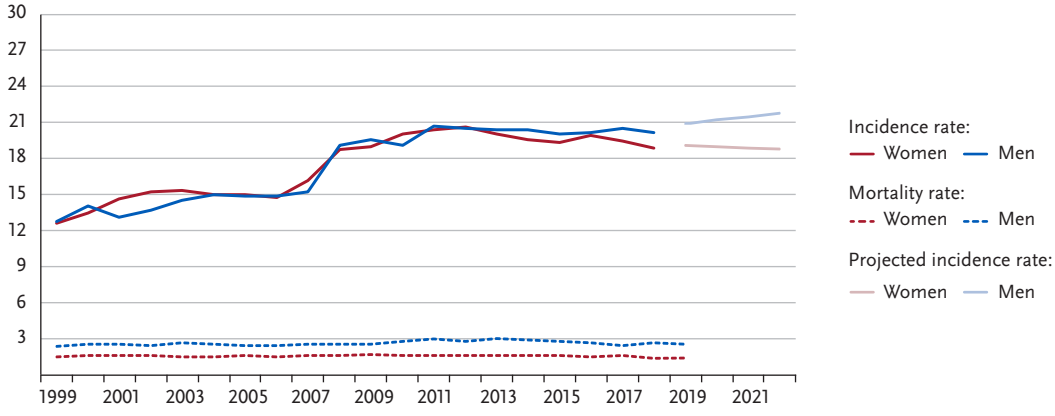


Figure 3.13.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C43, Germany 1999–2018/2019, projection (incidence) through 2022

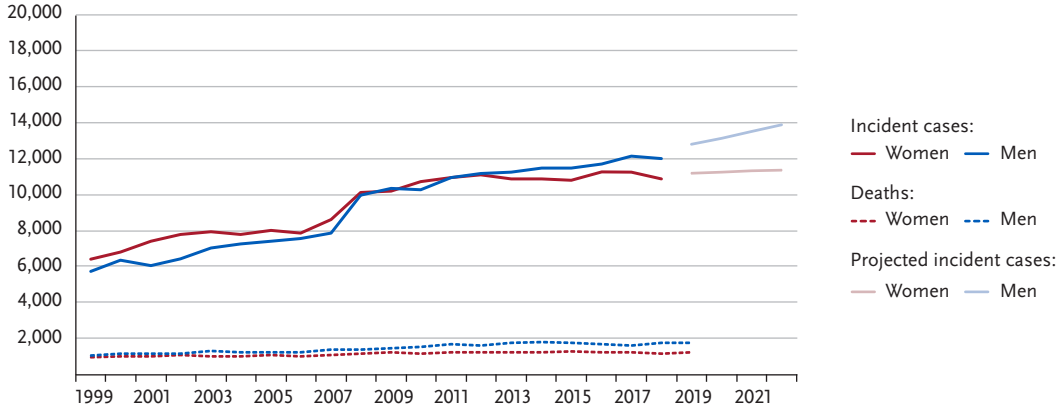


Figure 3.13.2
Age-specific incidence rates by sex, ICD-10 C43, Germany 2017–2018
per 100,000

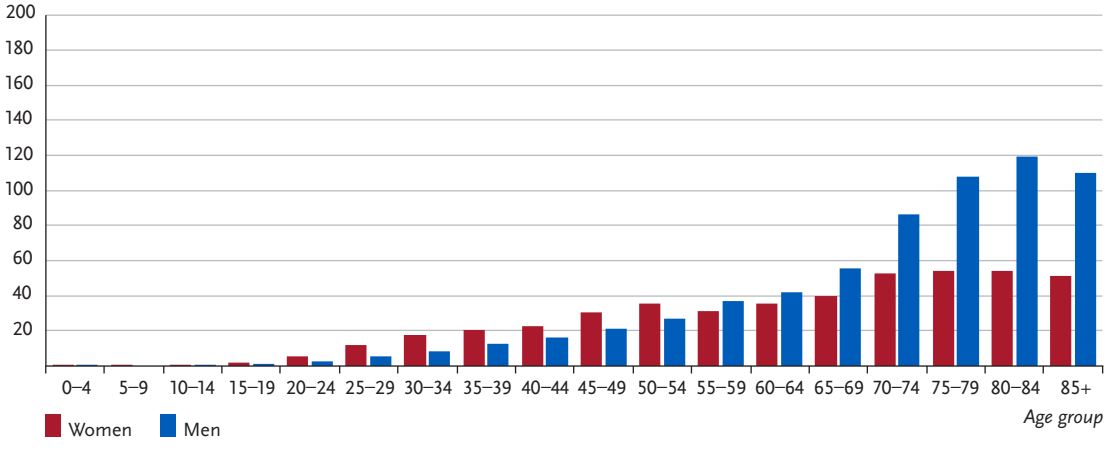


Table 3.13.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C43, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.2 %	(1 in 480)	1.8 %	(1 in 56)	< 0.1 %	(1 in 16,300)	0.2 %	(1 in 450)
45 years	0.3 %	(1 in 310)	1.6 %	(1 in 63)	< 0.1 %	(1 in 5,900)	0.2 %	(1 in 460)
55 years	0.3 %	(1 in 300)	1.3 %	(1 in 76)	< 0.1 %	(1 in 3,700)	0.2 %	(1 in 490)
65 years	0.4 %	(1 in 230)	1.0 %	(1 in 97)	< 0.1 %	(1 in 2,200)	0.2 %	(1 in 540)
75 years	0.5 %	(1 in 220)	0.7 %	(1 in 140)	0.1 %	(1 in 1,200)	0.2 %	(1 in 630)
Lifetime risk			2.0 %	(1 in 51)			0.2 %	(1 in 450)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 700)	2.1 %	(1 in 47)	< 0.1 %	(1 in 11,800)	0.4 %	(1 in 290)
45 years	0.3 %	(1 in 400)	2.0 %	(1 in 50)	< 0.1 %	(1 in 4,800)	0.3 %	(1 in 290)
55 years	0.4 %	(1 in 260)	1.8 %	(1 in 55)	< 0.1 %	(1 in 2,400)	0.3 %	(1 in 300)
65 years	0.6 %	(1 in 160)	1.6 %	(1 in 63)	0.1 %	(1 in 1,100)	0.3 %	(1 in 310)
75 years	0.9 %	(1 in 110)	1.2 %	(1 in 81)	0.2 %	(1 in 600)	0.3 %	(1 in 340)
Lifetime risk			2.2 %	(1 in 46)			0.4 %	(1 in 290)

Figure 3.13.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C43, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 1%. For 51% of the remaining cases, no UICC stage could be assigned.

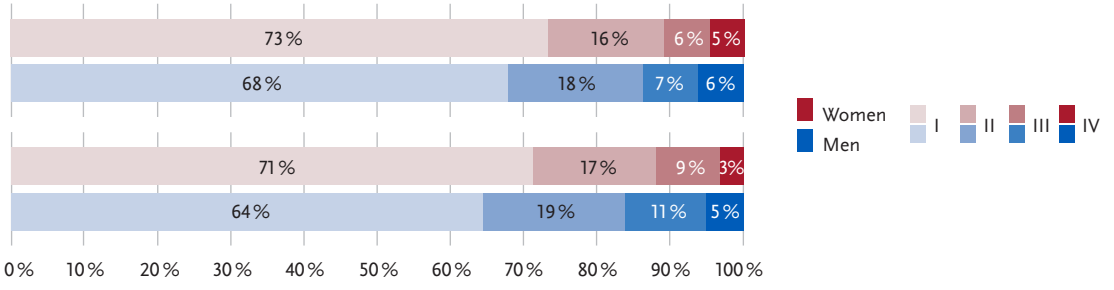


Figure 3.13.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C43, Germany 2017–2018

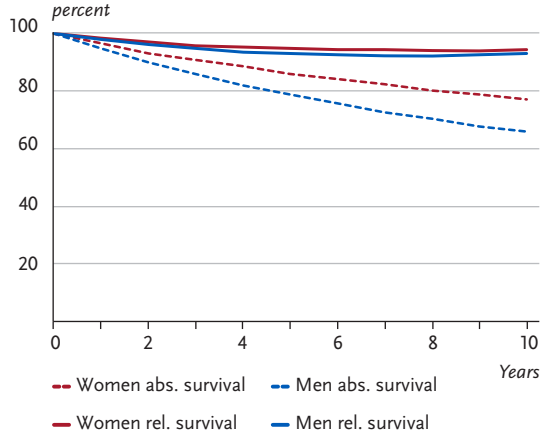


Figure 3.13.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C43, Germany 2016–2018

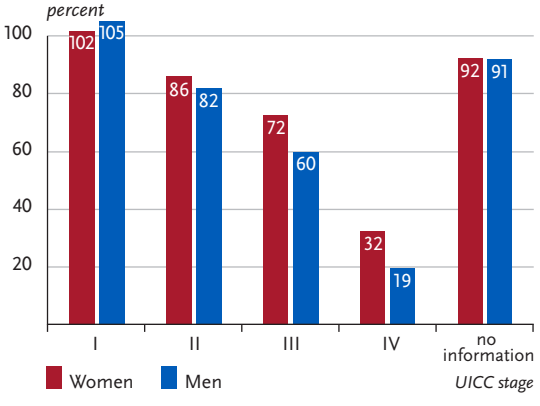


Figure 3.13.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C43, 2017–2018
per 100,000 (old European Standard)

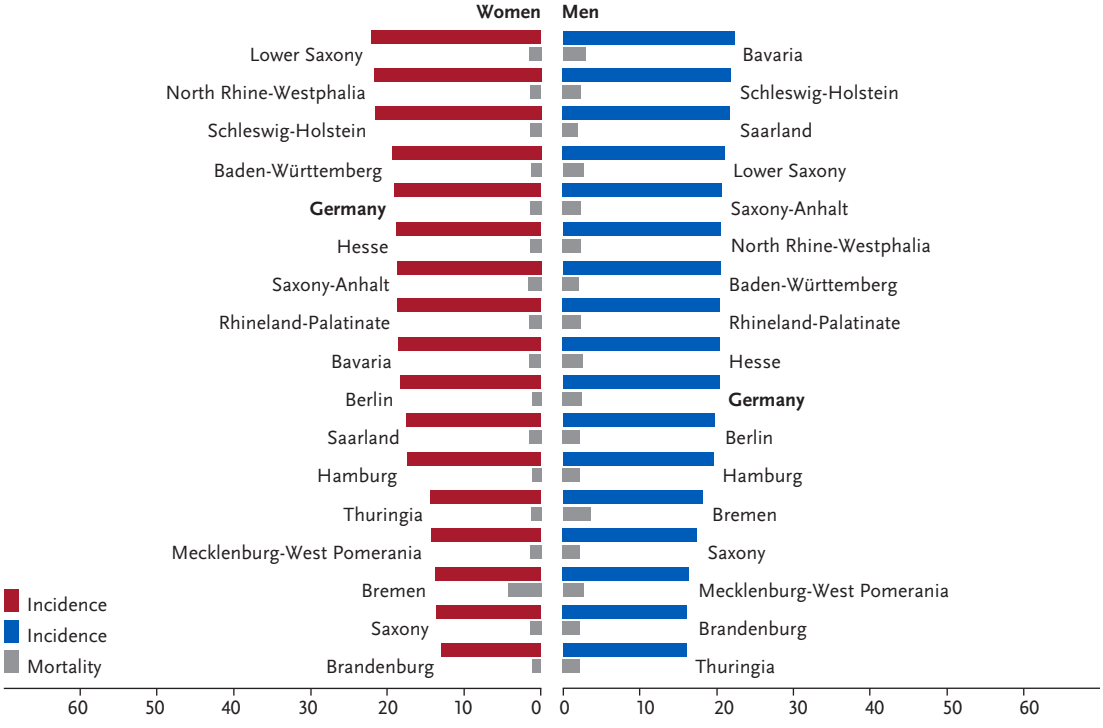
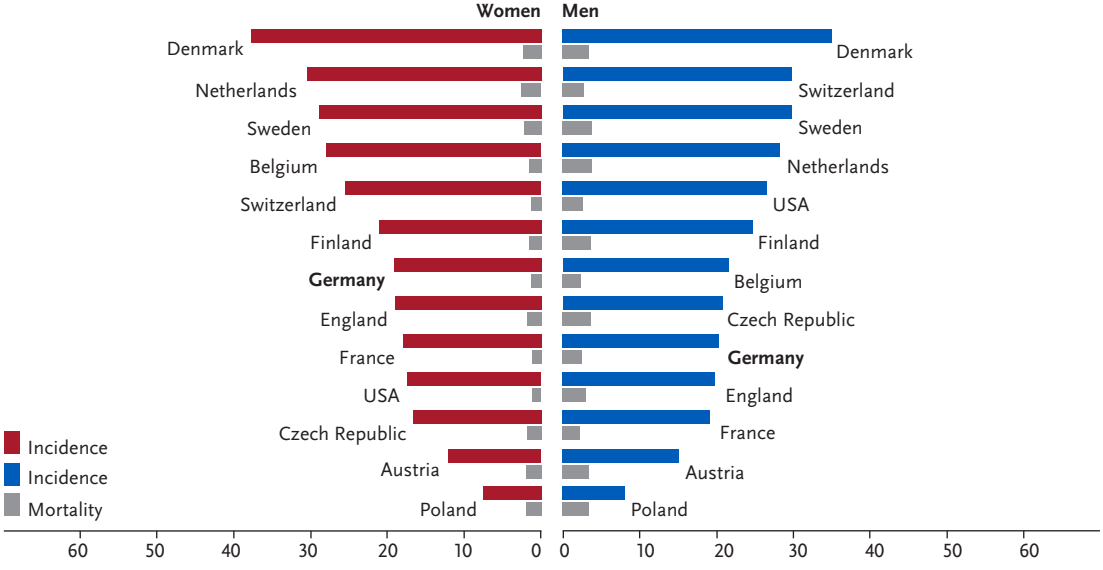


Figure 3.13.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C43, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.14 Non-melanoma skin cancer

Table 3.14.1
Overview of key epidemiological parameters for Germany, ICD-10 C44

Incidence		2017		2018		
	Women	Men	Women	Men		
Incident cases	98,040	109,120	94,200	105,230		
Crude incidence rate [1]	234.1	267.6	224.3	257.2		
Age-standardised incidence rate [1, 2]	129.3	160.8	122.4	152.2		
Median age at diagnosis	74	75	74	75		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	402	527	430	536	445	631
Crude mortality rate [1]	1.0	1.3	1.0	1.3	1.1	1.5
Age-standardised mortality rate [1, 2]	0.3	0.7	0.3	0.7	0.4	0.8
Median age at death	86	82	87	82	87	83
Survival rates		**5 years**		**10 years**		
	Women	Men	Women	Men		
Absolute survival rate (2017–2018) [3]	85 (84–86)	80 (78–81)	70 (68–71)	61 (60–63)		
Relative survival rate (2017–2018) [3]	103 (101–105)	103 (100–105)	107 (104–112)	106 (104–112)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

About three quarters of non-melanoma skin cancers are basal cell carcinomas (basaliomas). These metastasise only in exceptional cases, especially when the immune system is weakened, and are therefore rarely life-threatening. However, they can grow into the surrounding tissue, e.g. into the bones, and thus lead to considerable restrictions in the quality of life. Almost a quarter of malignant, non-melanoma tumours of the skin are squamous cell carcinomas. About two thirds of these tumours occur on the head or neck. Among the rare forms is Merkel cell carcinoma, which belongs to the neuroendocrine tumours. In 2018, it is estimated that almost 200,000 people in Germany developed non-melanoma skin cancer for the first time, compared to around 1,000 deaths per year. After the introduction of skin cancer screening, the incidence increased significantly; the recent noticeable decline might also be explained by a declining registration rate. Even though internationally, the data availability is less good compared to malignant melanoma, it can be assumed that the incidence of the disease has increased significantly in the western industrial nations during the last decades.

Risk factors

Non-melanoma skin cancer occurs more often in people with light skin types than in people with darker skin types. The most important risk factor for non-melanoma skin cancer is a strong exposure of the skin to ultraviolet (UV) radiation, no matter if the source is natural (the sun) or artificial (a solarium). The risk of squamous cell carcinoma increases with the cumulative (lifetime) UV dose. In the case of basal cell carcinoma, the risk is probably also increased by intermittent (recurrent intensive) UV exposure.

Those who have already developed non-melanoma skin cancer have an increased risk of developing it again. Actinic keratoses in particular increase the risk of squamous cell carcinoma. Non-melanoma skin cancer can also develop after many years of arsenic exposure, on radiation-damaged skin (for example after radiotherapy) or under immunosuppressive therapy, for example after an organ transplant.

The statutory cancer screening programme provides for a skin examination every two years by a doctor with appropriate training (dermatologist, general practitioner) for men and women from the age of 35.

▶ *Additional information: www.krebsdaten.de/non-melanoma_skin_cancer*

Figure 3.14.1
Age-standardised incidence and mortality rates by sex, ICD-10 C44, Germany 2006–2018/2019
per 100,000 (old European Standard)

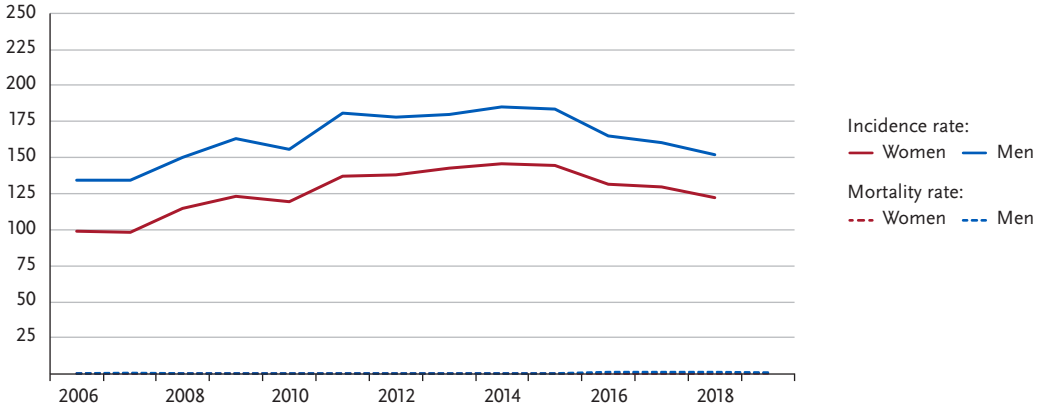


Figure 3.14.2
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C44, Germany 2017–2018

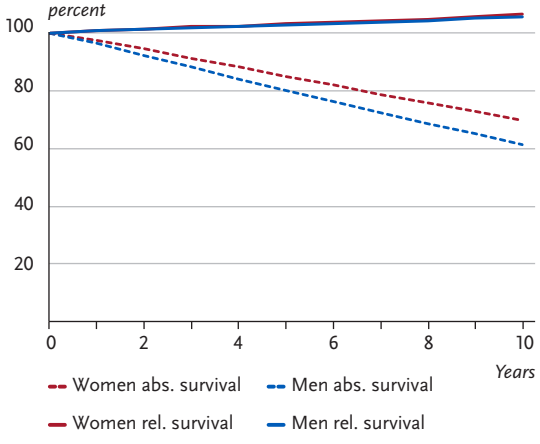


Figure 3.14.3
Relative 5-year survival by histology and sex, ICD-10 C44, Germany 2017–2018

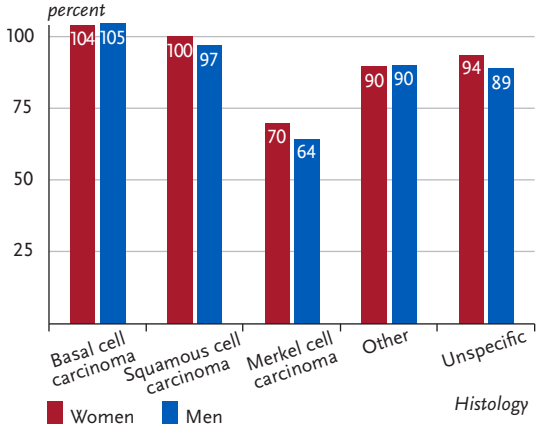
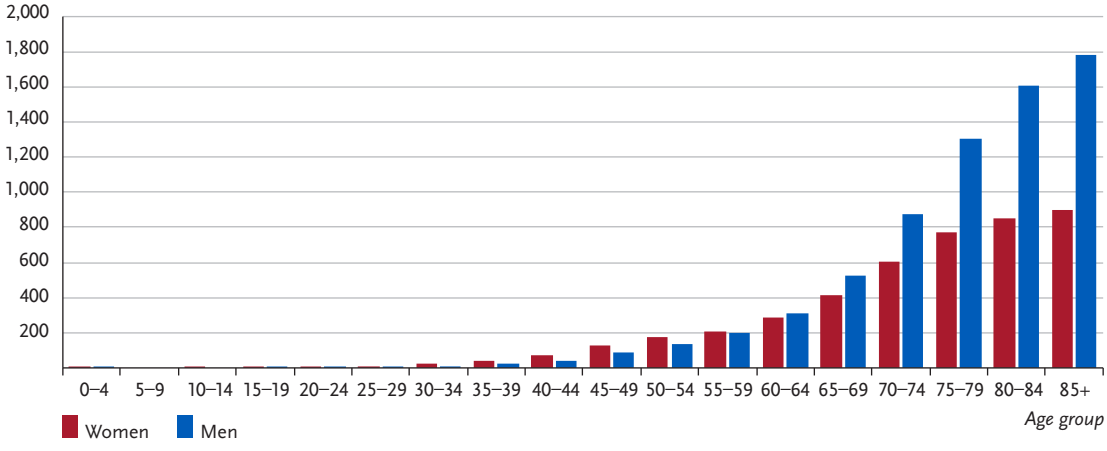


Figure 3.14.4
Age-specific incidence rates by sex, ICD-10 C44, Germany 2017–2018
per 100,000



3.15 Mesothelioma

Table 3.15.1
Overview of key epidemiological parameters for Germany, ICD-10 C45

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	290	1,310	340	1,290	340	1,400
Crude incidence rate [1]	0.7	3.2	0.8	3.1	0.8	3.4
Age-standardised incidence rate [1, 2]	0.4	1.8	0.4	1.8	0.4	1.8
Median age at diagnosis	75	76	76	76		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	270	1,121	269	1,092	274	1,156
Crude mortality rate [1]	0.6	2.7	0.6	2.7	0.7	2.8
Age-standardised mortality rate [1, 2]	0.3	1.5	0.3	1.4	0.3	1.5
Median age at death	77	77	77	78	78	78
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	500	1,800	800	2,300	1,400	3,800
Absolute survival rate (2017–2018) [3]	10	9	5	4		
Relative survival rate (2017–2018) [3]	12	11	6	6		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent

Epidemiology

Mesothelioma is a rare tumour of the soft tissue that occurs predominantly in men of advanced age. The most common location is the pleura; the disease is rarely diagnosed in the peritoneum. In 2018, about 340 women and 1,290 men were diagnosed in Germany. In the last 10 years, the incidence and mortality rates in Germany have been steadily decreasing, while the absolute numbers have remained almost constant. Comparatively high disease rates can be found today in north-western Germany at (former) shipbuilding sites, e.g. in the state of Bremen and neighbouring regions, and partly also at steel industry sites, such as in the Ruhr area. Occasionally, regions around former production sites of asbestos products are also affected. With relative 5-year survival rates of 12 % in women and 11 % in men, mesothelioma is one of the tumour diseases with a very unfavourable prognosis; accordingly, the number of annual deaths (1,430 in 2019) is only slightly below that of new cases.

Risk factors

Inhalation of asbestos fibres is primarily responsible for most of the newly diagnosed mesotheliomas today. Although the processing of asbestos was generally banned in Germany in 1993 and later throughout the EU, there is usually a latency period of 30 to 50 years between the onset of exposure and manifestation of the disease.

Primarily, people who have worked in the construction industry have an increased risk of asbestos exposure. In 2020, 824 asbestos-related mesotheliomas were recognised by the employers' liability insurance associations. Even if occupational exposure is not known, asbestos fibres can often be detected in X-rays or tissue samples: For example, in women who had only indirect contact with asbestos, e.g. when washing contaminated work clothes. There is also the possibility of asbestos exposure during privately carried out demolition and renovation work.

Weakly bound asbestos with a high fibre content is particularly dangerous. In contrast, asbestos cement (›Eternit‹), which can still be found in or on many buildings today, is considered largely harmless as long as it remains intact.

Exposure to other fibres such as erionite or even radiation therapy plays a subordinate role.

▶ *Additional information: www.krebsdaten.de/mesothelioma*

Figure 3.15.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C45, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

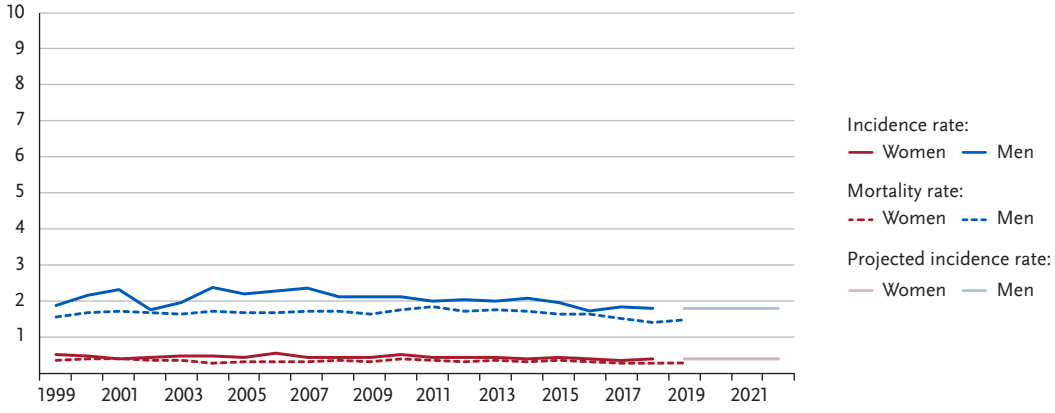


Figure 3.15.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C45, Germany 1999–2018/2019, projection (incidence) through 2022

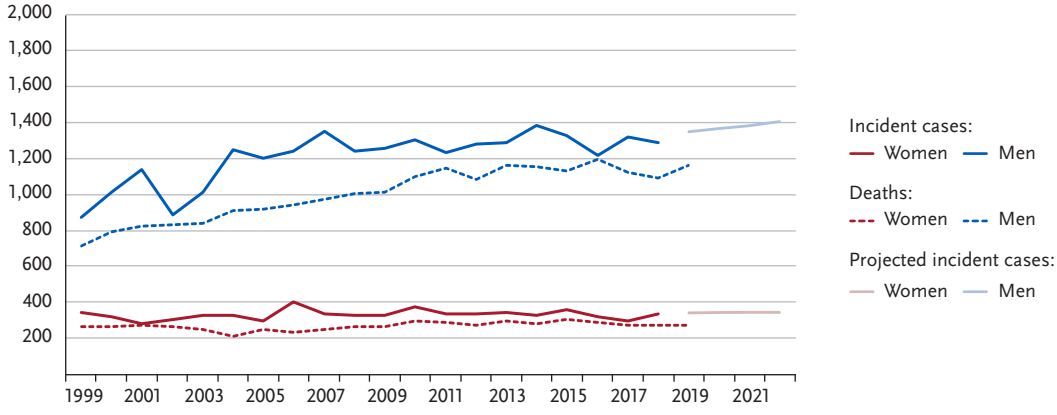


Figure 3.15.2
Age-specific incidence rates by sex, ICD-10 C45, Germany 2017–2018
per 100,000

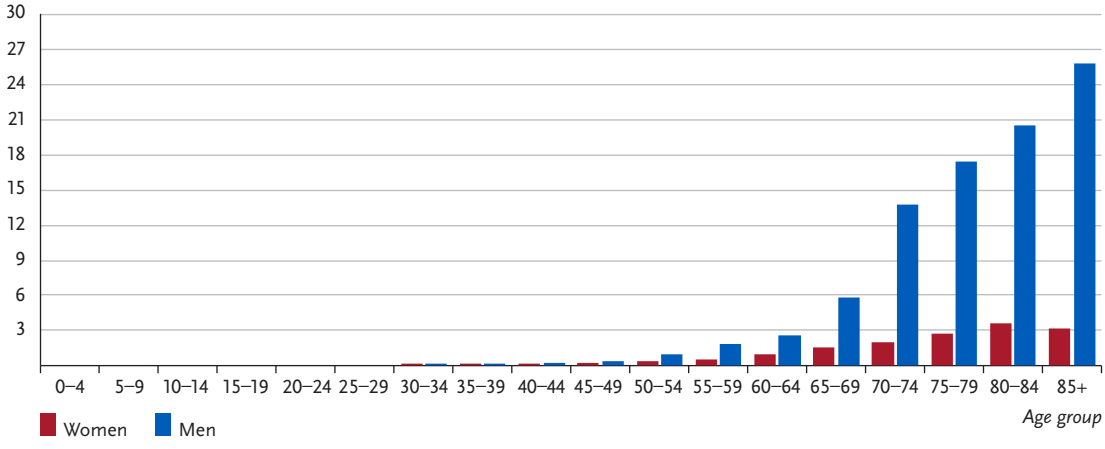


Table 3.15.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C45, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 71,600)	0.1 %	(1 in 1,600)	< 0.1 %	(1 in 443,000)	0.1 %	(1 in 1,900)
45 years	< 0.1 %	(1 in 38,800)	0.1 %	(1 in 1,600)	< 0.1 %	(1 in 83,200)	0.1 %	(1 in 1,900)
55 years	< 0.1 %	(1 in 13,900)	0.1 %	(1 in 1,700)	< 0.1 %	(1 in 21,400)	0.1 %	(1 in 1,900)
65 years	< 0.1 %	(1 in 5,700)	0.1 %	(1 in 1,800)	< 0.1 %	(1 in 7,100)	< 0.1 %	(1 in 2,000)
75 years	< 0.1 %	(1 in 3,500)	< 0.1 %	(1 in 2,300)	< 0.1 %	(1 in 4,300)	< 0.1 %	(1 in 2,500)
Lifetime risk			0.1 %	(1 in 1,600)			0.1 %	(1 in 2,000)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 65,500)	0.3 %	(1 in 380)	< 0.1 %	(1 in 126,700)	0.2 %	(1 in 450)
45 years	< 0.1 %	(1 in 14,600)	0.3 %	(1 in 380)	< 0.1 %	(1 in 32,800)	0.2 %	(1 in 450)
55 years	< 0.1 %	(1 in 4,500)	0.3 %	(1 in 380)	< 0.1 %	(1 in 7,100)	0.2 %	(1 in 440)
65 years	0.1 %	(1 in 1,200)	0.3 %	(1 in 370)	0.1 %	(1 in 1,700)	0.2 %	(1 in 420)
75 years	0.1 %	(1 in 700)	0.2 %	(1 in 430)	0.1 %	(1 in 690)	0.2 %	(1 in 450)
Lifetime risk			0.3 %	(1 in 390)			0.2 %	(1 in 460)

Figure 3.15.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C45, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 14%. For 75% of the remaining cases, no UICC stage could be assigned.

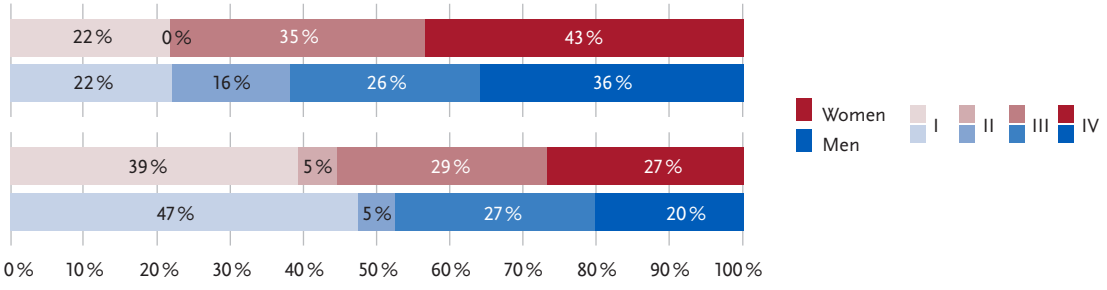


Figure 3.15.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C45, Germany 2017–2018

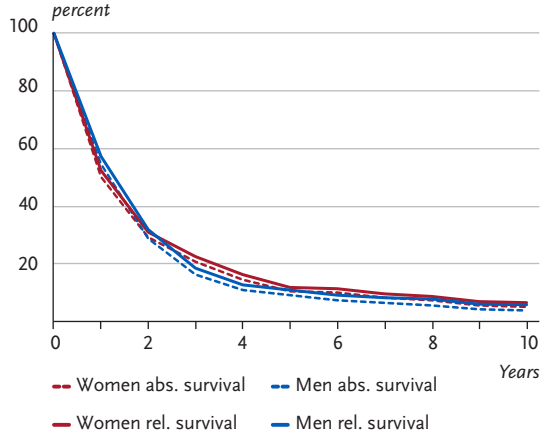


Figure 3.15.5
Relative 5-year survival by site and sex, ICD-10 C45, Germany 2017–2018

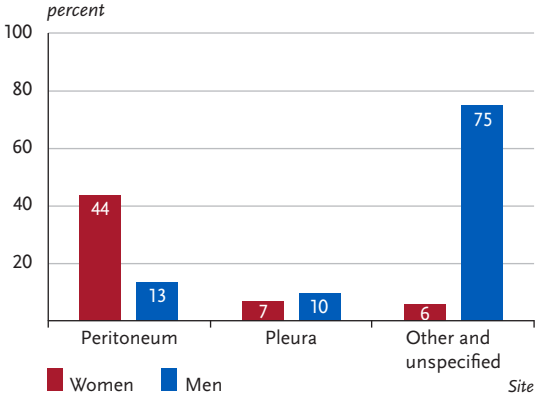


Figure 3.15.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C45, 2017–2018
per 100,000 (old European Standard)

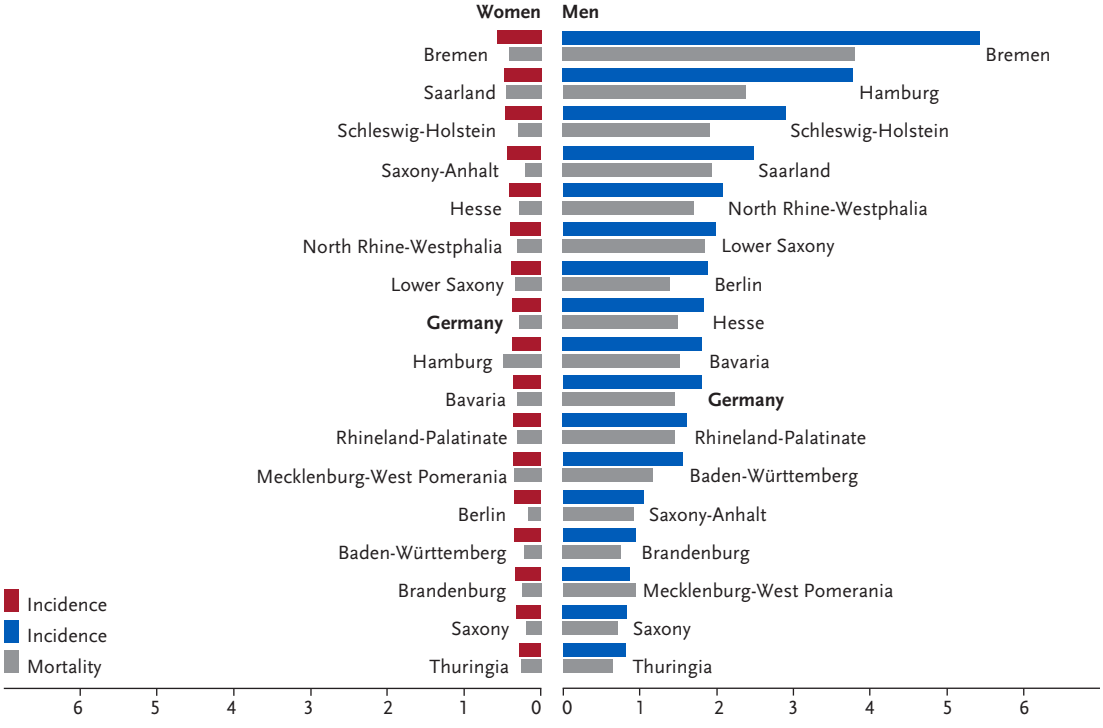
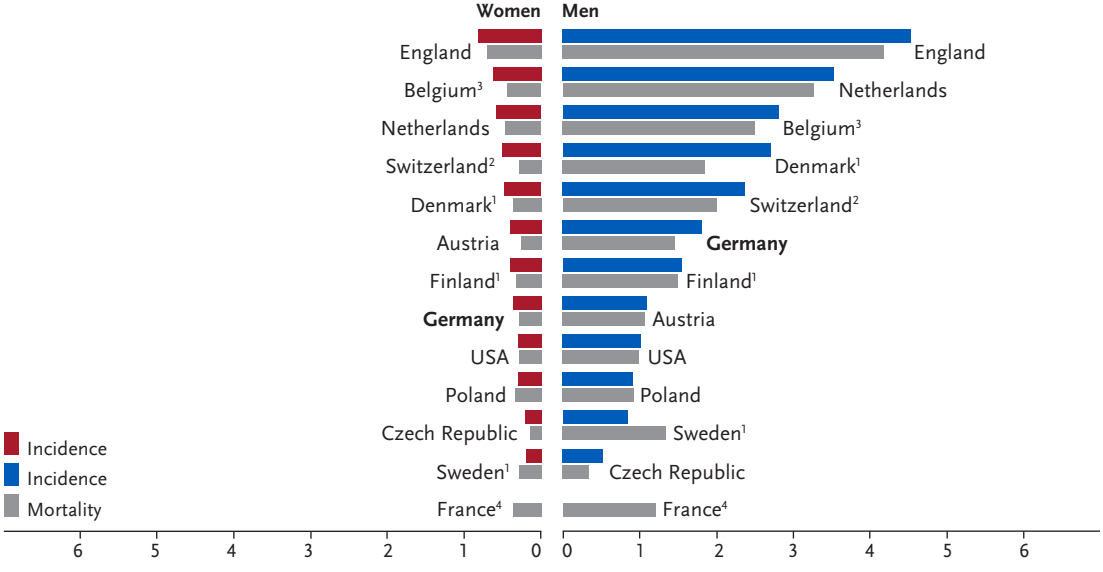


Figure 3.15.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C45, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



1 Data for C38.4, C45.0 and C45.9
2 Data for C38.4 and C45.0; mortality for 2013 to 2017
3 Mortality for 2016
4 No incidence data available

3.16 Malignant neoplasms of the soft tissue excluding mesothelioma

Table 3.16.1
Overview of key epidemiological parameters for Germany, ICD-10 C46–C49

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	2,090	2,290	2,160	2,140	2,400	2,500
Crude incidence rate [1]	5.0	5.6	5.1	5.2	5.6	6.1
Age-standardised incidence rate [1, 2]	3.3	4.1	3.4	3.8	3.7	4.4
Median age at diagnosis	68	67	68	68		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	972	884	943	913	991	961
Crude mortality rate [1]	2.3	2.2	2.2	2.2	2.4	2.3
Age-standardised mortality rate [1, 2]	1.3	1.4	1.3	1.5	1.3	1.5
Median age at death	75	72	73	71	74	72
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	7,000	7,400	11,200	12,400	19,500	20,900
Absolute survival rate (2017–2018) [3]	46 (38–57)	51 (44–62)	35	38		
Relative survival rate (2017–2018) [3]	51 (43–63)	61 (54–75)	45	55		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

This disease group includes the rare, malignant tumours of the peripheral nerves, connective tissue and other soft tissues, the peritoneum and the retroperitoneal soft tissue behind it. They also include the rare Kaposi's sarcomas that occur on the skin (4% of the diagnostic group). Since the tumours of the soft tissue, in contrast to carcinomas, predominantly develop from the connective tissue structures, sarcomas represent the majority of these tumours.

Leiomyosarcoma originating in smooth muscle tissue and liposarcoma (malignant fatty tissue tumour) are the most common forms in adults, along with fibrosarcoma. In contrast, rhabdomyosarcomas originating in the tissue of the skeletal muscles occur almost exclusively in children and adolescents. The approximately 4,300 new cases of malignant soft tissue tumours per year are compared to approximately 1,950 deaths. Age-standardised incidence and mortality rates for malignant soft tissue tumours have risen slightly in Germany since 1999.

Risk factors

In most cases, no clear cause for a soft tissue sarcoma can be found. Patients with rare hereditary tumour syndromes may have a higher incidence of sarcomas. The presence of one or more genetic variants probably also has an influence on the risk of developing the disease.

In rare cases, a sarcoma can occur in the irradiated region of the body after radiotherapy. Chemotherapy can also increase the risk of sarcoma. The human herpes virus type 8 (HHV8) causes Kaposi's sarcoma. In people with severe immunodeficiency, the Epstein-Barr virus (EBV) may also be involved in the development of soft tissue sarcomas.

Environmental toxins and chemicals may possibly contribute to the development of sarcomas. A connection between vinyl chloride and angiosarcomas of the liver is regarded as certain. Chronic inflammatory processes probably also increase the risk of soft tissue sarcomas. In addition, chronic lymphoedema after breast removal can lead to the development of angiosarcoma in rare cases (Stewart-Treves syndrome).

An influence of diet or other lifestyle factors such as smoking or alcohol consumption is not known.

▶ *Additional information: www.krebsdaten.de/soft_tissue*

Figure 3.16.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C46 – C49, Germany 1999 – 2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

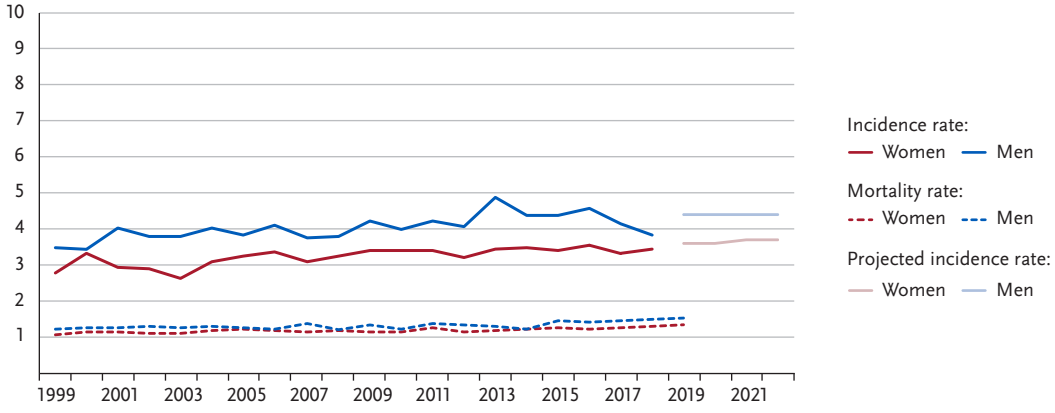


Figure 3.16.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C46 – C49, Germany 1999 – 2018/2019, projection (incidence) through 2022

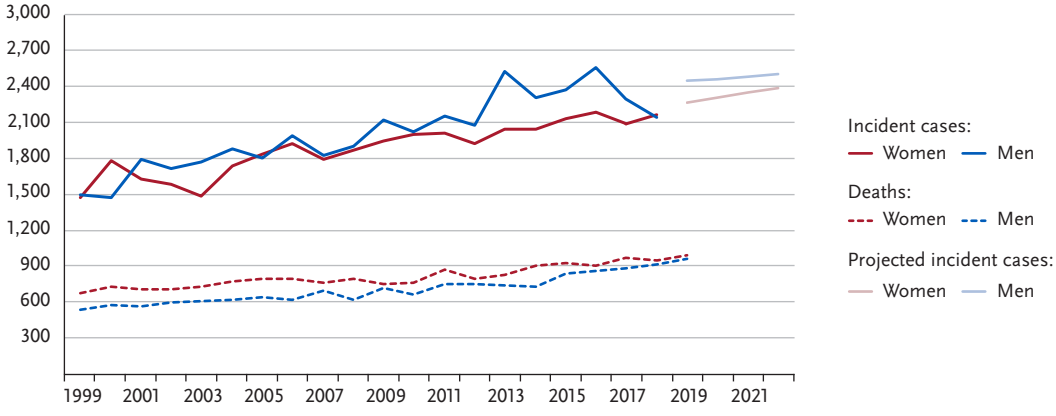


Figure 3.16.2
Age-specific incidence rates by sex, ICD-10 C46 – C49, Germany 2017 – 2018
per 100,000

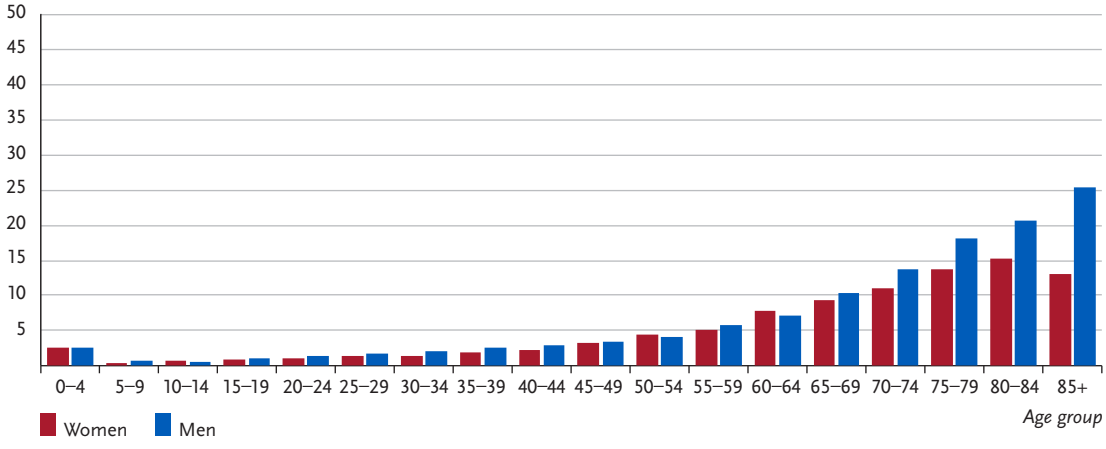


Table 3.16.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C46–C49, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 4,700)	0.4 %	(1 in 280)	< 0.1 %	(1 in 13,500)	0.2 %	(1 in 590)
45 years	< 0.1 %	(1 in 2,600)	0.3 %	(1 in 290)	< 0.1 %	(1 in 7,900)	0.2 %	(1 in 620)
55 years	0.1 %	(1 in 1,500)	0.3 %	(1 in 320)	< 0.1 %	(1 in 4,100)	0.2 %	(1 in 660)
65 years	0.1 %	(1 in 1,000)	0.3 %	(1 in 390)	< 0.1 %	(1 in 2,300)	0.1 %	(1 in 740)
75 years	0.1 %	(1 in 820)	0.2 %	(1 in 560)	0.1 %	(1 in 1,500)	0.1 %	(1 in 960)
Lifetime risk			0.4 %	(1 in 250)			0.2 %	(1 in 570)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 3,700)	0.4 %	(1 in 280)	< 0.1 %	(1 in 13,900)	0.2 %	(1 in 600)
45 years	< 0.1 %	(1 in 2,800)	0.3 %	(1 in 290)	< 0.1 %	(1 in 8,400)	0.2 %	(1 in 620)
55 years	0.1 %	(1 in 1,800)	0.3 %	(1 in 320)	< 0.1 %	(1 in 3,800)	0.2 %	(1 in 650)
65 years	0.1 %	(1 in 920)	0.3 %	(1 in 350)	< 0.1 %	(1 in 2,000)	0.1 %	(1 in 700)
75 years	0.1 %	(1 in 670)	0.2 %	(1 in 440)	0.1 %	(1 in 1,300)	0.1 %	(1 in 860)
Lifetime risk			0.4 %	(1 in 250)			0.2 %	(1 in 570)

Figure 3.16.3
Proportion of morphologic groups of malignant soft tissue tumours by sex, ICD-10 C46–C49, Germany 2017–2018

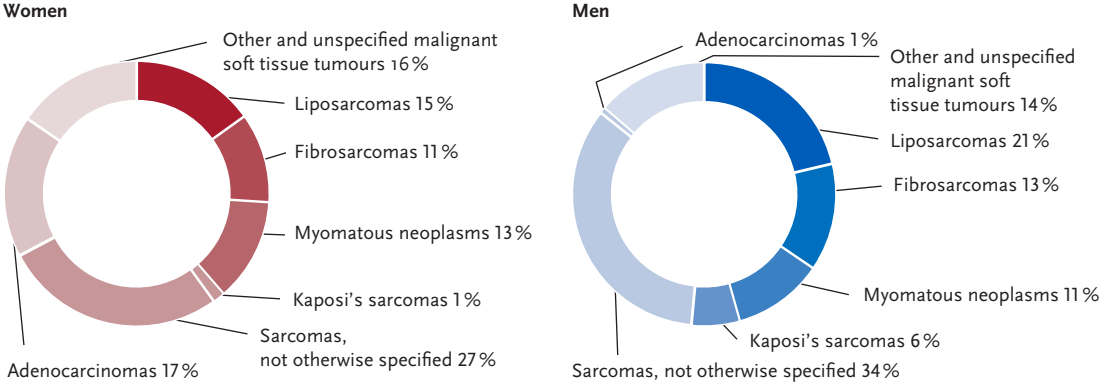


Figure 3.16.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C46–C49, Germany 2017–2018

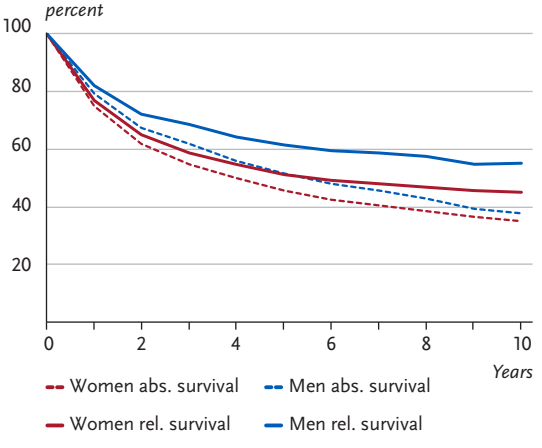


Figure 3.16.5
Relative 5-year survival by histology and sex, ICD-10 C46–C49, Germany 2017–2018

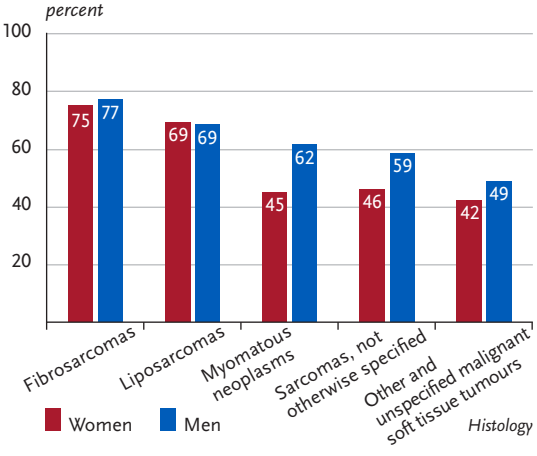


Figure 3.16.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C46–C49, 2017–2018
per 100,000 (old European Standard)

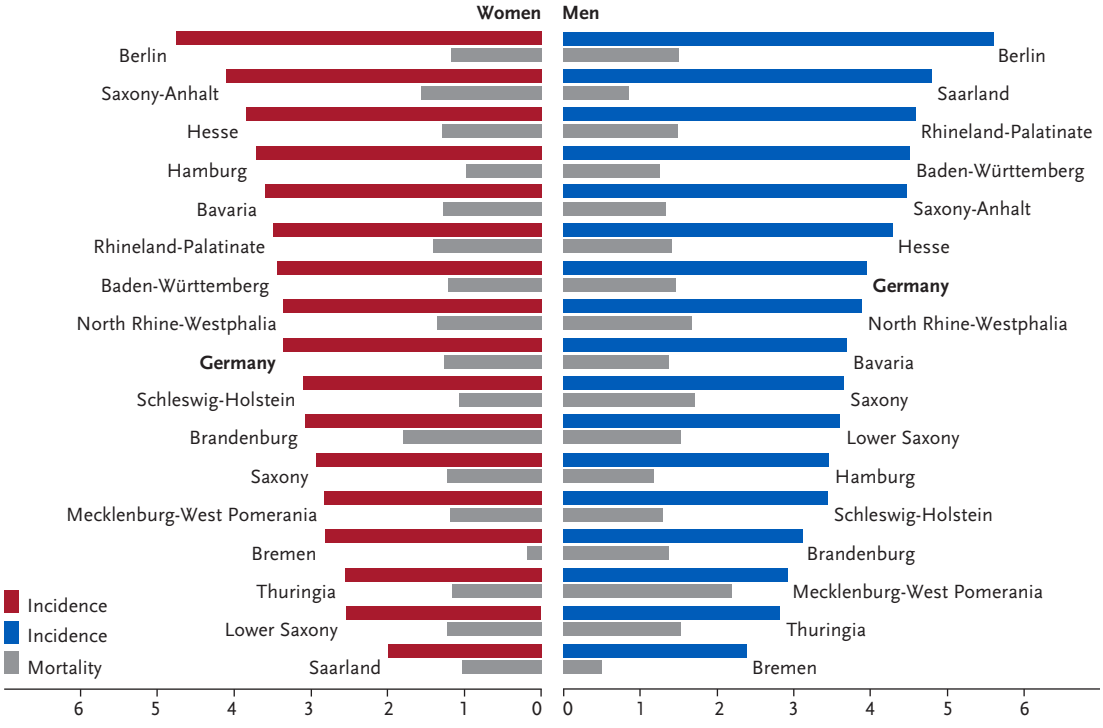
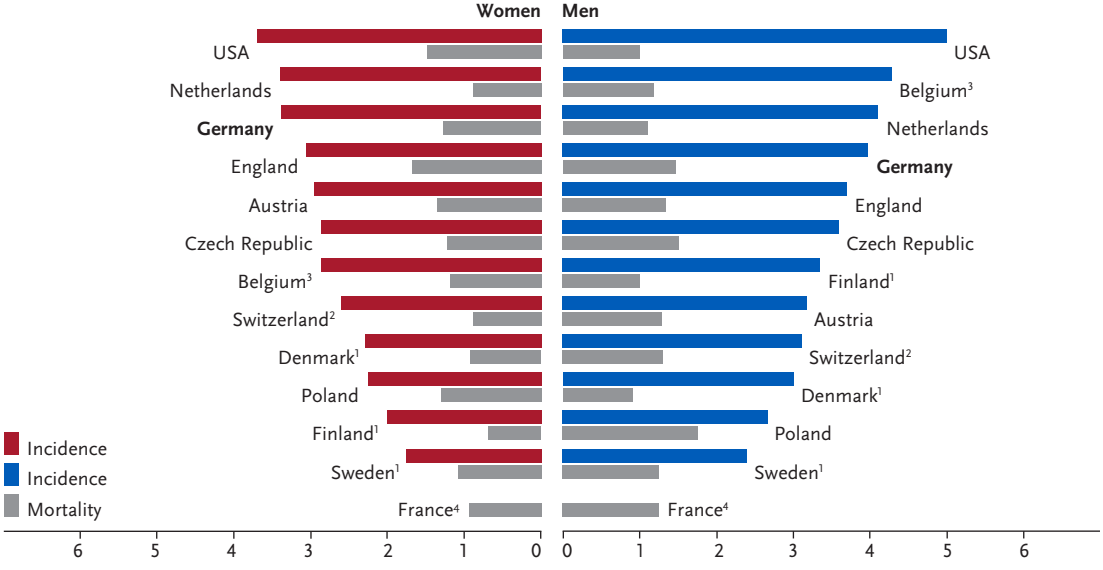


Figure 3.16.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C46–C49, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data for C49
[2] Data for C47 and C49; mortality for 2013 to 2017
[3] Mortality for 2016
[4] No incidence data available

3.17 Breast

Table 3.17.1
Overview of key epidemiological parameters for Germany, ICD-10 C50

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	69,390	690	69,900	720	66,800	770
Crude incidence rate [1]	165.7	1.7	166.4	1.8	158.0	1.9
Age-standardised incidence rate [1, 2]	111.7	1.1	112.6	1.1	105.6	1.1
Median age at diagnosis	65	72	64	71		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	18,401	192	18,591	195	18,519	193
Crude mortality rate [1]	43.9	0.5	44.3	0.5	44.0	0.5
Age-standardised mortality rate [1, 2]	22.9	0.3	22.8	0.3	22.3	0.3
Median age at death	76	77	76	76	76	75
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	304,100	2,800	559,300	4,700	968,900	7,000
Absolute survival rate (2017–2018) [3]	79 (77–81)	68	67 (63–69)	53		
Relative survival rate (2017–2018) [3]	88 (86–89)	84	83 (79–85)	83		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Breast cancer is by far the most common cancer in women, with approximately 69,900 new cases annually. In addition, more than 6,000 women are diagnosed with an in situ tumour each year. About 1% of all new cases affect men.

Based on current incidence rates, about one in eight women will develop breast cancer in their lifetime. One in six affected women will develop the disease before the age of 50 and just under two in five after the age of 70.

After the introduction of mammography screening between 2005 and 2009, the rates of new cases show a typical trend with a clear increase at the beginning of the programme and a subsequent slow decline. It could be shown that in the screening age group, fewer women recently developed advanced tumours than before the introduction of screening.

Since the end of the 1990s, breast cancer mortality rates have been declining steadily, recently most strongly among women between 55 and 69 years of age.

Risk factors and early detection

Hormones can influence the risk of developing the disease: An early first menstrual period (menarche) and a late menopause statistically increase the risk of developing (hormone-dependent) breast cancer. The same applies to hormone replacement therapy, especially if it is of longer duration and combined oestrogen-gestagen use. Hormone-containing ovulation inhibitors (birth control) only slightly increase the risk. Very dense breast tissue and certain benign breast tissue alterations are also risk factors.

If close relatives have breast or ovarian cancer, the risk of developing breast cancer increases. In addition to alterations in the BRCA1 and BRCA2 genes, there are other mutations that significantly increase the risk of developing the disease. Such mutations are found in up to a quarter of patients today.

Obesity after menopause, alcohol and smoking are likely to increase the risk of breast cancer, while exercise and long periods of breastfeeding reduce the risk.

The statutory cancer screening programme offers women aged 30 and older the opportunity to have an annual tactile examination at the doctor's office. Women between the ages of 50 and 69 are invited to have a breast X-ray every two years as part of the mammography screening programme. Women with a proven alteration in a breast cancer risk gene can be enrolled in an intensified cancer screening programme.

▶ *Additional information: www.krebsdaten.de/breast*

Figure 3.17.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C50, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

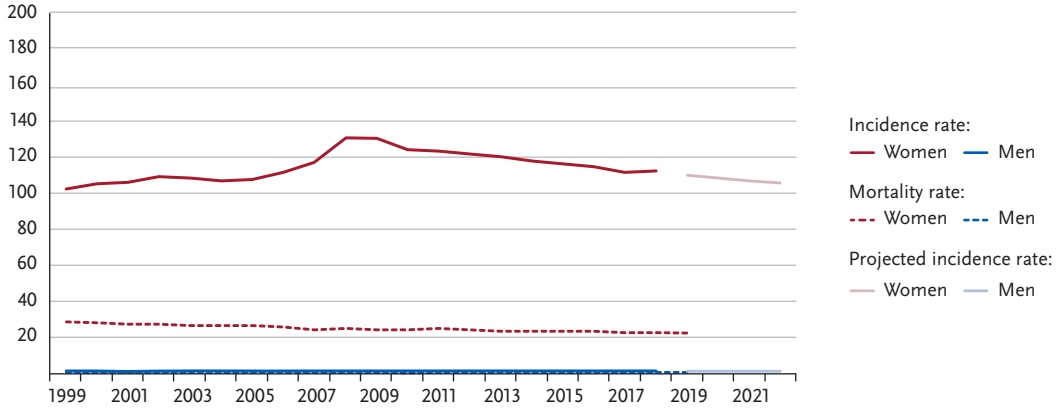


Figure 3.17.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C50, Germany 1999–2018/2019, projection (incidence) through 2022

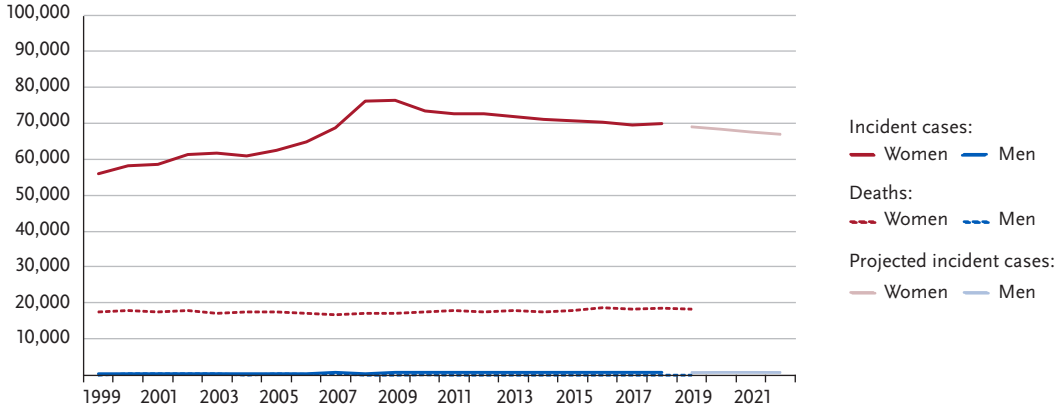


Figure 3.17.2
Age-specific incidence rates by sex, ICD-10 C50, Germany 2017–2018
per 100,000

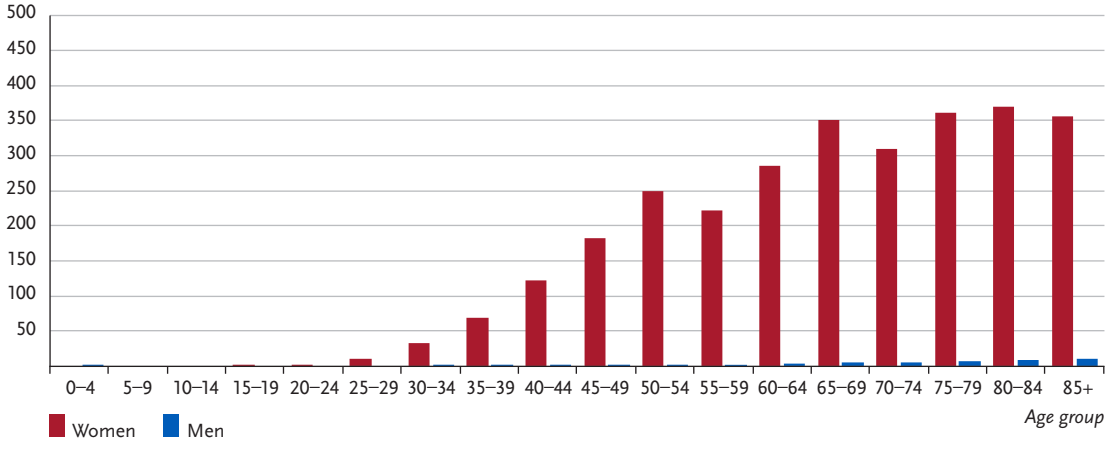


Table 3.17.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C50, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	1.0 %	(1 in 100)	12.2 %	(1 in 8)	0.1 %	(1 in 980)	3.5 %	(1 in 28)
45 years	2.2 %	(1 in 46)	11.4 %	(1 in 9)	0.3 %	(1 in 400)	3.4 %	(1 in 29)
55 years	2.6 %	(1 in 38)	9.7 %	(1 in 10)	0.5 %	(1 in 220)	3.2 %	(1 in 31)
65 years	3.3 %	(1 in 31)	7.6 %	(1 in 13)	0.8 %	(1 in 130)	2.9 %	(1 in 34)
75 years	3.4 %	(1 in 30)	5.1 %	(1 in 20)	1.3 %	(1 in 78)	2.5 %	(1 in 41)
Lifetime risk			12.4 %	(1 in 8)			3.5 %	(1 in 29)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 24,400)	0.1 %	(1 in 730)	< 0.1 %	(1 in 93,600)	< 0.1 %	(1 in 2,500)
45 years	< 0.1 %	(1 in 10,100)	0.1 %	(1 in 740)	< 0.1 %	(1 in 93,400)	< 0.1 %	(1 in 2,600)
55 years	< 0.1 %	(1 in 4,200)	0.1 %	(1 in 770)	< 0.1 %	(1 in 23,200)	< 0.1 %	(1 in 2,600)
65 years	< 0.1 %	(1 in 2,300)	0.1 %	(1 in 860)	< 0.1 %	(1 in 9,100)	< 0.1 %	(1 in 2,600)
75 years	< 0.1 %	(1 in 1,700)	0.1 %	(1 in 1,100)	< 0.1 %	(1 in 4,800)	< 0.1 %	(1 in 2,900)
Lifetime risk			0.1 %	(1 in 740)			< 0.1 %	(1 in 2,600)

Figure 3.17.3
Distribution of UICC stages at diagnosis for all women and women between 50 and 69 years of age, ICD-10 C50, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 3%. For 25% of the remaining cases, no UICC stage could be assigned.

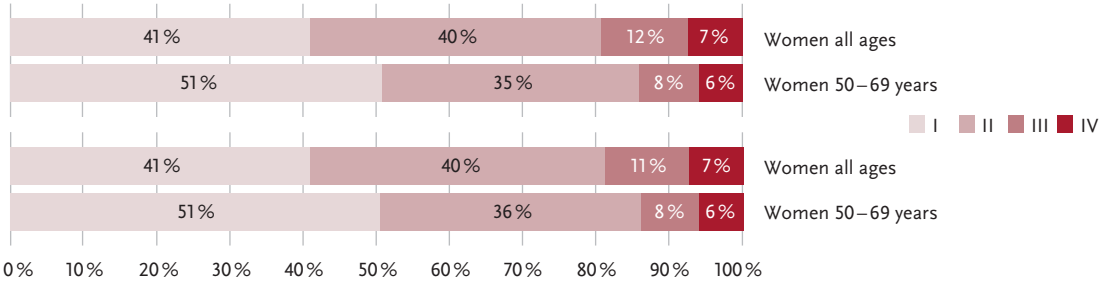


Figure 3.17.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C50, Germany 2017–2018

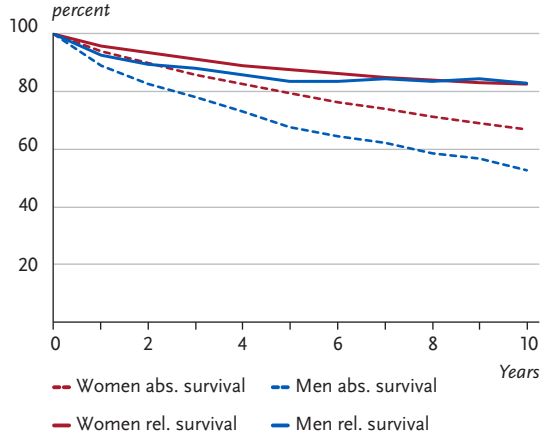


Figure 3.17.5
Relative 5-year survival by UICC stage (7th edition TNM), Women, ICD-10 C50, Germany 2016–2018

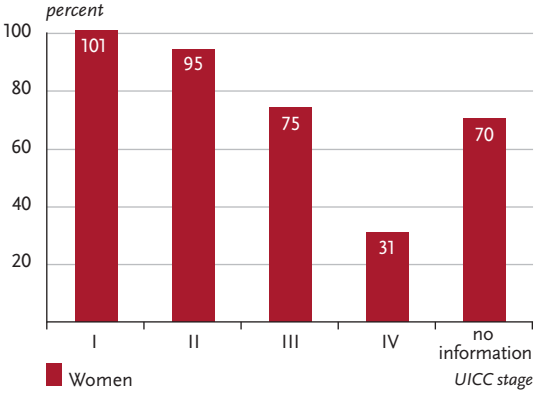


Figure 3.17.6
Age-standardised incidence and mortality rates in German federal states, Women, ICD-10 C50, 2017–2018
per 100,000 (old European Standard)

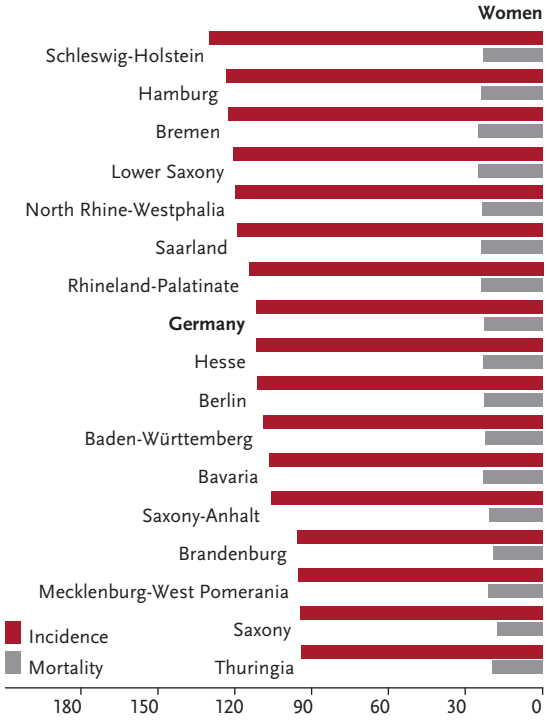
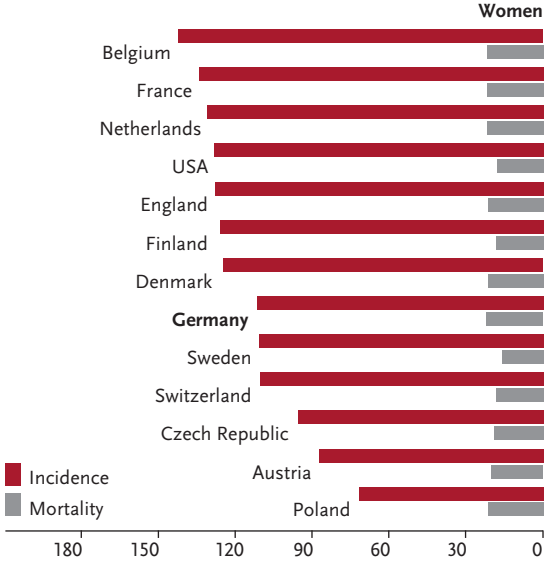


Figure 3.17.7
International comparison of age-standardised incidence and mortality rates, Women, ICD-10 C50, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.18 Vulva

Table 3.18.1
Overview of key epidemiological parameters for Germany, ICD-10 C51

Incidence	2017	2018	Prediction for 2022
	Women	Women	Women
Incident cases	3,430	3,270	3,700
Crude incidence rate [1]	8.2	7.8	8.7
Age-standardised incidence rate [1, 2]	4.8	4.4	4.9
Median age at diagnosis	72	73	
Mortality	**2017**	**2018**	**2019**
	Women	Women	Women
Deaths	943	957	1,016
Crude mortality rate [1]	2.3	2.3	2.4
Age-standardised mortality rate [1, 2]	1.0	1.0	1.0
Median age at death	80	80	81
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	11,800	20,000	26,900
Absolute survival rate (2017–2018) [3]	63 (58–68)	49 (44–52)	
Relative survival rate (2017–2018) [3]	73 (66–78)	68 (60–72)	

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Until the beginning of the decade, a significant increase in new cases and a slight increase in mortality rates from malignant tumours of the vulva were observed in Germany; since then, the rates have stabilised at a high level. In 2018, approximately 3,270 women were diagnosed with a malignant neoplasm of the vulva, and 1,016 women died of this disease in 2019. The largest increase in incidence rates was seen in women below 70 years of age, however since 2010, this trend has plateaued. The greatest burden of disease continues to be in women above 70 years of age, with a median age at diagnosis of 73 years. The relative 5-year survival rate after diagnosis of vulvar cancer is 73%. Among tumours with valid stage information, tumours of small extent (stage I, limited to vulva/perineum) are most common (about 65% to 67%). However, for a large proportion of cases (41%), no stage could be assigned.

The highest rates of malignant neoplasms of the vulva are found in Schleswig-Holstein, Hamburg, North Rhine-Westphalia and Saarland. Mortality and incidence rates in Germany are higher than in neighbouring countries (comparative figures are not available from all countries).

Risk factors, early detection and prevention

Vulvar carcinomas are mostly squamous cell carcinomas (about 90%) that can be divided into non-keratinising and keratinising forms. The latter account for 50 to 80% of squamous cell carcinomas of the vulva. Non-keratinising carcinomas and their precursors often arise in conjunction with a chronic human papillomavirus infection (especially HPV 16). These cases mostly affect younger women. In contrast, keratinising vulvar carcinomas and their precursors particularly occur in older women, independent of a concurrent HPV infection. The main risk factors are autoimmune processes, such as lichen sclerosus. Smoking and long-term immunosuppression such as after an organ transplant or due to HIV, also increase the risk of vulvar cancer. HIV also promotes an HPV infection and thus increases the risk of developing vulvar cancer. Further risk factors include HPV-induced cancers of the genitals and anus, such as cervical and anal carcinomas, their associated precursors, and Paget's disease of the vulva.

No targeted screening programme is currently in place in Germany for cancer of the vulva or its precursors. As such, the vulva should be completely examined during gynaecological cancer screening. HPV vaccination is viewed as a possible means of preventing vulvar cancer.

▶ *Additional information: www.krebsdaten.de/vulva*

Figure 3.18.1a
Age-standardised incidence and mortality rates, ICD-10 C51, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

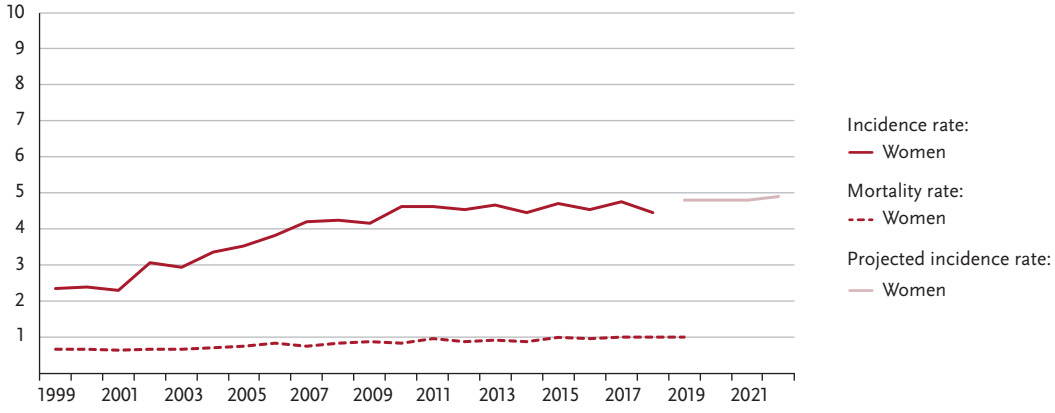


Figure 3.18.1b
Absolute numbers of incident cases and deaths, ICD-10 C51, Germany 1999–2018/2019, projection (incidence) through 2022

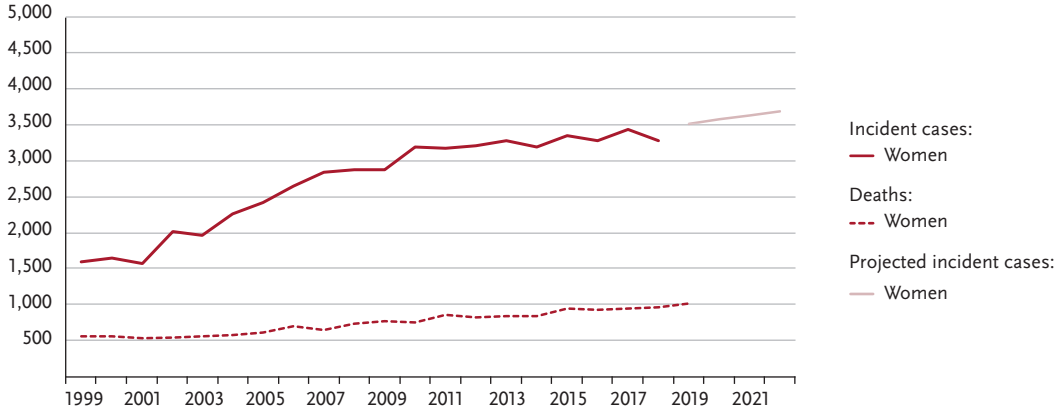


Figure 3.18.2
Age-specific incidence rates, ICD-10 C51, Germany 2017–2018
per 100,000

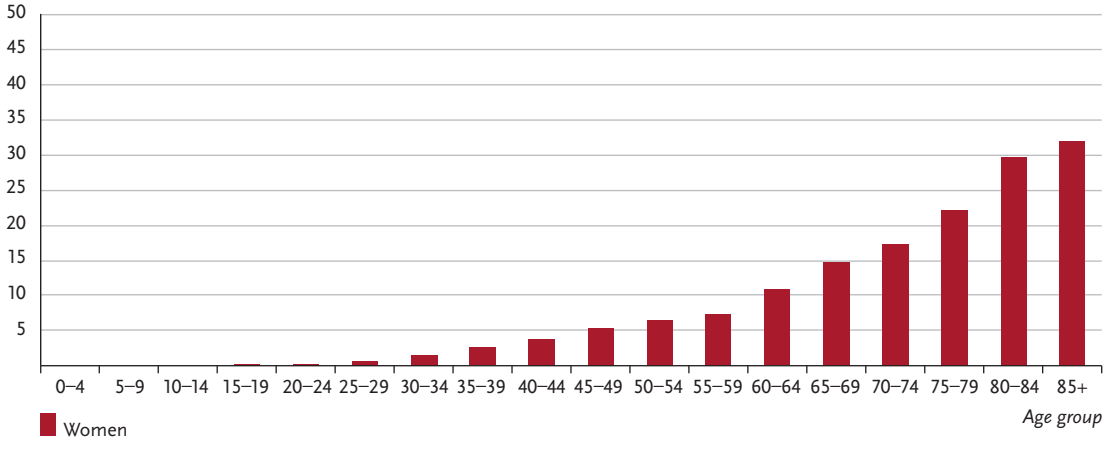


Table 3.18.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C51, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 3,200)	0.6 %	(1 in 170)	< 0.1 %	(1 in 45,800)	0.2 %	(1 in 530)
45 years	0.1 %	(1 in 1,700)	0.6 %	(1 in 180)	< 0.1 %	(1 in 19,200)	0.2 %	(1 in 540)
55 years	0.1 %	(1 in 1,200)	0.5 %	(1 in 190)	< 0.1 %	(1 in 7,100)	0.2 %	(1 in 540)
65 years	0.1 %	(1 in 680)	0.5 %	(1 in 220)	< 0.1 %	(1 in 2,600)	0.2 %	(1 in 560)
75 years	0.2 %	(1 in 460)	0.4 %	(1 in 280)	0.1 %	(1 in 1,200)	0.2 %	(1 in 620)
Lifetime risk			0.6 %	(1 in 170)			0.2 %	(1 in 540)

Figure 3.18.3
Distribution of UICC stages at diagnosis, ICD-10 C51, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 3%. For 41% of the remaining cases, no UICC stage could be assigned.

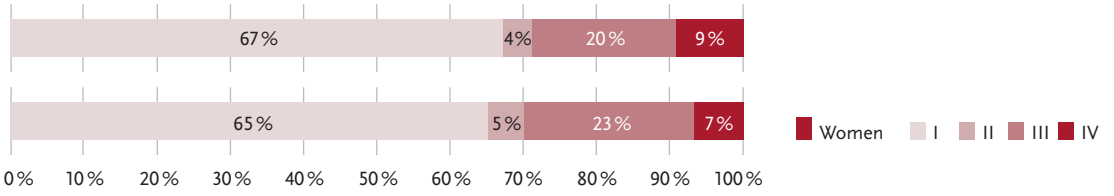


Figure 3.18.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C51, Germany 2017–2018

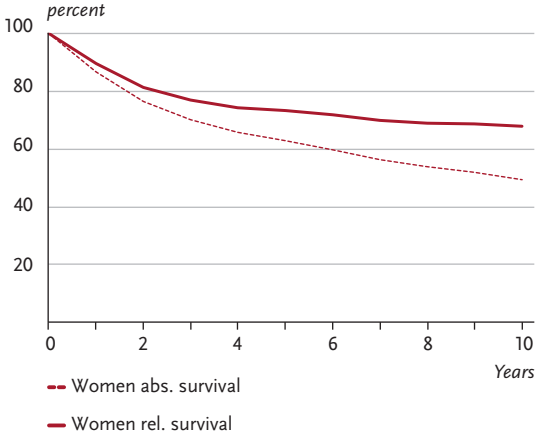


Figure 3.18.5
Relative 5-year survival by UICC stage (7th edition TNM), ICD-10 C51, Germany 2016–2018

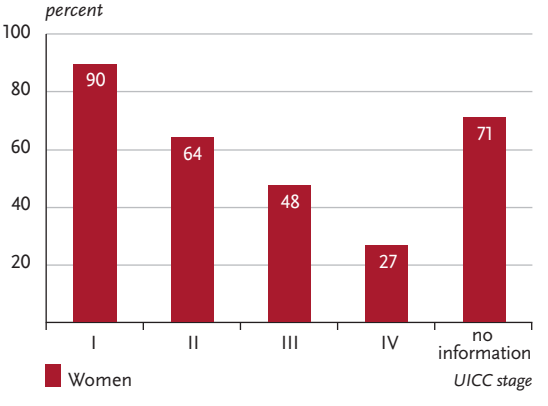
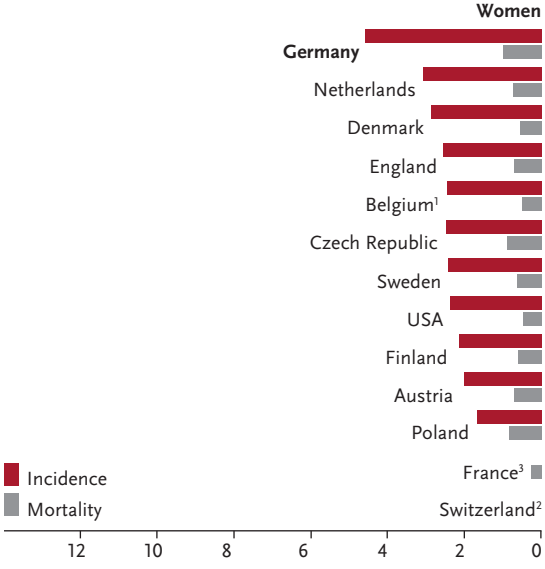


Figure 3.18.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C51, 2017–2018
per 100,000 (old European Standard)

Figure 3.18.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C51, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality for 2016
[2] No data available
[3] No incidence data available

3.19 Cervix

Table 3.19.1
Overview of key epidemiological parameters for Germany, ICD-10 C53

Incidence	2017	2018	Prediction for 2022
	Women	Women	Women
Incident cases	4,430	4,320	4,100
Crude incidence rate [1]	10.6	10.3	9.7
Age-standardised incidence rate [1, 2]	8.8	8.6	8.1
Median age at diagnosis	55	55	
Mortality	**2017**	**2018**	**2019**
	Women	Women	Women
Deaths	1,588	1,612	1,597
Crude mortality rate [1]	3.8	3.8	3.8
Age-standardised mortality rate [1, 2]	2.5	2.6	2.5
Median age at death	64	65	65
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	16,600	30,900	69,800
Absolute survival rate (2017–2018) [3]	62 (60–73)	55 (53–63)	
Relative survival rate (2017–2018) [3]	65 (62–76)	61 (58–70)	

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In 2018, about 4,320 women were diagnosed with cervical cancer in Germany. In about seven out of ten women, invasive tumours originated from the squamous epithelial tissue of the cervical mucosa. Adenocarcinomas tend to occur more proximally at the transition between the body of the uterus and the cervix. The rates of new invasive carcinoma of the cervix in women have been declining slightly for the last 10 years, after a very sharp decline in the three decades before the 2000s, and stable rates until 2010. The median age at diagnosis with an invasive carcinoma is 55 years. About four out of ten women are diagnosed in an early tumour stage (stage I). The much more frequent in situ carcinoma is usually discovered during screening in women who are on average 20 years younger. Around 1,600 women currently die of cervical cancer in Germany every year; 30 years ago, the number was more than twice as high. The relative 5-year survival rate after diagnosis of an invasive cervical tumour is 65 %. In an international comparison, the mortality rates in countries with long-standing, well-organised screening programs are significantly lower than in countries without such programs.

Risk factors, early detection and prevention

The main cause of cervical cancer is a persistent infection with a sexually-transmitted human papillomavirus (HPV). Asymptomatic HPV infections are common and usually clear up. Persistent infection with one or more of 12 high-risk viruses (primarily HPV 16 and 18) can lead to cervical cancer. Other risk factors include smoking, other sexually transmitted pathogens, early onset of sexual activity, a large number of childbirths and immunosuppression, for example after organ transplantation. Long-term use of oral contraceptives also slightly increases the risk of development of cervical cancer.

The statutory cancer screening programme offers women 20 years of age and older an annual cell test taken from the cervix (PAP smear) and its cytological examination. From the age of 35, an HPV test combined with the PAP smear is offered every three years since the beginning of 2020. The Standing Commission on Vaccination (STIKO) recommends that girls and boys be vaccinated against HPV, primarily between the ages of 9 and 14 years. Statutory health insurers cover the costs of vaccination for young people up to the age of 18 years. However, vaccination does not replace screening, as it does not protect against all high-risk HP viruses.

▶ *Additional information: www.krebsdaten.de/cervix*

Figure 3.19.1a
Age-standardised incidence and mortality rates, ICD-10 C53, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

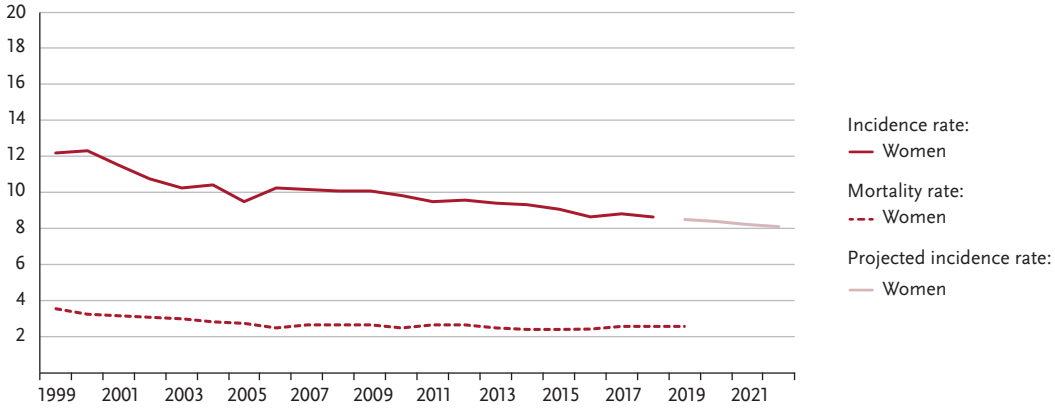


Figure 3.19.1b
Absolute numbers of incident cases and deaths, ICD-10 C53, Germany 1999–2018/2019, projection (incidence) through 2022

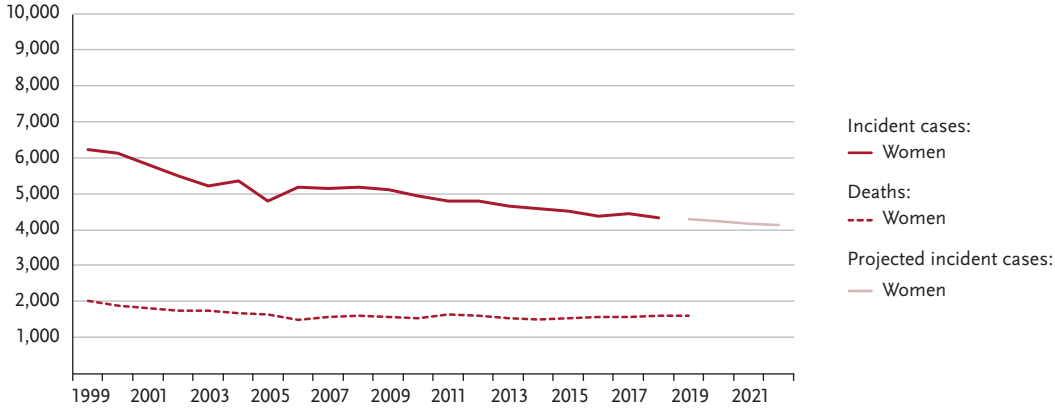


Figure 3.19.2
Age-specific incidence rates, ICD-10 C53, Germany 2017–2018
per 100,000

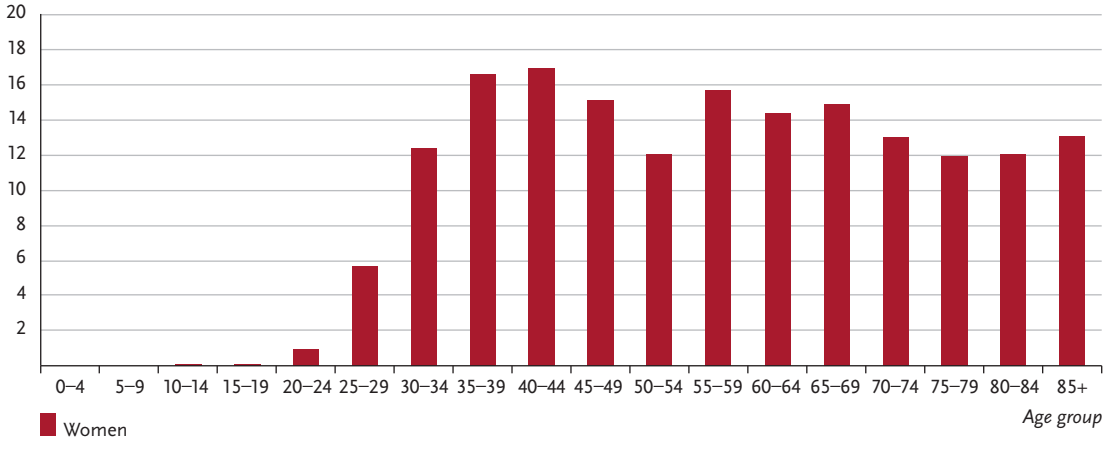


Table 3.19.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C53, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
15 years	< 0.1 %	(1 in 12,300)	0.8 %	(1 in 130)	< 0.1 %	(1 in 437,900)	0.3 %	(1 in 340)
25 years	0.1 %	(1 in 1,100)	0.8 %	(1 in 130)	< 0.1 %	(1 in 11,500)	0.3 %	(1 in 340)
35 years	0.2 %	(1 in 620)	0.7 %	(1 in 150)	< 0.1 %	(1 in 4,600)	0.3 %	(1 in 350)
45 years	0.1 %	(1 in 730)	0.5 %	(1 in 190)	< 0.1 %	(1 in 2,500)	0.3 %	(1 in 380)
55 years	0.1 %	(1 in 700)	0.4 %	(1 in 250)	0.1 %	(1 in 1,600)	0.2 %	(1 in 440)
65 years	0.1 %	(1 in 740)	0.3 %	(1 in 370)	0.1 %	(1 in 1,400)	0.2 %	(1 in 570)
75 years	0.1 %	(1 in 1,000)	0.2 %	(1 in 650)	0.1 %	(1 in 1,500)	0.1 %	(1 in 860)
Lifetime risk			0.8 %	(1 in 130)			0.3 %	(1 in 340)

Figure 3.19.3
Distribution of UICC stages at diagnosis, ICD-10 C53, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 4%. For 43% of the remaining cases, no UICC stage could be assigned.

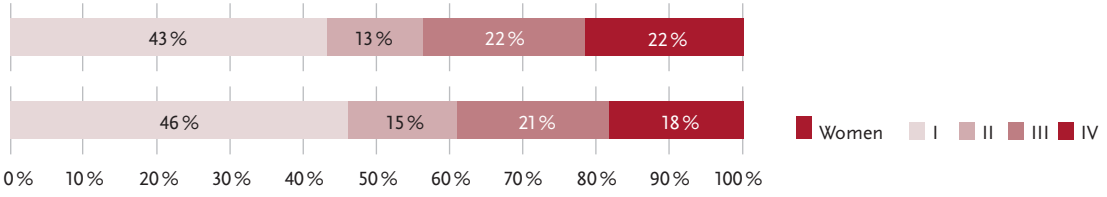


Figure 3.19.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C53, Germany 2017–2018

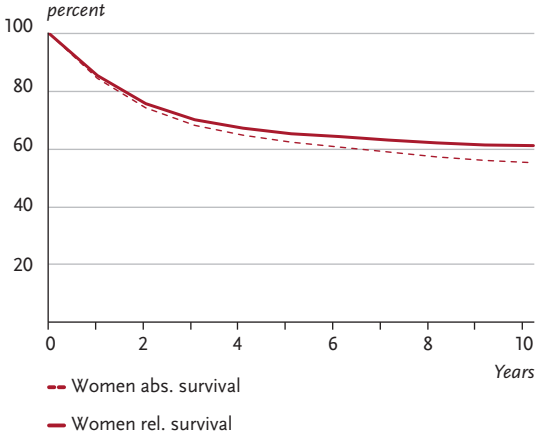


Figure 3.19.5
Relative 5-year survival by UICC stage (7th edition TNM), ICD-10 C53, Germany 2016–2018

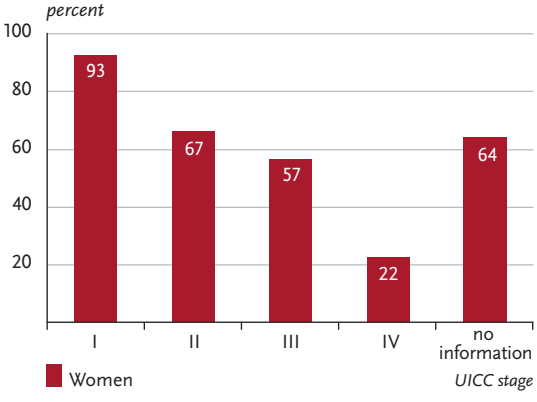


Figure 3.19.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C53, 2017–2018
per 100,000 (old European Standard)

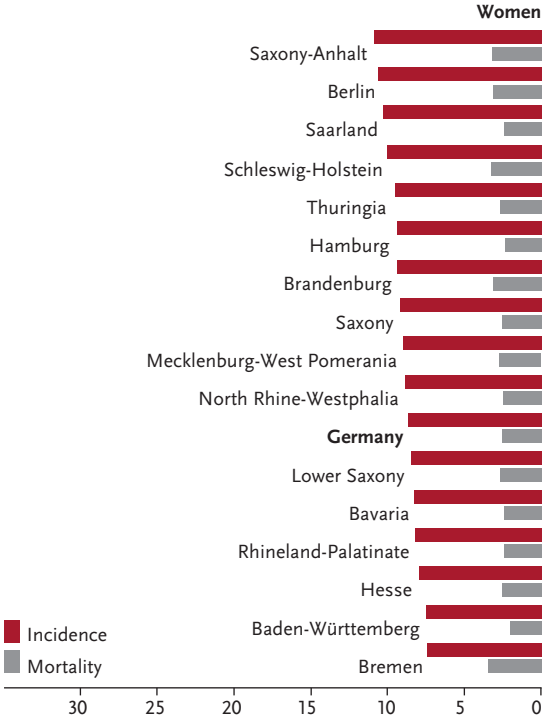
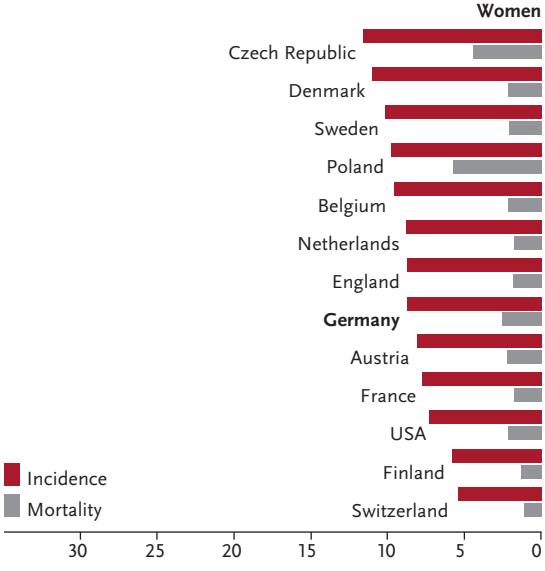


Figure 3.19.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C53, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.20 Uterus

Table 3.20.1
Overview of key epidemiological parameters for Germany, ICD-10 C54–C55

Incidence	2017	2018	Prediction for 2022
	Women	Women	Women
Incident cases	10,760	10,860	10,600
Crude incidence rate [1]	25.7	25.9	25.1
Age-standardised incidence rate [1, 2]	15.9	15.9	15.1
Median age at diagnosis	68	68	
Mortality	**2017**	**2018**	**2019**
	Women	Women	Women
Deaths	2,707	2,631	2,659
Crude mortality rate [1]	6.5	6.3	6.3
Age-standardised mortality rate [1, 2]	3.1	3.0	3.0
Median age at death	77	77	77
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	43,000	77,100	143,600
Absolute survival rate (2017–2018) [3]	69 (66–72)	57 (52–59)	
Relative survival rate (2017–2018) [3]	78 (75–81)	74 (68–78)	

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

With approximately 10,860 new cases in 2018, malignant tumours of the uterus (corpus or endometrial carcinoma) are the fifth most common cancer in women and the most common of the female genital organs. Uterine cancer generally has a good prognosis. As such, the number of deaths from this disease is comparatively low at about 2,650 per year. One in 50 women will develop uterine cancer in the course of her life, and one in 200 will die from it. Within Germany, regional differences in mortality rates are rather small. Internationally, significantly higher incidence rates are reported from the US, but also from Eastern European countries and the Nordic countries, as well as from England. The age-standardised incidence and mortality rates from uterine cancer have recently remained almost constant after a continuous decline. The median age at diagnosis is 68 years. Histologically, uterine cancers are mostly endometrioid adenocarcinomas (originating from the glandular lining of the uterus). Between 64% and 67% of carcinomas with valid stage information are diagnosed at stage I. However, about half of the tumours could not be assigned to any stage. The relative 5-year survival of patients with uterine cancer is around 78% in Germany. At the end of 2018, there were about 143,600 women living in Germany who had been diagnosed with uterine cancer in the past 25 years.

▶ *Additional information: www.krebsdaten.de/uterus*

Risk factors

About 80% of endometrial carcinomas are hormone-dependent. Long-term oestrogen exposure is a risk factor for these: An early first menstruation, a late menopause, childlessness and diseases of the ovaries increase the risk. Similarly, oestrogen monotherapy during menopause also increases risk. However, this risk can be reduced by combining them with gestagen counteracts the risk. Oral contraceptives and especially oestrogen-gestagen combinations reduce the risk. In the case of hormone-dependent tumours, obesity and lack of exercise also play a role. Furthermore, women with type 2 diabetes mellitus are more likely to develop uterine cancer. Women who are treated for breast cancer with tamoxifen also have a slightly higher risk. Gene mutations associated with hereditary colorectal cancer, hereditary non-polyposis colorectal carcinoma (HNPCC, Lynch syndrome), also increase the risk of developing uterine cancer.

Advanced age is associated with the rarer oestrogen-independent forms of uterine cancer. Uterine exposure to radiation can also increase the risk. The role of lifestyle or genetic factors remains unclear.

Figure 3.20.1a
Age-standardised incidence and mortality rates, ICD-10 C54 – C55, Germany 19999 – 2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

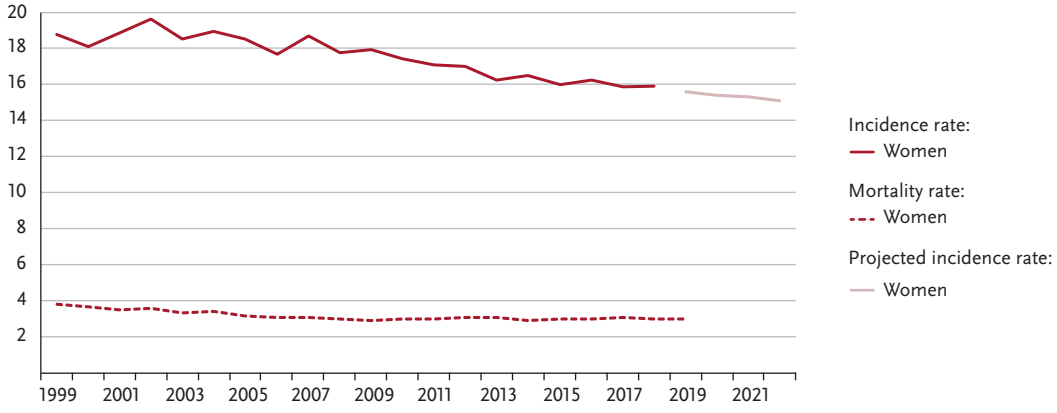


Figure 3.20.1b
Absolute numbers of incident cases and deaths, ICD-10 C54 – C55, Germany 1999 – 2018/2019, projection (incidence) through 2022

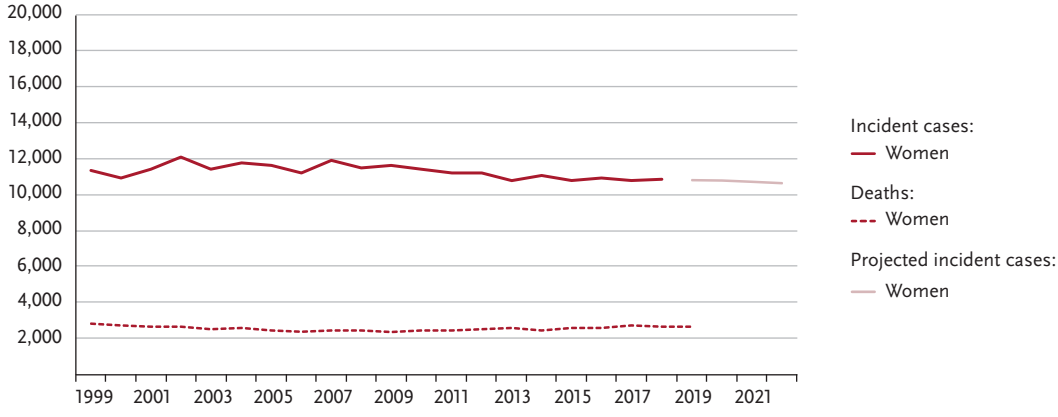


Figure 3.20.2
Age-specific incidence rates, ICD-10 C54 – C55, Germany 2017 – 2018
per 100,000

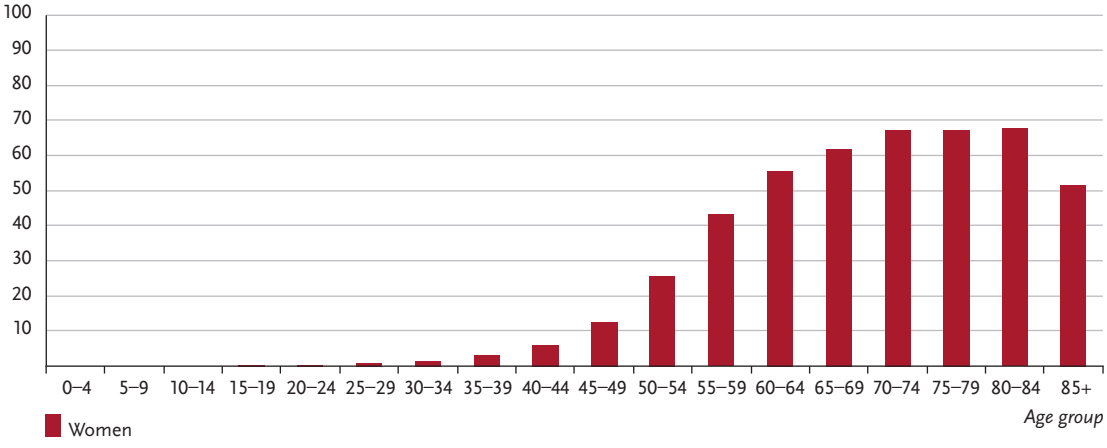


Table 3.20.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C54–C55, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 2,000)	1.9 %	(1 in 52)	< 0.1 %	(1 in 20,900)	0.5 %	(1 in 200)
45 years	0.2 %	(1 in 510)	1.9 %	(1 in 53)	< 0.1 %	(1 in 5,700)	0.5 %	(1 in 200)
55 years	0.5 %	(1 in 210)	1.7 %	(1 in 58)	0.1 %	(1 in 1,700)	0.5 %	(1 in 200)
65 years	0.6 %	(1 in 160)	1.3 %	(1 in 75)	0.1 %	(1 in 770)	0.5 %	(1 in 220)
75 years	0.6 %	(1 in 170)	0.8 %	(1 in 120)	0.2 %	(1 in 470)	0.4 %	(1 in 270)
Lifetime risk			1.9 %	(1 in 52)			0.5 %	(1 in 200)

Figure 3.20.3
Distribution of UICC stages at diagnosis, ICD-10 C54–C55, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 3%. For 49% of the remaining cases, no UICC stage could be assigned.

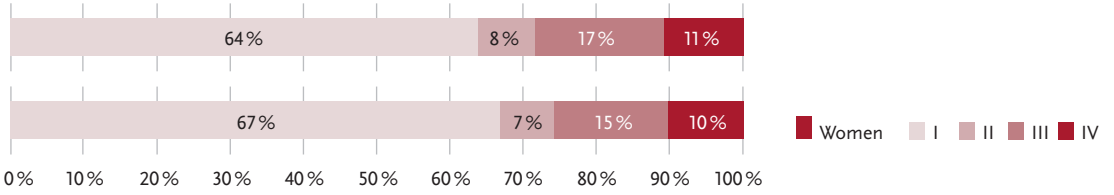


Figure 3.20.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C54–C55, Germany 2017–2018

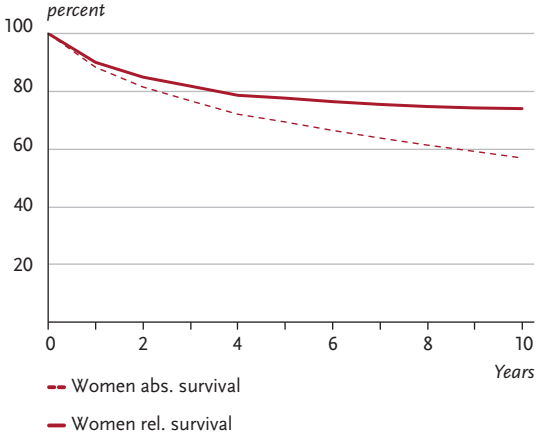


Figure 3.20.5
Relative 5-year survival by UICC stage (7th edition TNM), ICD-10 C54–C55, Germany 2016–2018

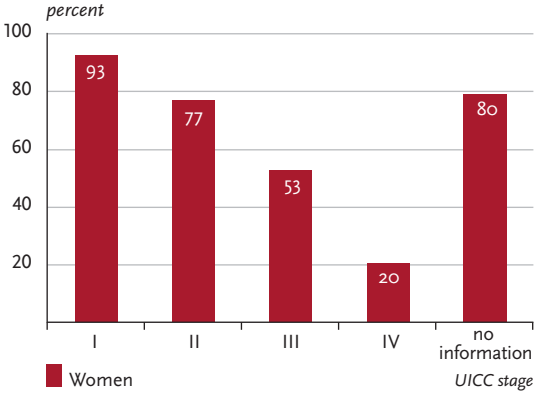


Figure 3.20.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C54 – C55, 2017 – 2018
per 100,000 (old European Standard)

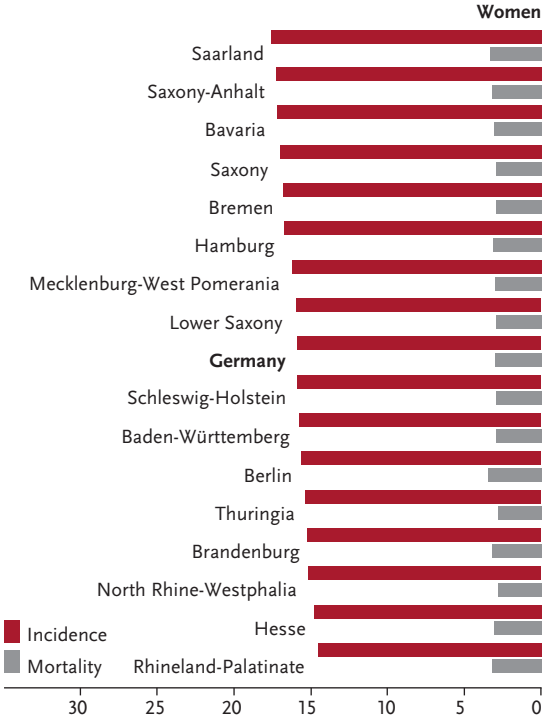
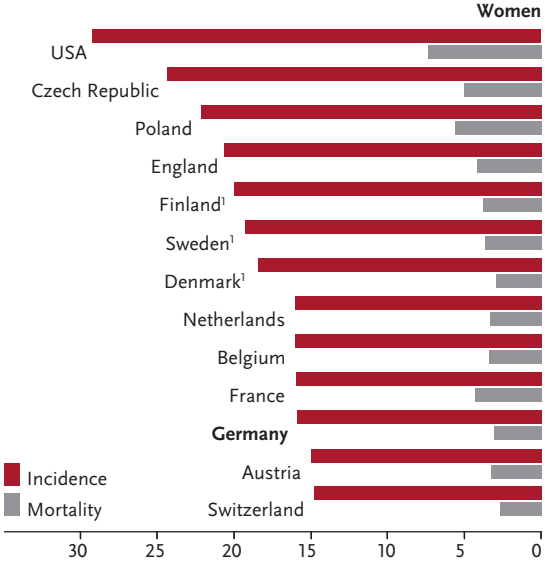


Figure 3.20.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C54 – C55, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data include C58

3.21 Ovaries

Table 3.21.1
Overview of key epidemiological parameters for Germany, ICD-10 C56

Incidence	2017	2018	Prediction for 2022
	Women	Women	Women
Incident cases	7,460	7,300	6,800
Crude incidence rate [1]	17.8	17.4	16.2
Age-standardised incidence rate [1, 2]	11.1	10.7	9.8
Median age at diagnosis	69	69	
Mortality	**2017**	**2018**	**2019**
	Women	Women	Women
Deaths	5,373	5,326	5,291
Crude mortality rate [1]	12.8	12.7	12.6
Age-standardised mortality rate [1, 2]	6.6	6.6	6.5
Median age at death	75	75	75
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	21,400	34,000	63,600
Absolute survival rate (2017–2018) [3]	39 (36–43)	27 (25–32)	
Relative survival rate (2017–2018) [3]	42 (39–47)	33 (30–38)	

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Ovarian cancer accounts for about one third of all malignant neoplasms of the female genitalia and half of all deaths from cancers of these organs. The incidence rate increases continuously up to the age of 85, and the median age at diagnosis is 69 years. Histologically, malignant tumours of the ovaries tend to be moderately to poorly differentiated serous adenocarcinomas. Some rare forms of ovarian cancer, such as germ cell tumours, can already occur in girls and young women. About one in 76 women will develop ovarian cancer in her lifetime. Since the turn of the millennium, the incidence and mortality rates in Germany have continued to decrease significantly, and absolute numbers of new cases are also decreasing.

Partly due to the fact that ovarian cancer is diagnosed at a late stage (72 % to 76 % in stage III/IV), the survival prospects of patients with ovarian cancer are relatively poor. Relative 5-year survival is currently 42 %. If the disease is diagnosed early, relative survival rates are 88 % in stage I and 79 % in stage II.

Risk factors

The risk of developing ovarian cancer increases with age. Obesity also plays a role. Hormonal factors also have an impact on the risk of developing ovarian cancer: Whereas childlessness and infertility are linked to an increased risk, multiple childbirths and longer periods of breastfeeding reduce the risk. In women with multiple cysts in the ovaries, hormonal factors probably increase the risk. Hormone replacement therapy, especially with oestrogen mono preparations in post-menopausal women is also a risk factor for the development of ovarian cancer. In contrast, ovulation inhibitors have a protective effect. Finally, sterilisation through occlusion of the fallopian tubes reduces the risk of ovarian cancer.

Women with first-degree relatives who have developed breast or ovarian cancer, as well as women with breast, uterine or colorectal cancer, are more likely to develop ovarian cancer. Often, underlying genetic mutations, especially in the BRCA1 and BRCA2 genes can be detected in these cases. There are other hereditary gene mutations that significantly increase the risk of developing the disease. According to new research results, such inherited mutations are found in up to 25 % of patients.

▶ *Additional information: www.krebsdaten.de/ovaries*

Figure 3.21.1a
Age-standardised incidence and mortality rates, ICD-10 C56, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

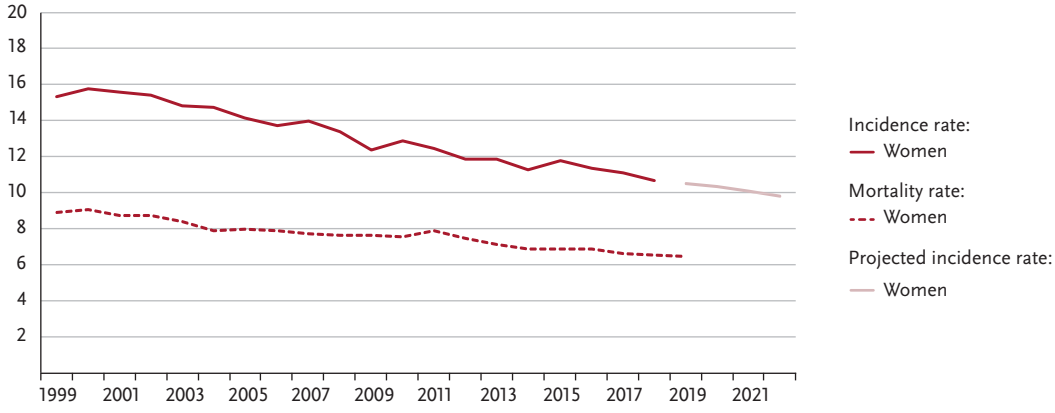


Figure 3.21.1b
Absolute numbers of incident cases and deaths, ICD-10 C56, Germany 1999–2018/2019, projection (incidence) through 2022

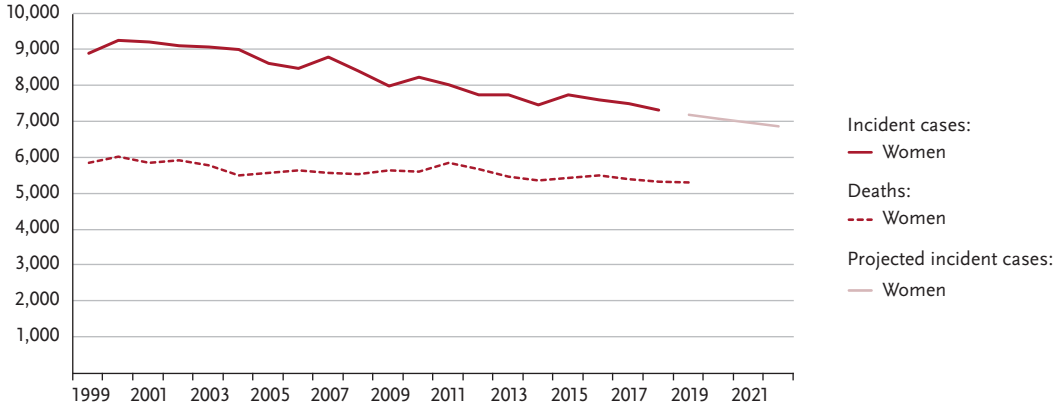


Figure 3.21.2
Age-specific incidence rates, ICD-10 C56, Germany 2017–2018
per 100,000

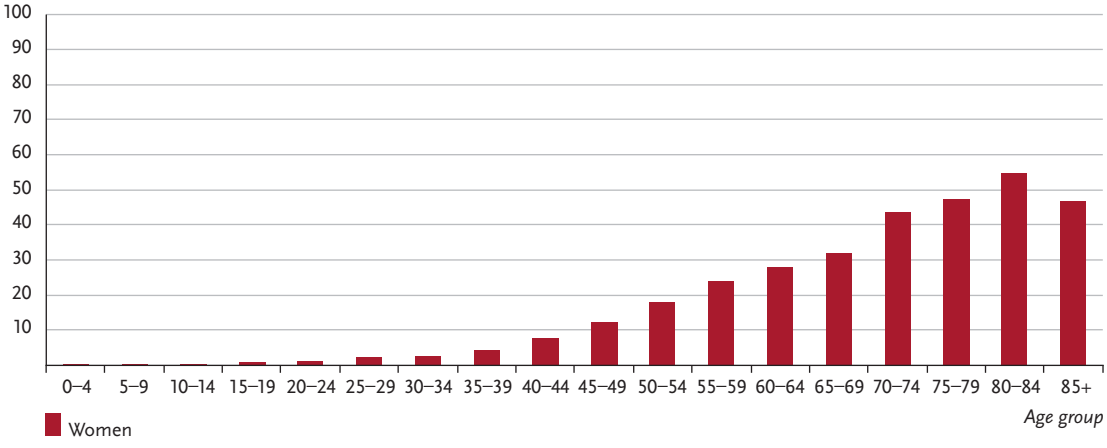


Table 3.21.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C56, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,700)	1.3 %	(1 in 78)	< 0.1 %	(1 in 6,500)	1.0 %	(1 in 100)
45 years	0.1 %	(1 in 710)	1.2 %	(1 in 81)	0.1 %	(1 in 1,700)	1.0 %	(1 in 100)
55 years	0.3 %	(1 in 400)	1.1 %	(1 in 89)	0.1 %	(1 in 670)	0.9 %	(1 in 110)
65 years	0.4 %	(1 in 280)	0.9 %	(1 in 110)	0.3 %	(1 in 380)	0.8 %	(1 in 120)
75 years	0.4 %	(1 in 240)	0.6 %	(1 in 160)	0.4 %	(1 in 240)	0.6 %	(1 in 160)
Lifetime risk			1.3 %	(1 in 76)			1.0 %	(1 in 100)

Figure 3.21.3
Distribution of UICC stages at diagnosis, ICD-10 C56, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 10%. For 39% of the remaining cases, no UICC stage could be assigned.

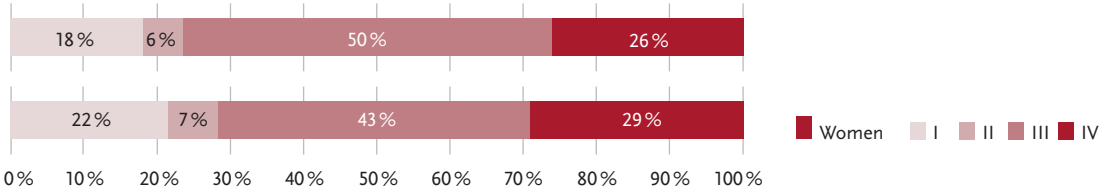


Figure 3.21.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C56, Germany 2017–2018

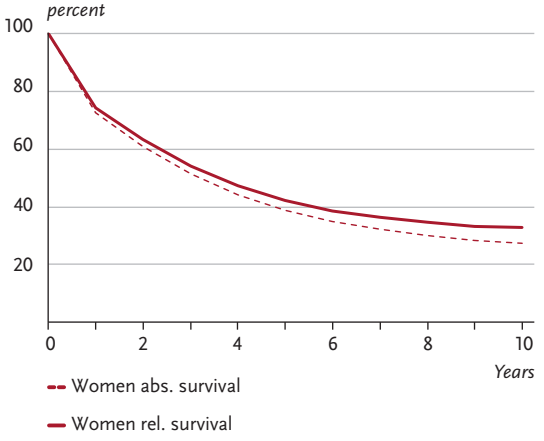


Figure 3.21.5
Relative 5-year survival by UICC stage (7th edition TNM), ICD-10 C56, Germany 2016–2018

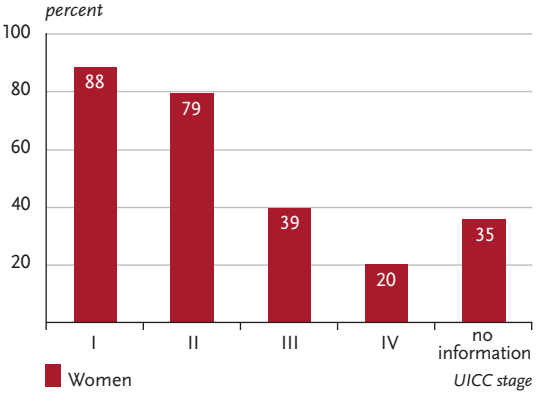


Figure 3.21.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C56, 2017–2018
per 100,000 (old European Standard)

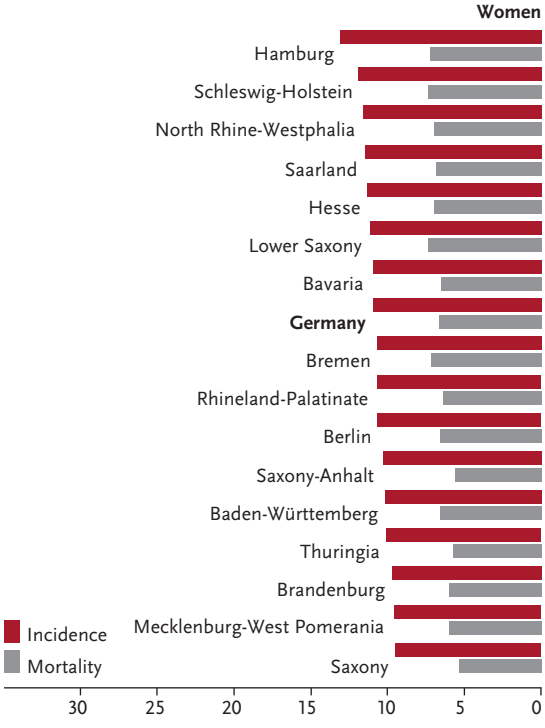
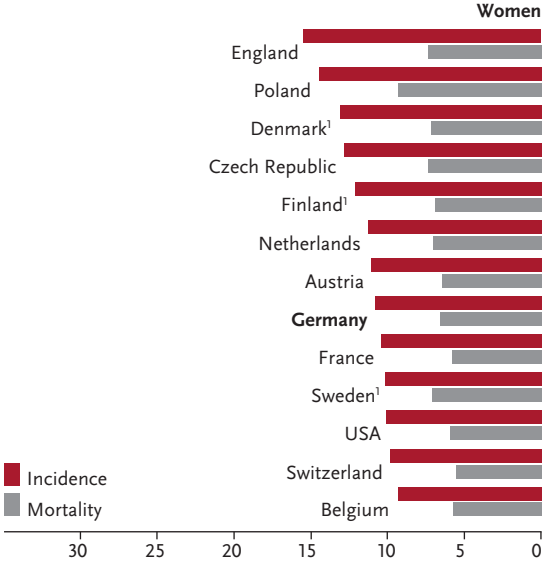


Figure 3.21.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C56, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data include C57.0 to C57.4

3.22 Prostate

Table 3.22.1
Overview of key epidemiological parameters for Germany, ICD-10 C61

Incidence	2017	2018	Prediction for 2022
	Men	Men	Men
Incident cases	64,250	65,200	70,100
Crude incidence rate [1]	157.6	159.4	169.8
Age-standardised incidence rate [1, 2]	99.0	99.1	100.3
Median age at diagnosis	72	71	
Mortality	**2017**	**2018**	**2019**
	Men	Men	Men
Deaths	14,318	14,963	15,040
Crude mortality rate [1]	35.1	36.6	36.7
Age-standardised mortality rate [1, 2]	18.8	19.2	18.7
Median age at death	80	80	81
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Men	Men	Men
Prevalence	260,400	474,000	753,800
Absolute survival rate (2017–2018) [3]	74 (73–76)	58 (56–60)	
Relative survival rate (2017–2018) [3]	89 (89–91)	88 (87–91)	

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Around 65,200 new cases of prostate cancer were diagnosed in 2018. After an increase at the beginning of the 2000s, the age-standardised incidence rate has been declining slightly since 2011 and has been rather constant in recent years. A similar development can be observed in many other western industrialised nations and is likely due to the use of the PSA test (prostate specific antigen) as an early detection test, which usage has been increasing for a long time but is now probably declining. In contrast to the incidence rate, the age-standardised mortality rate decreased continuously until 2007 and has been almost stable since then. Germany is in the lower midfield in terms of prostate cancer incidence, compared to other countries in Central Europe.

Prostate cancer rarely occurs before the age of 50: The risk of developing the disease in the next 10 years is less than 0.1% for a 35-year-old man, while it is about 6% for a 75-year-old man.

The relative 5-year survival rate for men with prostate cancer is 89%. About two-thirds of tumours are diagnosed at an early stage (I/II).

Risk factors and early detection

Causes of prostate cancer and the factors that influence its course are essentially unknown. Age is an important risk factor. Men of black African origin are more likely to develop prostate cancer than Europeans and white North Americans; Asians are rarely affected. An accumulation of the disease among close relatives has now been proven as a risk factor; in some cases, inherited changes in certain risk genes can be detected. In addition, chronic inflammation of the prostate and sexually transmitted diseases seem to increase the risk of prostate cancer.

There is little evidence on lifestyle or environmental risk factors. However, a normal weight and sufficient exercise could reduce the risk of prostate cancer.

The statutory cancer screening programme in Germany currently includes an examination of the external genital organs and palpation of the prostate and lymph nodes once a year for men over the age of 45, in addition to asking about symptoms. The PSA test in the blood is not part of the statutory screening programme, as the benefit of population-wide PSA screening has not yet been proven beyond doubt.

▶ *Additional information: www.krebsdaten.de/prostate*

Figure 3.22.1a
Age-standardised incidence and mortality rates, ICD-10 C61, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

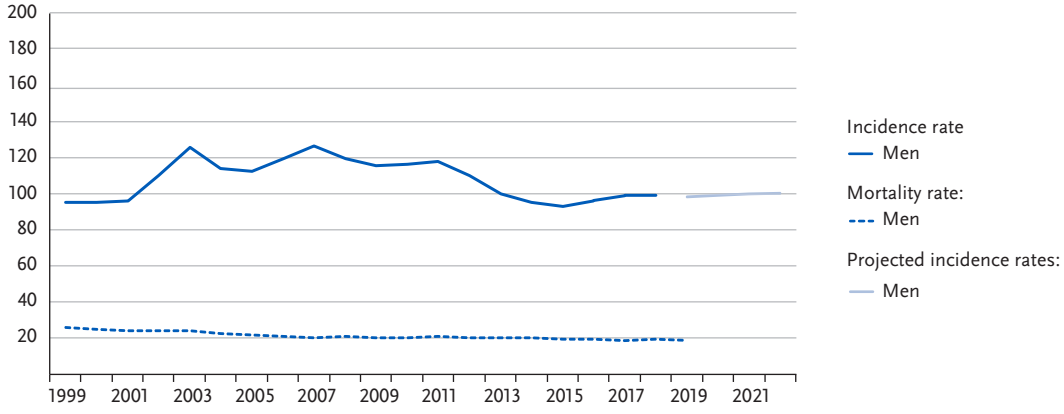


Figure 3.22.1b
Absolute numbers of incident cases and deaths, ICD-10 C61, Germany 1999–2018/2019, projection (incidence) through 2022

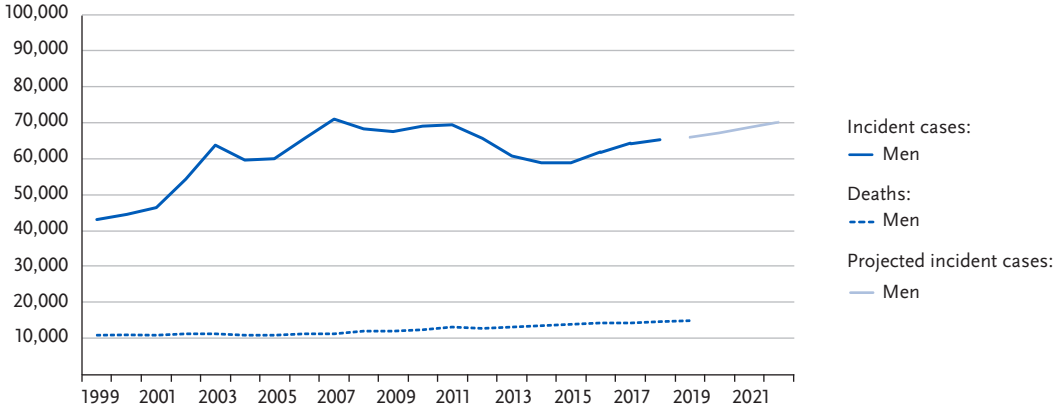


Figure 3.22.2
Age-specific incidence rates, ICD-10 C61, Germany 2017–2018
per 100,000

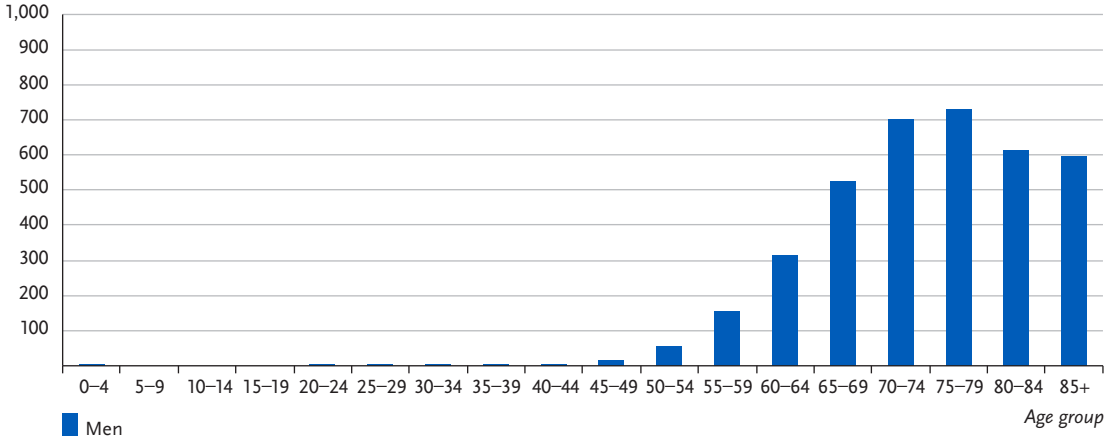


Table 3.22.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C61, database 2018

	Risk of developing cancer				Mortality risk			
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 4,800)	12.3 %	(1 in 8)	< 0.1 %	(1 in 84,200)	3.3 %	(1 in 30)
45 years	0.4 %	(1 in 250)	12.4 %	(1 in 8)	< 0.1 %	(1 in 6,000)	3.4 %	(1 in 30)
55 years	2.3 %	(1 in 43)	12.5 %	(1 in 8)	0.2 %	(1 in 650)	3.5 %	(1 in 29)
65 years	5.6 %	(1 in 18)	11.5 %	(1 in 9)	0.7 %	(1 in 150)	3.7 %	(1 in 27)
75 years	5.9 %	(1 in 17)	7.9 %	(1 in 13)	1.8 %	(1 in 54)	3.8 %	(1 in 27)
Lifetime risk			12.1 %	(1 in 8)			3.3 %	(1 in 30)

Figure 3.22.3
Distribution of UICC stages at diagnosis, ICD-10 C61, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 4%. For 47% of the remaining cases, no UICC stage could be assigned.

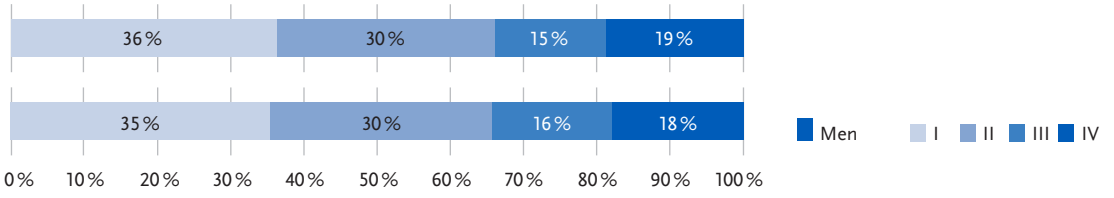


Figure 3.22.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C61, Germany 2017–2018

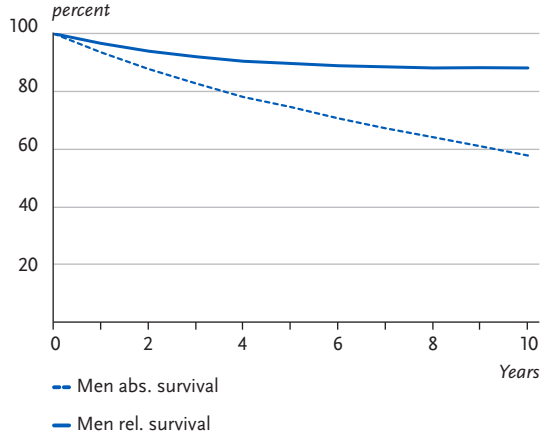


Figure 3.22.5
Relative 5-year survival by UICC stage (7th edition TNM), ICD-10 C61, Germany 2016–2018

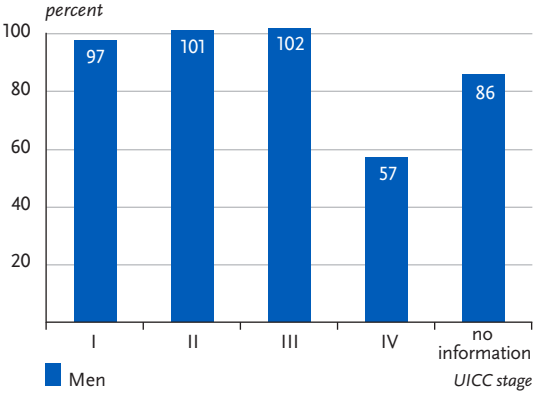


Figure 3.22.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C61, 2017–2018
per 100,000 (old European Standard)

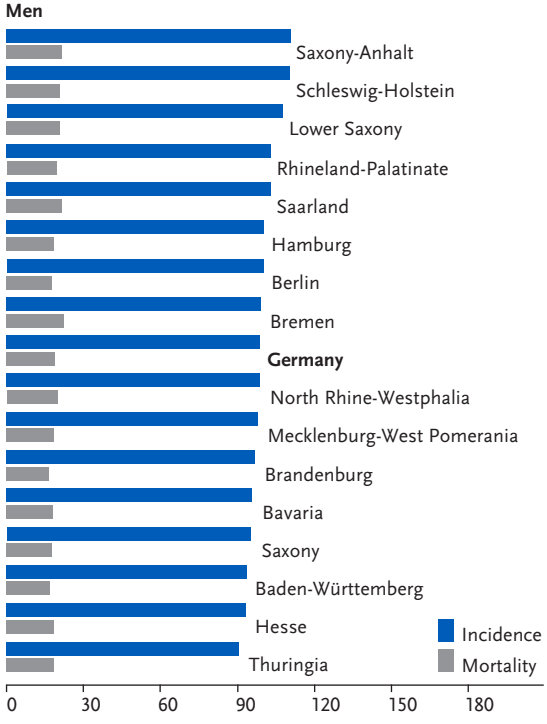
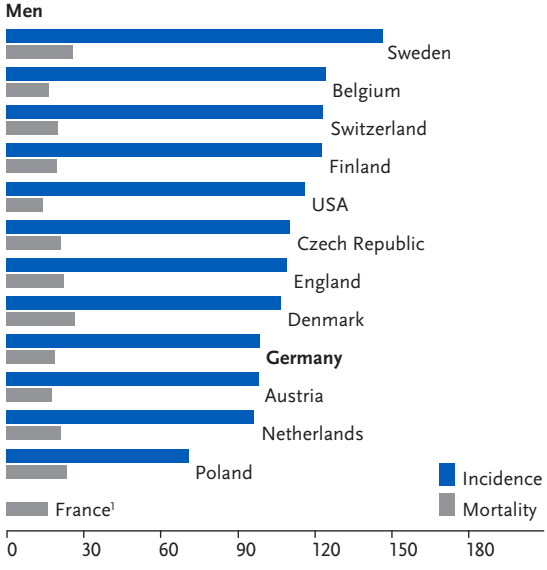


Figure 3.22.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C61, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] No incidence data available

3.23 Testis

Table 3.23.1
Overview of key epidemiological parameters for Germany, ICD-10 C62

Incidence	2017	2018	Prediction for 2022
	Men	Men	Men
Incident cases	4,140	4,160	4,100
Crude incidence rate [1]	10.1	10.2	10.0
Age-standardised incidence rate [1, 2]	10.2	10.4	10.2
Median age at diagnosis	38	37	
Mortality	**2017**	**2018**	**2019**
	Men	Men	Men
Deaths	157	178	158
Crude mortality rate [1]	0.4	0.4	0.4
Age-standardised mortality rate [1, 2]	0.3	0.4	0.3
Median age at death	53	54	54
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Men	Men	Men
Prevalence	20,100	39,300	87,300
Absolute survival rate (2017–2018) [3]	95 (92–98)	93 (91–95)	
Relative survival rate (2017–2018) [3]	97 (94–100)	97 (95–99)	

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In 2018, approximately 4,160 men were diagnosed with testicular cancer in Germany. Accordingly, testicular cancer is rare, accounting for 1.6% of all cancers in men. In contrast to almost all other cancers, most cases occur at a comparatively early age between 25 and 45 years. In this age group, testicular cancer is the most common malignant tumour in men. It accounts for about one third of all tumours (excluding non-melanoma skin cancer) in this age group. The median age at diagnosis is 37 years. The age-standardised incidence rate has recently remained almost constant, after a steady increase over decades, as in other European countries. About 86% to 89% of testicular tumours for which a stage is known are diagnosed in stage I/II. Histologically, testicular cancer is predominantly germ cell tumours: about two thirds of all testicular tumours are seminomas. About one in six cases are malignant teratomas or mixed forms of both types.

Since the introduction of cis-platinum in chemotherapy of testicular cancer a good 30 years ago, the disease has been one of the most prognostically favourable malignant neoplasms with correspondingly high relative 5-year survival rates (most recently 97%) and low mortality (158 deaths in 2019).

Risk factors and early detection

Undescended testis (cryptorchidism) is considered a confirmed risk factor for testicular cancer. In addition, men who have already had testicular cancer or a precursor have an increased risk of developing a tumour in the healthy testicle as well. Rare genetic disorders of sex development such as Klinefelter's syndrome also increase the risk of developing the disease.

A small number of those affected may have a family history of the disease. Sons and brothers of people with the disease have a significantly increased risk.

A birth weight of less than 2,500 g or more than 4,500 g as well as tall stature are also discussed as possible risk factors. The causes of the increase in incidence observed over several decades have not been conclusively clarified. According to current knowledge, lifestyle and environmental factors do not play a role in the development of testicular cancer.

It has been proven that early diagnosis correlates with a better prognosis. Adolescents and men are therefore advised to undergo regular self-examination from puberty onwards. From the age of 45, men can have an examination of the genital organs once a year as part of the statutory cancer screening.

▶ *Additional information: www.krebsdaten.de/testis*

Figure 3.23.1a
Age-standardised incidence and mortality rates, ICD-10 C62, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

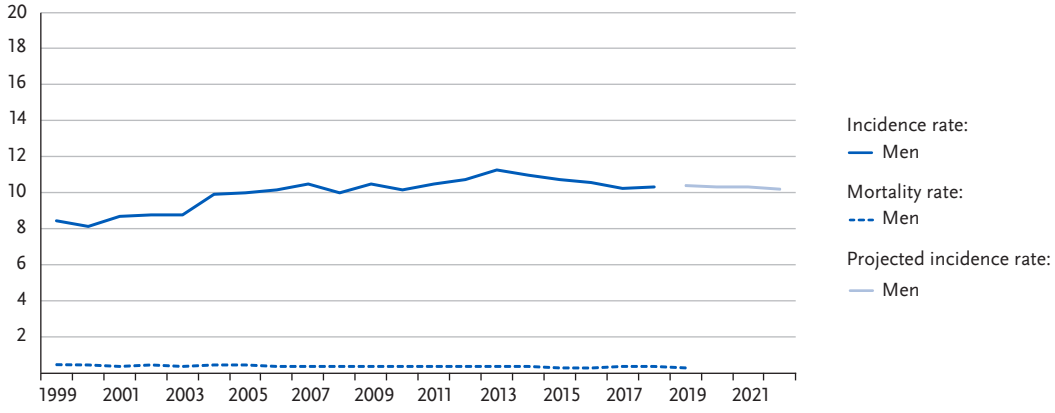


Figure 3.23.1b
Absolute numbers of incident cases and deaths, ICD-10 C62, Germany 1999–2018/2019, projection (incidence) through 2022

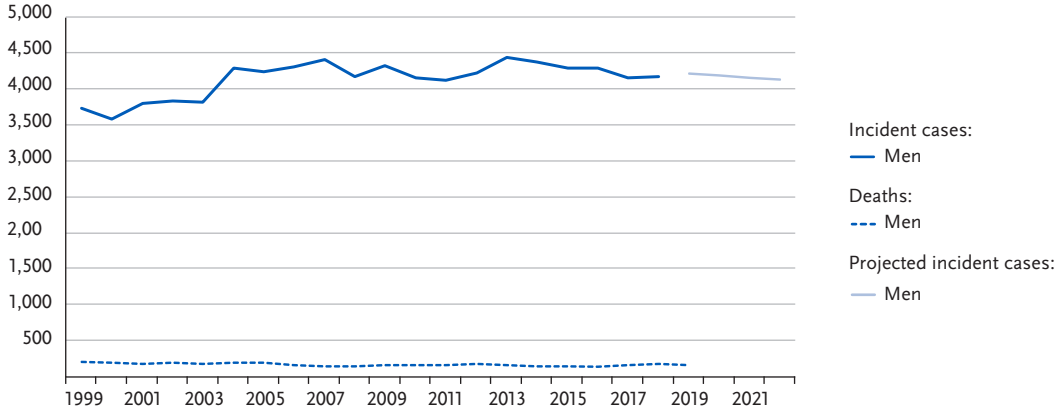


Figure 3.23.2
Age-specific incidence rates, ICD-10 C62, Germany 2017–2018
per 100,000

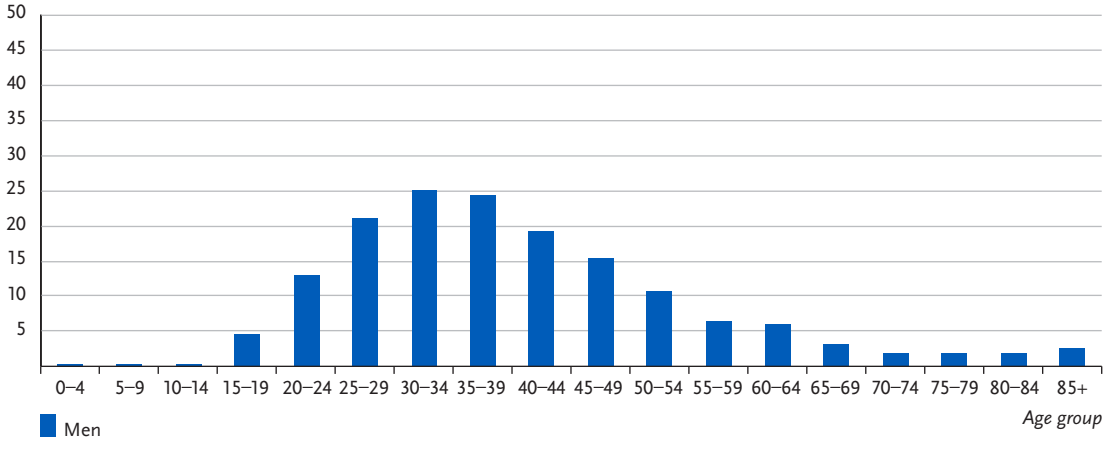


Table 3.23.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C62, database 2018

	Risk of developing cancer				Mortality risk			
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
15 years	0.1 %	(1 in 1,100)	0.8 %	(1 in 130)	< 0.1 %	(1 in 65,300)	< 0.1 %	(1 in 3,100)
25 years	0.2 %	(1 in 440)	0.7 %	(1 in 150)	< 0.1 %	(1 in 24,400)	< 0.1 %	(1 in 3,300)
35 years	0.2 %	(1 in 460)	0.4 %	(1 in 230)	< 0.1 %	(1 in 15,600)	< 0.1 %	(1 in 3,700)
45 years	0.1 %	(1 in 800)	0.2 %	(1 in 460)	< 0.1 %	(1 in 21,200)	< 0.1 %	(1 in 4,900)
55 years	0.1 %	(1 in 1,700)	0.1 %	(1 in 1,000)	< 0.1 %	(1 in 16,100)	< 0.1 %	(1 in 6,100)
65 years	< 0.1 %	(1 in 4,000)	< 0.1 %	(1 in 2,300)	< 0.1 %	(1 in 21,000)	< 0.1 %	(1 in 8,900)
75 years	< 0.1 %	(1 in 6,700)	< 0.1 %	(1 in 4,400)	< 0.1 %	(1 in 21,600)	< 0.1 %	(1 in 12,300)
Lifetime risk			0.8 %	(1 in 130)			< 0.1 %	(1 in 3,100)

Figure 3.23.3
Distribution of UICC stages at diagnosis, ICD-10 C62, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 1%. For 57 % of the remaining cases, no UICC stage could be assigned.

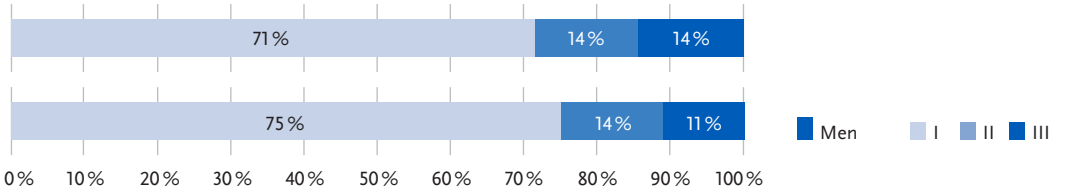


Figure 3.23.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C62, Germany 2017–2018

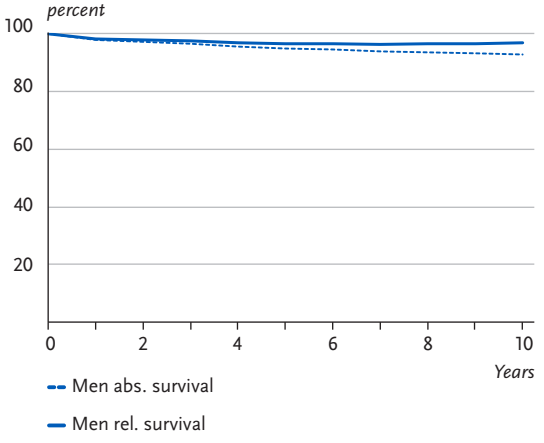


Figure 3.23.5
Relative 5-year survival by UICC stage (7th edition TNM), ICD-10 C62, Germany 2016–2018

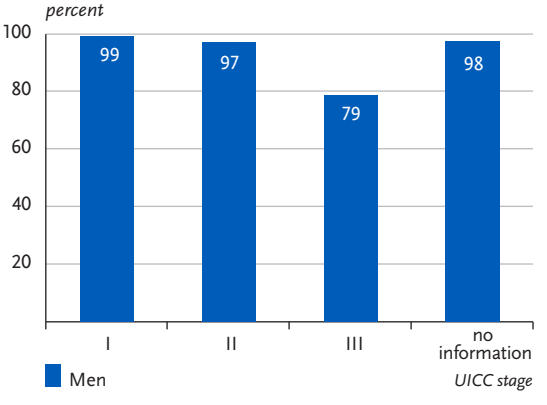


Figure 3.23.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C62, 2017–2018
per 100,000 (old European Standard)

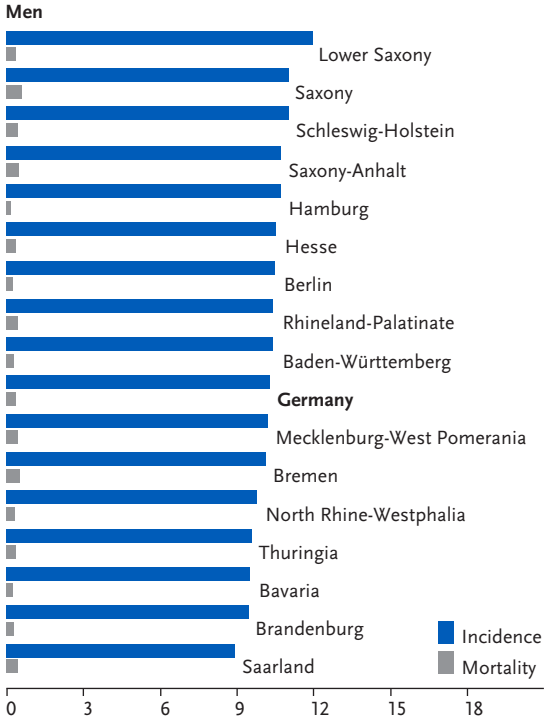
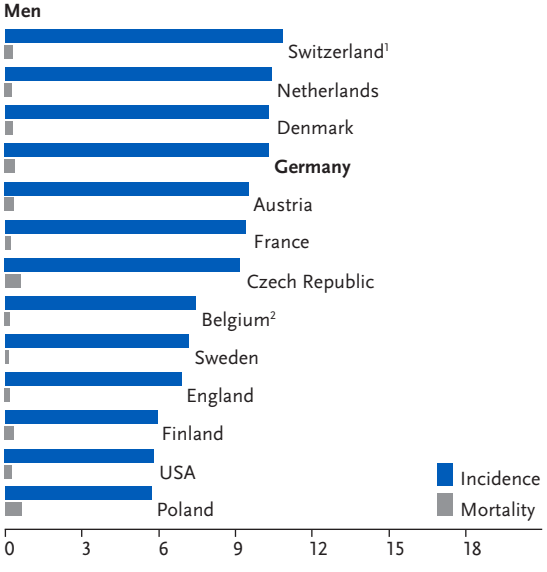


Figure 3.23.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C62, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality for 2013 to 2017
[2] Mortality for 2016

3.24 Kidney

Table 3.24.1
Overview of key epidemiological parameters for Germany, ICD-10 C64

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	5,410	9,070	5,480	9,350	5,200	9,300
Crude incidence rate [1]	12.9	22.2	13.0	22.9	12.4	22.4
Age-standardised incidence rate [1, 2]	7.5	15.2	7.6	15.4	7.1	14.7
Median age at diagnosis	72	68	71	68		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	1,985	3,155	1,931	3,108	1,920	3,230
Crude mortality rate [1]	4.7	7.7	4.6	7.6	4.6	7.9
Age-standardised mortality rate [1, 2]	2.0	4.6	1.9	4.5	1.8	4.5
Median age at death	80	76	80	76	81	77
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	21,200	35,900	37,400	62,200	63,100	101,900
Absolute survival rate (2017–2018) [3]	67 (62–72)	67 (66–70)	52 (47–62)	51 (50–53)		
Relative survival rate (2017–2018) [3]	76 (70–81)	78 (75–81)	70 (63–81)	71 (70–74)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Malignant neoplasms of the kidney can originate from various tissues. Among all kidney tumours in adults, renal cell carcinomas (hypernephromas) occur most frequently with a share of about 95%. In children, however, who are rarely affected, nephroblastomas (Wilms tumours) predominate. In total, about 14,800 new cases occurred in 2018, men were affected almost twice as often as women.

The age-standardised incidence rates show a slight decline in both sexes since around 2008. Age-standardised mortality rates have slightly decreased for women and men over the entire observation period. The median age at diagnosis is 71 to 72 years for women and 68 years for men. The prognosis of renal carcinoma is comparatively favourable, the relative 5-year survival of patients is 76% for women and 78% for men. A good half of all tumours are diagnosed at an early stage (UICC I). In a regional comparison, higher incidence and mortality rates are noticeable in the eastern federal states. Internationally, the disease and mortality rates in the Czech Republic are comparatively high.

Risk factors

Smoking and passive smoking as well as high blood pressure and obesity are considered the most important risk factors associated with cancer of the kidney. In addition, lack of physical activity seems to increase the risk. Chronic renal insufficiency favours tumours of this organ overall and regardless of their cause. It can be caused, for example, by drugs that damage the kidneys or repeated inflammations of the urinary tract. Even after a kidney transplant, the risk of developing renal cell carcinoma remains increased in immunosuppressed patients.

A familial predisposition probably only plays a role in a comparatively small number of cases. About 4% of renal cell carcinomas occur in patients with complex hereditary diseases, such as von Hippel-Lindau syndrome. These genetic renal cell carcinomas are often multifocal, bilateral and occur more often at a younger age than renal cancers in patients without a genetic disposition.

▶ *Additional information: www.krebsdaten.de/kidney*

Figure 3.24.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C64, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

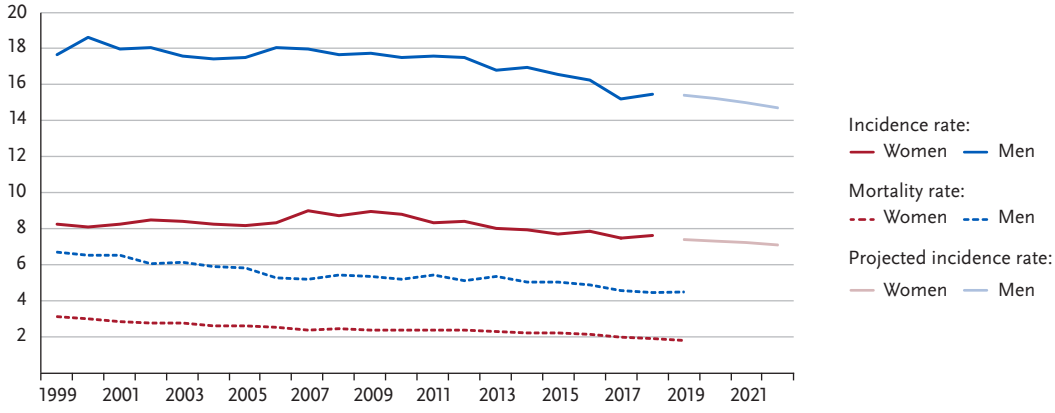


Figure 3.24.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C64, Germany 1999–2018/2019, projection (incidence) through 2022

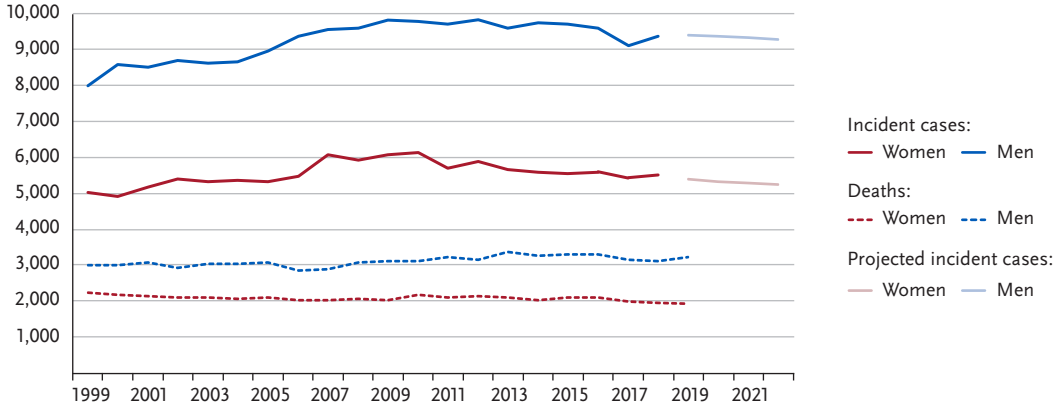


Figure 3.24.2
Age-specific incidence rates by sex, ICD-10 C64, Germany 2017–2018
per 100,000

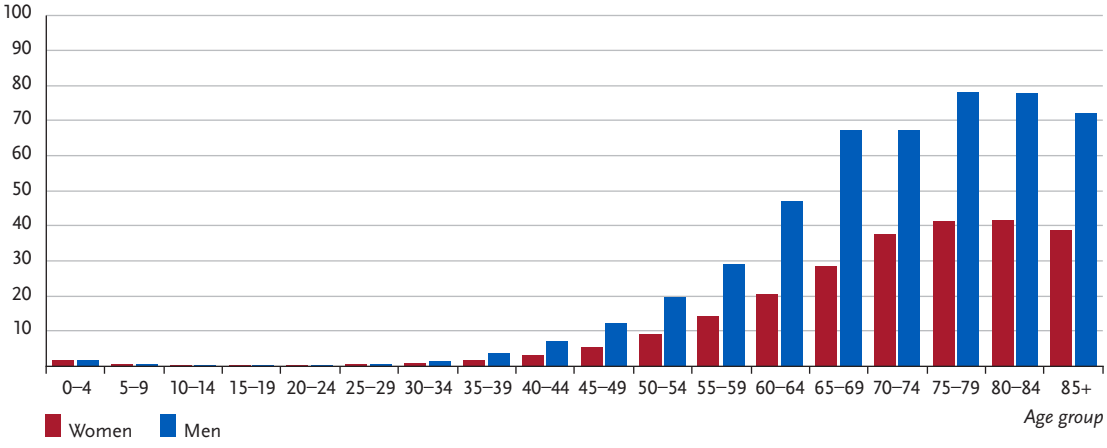


Table 3.24.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C64, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 3,600)	1.0 %	(1 in 100)	< 0.1 %	(1 in 57,000)	0.4 %	(1 in 270)
45 years	0.1 %	(1 in 1,300)	1.0 %	(1 in 100)	< 0.1 %	(1 in 12,500)	0.4 %	(1 in 270)
55 years	0.2 %	(1 in 560)	0.9 %	(1 in 110)	< 0.1 %	(1 in 3,400)	0.4 %	(1 in 270)
65 years	0.2 %	(1 in 320)	0.8 %	(1 in 130)	0.1 %	(1 in 1,300)	0.4 %	(1 in 270)
75 years	0.3 %	(1 in 290)	0.5 %	(1 in 190)	0.2 %	(1 in 580)	0.3 %	(1 in 300)
Lifetime risk			1.0 %	(1 in 100)			0.4 %	(1 in 270)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,700)	1.7 %	(1 in 59)	< 0.1 %	(1 in 20,900)	0.6 %	(1 in 160)
45 years	0.2 %	(1 in 610)	1.7 %	(1 in 60)	< 0.1 %	(1 in 4,000)	0.6 %	(1 in 160)
55 years	0.4 %	(1 in 270)	1.5 %	(1 in 65)	0.1 %	(1 in 1,200)	0.6 %	(1 in 160)
65 years	0.6 %	(1 in 160)	1.3 %	(1 in 77)	0.2 %	(1 in 580)	0.6 %	(1 in 170)
75 years	0.6 %	(1 in 160)	0.9 %	(1 in 120)	0.3 %	(1 in 330)	0.5 %	(1 in 190)
Lifetime risk			1.7 %	(1 in 59)			0.6 %	(1 in 160)

Figure 3.24.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C64, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 7%. For 47% of the remaining cases, no UICC stage could be assigned.

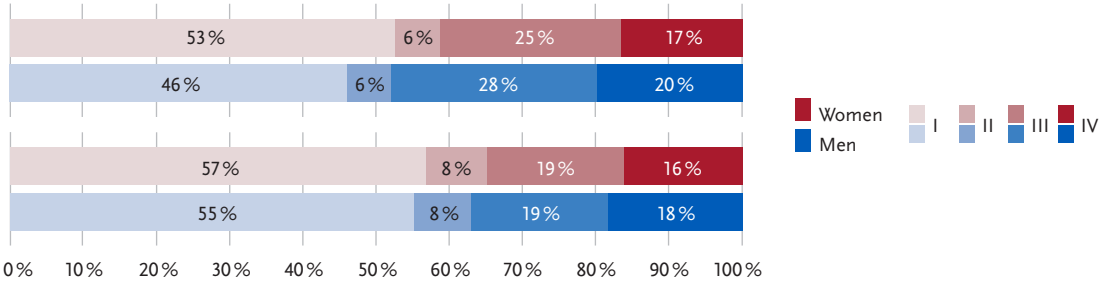


Figure 3.24.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C64, Germany 2017–2018

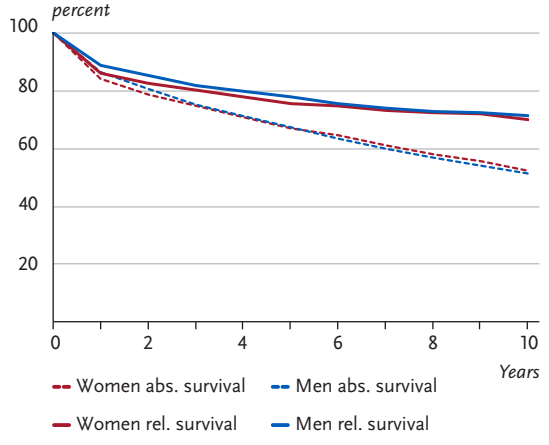


Figure 3.24.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C64, Germany 2016–2018

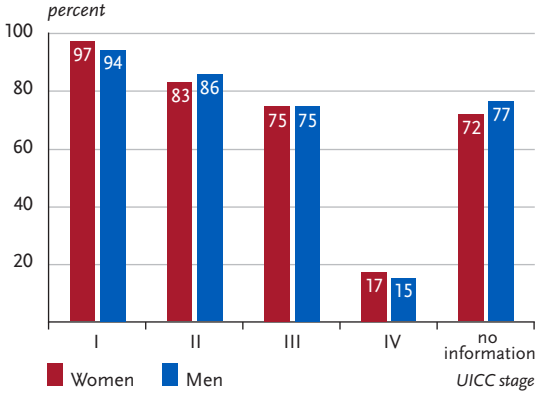


Figure 3.24.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C64, 2017–2018
per 100,000 (old European Standard)

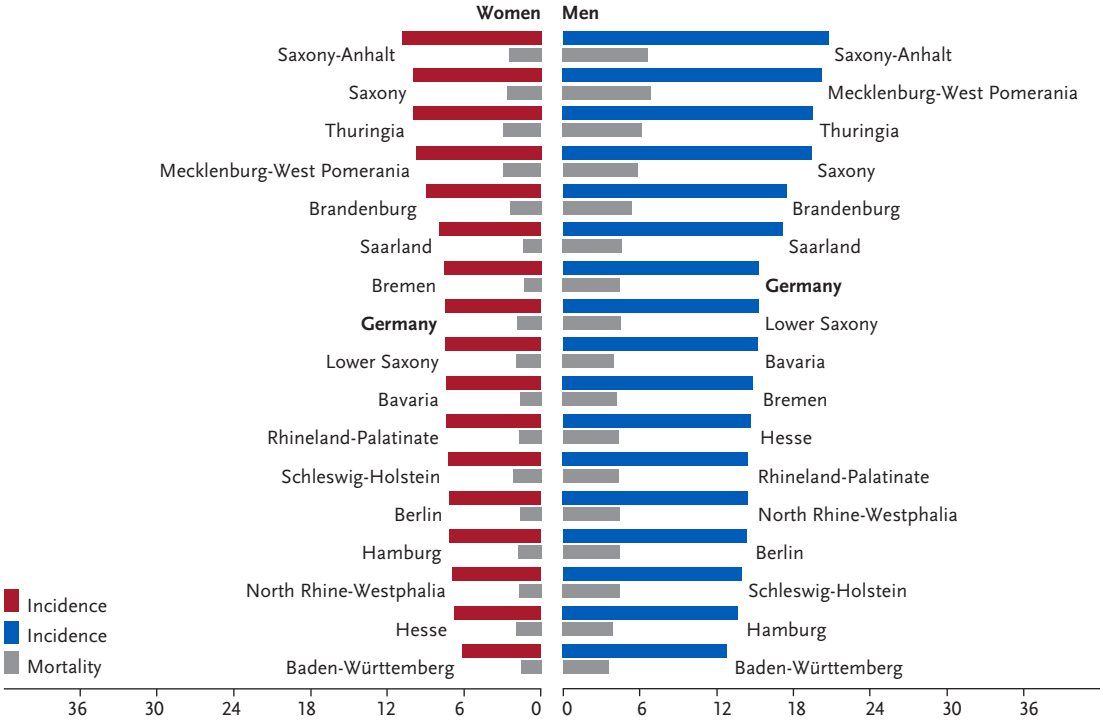
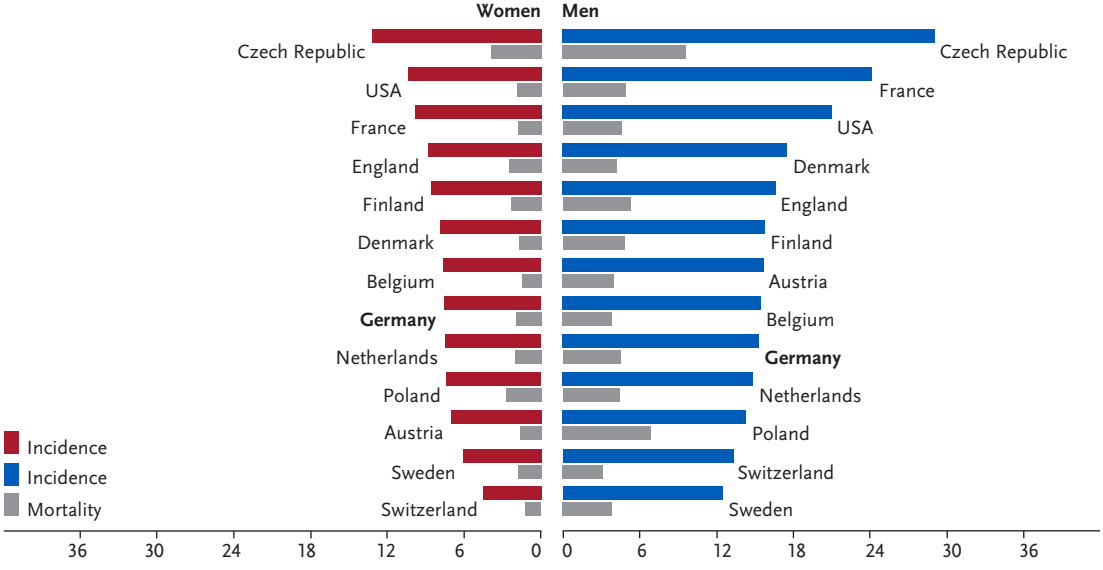


Figure 3.24.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C64, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.25 Bladder

Table 3.25.1
Overview of key epidemiological parameters for Germany, ICD-10 C67

Incidence	2017				2018				Prediction for 2022			
	Women		Men		Women		Men		Women		Men	
Incident cases [4]	4,720	(7,450)	12,520	(23,170)	4,770	(7,630)	13,500	(23,410)	5,200	(7,700)	14,600	(23,000)
Crude incidence rate [1, 4]	11.3	(17.8)	30.7	(56.8)	11.4	(18.2)	33.0	(57.2)	12.3	(18.2)	35.3	(55.7)
Age-standardised incidence rate [1, 2, 4]	5.6	(9.2)	18.5	(34.7)	5.5	(9.3)	19.7	(34.5)	6.0	(9.2)	20.1	(32.3)
Median age at diagnosis [4]	76	(75)	75	(74)	76	(75)	75	(74)				
Mortality	**2017**				**2018**				**2019**			
	Women		Men		Women		Men		Women		Men	
Deaths	1,858		3,848		1,840		3,862		1,814		3,824	
Crude mortality rate [1]	4.4		9.4		4.4		9.4		4.3		9.3	
Age-standardised mortality rate [1, 2]	1.8		5.2		1.7		5.1		1.6		5.0	
Median age at death	81		80		82		80		82		80	
Prevalence and survival rates	**5 years**				**10 years**				**25 years**			
	Women		Men		Women		Men		Women		Men	
Prevalence	11,900		38,400		19,100		60,200		30,500		93,200	
Absolute survival rate (2017–2018) [3]	40 (35–47)		47 (44–51)		27 (23–34)		31 (29–32)					
Relative survival rate (2017–2018) [3]	48 (43–58)		59 (56–64)		42 (36–55)		51 (50–54)					

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)
[4] in parentheses: including in situ tumours and neoplasms of uncertain or unknown behavior (D09.0, D41.4)

Epidemiology

Approximately 18,270 people were diagnosed with invasive bladder cancer in 2018, including 4,770 women. In addition, around 12,770 people were diagnosed with non-invasive papillary carcinomas and in situ carcinomas of the bladder. Especially with the latter, there is an increased risk of tumour growth (progression) and recurrence of the disease. Therefore, they are of particular clinical relevance, although they are currently not classified as malignant tumours according to ICD-10. Most bladder cancers are urothelial carcinomas, which often occur simultaneously in different parts of the bladder and urinary tract.

In men, the age-standardised incidence and mortality rates have declined significantly since the end of the 1990s. This is probably a consequence of a reduction in tobacco consumption, possibly also a consequence of reduced occupational exposure to carcinogenic substances. For women, both rates have been largely constant over the years, but at a significantly lower level than for men.

The higher relative 5-year survival rates of men compared to women correspond to a more favourable distribution of tumour stages.

Risk factors

Active and passive smoking are the most important risk factors for bladder cancer. In addition, some chemical substances such as aromatic amines increase the risk. The known risk-increasing agents have now largely disappeared from the workplace in Europe. However, the latency period between exposure and cancer development is long, so that occupational bladder cancers continue to be registered. Cytostatics used in cancer therapy and radiotherapy of this body region can increase the risk. Other drugs such as the antidiabetic drug pioglitazone also seem to increase bladder cancer risk.

In addition, air pollution and arsenic or chlorine in drinking water increase the risk of developing bladder cancer. Aristolochic acid from Aristolochia plants such as Easter luce also increases the risk of bladder cancer. Chronic inflammatory damage to the bladder mucosa also increases the risk of disease. Familial clusters are observed: There is evidence that genetic factors play a role in the development of bladder cancer by influencing sensitivity to carcinogens.

▶ *Additional information: www.krebsdaten.de/bladder*

Figure 3.25.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C67, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

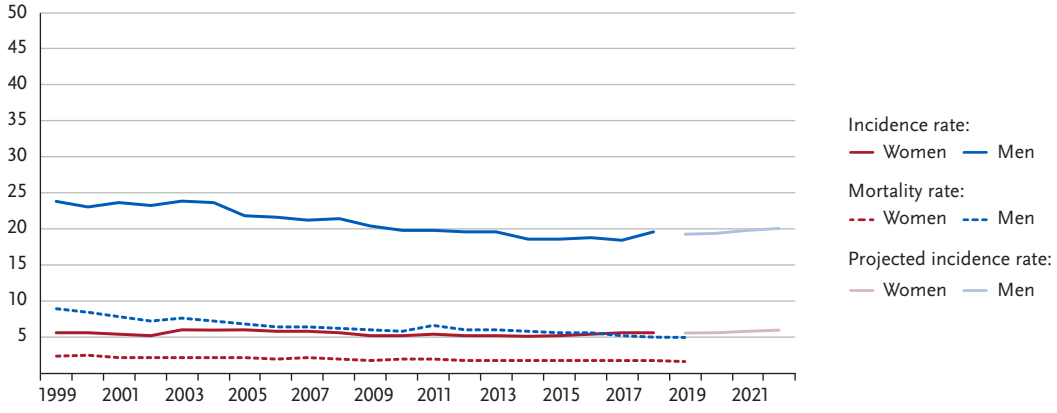


Figure 3.25.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C67, Germany 1999–2018/2019, projection (incidence) through 2022

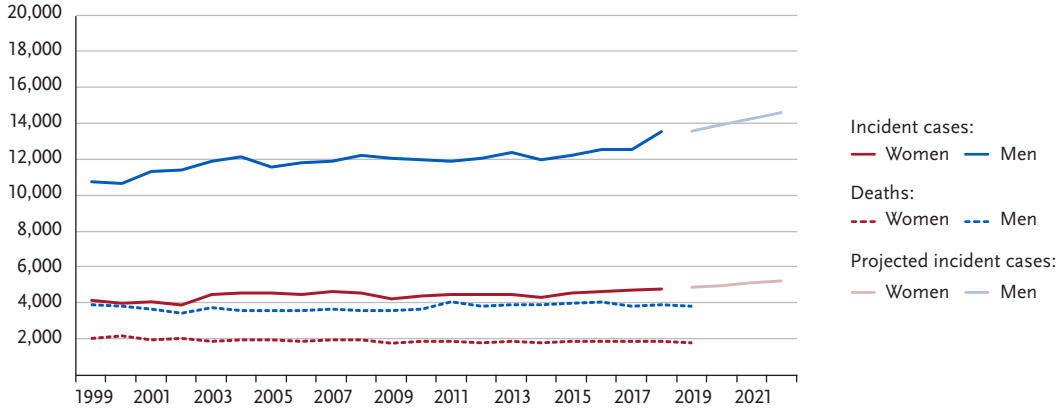


Figure 3.25.2
Age-specific incidence rates by sex, ICD-10 C67, Germany 2017–2018
per 100,000

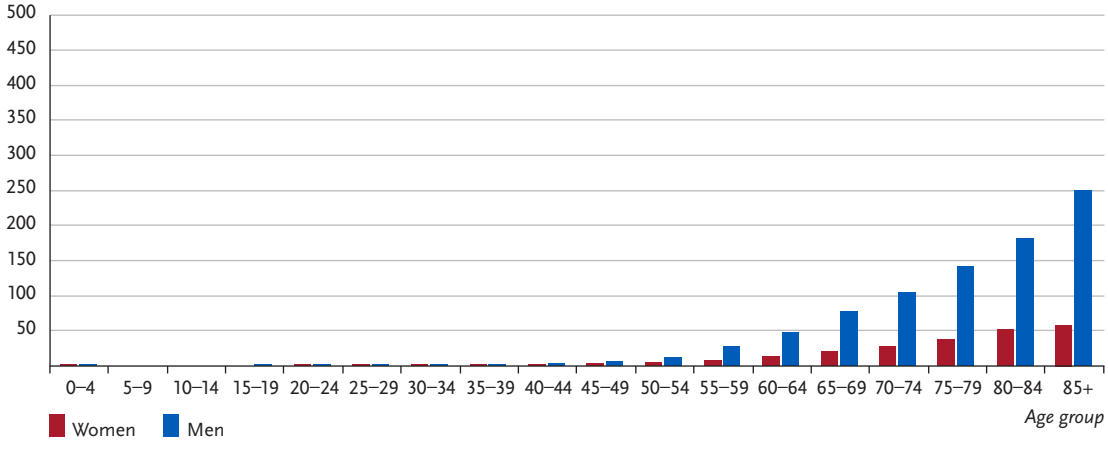


Table 3.25.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C67, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 10,300)	0.9 %	(1 in 110)	< 0.1 %	(1 in 39,700)	0.4 %	(1 in 270)
45 years	< 0.1 %	(1 in 2,500)	0.9 %	(1 in 110)	< 0.1 %	(1 in 10,300)	0.4 %	(1 in 270)
55 years	0.1 %	(1 in 860)	0.9 %	(1 in 120)	< 0.1 %	(1 in 4,300)	0.4 %	(1 in 270)
65 years	0.2 %	(1 in 430)	0.8 %	(1 in 130)	0.1 %	(1 in 1,800)	0.4 %	(1 in 280)
75 years	0.4 %	(1 in 270)	0.6 %	(1 in 160)	0.2 %	(1 in 660)	0.3 %	(1 in 290)
Lifetime risk			0.9 %	(1 in 110)			0.4 %	(1 in 270)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 4,900)	2.7 %	(1 in 38)	< 0.1 %	(1 in 54,300)	0.9 %	(1 in 120)
45 years	0.1 %	(1 in 970)	2.7 %	(1 in 37)	< 0.1 %	(1 in 7,600)	0.9 %	(1 in 120)
55 years	0.4 %	(1 in 260)	2.7 %	(1 in 37)	0.1 %	(1 in 1,700)	0.9 %	(1 in 110)
65 years	0.8 %	(1 in 120)	2.5 %	(1 in 40)	0.2 %	(1 in 600)	0.9 %	(1 in 110)
75 years	1.3 %	(1 in 77)	2.1 %	(1 in 47)	0.4 %	(1 in 230)	0.9 %	(1 in 110)
Lifetime risk			2.6 %	(1 in 38)			0.8 %	(1 in 120)

Figure 3.25.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C67, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 5%. For 56% of the remaining cases, no UICC stage could be assigned.

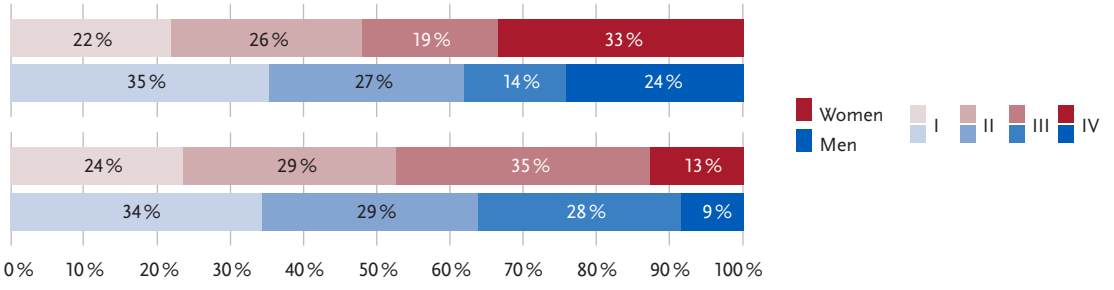


Figure 3.25.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C67, Germany 2017–2018

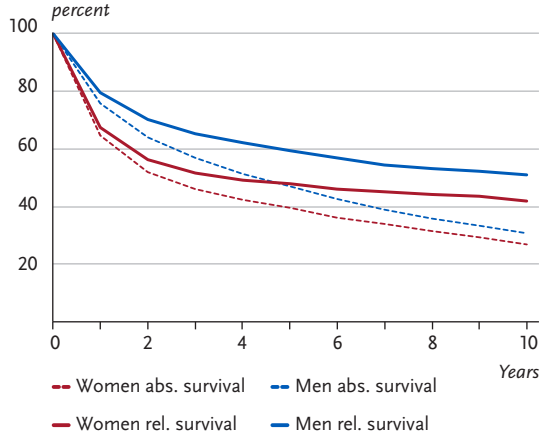


Figure 3.25.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C67, Germany 2016–2018

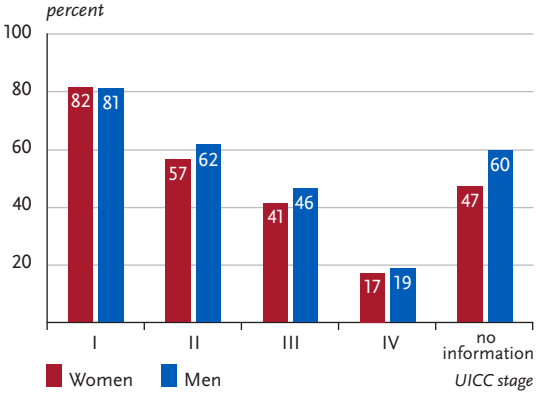


Figure 3.25.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C67, 2017–2018
per 100,000 (old European Standard)

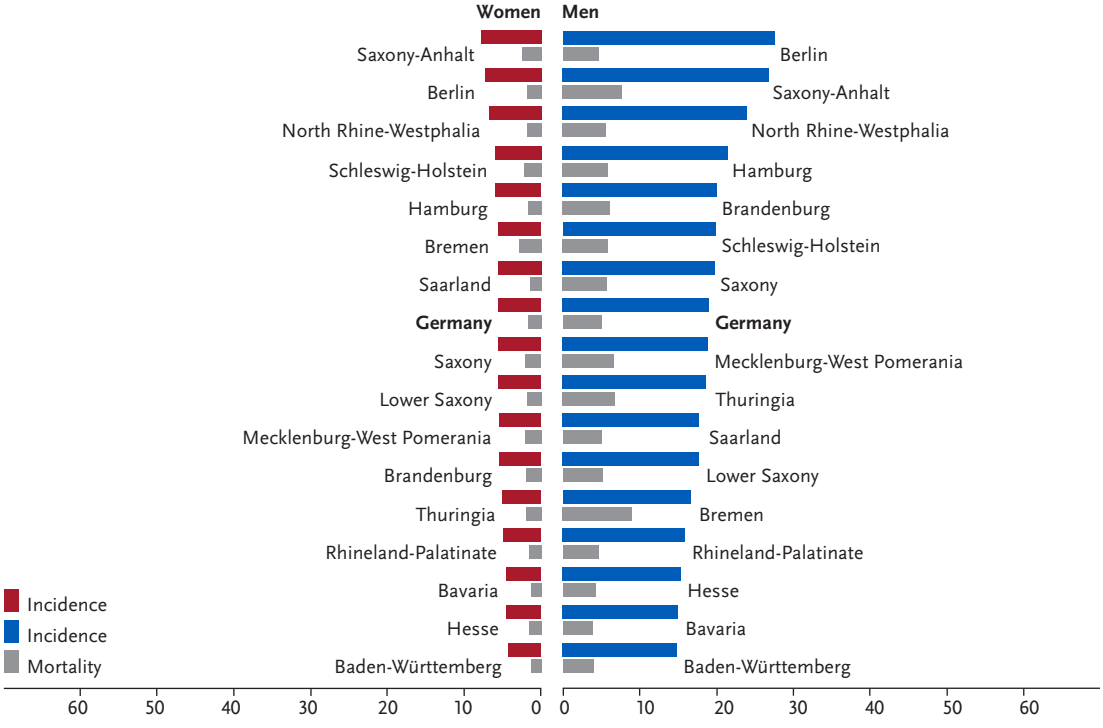
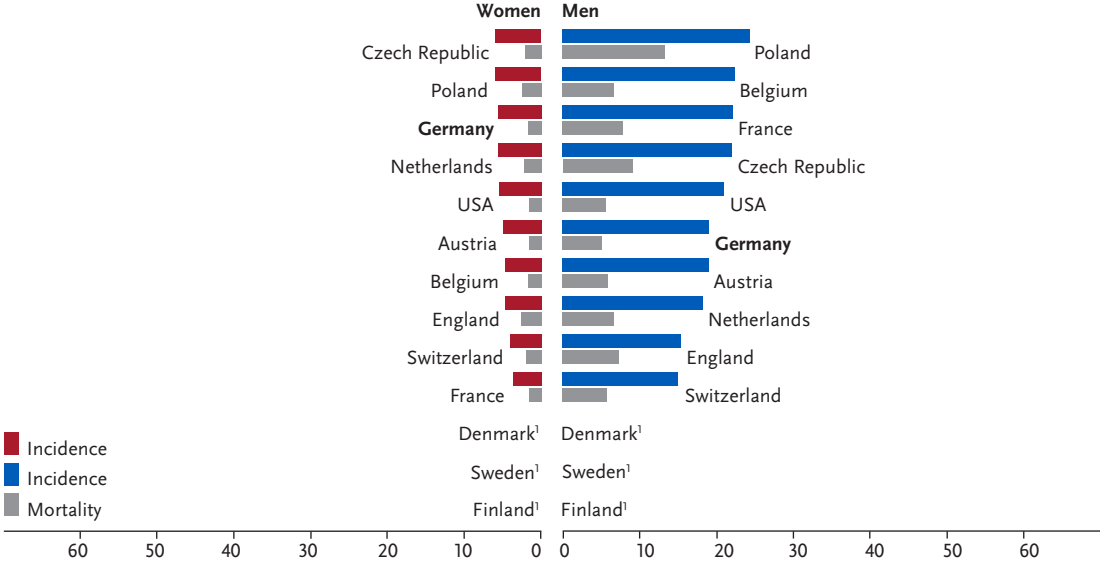


Figure 3.25.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C67, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] No comparable data available

3.26 Central nervous system

Table 3.26.1
Overview of key epidemiological parameters for Germany, ICD-10 C70–C72

Incidence	2017		2018		Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	3,110	3,950	3,130	4,100	3,500	4,300
Crude incidence rate [1]	7.4	9.7	7.5	10.0	8.3	10.5
Age-standardised incidence rate [1, 2]	5.3	7.4	5.4	7.8	5.8	8.0
Median age at diagnosis	66	63	65	63		
Mortality	**2017**		**2018**		**2019**	
	Women	Men	Women	Men	Women	Men
Deaths	2,721	3,385	2,615	3,441	2,583	3,430
Crude mortality rate [1]	6.5	8.3	6.2	8.4	6.1	8.4
Age-standardised mortality rate [1, 2]	4.0	5.9	3.9	5.9	3.8	5.9
Median age at death	70	66	69	67	70	67
Prevalence and survival rates	**5 years**		**10 years**		**25 years**	
	Women	Men	Women	Men	Women	Men
Prevalence	6,000	7,700	9,600	11,700	16,200	19,600
Absolute survival rate (2017–2018) [3]	23 (18–30)	19 (16–29)	16 (13–25)	13 (12–20)		
Relative survival rate (2017–2018) [3]	24 (19–32)	21 (18–31)	18 (14–27)	15 (13–23)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Cancers of the central nervous system (CNS) affect 95% of the brain, with the remaining 5% distributed among the meninges, cranial nerves and spinal cord.

CNS tumours can occur at any age. Histologically, gliomas originating from the supporting tissue of the nerve cells are predominantly found in adults, of which a bit more than two thirds are glioblastomas (astrocytoma grade IV) with an unfavourable prognosis. In infants and young children, on the other hand, embryonic tumours predominate.

In 2018, about 3,130 women and 4,100 men were diagnosed with malignant tumours of the CNS in Germany. No significant changes in the incidence and mortality rates have been observed since 1999. The relative 5-year survival rates for malignant CNS tumours are 24% for women and 21% for men. These figures do not include histologically benign CNS tumours or those of uncertain or unknown behaviour, which, depending on their location, can also lead to complications or even death. For these diagnoses together, about 6,000 new cases per year are to be expected, of which almost two thirds originate from the meninges. Women are affected significantly more often.

Risk factors

The triggers of the various brain tumours are still largely unclear. Some very rare hereditary tumour syndromes are associated with a significantly increased risk of brain tumours. After therapeutic head irradiation, the risk of developing a brain tumour is slightly increased after a long latency period. This applies in particular to irradiation in childhood and adolescence. Diagnostic computed tomography in childhood can probably also slightly increase the risk of a brain tumour.

A clear connection between mobile phone use and brain tumours has not been proven so far. However, an increased risk cannot be ruled out beyond doubt either. This is especially true for people who use mobile phones particularly long and frequently.

A slightly increased brain tumour risk is discussed for people with occupational contact with pesticides in agriculture. According to current knowledge, viruses or lifestyle factors such as smoking or alcohol do not contribute to an increase in risk.

Brain tumours occur more frequently in some families. If close relatives of a person suffer from a brain tumour, statistically his or her own risk of contracting the disease is increased, but remains very low in absolute terms.

▶ *Additional information: www.krebsdaten.de/cns*

Figure 3.26.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C70 – C72, Germany 1999 – 2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

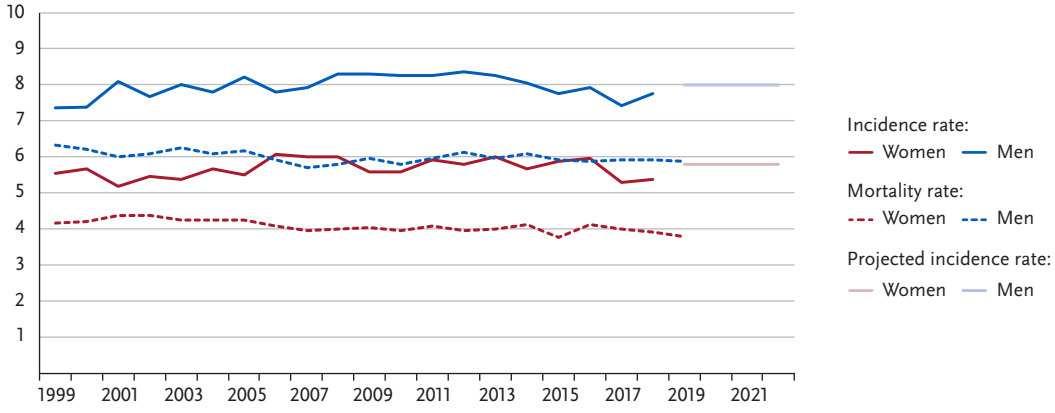


Figure 3.26.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C70 – C72, Germany 1999 – 2018/2019, projection (incidence) through 2022

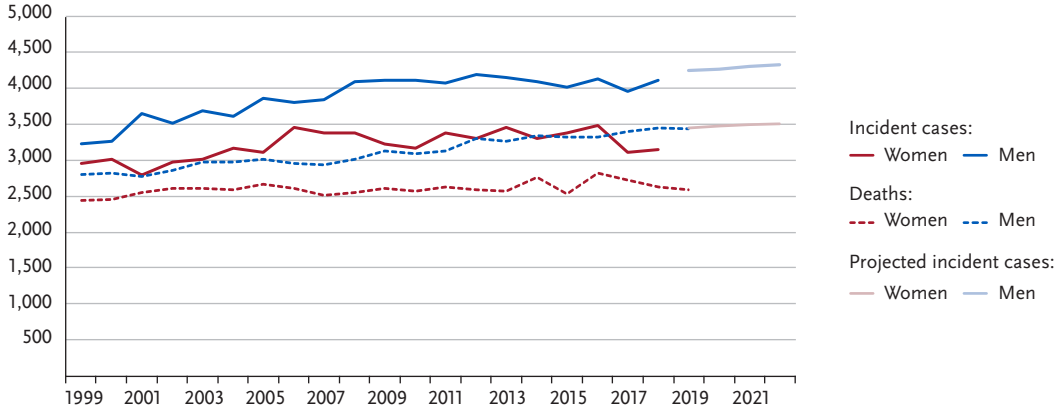


Figure 3.26.2
Age-specific incidence rates by sex, ICD-10 C70 – C72, Germany 2017 – 2018
per 100,000

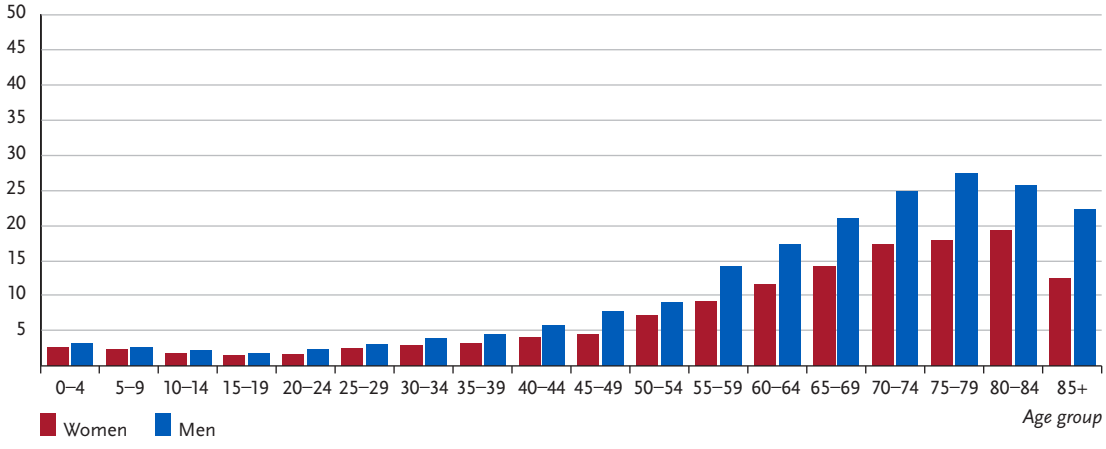
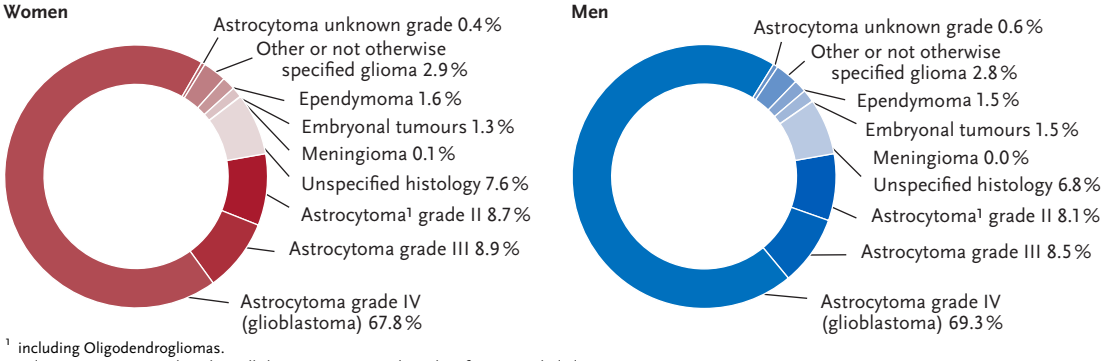


Table 3.26.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C70–C72, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,700)	0.5 %	(1 in 200)	< 0.1 %	(1 in 5,100)	0.5 %	(1 in 220)
45 years	0.1 %	(1 in 1,600)	0.5 %	(1 in 210)	< 0.1 %	(1 in 2,300)	0.4 %	(1 in 230)
55 years	0.1 %	(1 in 970)	0.4 %	(1 in 240)	0.1 %	(1 in 1,100)	0.4 %	(1 in 250)
65 years	0.2 %	(1 in 670)	0.3 %	(1 in 300)	0.1 %	(1 in 740)	0.3 %	(1 in 310)
75 years	0.1 %	(1 in 680)	0.2 %	(1 in 490)	0.2 %	(1 in 660)	0.2 %	(1 in 450)
Lifetime risk			0.6 %	(1 in 170)			0.5 %	(1 in 210)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,900)	0.7 %	(1 in 150)	< 0.1 %	(1 in 3,300)	0.6 %	(1 in 170)
45 years	0.1 %	(1 in 1,200)	0.6 %	(1 in 160)	0.1 %	(1 in 1,400)	0.6 %	(1 in 170)
55 years	0.2 %	(1 in 670)	0.5 %	(1 in 180)	0.1 %	(1 in 760)	0.5 %	(1 in 190)
65 years	0.2 %	(1 in 480)	0.4 %	(1 in 230)	0.2 %	(1 in 500)	0.4 %	(1 in 230)
75 years	0.2 %	(1 in 480)	0.3 %	(1 in 350)	0.2 %	(1 in 470)	0.3 %	(1 in 340)
Lifetime risk			0.7 %	(1 in 130)			0.6 %	(1 in 160)

Figure 3.26.3
Distribution of histological types of malignant brain tumours (C71) according to WHO-classification (2016), by sex, (DCO cases excluded), Germany 2017–2018



¹ including Oligodendrogliomas.
Grade I astrocytomas are histologically benign tumours and are therefore not included.

Figure 3.26.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C70–C72, Germany 2017–2018

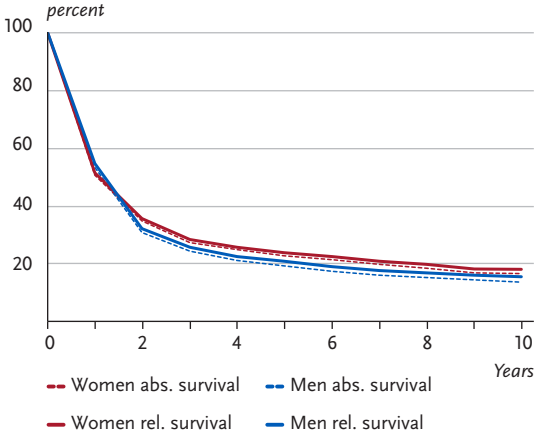


Figure 3.26.5
Relative 5-year survival by histology and sex, ICD-10 C71, Germany 2017–2018

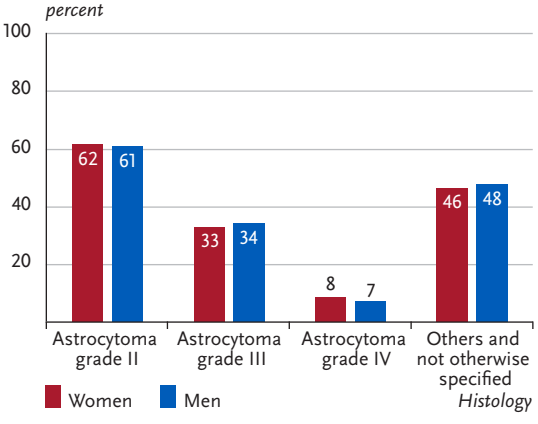


Figure 3.26.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C70 – C72, 2017 – 2018
per 100,000 (old European Standard)

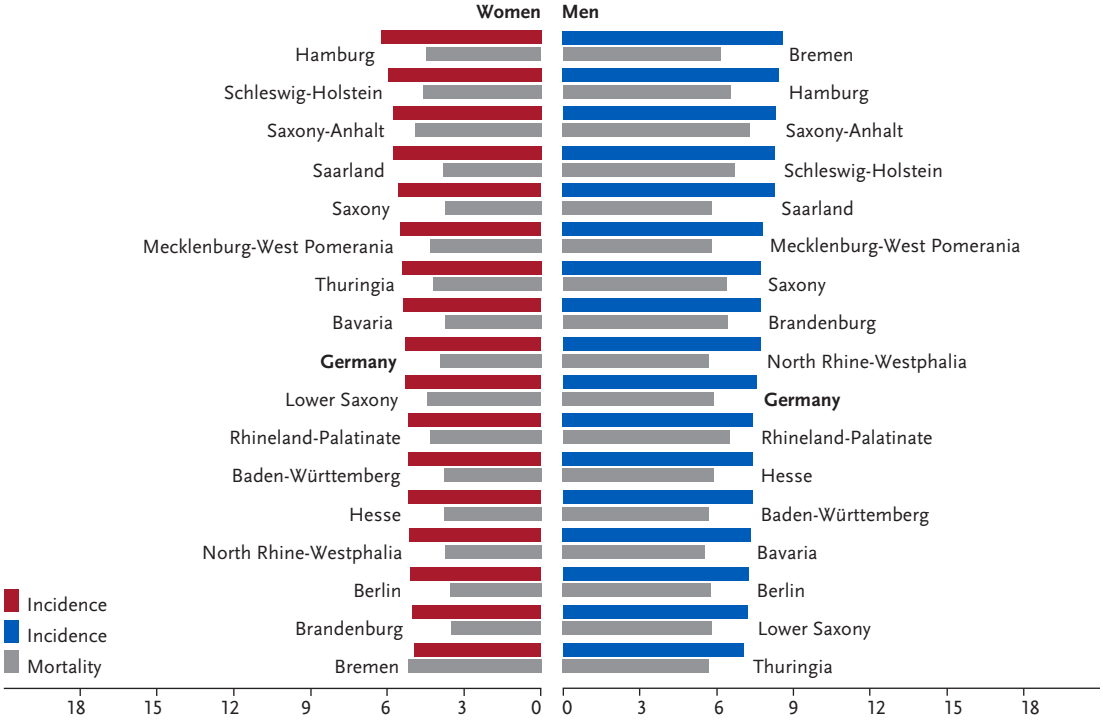
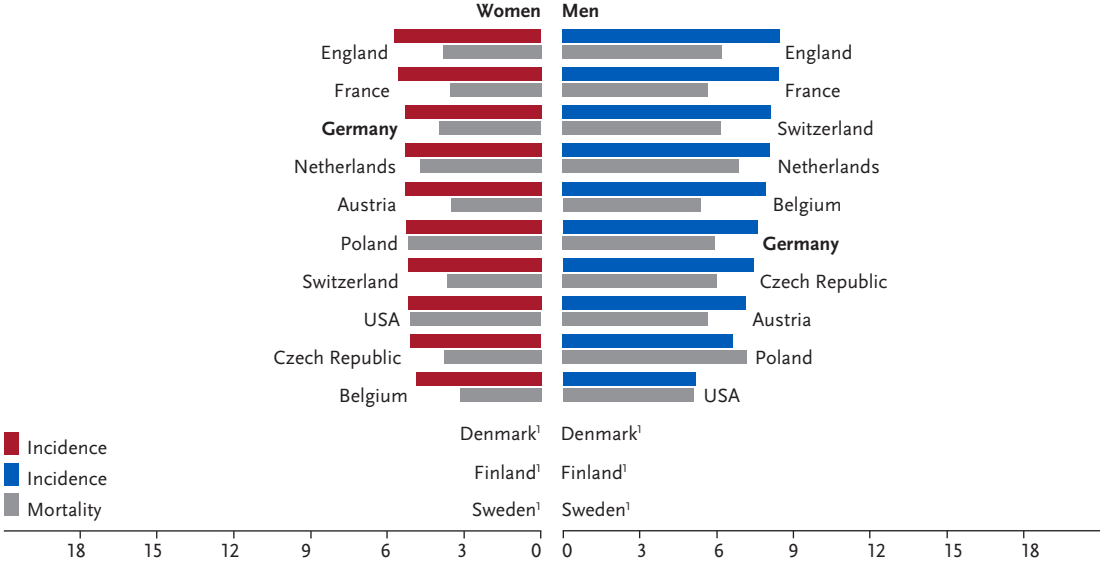


Figure 3.26.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C70 – C72, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] No comparable data available

3.27 Thyroid gland

Table 3.27.1
Overview of key epidemiological parameters for Germany, ICD-10 C73

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	4,970	2,100	4,270	1,930	5,000	2,200
Crude incidence rate [1]	11.9	5.1	10.2	4.7	11.7	5.4
Age-standardised incidence rate [1, 2]	10.5	4.3	9.1	3.9	10.8	4.5
Median age at diagnosis	52	55	51	56		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	411	292	390	300	426	311
Crude mortality rate [1]	1.0	0.7	0.9	0.7	1.0	0.8
Age-standardised mortality rate [1, 2]	0.4	0.4	0.4	0.4	0.4	0.5
Median age at death	78	74	80	75	80	73
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	21,100	8,500	40,500	15,800	76,500	26,800
Absolute survival rate (2017–2018) [3]	92 (90–95)	85 (83–88)	87 (79–91)	76 (69–81)		
Relative survival rate (2017–2018) [3]	95 (94–98)	91 (89–93)	94 (87–98)	88 (82–94)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Approximately 4,270 women and 1,930 men were diagnosed with thyroid cancer in 2018. The median age at diagnosis was 51 years for women and 56 years for men, which was relatively low compared to other cancers.

In the period from 1999 to 2018, the age-standardised incidence rates in Germany initially increased, especially among women, but a plateau has since been reached. This increase is almost exclusively due to the prognostically very favourable papillary carcinomas. The reasons for the increase are not yet clearly understood. However, it is likely that more tumours are being detected due to increased use of imaging diagnostics with improved examination methods. Similar trends can be observed worldwide for thyroid carcinoma.

The mortality rates in Germany have decreased for both sexes. Overall, thyroid cancer has a favourable prognosis: Relative 5-year survival rates are 95% in women and 91% in men. Only the rarer anaplastic carcinomas have an unfavourable prognosis. Most thyroid carcinomas are detected at an early stage (UICC I) (88% in women, 75% in men).

Risk factors

Ionising radiation from the environment increases the risk of thyroid cancer. For example, the risk of thyroid cancer is increased if the thyroid gland is in the radiation field during radiotherapy. The intake of radioactive iodine also increases the risk, as was found after the Chernobyl reactor accident in the Soviet republics affected at the time. In childhood, the thyroid gland is particularly sensitive to radiation.

Other nutritional or lifestyle-related risk factors or environmental risks have not been proven with certainty at present. It is also unclear why women are affected more often than men. Many patients have a history of iodine deficiency and benign thyroid conditions, such as goitre and adenomas, which increase the risk of thyroid cancer. About one-fifth of those with the rare medullary thyroid carcinomas carry genetic variants that are inherited in an autosomal dominant manner. Medullary thyroid carcinoma can also occur together with other endocrine tumours – as part of a so-called multiple endocrine neoplasia type 2 (MEN 2). A genetic component is also suspected in papillary thyroid carcinomas.

▶ *Additional information: www.krebsdaten.de/thyroid*

Figure 3.27.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C73, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

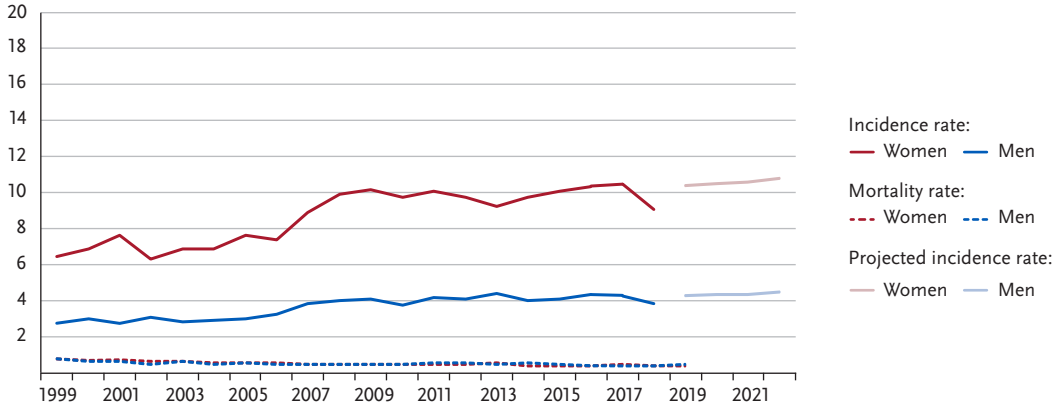


Figure 3.27.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C73, Germany 1999–2018/2019, projection (incidence) through 2022

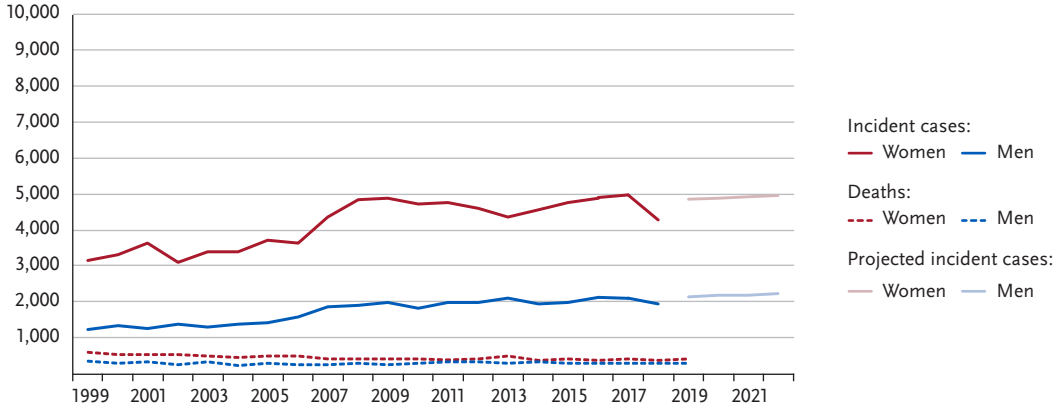


Figure 3.27.2
Age-specific incidence rates by sex, ICD-10 C73, Germany 2017–2018
per 100,000

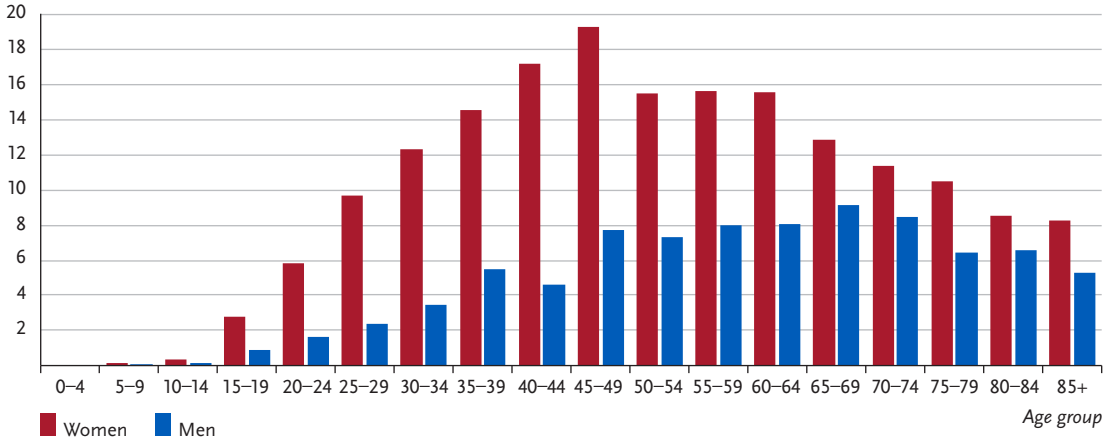


Table 3.27.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C73, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
25 years	0.1 %	(1 in 970)	0.7 %	(1 in 140)	< 0.1 %	(1 in 244,600)	0.1 %	(1 in 1,300)
35 years	0.1 %	(1 in 690)	0.6 %	(1 in 160)	< 0.1 %	(1 in 132,600)	0.1 %	(1 in 1,300)
45 years	0.2 %	(1 in 630)	0.5 %	(1 in 210)	< 0.1 %	(1 in 36,800)	0.1 %	(1 in 1,300)
55 years	0.1 %	(1 in 710)	0.3 %	(1 in 300)	< 0.1 %	(1 in 15,400)	0.1 %	(1 in 1,300)
65 years	0.1 %	(1 in 970)	0.2 %	(1 in 500)	< 0.1 %	(1 in 6,500)	0.1 %	(1 in 1,400)
75 years	0.1 %	(1 in 1,300)	0.1 %	(1 in 900)	< 0.1 %	(1 in 3,300)	0.1 %	(1 in 1,600)
Lifetime risk			0.8 %	(1 in 130)			0.1 %	(1 in 1,300)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
25 years	< 0.1 %	(1 in 3,500)	0.3 %	(1 in 310)	< 0.1 %	(1 in 361,600)	0.1 %	(1 in 1,700)
35 years	< 0.1 %	(1 in 2,500)	0.3 %	(1 in 340)	< 0.1 %	(1 in 84,800)	0.1 %	(1 in 1,700)
45 years	0.1 %	(1 in 1,400)	0.3 %	(1 in 390)	< 0.1 %	(1 in 43,500)	0.1 %	(1 in 1,700)
55 years	0.1 %	(1 in 1,300)	0.2 %	(1 in 510)	< 0.1 %	(1 in 14,300)	0.1 %	(1 in 1,700)
65 years	0.1 %	(1 in 1,300)	0.1 %	(1 in 770)	< 0.1 %	(1 in 5,300)	0.1 %	(1 in 1,700)
75 years	0.1 %	(1 in 1,900)	0.1 %	(1 in 1,500)	< 0.1 %	(1 in 3,400)	< 0.1 %	(1 in 2,000)
Lifetime risk			0.3 %	(1 in 300)			0.1 %	(1 in 1,700)

Figure 3.27.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C73, Germany 2017–2018
top: according to 7th edition TNM; bottom: according to 8th edition TNM.
The DCO proportion was 2%. For 29% of the remaining cases, no UICC stage could be assigned.

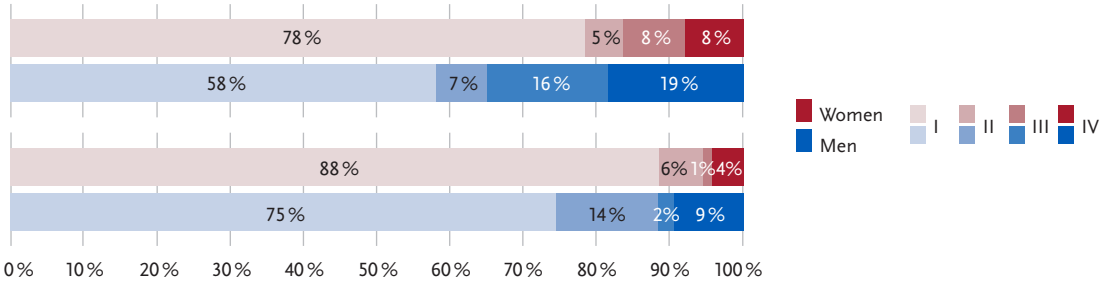


Figure 3.27.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C73, Germany 2017–2018

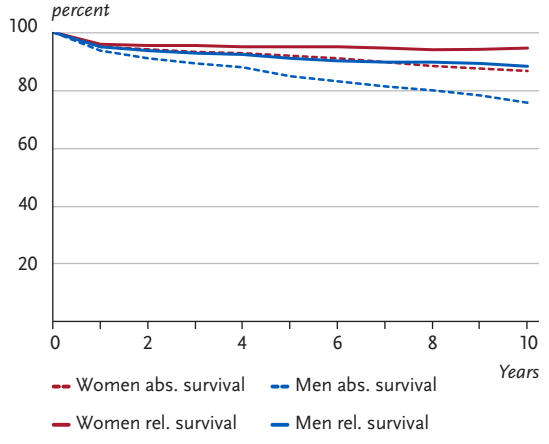


Figure 3.27.5
Relative 5-year survival by UICC stage (7th edition TNM) and sex, ICD-10 C73, Germany 2016–2018

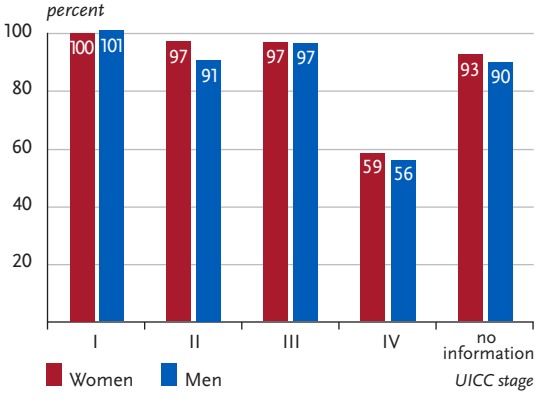


Figure 3.27.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C73, 2017–2018
per 100,000 (old European Standard)

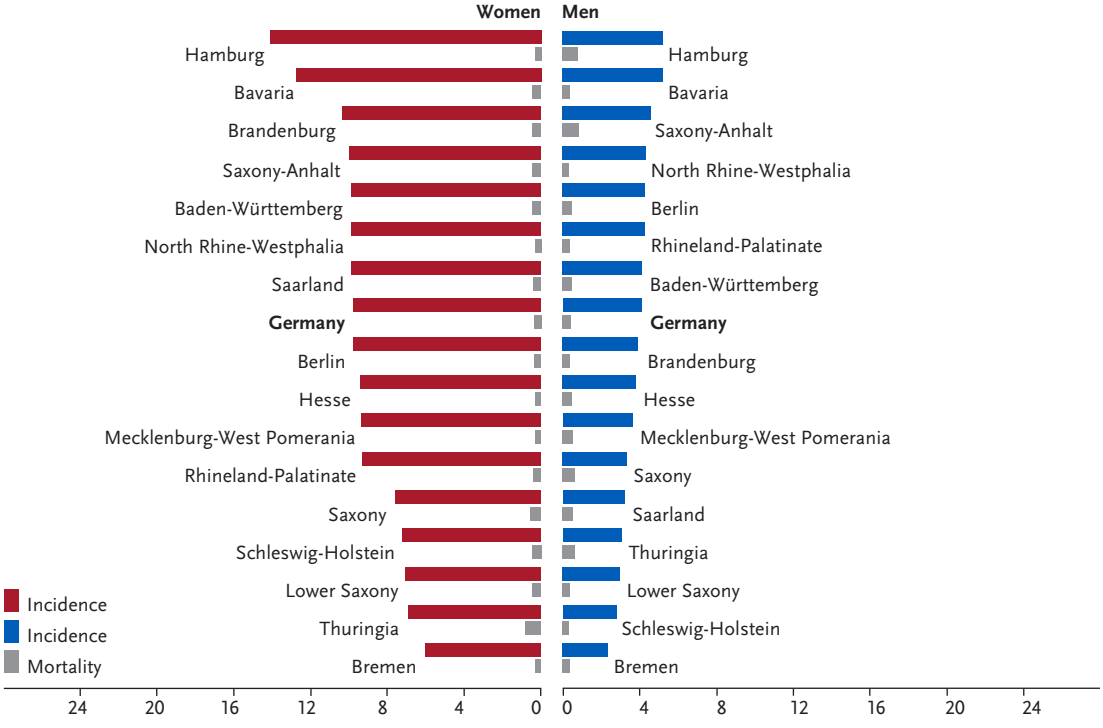
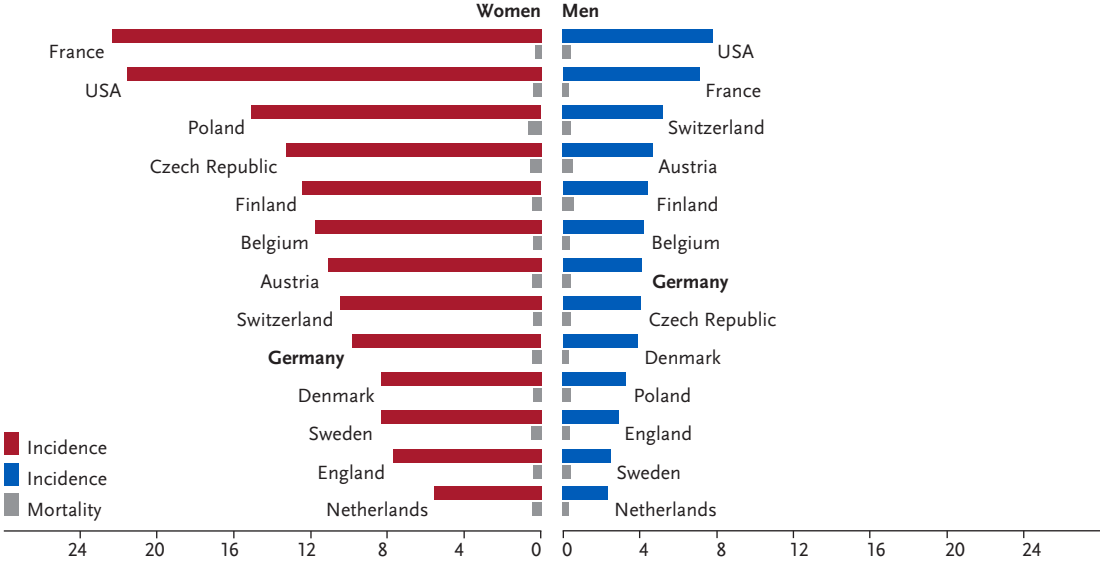


Figure 3.27.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C73, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.28 Hodgkin lymphoma

Table 3.28.1
Overview of key epidemiological parameters for Germany, ICD-10 C81

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	1,050	1,520	1,100	1,440	1,200	1,600
Crude incidence rate [1]	2.5	3.7	2.6	3.5	2.8	3.8
Age-standardised incidence rate [1, 2]	2.4	3.4	2.5	3.2	2.7	3.5
Median age at diagnosis	44	49	44	48		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	125	177	124	197	127	207
Crude mortality rate [1]	0.3	0.4	0.3	0.5	0.3	0.5
Age-standardised mortality rate [1, 2]	0.2	0.3	0.1	0.3	0.1	0.3
Median age at death	76	73	77	74	79	73
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	4,400	5,900	8,100	10,700	17,100	20,600
Absolute survival rate (2017–2018) [3]	88 (82–93)	76 (74–80)	81 (77–91)	69 (63–75)		
Relative survival rate (2017–2018) [3]	91 (85–96)	81 (77–84)	87 (82–96)	77 (70–85)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Hodgkin's disease (Hodgkin lymphoma), formerly called lymphogranulomatosis, has microscopically recognisable so-called Sternberg-Reed giant cells in the bone marrow and thus differs from Non-Hodgkin lymphomas.

Hodgkin lymphoma is a rare disease that affected about 1,100 women and 1,440 men in Germany in 2018, relatively often in young and middle adulthood. Between the ages of 10 and 35, this disease is therefore one of the five most common cancer diagnoses. The risk of ever developing Hodgkin's disease is 0.2% for women and 0.3% for men.

The incidence rates, as well as the absolute number of new cases, have been increasing slightly since the mid-2000s, while the number of deaths from Hodgkin's disease has recently been significantly lower than at the end of the 1990s, with just over 300 deaths per year. The prognosis is correspondingly favourable, with a relative survival five years after diagnosis of about 91% in women and 81% in men. Due to the often chronic recurrence of the disease, the long-term prognosis is also influenced by the side effects of the therapy (including second primary tumours).

Risk factors

The risk factors for Hodgkin lymphoma are only partially understood. Congenital diseases of the immune system or acquired immune defects, for example due to an HIV infection, can increase the risk of Hodgkin lymphoma.

Epstein-Barr viruses (EBV), the pathogens of Pfeiffer's glandular fever (infectious mononucleosis) can play a causative role in the development of Hodgkin lymphoma. However, this probably only applies to some Hodgkin lymphomas. Whether lifestyle-related risk factors or environmental risks are responsible for the development of Hodgkin lymphoma is still unclear. Long-term cigarette use may increase the risk.

Children and siblings of those affected have a slightly increased risk of developing Hodgkin's disease themselves. The reasons for these associations are not yet completely clear and are currently being researched.

Overall, no clear cause for the development of Hodgkin lymphoma can be found for most patients. Presumably, several factors must interact before Hodgkin lymphoma develops.

▶ *Additional information: www.krebsdaten.de/hodgkin_lymphoma*

Figure 3.28.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C81, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

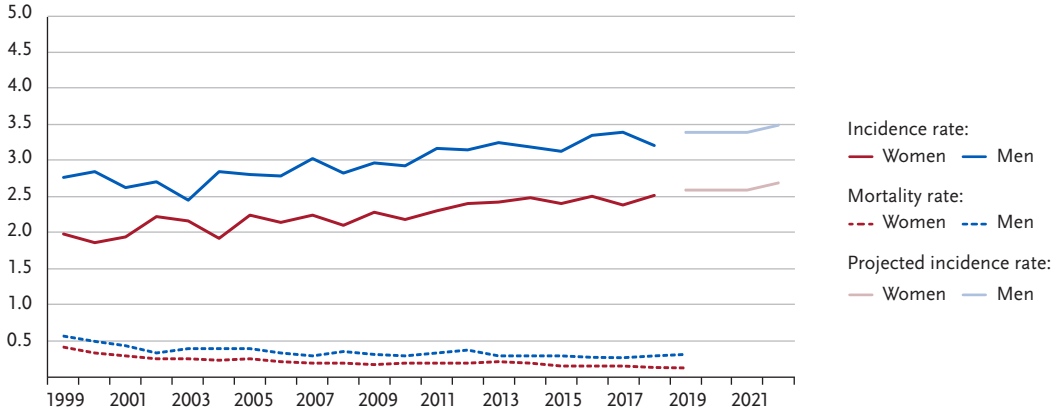


Figure 3.28.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C81, Germany 1999–2018/2019, projection (incidence) through 2022

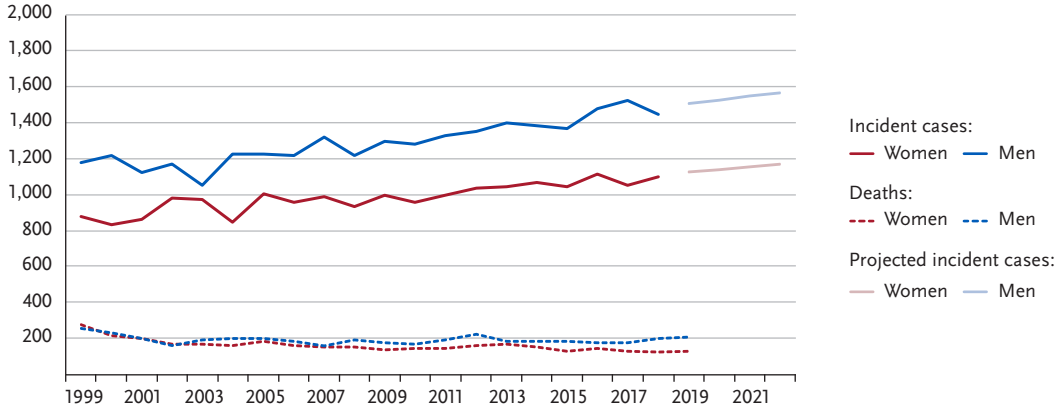


Figure 3.28.2
Age-specific incidence rates by sex, ICD-10 C81, Germany 2017–2018
per 100,000

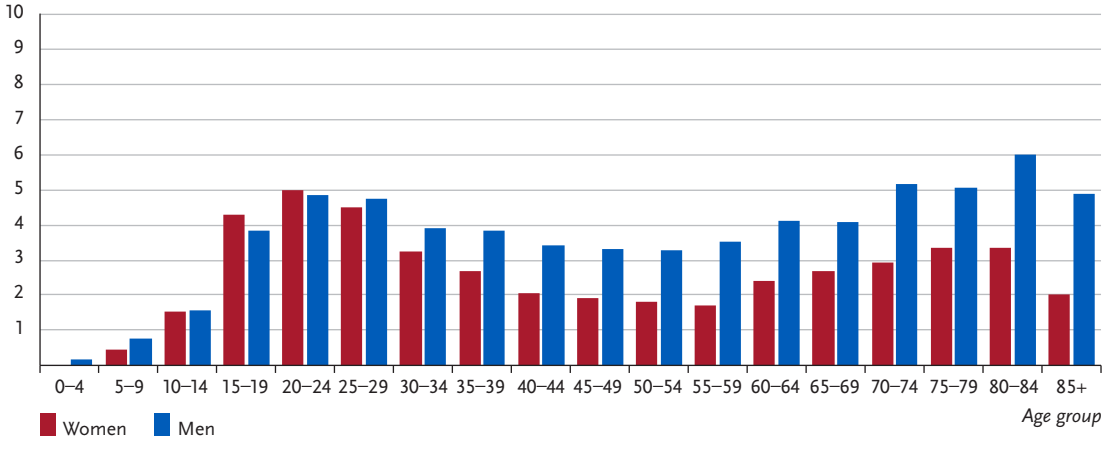


Table 3.28.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C81, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
15 years	< 0.1 %	(1 in 2,200)	0.2 %	(1 in 490)	< 0.1 %	(1 in 374,700)	< 0.1 %	(1 in 4,300)
25 years	< 0.1 %	(1 in 2,500)	0.2 %	(1 in 630)	< 0.1 %	(1 in 577,000)	< 0.1 %	(1 in 4,300)
35 years	< 0.1 %	(1 in 4,000)	0.1 %	(1 in 840)	< 0.1 %	(1 in 920,200)	< 0.1 %	(1 in 4,400)
45 years	< 0.1 %	(1 in 5,200)	0.1 %	(1 in 1,000)	< 0.1 %	(1 in 55,700)	< 0.1 %	(1 in 4,400)
55 years	< 0.1 %	(1 in 4,900)	0.1 %	(1 in 1,300)	< 0.1 %	(1 in 32,400)	< 0.1 %	(1 in 4,600)
Lifetime risk			0.2 %	(1 in 450)			< 0.1 %	(1 in 4,300)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
15 years	< 0.1 %	(1 in 2,400)	0.3 %	(1 in 390)	< 0.1 %	(1 in 100,900)	< 0.1 %	(1 in 2,600)
25 years	< 0.1 %	(1 in 2,200)	0.2 %	(1 in 460)	< 0.1 %	(1 in 90,400)	< 0.1 %	(1 in 2,600)
35 years	< 0.1 %	(1 in 2,800)	0.2 %	(1 in 580)	< 0.1 %	(1 in 90,200)	< 0.1 %	(1 in 2,700)
45 years	< 0.1 %	(1 in 3,100)	0.1 %	(1 in 710)	< 0.1 %	(1 in 43,600)	< 0.1 %	(1 in 2,700)
55 years	< 0.1 %	(1 in 2,900)	0.1 %	(1 in 890)	< 0.1 %	(1 in 24,600)	< 0.1 %	(1 in 2,800)
Lifetime risk			0.3 %	(1 in 360)			< 0.1 %	(1 in 2,600)

Figure 3.28.3
Distribution of UICC stages at diagnosis by sex
Not included because UICC stages are not defined for Hodgkin lymphoma.

Figure 3.28.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C81, Germany 2017–2018

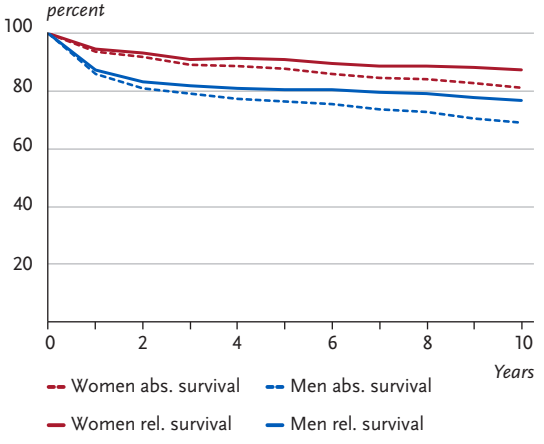


Figure 3.28.5
Relative 5-year survival by UICC stage
Not included because UICC stages are not defined for Hodgkin lymphoma.

Figure 3.28.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C81, 2017–2018
per 100,000 (old European Standard)

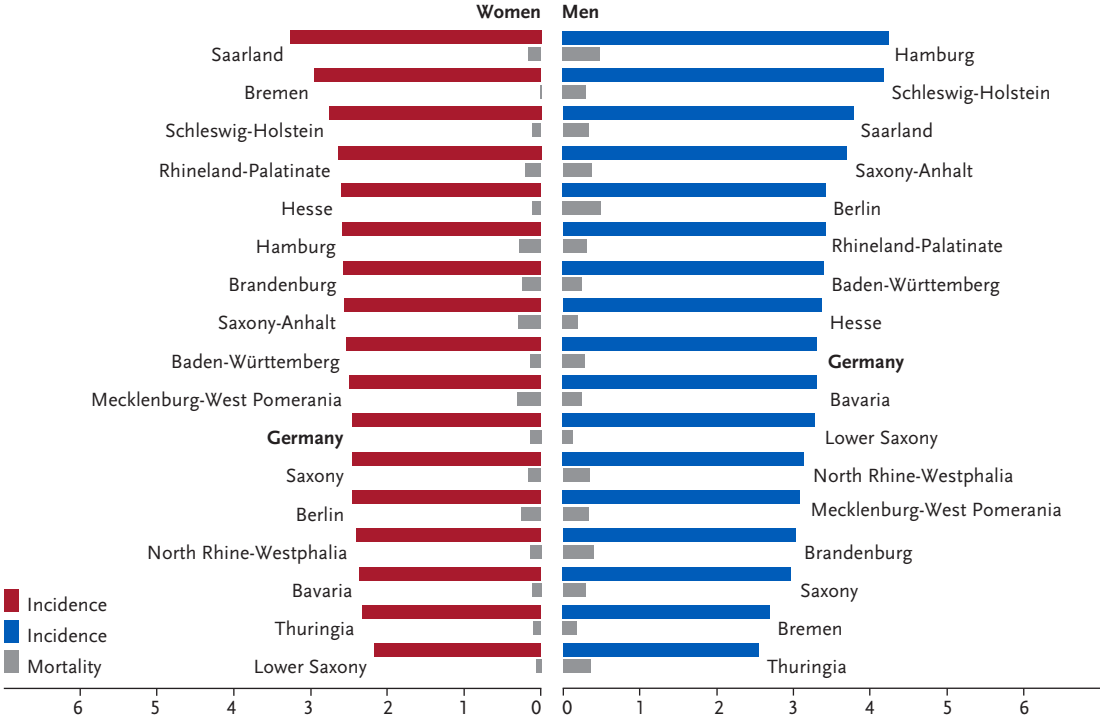
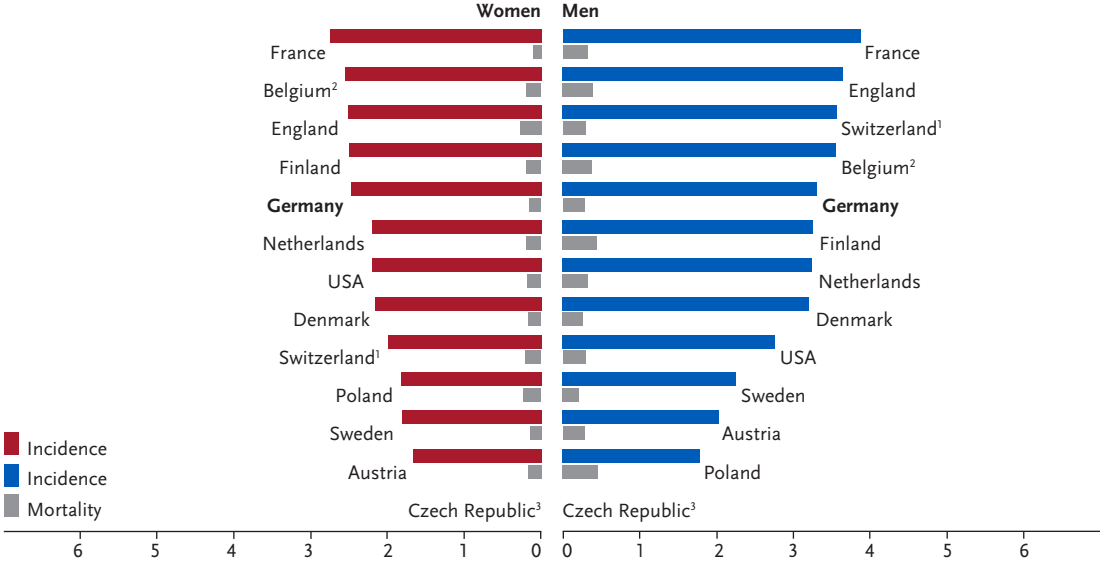


Figure 3.28.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C81, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality for 2013 to 2017
[2] Mortality for 2016
[3] No data available

3.29 Non-Hodgkin lymphoma

Table 3.29.1
Overview of key epidemiological parameters for Germany, ICD-10 C82–C88

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	8,630	10,710	8,280	10,190	9,300	11,800
Crude incidence rate [1]	20.6	26.3	19.7	24.9	22.1	28.6
Age-standardised incidence rate [1, 2]	11.7	17.6	11.4	16.6	12.3	18.2
Median age at diagnosis	73	70	72	70		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	3,116	3,745	3,220	3,835	3,145	3,885
Crude mortality rate [1]	7.4	9.2	7.7	9.4	7.5	9.5
Age-standardised mortality rate [1, 2]	3.1	5.3	3.2	5.2	3.1	5.2
Median age at death	80	77	80	78	80	78
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	29,400	35,600	49,500	58,300	78,000	89,000
Absolute survival rate (2017–2018) [3]	62 (55–66)	59 (56–64)	48 (41–53)	45 (41–50)		
Relative survival rate (2017–2018) [3]	71 (63–75)	70 (66–75)	64 (55–69)	64 (57–70)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Non-Hodgkin lymphomas are a heterogeneous group of cancers that originate from cells of the lymphatic system, so-called lymphocytes. The various lymphomas differ in terms of prognosis and treatment options according to cell type as well as clinical and molecular characteristics. In 2018, approximately 18,470 men were diagnosed with non-Hodgkin lymphoma in Germany. The disease is primarily a disease of older age. On average, affected women were 72 years old and men 70 years old at the time of diagnosis.

The increased age-standardised incidence rates are to be seen against the background of changed diagnostic criteria, since chronic lymphocytic leukaemias are now often counted among the low-malignant non-Hodgkin lymphomas. The age-standardised mortality rates for both women and men declined in the first decade after the turn of the millennium and have remained at a roughly constant level since then. The average prognosis of non-Hodgkin lymphoma is rather good overall, with relative 5-year survival rates of 71% in women and 70% in men, although these figures continue to decline as the disease progresses.

Risk factors

No generally valid risk factors can be named for the group of all non-Hodgkin lymphomas. Congenital or acquired immunodeficiency, radioactive radiation, chemotherapy and some rare autoimmune diseases can increase the risk of lymphoma. Certain viruses and other pathogens are also considered risk factors for individual lymphomas: For example, Epstein-Barr virus (EBV) can contribute to the development of Burkitt's lymphoma, which is predominantly endemic in Africa. Helicobacter pylori bacteria favour the development of MALT lymphoma of the stomach.

Benzene and related substances can promote the development of individual non-Hodgkin lymphomas. Other environmental toxins and lifestyle factors are also discussed as triggers for lymphomas. If lymphomas have already occurred in a family, the risk of lymphoma for relatives can be slightly increased. The reasons for these associations are still widely unknown.

Overall, no clear cause for the development of lymphoma can be found for many patients. Presumably, several factors must interact before a non-Hodgkin lymphoma develops.

▶ *Additional information: www.krebsdaten.de/non-hodgkin_lymphoma*

Figure 3.29.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C82 – C88, Germany 1999 – 2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

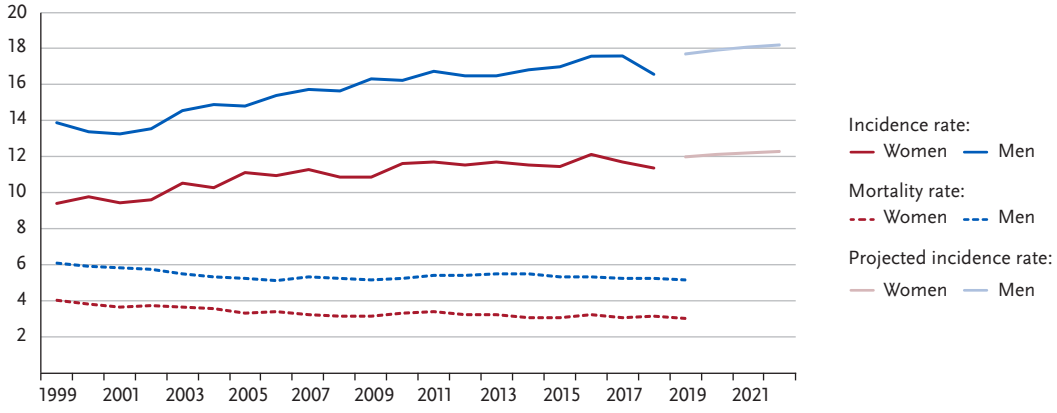


Figure 3.29.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C82 – C88, Germany 1999 – 2018/2019, projection (incidence) through 2022

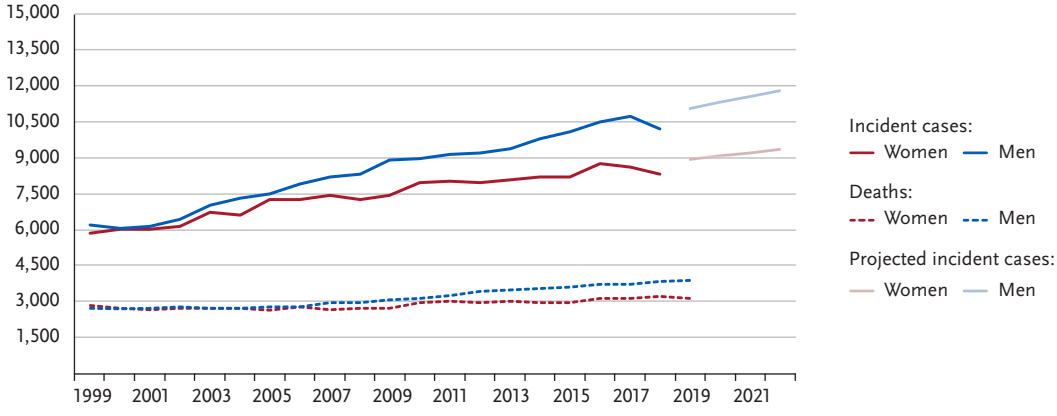


Figure 3.29.2
Age-specific incidence rates by sex, ICD-10 C82 – C88, Germany 2017 – 2018
per 100,000

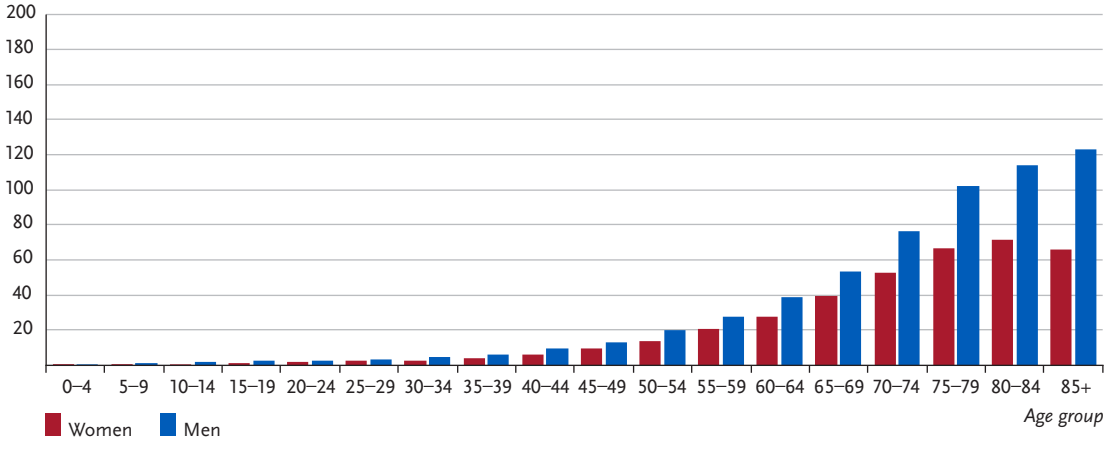


Table 3.29.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C82–C88, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,000)	1.5 %	(1 in 68)	< 0.1 %	(1 in 18,900)	0.6 %	(1 in 160)
45 years	0.1 %	(1 in 830)	1.4 %	(1 in 69)	< 0.1 %	(1 in 6,800)	0.6 %	(1 in 160)
55 years	0.2 %	(1 in 430)	1.3 %	(1 in 74)	< 0.1 %	(1 in 2,600)	0.6 %	(1 in 160)
65 years	0.4 %	(1 in 240)	1.2 %	(1 in 85)	0.1 %	(1 in 810)	0.6 %	(1 in 160)
75 years	0.6 %	(1 in 180)	0.9 %	(1 in 120)	0.3 %	(1 in 330)	0.6 %	(1 in 180)
Lifetime risk			1.5 %	(1 in 66)			0.6 %	(1 in 160)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,300)	1.8 %	(1 in 54)	< 0.1 %	(1 in 12,400)	0.8 %	(1 in 130)
45 years	0.2 %	(1 in 630)	1.8 %	(1 in 56)	< 0.1 %	(1 in 4,700)	0.8 %	(1 in 130)
55 years	0.3 %	(1 in 310)	1.7 %	(1 in 59)	0.1 %	(1 in 1,600)	0.8 %	(1 in 130)
65 years	0.6 %	(1 in 170)	1.5 %	(1 in 66)	0.2 %	(1 in 510)	0.8 %	(1 in 130)
75 years	0.8 %	(1 in 120)	1.2 %	(1 in 84)	0.4 %	(1 in 220)	0.8 %	(1 in 130)
Lifetime risk			1.9 %	(1 in 53)			0.8 %	(1 in 130)

Figure 3.29.3
Distribution of UICC stages at diagnosis by sex
Not included because UICC stages are not defined for non-Hodgkin lymphomas.

Table 3.29.3
Proportion of non-Hodgkin lymphoma incidence by type of lymphoma and sex, ICD-10 C82–C88, Germany 2017–2018

	C82[1]	C83[2]	C84[3]	C85[4]	C86[5]	C88[6]
Women	19 %	49 %	6 %	17 %	2 %	8 %
Men	15 %	53 %	9 %	15 %	2 %	7 %

[1] Follicular lymphoma
[2] Non-follicular lymphoma
[3] Mature T/NK-cell lymphoma
[4] Other and unspecified types
[5] Other specified types of T/NK-cell lymphoma
[6] Malignant immunoproliferative diseases

Figure 3.29.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C82–C88, Germany 2017–2018

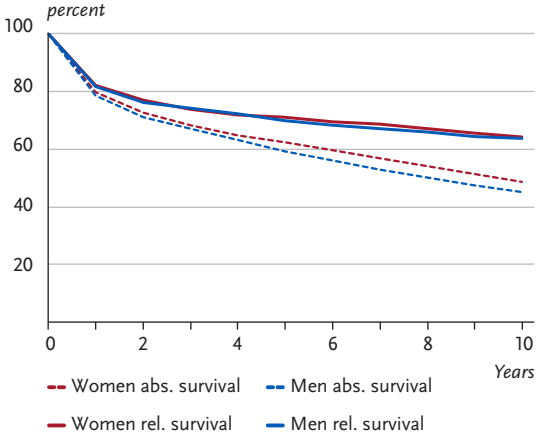


Figure 3.29.5
Relative 5-year-survival by type of non-Hodgkin lymphoma (ICD-10) and sex, ICD-10 C82–C88, Germany 2017–2018

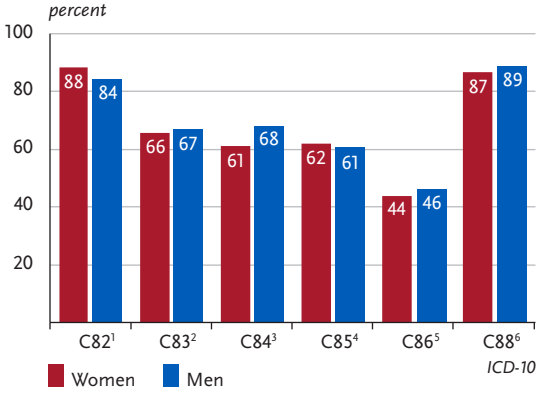


Figure 3.29.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C82 – C88, 2017 – 2018
per 100,000 (old European Standard)

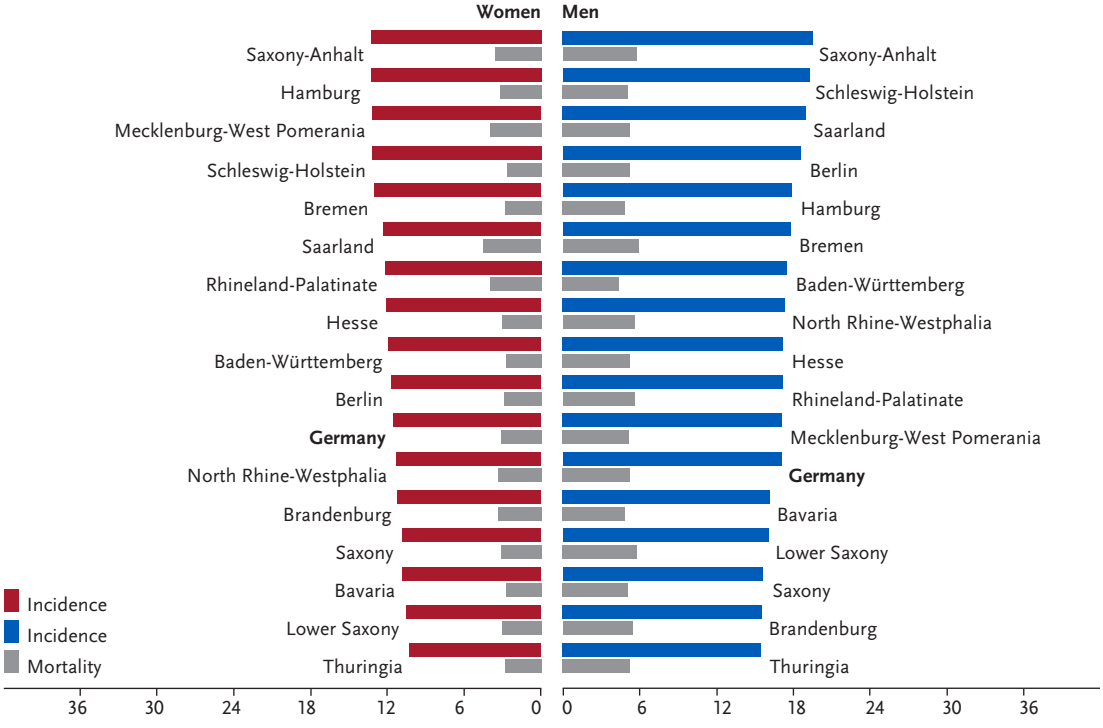
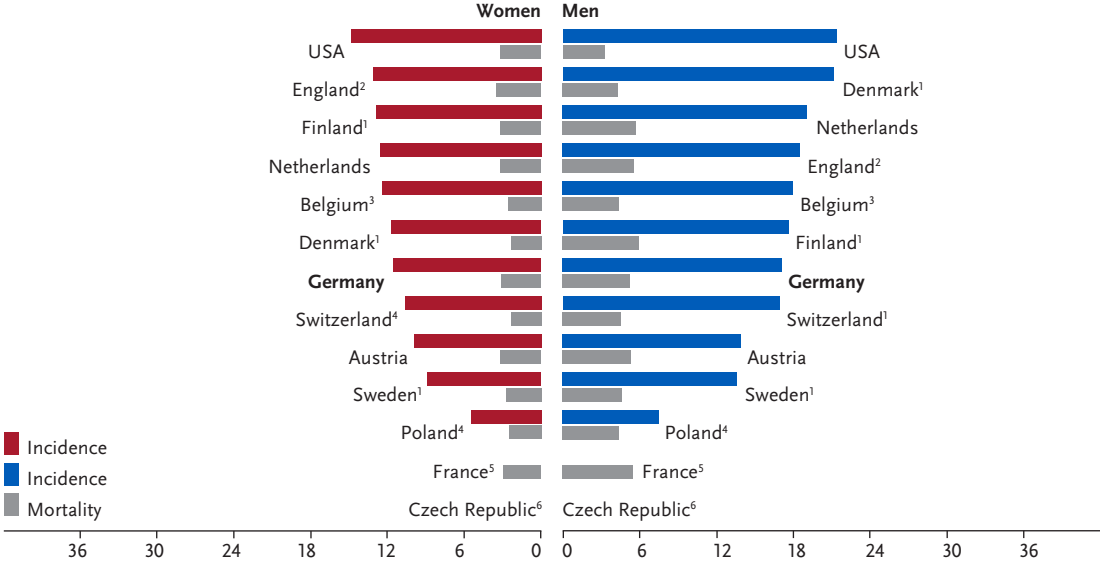


Figure 3.29.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C82 – C88, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Data for C82 to C86 and C96
[2] Data only for C82 to C85
[3] Mortality for 2016
[4] Data for C82 to C85 and C88
[5] No incidence data available
[6] No data available

3.30 Multiple myeloma

Table 3.30.1
Overview of key epidemiological parameters for Germany, ICD-10 C90

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	3,340	3,820	2,810	3,540	3,400	3,100
Crude incidence rate [1]	8.0	9.4	6.7	8.6	7.9	7.6
Age-standardised incidence rate [1, 2]	4.3	5.9	3.5	5.4	4.1	4.6
Median age at diagnosis	74	72	74	72		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	1,851	2,287	1,881	2,299	1,884	2,116
Crude mortality rate [1]	4.4	5.6	4.5	5.6	4.5	5.2
Age-standardised mortality rate [1, 2]	1.9	3.2	1.9	3.2	1.8	2.8
Median age at death	78	76	79	77	79	77
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	9,500	11,500	14,200	16,800	20,000	22,500
Absolute survival rate (2017–2018) [3]	47 (44–52)	47 (39–53)	28 (21–36)	26 (22–30)		
Relative survival rate (2017–2018) [3]	54 (49–60)	56 (47–62)	37 (29–49)	39 (33–44)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

Multiple myeloma (synonym: Plasmocytoma) is a malignant proliferation of antibody-producing plasma cells. In most cases, the disease initially occurs in the bone marrow, where it often forms several foci of disease (multiple myeloma) with corresponding complications, such as bone fractures and pain or blood count changes. Only about 1% of diagnoses affect organs other than the bone marrow (extramedullary plasmocytoma).

In 2018, the disease occurred in about 2,800 women and 3,500 men in Germany. The risk of developing the disease increases significantly with age; cases before the age of 45 are extremely rare (about 1.5% of all cases). The age-standardised incidence and mortality rates among women and men have been almost constant since about 2005.

The prognosis is rather unfavourable with relative 5-year survival rates of 54% in women and 56% in men. Normally, a permanent cure is not likely. However, the disease can remain asymptomatic for relatively long time and temporary remissions under therapy are possible.

Risk factors

The causes of multiple myeloma are not yet fully understood. Monoclonal gammopathy of uncertain significance (MGUS) is considered a precursor of multiple myeloma. Other recognised risk factors include advanced age, male sex, African ancestry and familial clustering. Some families have a higher incidence of multiple myeloma. The own risk of developing the disease increases statistically, if close relatives have multiple myeloma. Differences in the frequency in different population groups also point to genetic factors.

Chronic infections, e.g. with HIV or hepatitis C viruses, are associated with an increased risk of multiple myeloma. According to study data, overweight is also associated with an increased risk. However, a causal relation has not yet been proven.

It is also being discussed, whether certain lifestyle habits, heavy overweight, exposure to environmental toxins or radiation increase the risk of myeloma. In the case of intensive occupational contact with benzene or benzene derivatives, multiple myeloma is recognised as an occupational disease under certain conditions

▶ *Additional information: www.krebsdaten.de/multiple_myeloma*

Figure 3.30.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C90, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

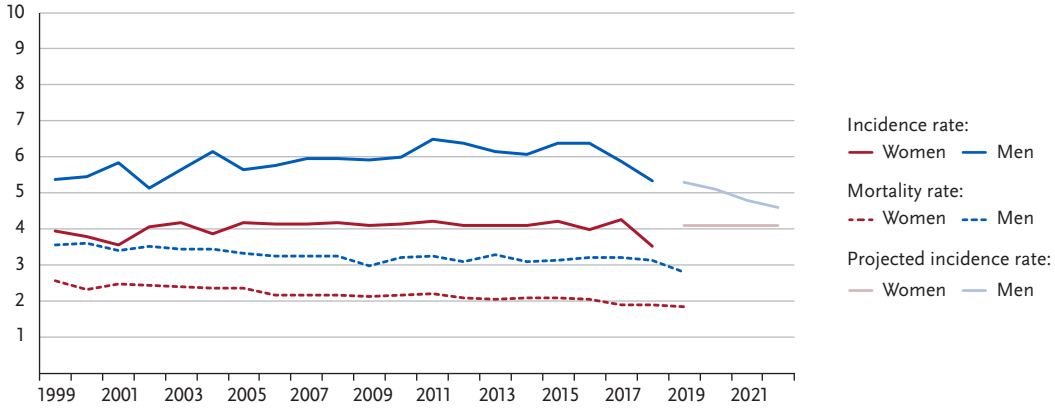


Figure 3.30.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C90, Germany 1999–2018/2019, projection (incidence) through 2022

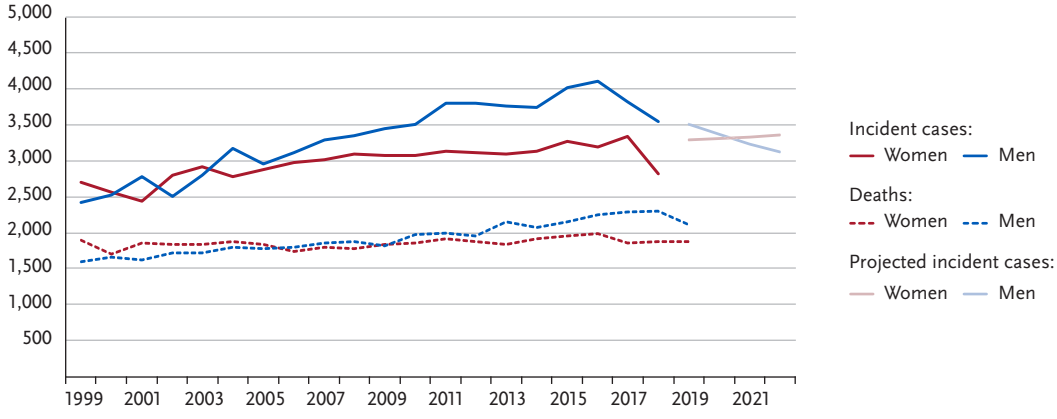


Figure 3.30.2
Age-specific incidence rates by sex, ICD-10 C90, Germany 2017–2018
per 100,000

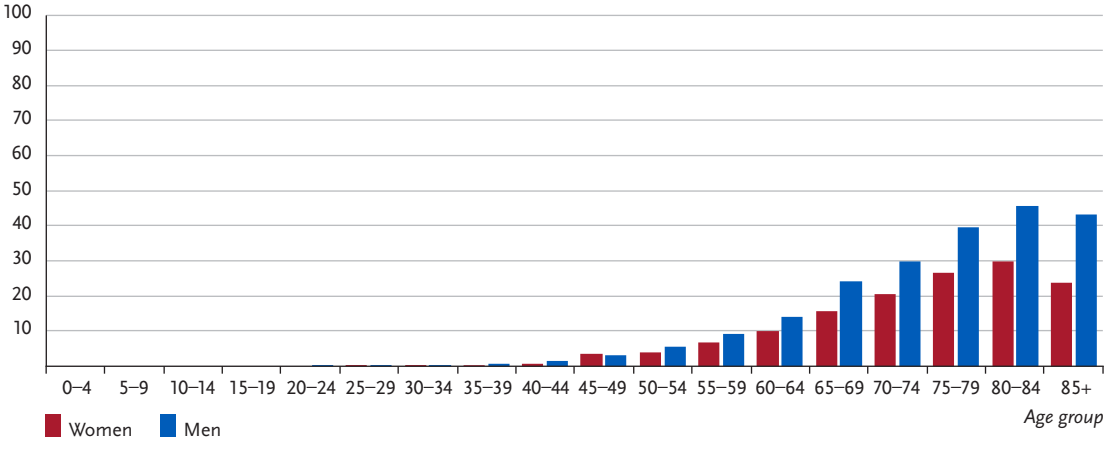


Table 3.30.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C90, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 11,300)	0.5 %	(1 in 190)	< 0.1 %	(1 in 84,500)	0.4 %	(1 in 280)
45 years	< 0.1 %	(1 in 3,200)	0.5 %	(1 in 200)	< 0.1 %	(1 in 14,700)	0.4 %	(1 in 280)
55 years	0.1 %	(1 in 1,300)	0.5 %	(1 in 210)	< 0.1 %	(1 in 3,400)	0.4 %	(1 in 280)
65 years	0.2 %	(1 in 640)	0.4 %	(1 in 230)	0.1 %	(1 in 1,200)	0.3 %	(1 in 290)
75 years	0.2 %	(1 in 460)	0.3 %	(1 in 320)	0.2 %	(1 in 550)	0.3 %	(1 in 330)
Lifetime risk			0.5 %	(1 in 200)			0.4 %	(1 in 280)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 9,900)	0.7 %	(1 in 150)	< 0.1 %	(1 in 29,600)	0.5 %	(1 in 220)
45 years	< 0.1 %	(1 in 2,300)	0.7 %	(1 in 150)	< 0.1 %	(1 in 7,800)	0.5 %	(1 in 220)
55 years	0.1 %	(1 in 930)	0.6 %	(1 in 160)	< 0.1 %	(1 in 2,300)	0.5 %	(1 in 210)
65 years	0.2 %	(1 in 420)	0.6 %	(1 in 170)	0.1 %	(1 in 740)	0.5 %	(1 in 210)
75 years	0.3 %	(1 in 320)	0.5 %	(1 in 220)	0.3 %	(1 in 380)	0.4 %	(1 in 240)
Lifetime risk			0.7 %	(1 in 150)			0.5 %	(1 in 220)

Figure 3.30.3
Distribution of UICC stages at diagnosis by sex
Not included because UICC stages are not defined for multiple myeloma.

Figure 3.30.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C90, Germany 2017–2018

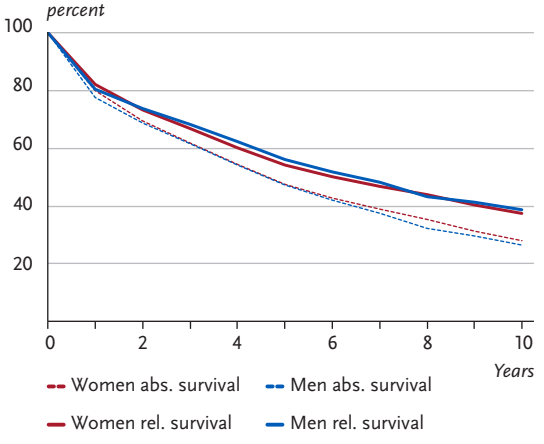


Figure 3.30.5
Relative 5-year survival by UICC stage
Not included because UICC stages are not defined for multiple myeloma.

Figure 3.30.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C90, 2017–2018
per 100,000 (old European Standard)

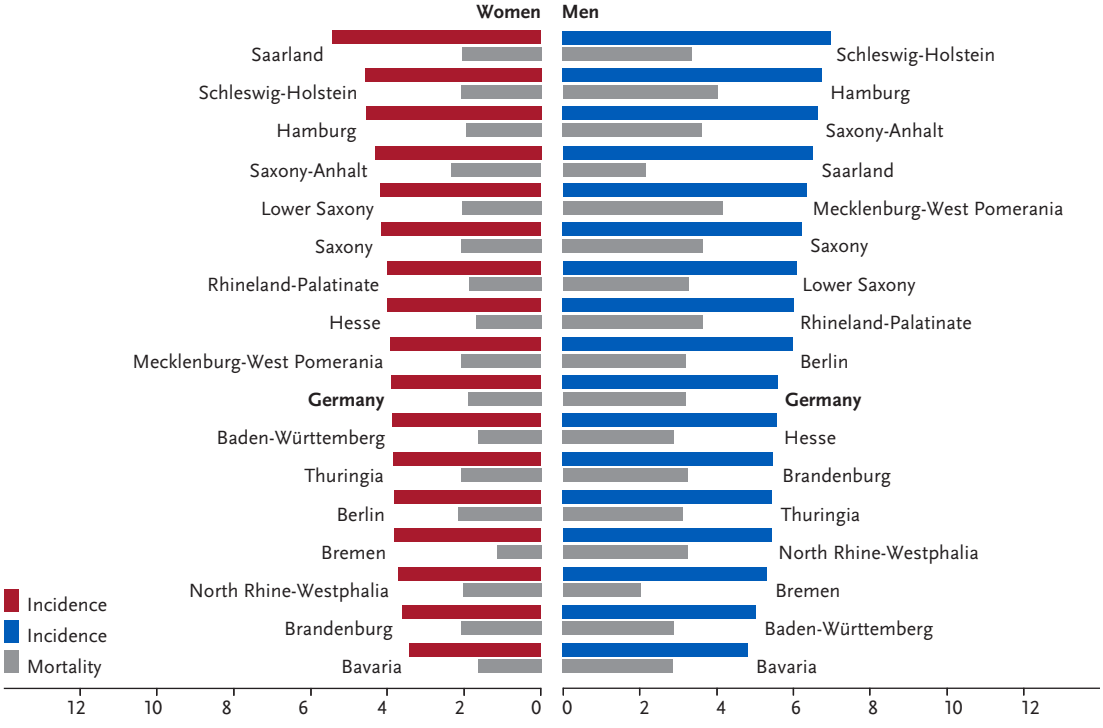
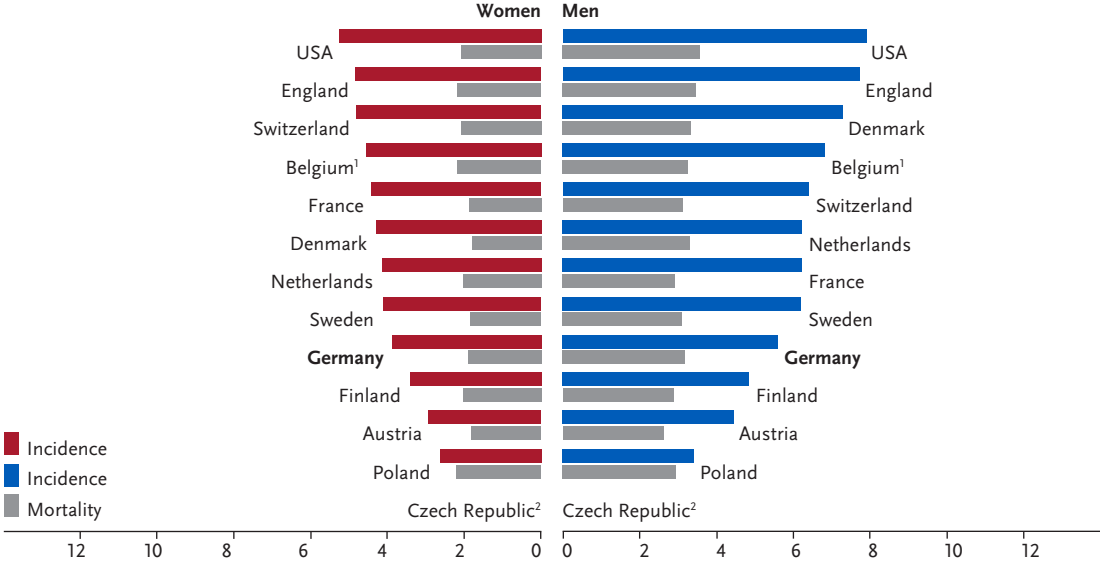


Figure 3.30.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C90, 2017–2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Mortality including C88 and C96
[2] No data available

3.31 Leukaemia

Table 3.31.1
Overview of key epidemiological parameters for Germany, ICD-10 C91–C95

Incidence		2017		2018	Prediction for 2022	
	Women	Men	Women	Men	Women	Men
Incident cases	6,070	8,000	5,310	6,870	5,600	6,200
Crude incidence rate [1]	14.5	19.6	12.6	16.8	13.3	14.9
Age-standardised incidence rate [1, 2]	8.7	13.5	7.6	11.5	7.8	10.1
Median age at diagnosis	73	71	74	71		
Mortality		**2017**		**2018**		**2019**
	Women	Men	Women	Men	Women	Men
Deaths	3,653	4,521	3,682	4,588	3,670	4,590
Crude mortality rate [1]	8.7	11.1	8.8	11.2	8.7	11.2
Age-standardised mortality rate [1, 2]	3.8	6.4	3.9	6.5	3.7	6.3
Median age at death	79	77	79	77	80	78
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	16,800	22,800	28,700	38,200	47,200	60,300
Absolute survival rate (2017–2018) [3]	49 (37–59)	49 (47–53)	37 (31–43)	36 (34–40)		
Relative survival rate (2017–2018) [3]	56 (42–69)	58 (54–62)	48 (39–59)	51 (46–56)		

[1] per 100,000 persons [2] age-standardised (old European Standard) [3] in percent (lowest and highest value of the included German federal states)

Epidemiology

In 2018, approximately 12,200 people in Germany were diagnosed with leukaemia, of which just over 4% were under the age of 15. The risk of developing leukaemia decreases with age until the age of 30, after which it increases significantly, with a higher incidence rate in men compared to women. One in 99 women and one in 75 men will develop leukaemia in their lifetime. At around 37%, chronic lymphocytic leukaemia (CLL) is the most common form.

Between 1999 and 2018, age-standardised incidence rates remained relatively stable, although the apparent decline in incidence for 2018 is likely still an underestimate. Age-standardised mortality rates, on the other hand, have been steadily declining.

The prognosis for people with leukaemia depends on the form of the disease and the age at diagnosis: Children have by far the best survival prospects, while among adults the acute forms continue to have a rather poor prognosis. Overall slightly more than one third of adults with the disease are still alive at 10 years after diagnosis. In the case of chronic leukaemia, a cure can only rarely be achieved, e.g. by means of a high-risk stem cell transplant.

Risk factors

No generally valid risk factors can be named for the group of all leukaemias. However, some factors increase the risk of developing certain leukaemias. The known risk factors for acute leukaemias include ionising radiation and cytostatic drugs. Occupational exposure to benzene, 1,3-butadiene and related substances may also contribute to the development of leukaemia. Some rare genetic alterations can increase the risk of developing acute leukaemia, including chromosome 21 trisomy. Viruses have not been confirmed as a risk factor for leukaemia, except for the human T-lymphotropic virus (HTLV), which is extremely rare in Europe. Several other risk factors are currently being discussed as causes of leukaemia. These include environmental influences as well as lifestyle factors such as smoking or obesity. However, a causal relation has not yet been fully established.

Overall, no clear cause for the development of leukaemia can be found for most patients. Presumably, several factors have to work together for this to happen.

▶ *Additional information: www.krebsdaten.de/leukaemia*

Figure 3.31.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C91 – C95, Germany 1999 – 2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

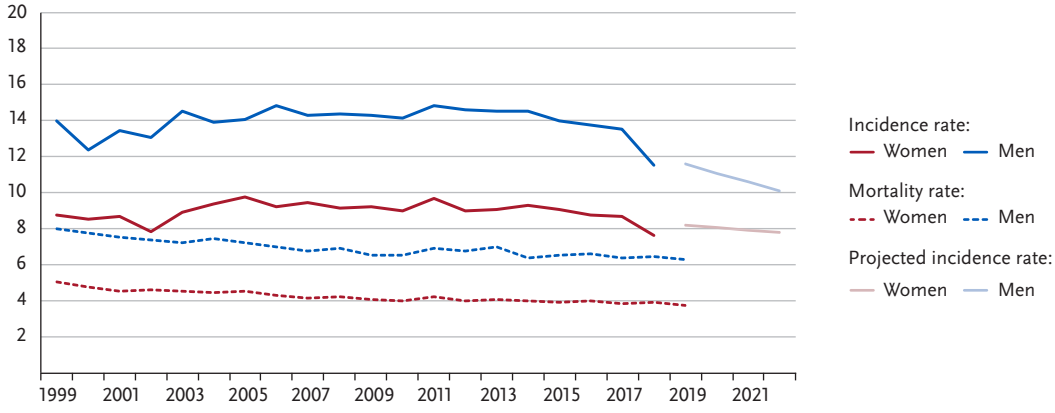


Figure 3.31.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C91 – C95, Germany 1999 – 2018/2019, projection (incidence) through 2022

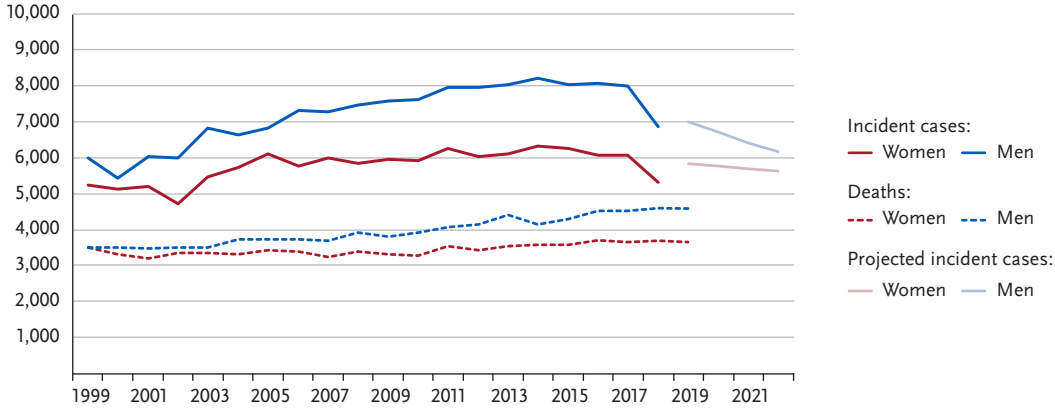


Figure 3.31.2
Age-specific incidence rates by sex, ICD-10 C91 – C95, Germany 2017 – 2018
per 100,000

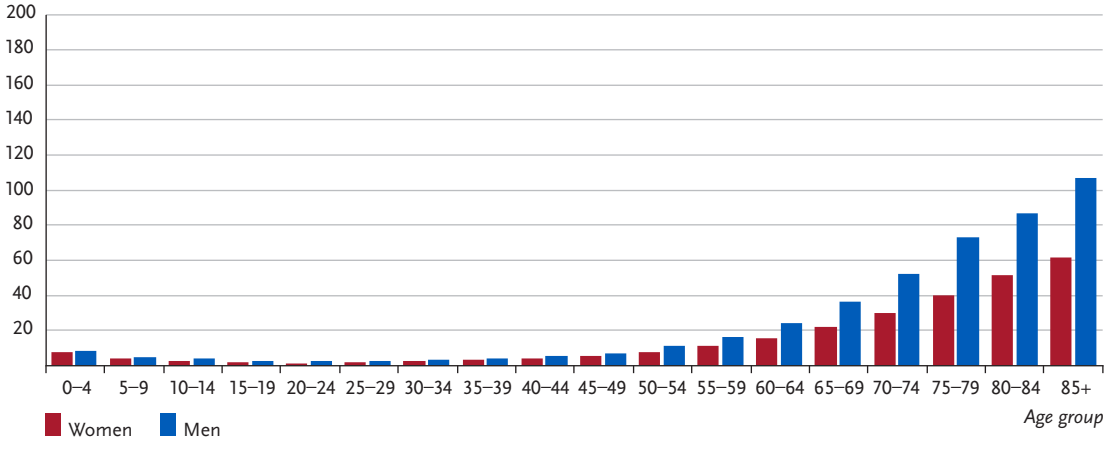


Table 3.31.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C91–C95, database 2018

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,700)	0.9 %	(1 in 110)	< 0.1 %	(1 in 8,100)	0.7 %	(1 in 140)
45 years	0.1 %	(1 in 1,600)	0.9 %	(1 in 110)	< 0.1 %	(1 in 5,400)	0.7 %	(1 in 140)
55 years	0.1 %	(1 in 820)	0.8 %	(1 in 120)	< 0.1 %	(1 in 2,000)	0.7 %	(1 in 140)
65 years	0.2 %	(1 in 460)	0.8 %	(1 in 130)	0.1 %	(1 in 720)	0.7 %	(1 in 150)
75 years	0.4 %	(1 in 280)	0.6 %	(1 in 160)	0.3 %	(1 in 310)	0.6 %	(1 in 160)
Lifetime risk			1.0 %	(1 in 99)			0.7 %	(1 in 140)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,200)	1.2 %	(1 in 82)	< 0.1 %	(1 in 9,500)	0.9 %	(1 in 110)
45 years	0.1 %	(1 in 1,200)	1.2 %	(1 in 84)	< 0.1 %	(1 in 4,300)	0.9 %	(1 in 110)
55 years	0.2 %	(1 in 570)	1.1 %	(1 in 88)	0.1 %	(1 in 1,300)	0.9 %	(1 in 110)
65 years	0.3 %	(1 in 290)	1.1 %	(1 in 94)	0.2 %	(1 in 420)	0.9 %	(1 in 110)
75 years	0.6 %	(1 in 170)	0.9 %	(1 in 110)	0.5 %	(1 in 200)	0.9 %	(1 in 110)
Lifetime risk			1.3 %	(1 in 75)			0.9 %	(1 in 110)

Figure 3.31.3
Distribution of UICC stages at diagnosis by sex
Not included because UICC stages are not defined for leukaemias.

Table 3.31.3
Proportion of incident leukaemias C91–C95 by type and sex, Germany 2017–2018

	ALL[1]	CLL[2]	AML[3]	CML[4]	others[5]
Women	7 %	34 %	27 %	9 %	24 %
Men	7 %	38 %	22 %	8 %	25 %

[1] Acute lymphatic leukaemia (C91.0)
[2] Chronic lymphatic leukaemia (C91.1)
[3] Acute myeloid leukaemia (C92.0)
[4] Chronic myeloid leukaemia (C92.1)
[5] incl. unspecified leukaemia forms

Figure 3.31.4
Absolute and relative survival rates up to 10 years after diagnosis by sex, ICD-10 C91–C95, Germany 2017–2018

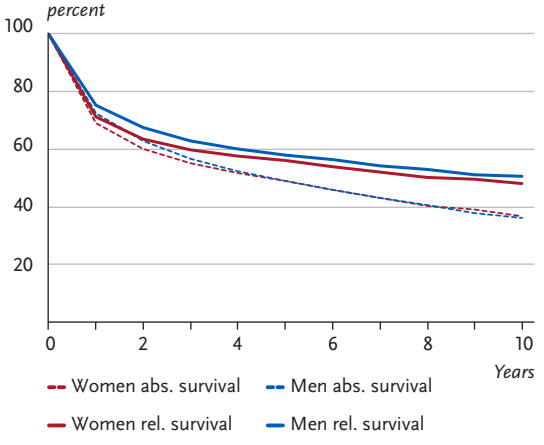


Figure 3.31.5
Relative 5-year-survival by type of leukaemia and sex, ICD-10 C91–C95, Germany 2017–2018

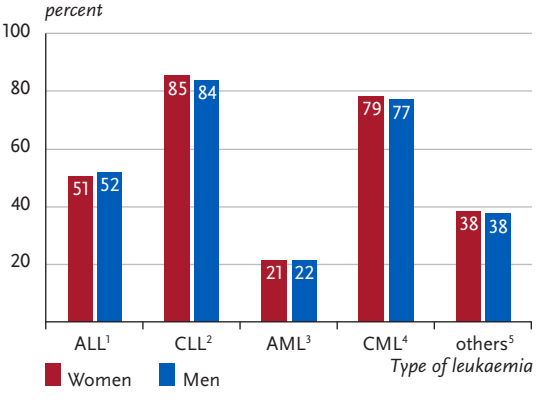


Figure 3.31.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C91 – C95, 2017 – 2018
per 100,000 (old European Standard)

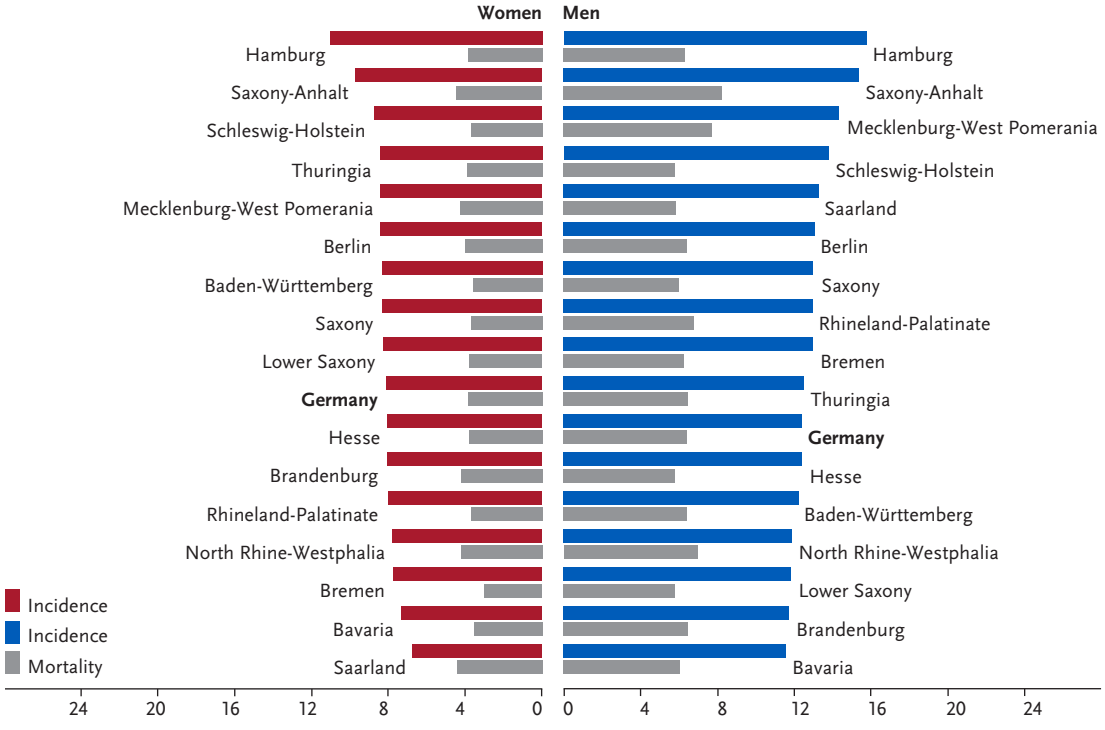
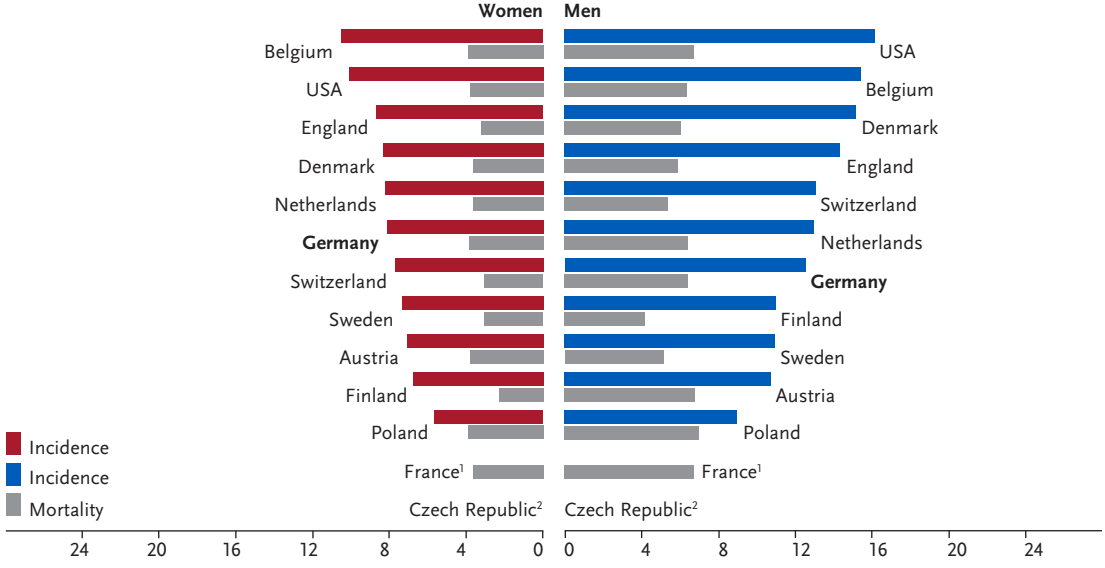


Figure 3.31.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C91 – C95, 2017 – 2018 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] No incidence data available
[2] No data available

4 Cancer in children

Since taking up its work in 1980, the German Childhood Cancer Registry (GCCR), Department of Childhood Cancer Epidemiology, has been located at the Institute of Medical Biometry, Epidemiology and Informatics of the University Medical Centre of the Johannes Gutenberg University Mainz. Close cooperation with the Society for Paediatric Oncology and Haematology (GPOH) and its associated clinics was already intended in the conception of the GCCR. As a result, the registry has a characteristic that is not easily transferable to adult oncology. A comprehensive, nationwide epidemiological cancer registry was created for the entire Federal Republic of Germany with high data quality and a completeness of

Figure 4.1
Most frequent tumour sites as percent of all incident cancer cases in children under 18 years (determined for the period 2010–2019)

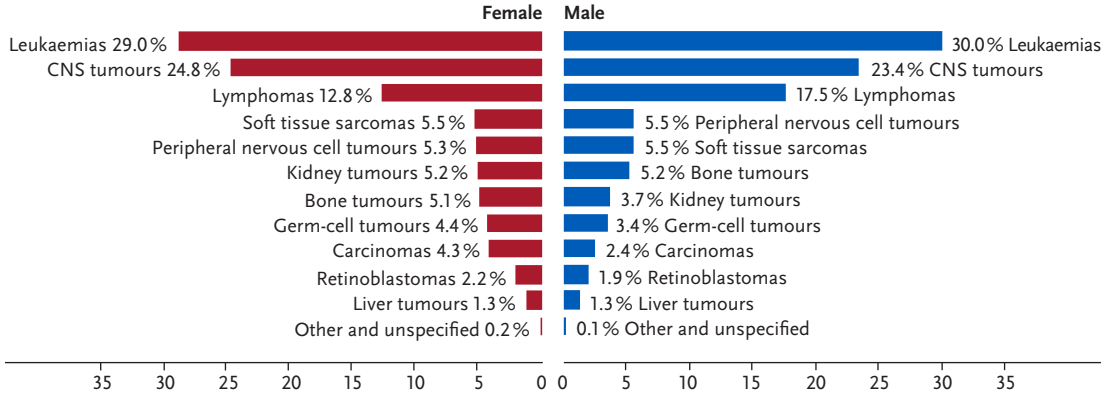


Table 4.1
Incidence* and survival rates for the most frequent diagnoses in childhood (under 18 years), by sex**

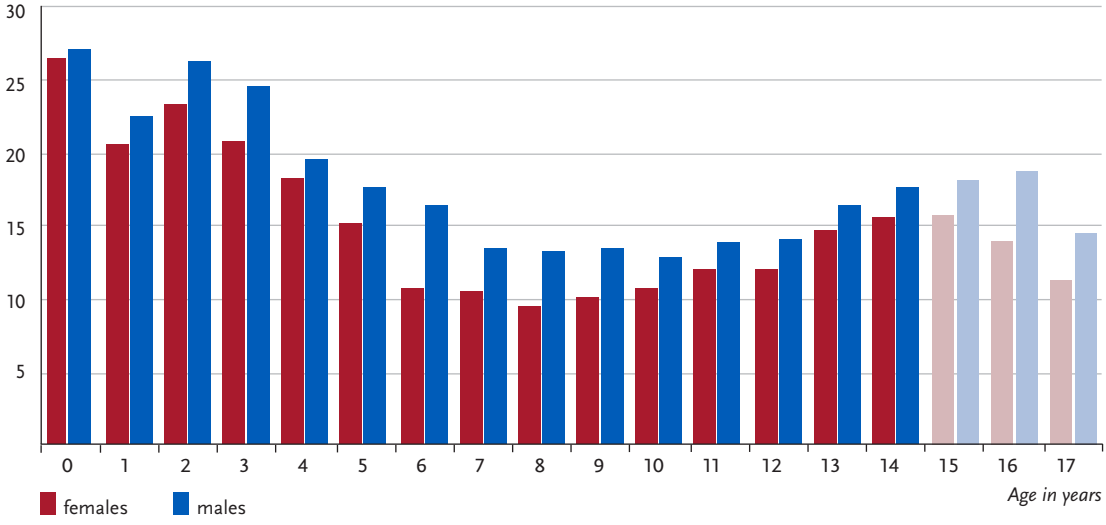
	Incidence*		survival rate in %**					
			after 5 years		after 10 years		after 15 years	
Cancer sites	females	males	females	males	females	males	females	males
Lymphoid leukaemias	3.5	4.3	92	92	91	91	90	90
Acute myeloid leukaemias	0.7	0.7	76	76	74	75	74	75
Hodgkin lymphomas	1.0	1.2	98	98	98	97	97	97
Non-Hodgkin lymphomas	0.4	1.1	88	91	87	90	86	88
Astrocytomas	1.8	1.9	86	83	84	82	83	80
Intracranial and intraspinal embryonal tumours	0.6	0.9	68	68	64	61	61	58
Neuroblastomas and ganglioneuroblastomas	1.0	1.3	85	79	84	77	83	77
Retinoblastomas	0.4	0.4	98	98	98	98	98	98
Nephroblastomas	0.9	0.8	94	93	93	92	92	92
Osteosarcomas	0.4	0.4	81	75	78	69	76	68
Rhabdomyosarcomas	0.4	0.6	70	72	68	70	68	69
Germ-cell tumours	0.7	0.6	97	91	95	91	95	90
All malignancies	15.7	18.4	87	86	85	84	84	83

* Cases per 100,000 children under age 18, age-standardised, standard: Segi world population, diagnosis years 2010–2019
** For children diagnosed between 2009 and 2018, predicted according to: Brenner H, Spix C. Combining cohort and period methods for retrospective time trend analyses of long-term cancer patient survival rates. Br J Cancer 89, 1260–1265, 2003

over 95% (since about 1987). The GCCR thus meets the international requirements for an epidemiological cancer registry. Another characteristic of the GCCR is the active open-end long-term follow-up well into adulthood. Thus, the registry also provides the basis for research into late sequelae, second tumours and generally for studies with long-term survivors.

Since 1980, the registry population included children who were diagnosed with a malignant disease or a histologically benign brain tumour before their fifteenth birthday and who belonged to the resident population of the Federal Republic of Germany at the time of diagnosis. Since about 1987, it can be assumed that the data are largely complete. Since 1991, cases in the new federal states have also been recorded.

Figure 4.2
Incidence rate by age and sex, all childhood malignancies
Number of cases per 100,000 by age group, determined for the period 2010–2019



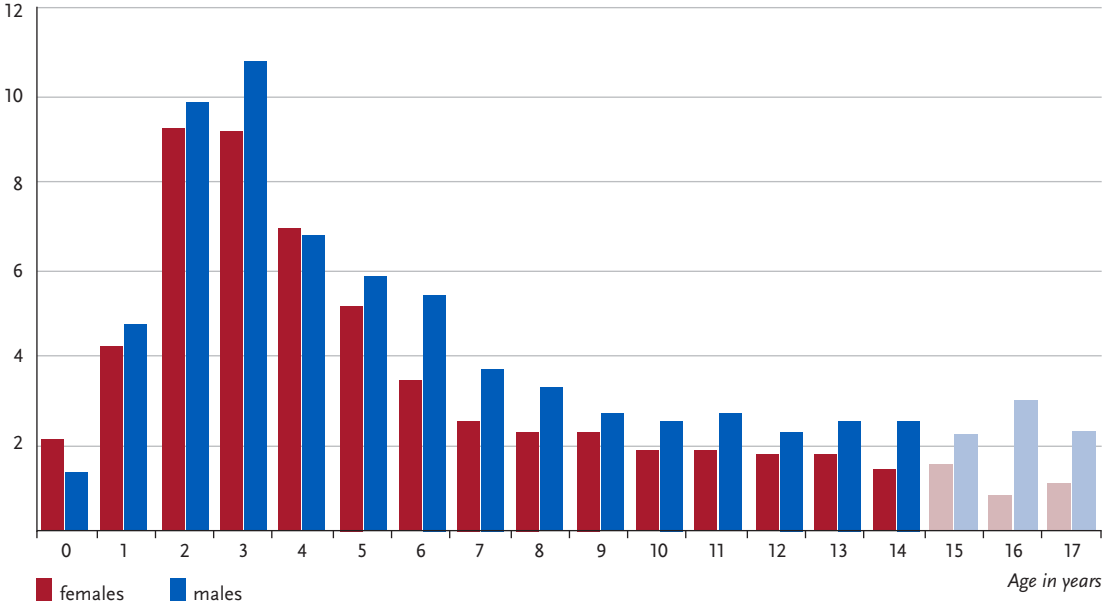
Suspected under-reporting among adolescents 15 years and older

Table 4.2
Number of incident cancer cases, incidence rates* and survival rates among children under 18 years for each of the 4 most frequent diagnoses in childhood and adulthood according to ICD-10, by sex**

		No. of incident cases		Incidence rate*		survival rate** in %					
						after 5 years		after 10 years		after 15 years	
Cancer sites	ICD-10	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
Leukaemia	C91–C95	2,590	3,368	4.3	5.2	89.8	89.9	88.8	88.7	88.1	88.1
Central nervous system	C70–C72	1,414	1,771	2.3	2.7	69.6	68.2	65.4	62.9	63.0	60.1
Hodgkin lymphoma	C81	741	873	1.0	1.1	97.9	98.3	97.6	97.5	97.4	96.6
Soft tissue without mesothelioma	C46–C49	731	750	1.3	1.2	79.5	74.4	77.0	71.9	76.3	71.3
Lung	C33–C34	39	45	0.1	0.1	69.7	81.0	69.7	78.5	69.7	76.3
Prostate	C61		7		0.0						
Breast	C50	3	2	0.0	0.0						
Colon and rectum	C18–C21	155	91	0.2	0.1						

* Cases per 100,000 persons under the age of 18, age-standardised according to the Segi world population, 2010–2019
** For children diagnosed between 2009 and 2018
♀female, ♂male

Figure 4.3
Incidence rate by age and sex, childhood lymphoid leukaemia (LL)
Number of cases per 100,000 by age group, determined for the period 2010–2019



Since 2009, the GCCR recorded all children and adolescents up to the age of 17 (= diagnosed before their eighteenth birthday) based on the »Guideline of the Joint Federal Committee on Quality Assurance Measures for the Inpatient Care of Children and Adolescents with Haematological Diseases«. This allows to meet the requirements of the cooperating hospitals, which had already included paediatric and adolescent medicine for several years and thus also treat adolescents above the age of 14 with corresponding diagnoses. The currently available data set is based on a total of approx. 70,000 cases.

Incidence of childhood cancers

In Germany, there are about 2,200 newly diagnosed cases under the age of 18 every year. With a population of about 13 million under 18-year-olds, this results in annual incidence rates for girls of 15.7 per 100,000 children and for boys of 18.4 per 100,000 children in this age group. The probability for a newborn child to suffer a malignant disease within the first 18 years of life is 0.3%. Thus, one in every 330 children will be diagnosed with a malignant cancer by the age of 18. Within the first 30 years after the initial diagnosis, at least one subsequent cancer (second neoplasia) was reported in currently 1,661 patients, which represents 6.1% of those affected (cumulative incidence).

In a European comparison, Germany is roughly in the middle of the field in terms of incidence rates. The most important reasons for differences in incidence rates are generally differences in recording, as well as random effects in countries with a very small data base, e.g. if there is no national coverage.

Range of diagnoses

In general, the distribution of diagnoses in children is completely different from adults. The most appropriate classification of entities for children therefore also focuses on morphology. The largest diagnostic groups are leukaemias (30%), tumours of the central nervous system (CNS; 23 to 25%) and lymphomas (13 to 17%), especially Hodgkin lymphomas. Embryonal tumours (neuroblastomas, retinoblastomas, nephroblastomas, medulloblastomas, embryonal rhabdomyosarcomas or germ cell tumours) are also frequent in childhood, but almost never observed in adulthood. Carcinomas, on the other hand, are extremely rare (about 2 to 4% of all malignancies). The median age at diagnosis for children and adolescents under 18 years of age is seven years and seven months. Boys are diagnosed 1.2 times more frequently than girls.

Analogous to the usual recording and presentation according to the ICD in adulthood (predominantly localisation-based), the fourth most frequent diagnosis group after leukaemias, lymphomas and malignant CNS tumours is »tumours in soft tissue without mesotheliomas«, which includes a number of different morphologies. In contrast, the organs most commonly affected in adulthood – lung, prostate,

breast and colon – are markedly rarely affected in childhood and adolescence. Most childhood tumours in these locations are not carcinomas comparable to the disease in adults; for example, the tumours reported in childhood in the colon are predominantly appendix carcinoids, and the lung tumours are mostly pulmonary carcinoids.

Survival

Less than 1% of all cancer patients are children under 18 years of age. However, malignant neoplasms are the second most common cause of death in children. Fortunately, the survival probability has improved considerably in the last 40 years thanks to more differentiated diagnostics and the use of multimodal therapy concepts. While the probability of survival five years after diagnosis was 67% for children diagnosed in the early 1980s, this value is now 87% for girls and 86% for boys among patients belonging to the registry population and been diagnosed between 2009 and 2018. Survival probabilities vary relatively strongly depending on the entity.

Long-term follow-up of former paediatric cancer patients is increasingly coming into focus with the encouraging increase in long-term survival. The GCCR provides an ideal data basis for conducting studies with long-term survivors. As can be seen from the figures above, estimates of the long-term probability of survival (after 15 years and more) or the long-term risk of developing a second neoplasia after childhood cancer are available. Investigations of the occurrence of other late effects, such as possible consequences of therapy on fertility, offspring or cardiovascular late effects are examples of further research fields. About 44,000 of the more than 54,000 patients currently known to the registry to be alive have been under observation for at least five years. The majority of these former patients are now 18 years or older.

Leukaemias

Leukaemias account for almost one third of all cancers in patients under the age of 18. With 22.1%, lymphoid leukaemia (LL) is the most frequent single diagnosis overall. It is almost twice as frequent in the under-five-year olds as in the other age groups. 4.1% of all malignancies in childhood are acute myeloid leukaemias (AML). AML is most common in the under-two-year olds. The survival probability of AML is significantly lower than for LL. 10.5% of all second neoplasms are AML, they occur predominantly in the first 10 years after initial diagnosis.

Until the early 2000s, a slight steadily increasing trend was observed for leukaemias, which was also observed in Europe as a whole. Since then, incidence rates have remained largely constant.

The causes of childhood leukaemias still remain largely unclear. Environmental influences have long been suspected of causing childhood leukaemias. Meanwhile, it has been shown that the proportion of cases caused by most environmental factors (ionising radiation in the low-dose range as well as non-ionising radiation or pesticides) is rather small, even if a weak association with the occurrence of a childhood leukaemia cannot be ruled out. There is mounting evidence for hypotheses assigning a key role to infectious pathogens and the immune system in the development of childhood lymphoid leukaemias in particular. Genetic causes continue to be increasingly investigated and discussed for all childhood neoplasms.

Lymphomas

The most common lymphomas are non-Hodgkin lymphoma (NHL) including Burkitt's lymphoma (6.4% overall) and Hodgkin's disease (7.3%). Survival rates for Hodgkin's disease are among the highest in paediatric oncology (97 to 98% after 15 years). Unfortunately, the risk of a second neoplasia is also particularly high after Hodgkin's disease, at more than 13% (within 30 years of initial diagnosis), with a particular risk for breast cancer in young women.

Regarding lymphomas, the incidence rate was largely constant, but since lymphomas occur much more frequently in older children and adolescents, significantly more cases have been recorded since the additional registration of 15- to 17-year-olds, and a higher incidence rate is observed than in those under 15 years of age.

Children with congenital or acquired immunodeficiency and after immunosuppressive therapy are at an increased risk of developing NHL.

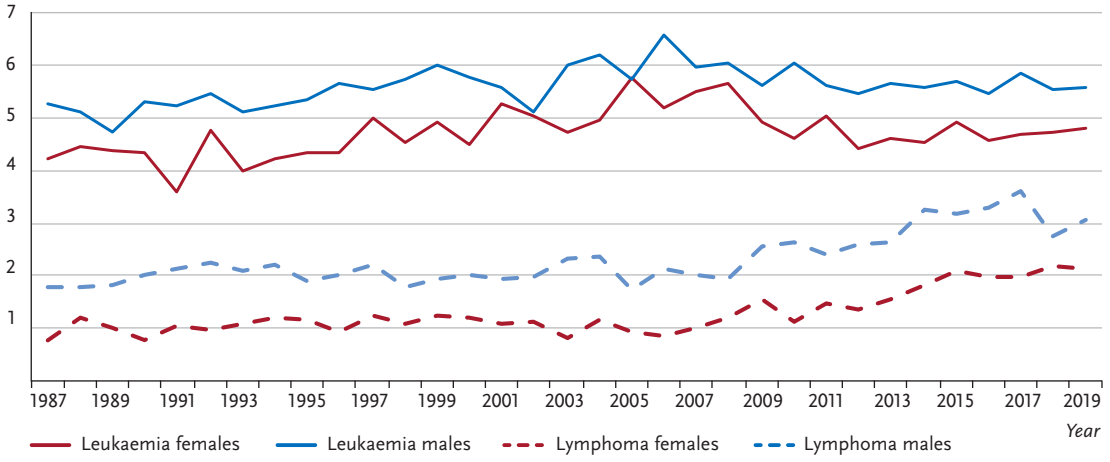
CNS tumours

The most commonly diagnosed CNS tumours in children are astrocytomas (10.6% overall), intracranial and intraspinal embryonal tumours (4.0%) and ependymomas (1.6%). 22% of all second neoplasms are CNS tumours. The increase in incidence of CNS tumours in childhood observed in Germany in recent decades, but also in a number of western countries, is probably primarily related to better recording. General changes in environmental factors and the resulting exposures are also discussed. For example, a number of epidemiological studies investigated the potential influence of ionising radiation, electromagnetic fields or pesticides, as well as genetic aspects, but no consistent correlations have been found so far.

Other common malignant diseases

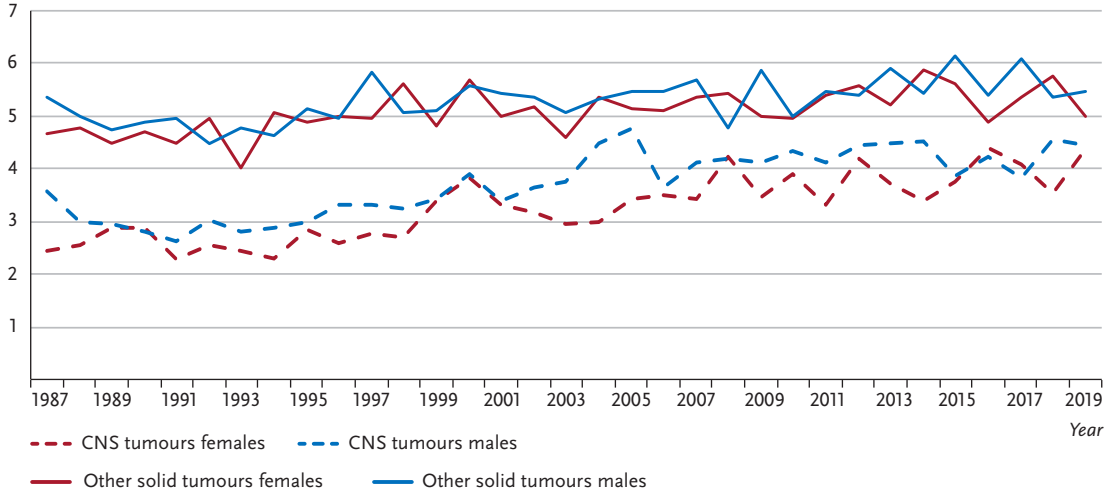
Other common malignant diseases in childhood are neuroblastoma (nerve cell tumour), nephroblastoma (kidney tumour), germ cell tumours, bone tumours

Figure 4.4
Trends in incidence of childhood leukaemia and lymphoma (under 15 years until 2008, under 18 years from 2009), by sex, 1987–2019
Number of cases per 100,000 (age-standardised according to Segi), including eastern Germany since 1991



In the last decade, further neoplasms of the lymphatic system have been newly classified as malignant (Langerhans cell histiocytosis).

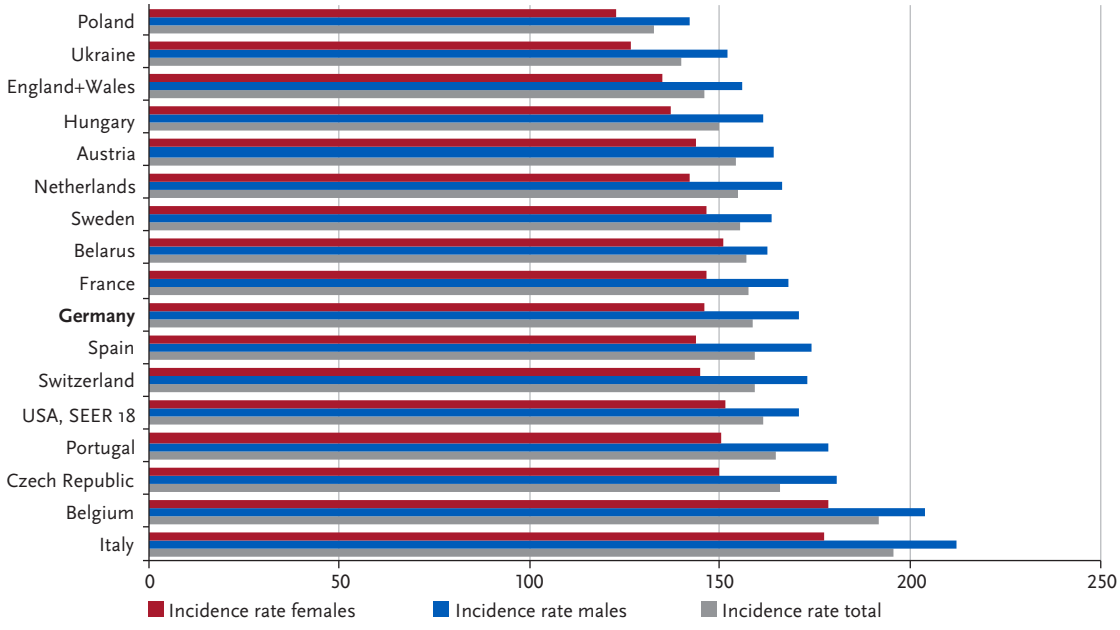
Figure 4.5
Trends in incidence of childhood CNS tumours and other solid tumours (under 15 years until 2008, under 18 years from 2009), by sex, 1987–2019
Number of cases per 100,000 (age-standardised according to Segi), including eastern Germany since 1991



and rhabdomyosarcoma (tumour of the skeletal muscles). The prognosis for children with nephroblastoma or germ cell tumour is much more favourable than for other tumours. Leukaemias and CNS tumours are particularly frequent secondary neoplasms, as already described. Others are skin tumours, thyroid carcinomas and breast cancer in young women.

There tends to be no real trend in incidence rates for solid tumours outside the CNS. Over the years, additional diagnoses were recategorized as malignant and registered from then on. Certain solid tumours in older children, some of which are not primarily treated in paediatric oncology, such as gynaecological and urological carcinomas and skin tumours, are under-registered, but this is slowly improving. Overall, this led to a slight increase in the number of reported cases.

Figure 4.6
International comparison of age-standardised cancer incidence rates for children under 15 years, by sex
Number of cases per 100,000 children (age-standardised according to Segi world population), different periods between 1990 and 2014



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5 Appendix

5.1 The German Centre for Cancer Registry Data at the Robert Koch Institute (Zentrum für Krebsregisterdaten, ZfKD)

After enactment of the Federal Cancer Registry Data Act (Bundeskrebsregisterdatengesetz – BKRG) in August 2009, the German Centre for Cancer Registry Data was established at the beginning of 2010 at the Robert Koch Institute (RKI). It is an independent division within the Department of Epidemiology and Health Monitoring.

With the amendment of the BKRG through the Act for the Consolidation of Cancer Registry Data (Gesetz zur Zusammenführung von Krebsregisterdaten) in August 2021, the ZfKD's duties and responsibilities have broadened. Starting at the end of 2022, the data set currently transmitted annually by the cancer registries to the ZfKD will be supplemented with various clinical data.

Among the responsibilities of the ZfKD:

- to merge and check the population-based data submitted by the state cancer registries on uniformity and completeness of case finding
- to create, maintain and update a dataset containing the data transmitted by the state cancer registries and checked by the ZfKD
- to further enhance methods and standards for data collection and data transfer, and to analyse the data together with the state cancer registries
- to regularly estimate and analyse cancer incidence, mortality, survival rates, stage distribution at diagnosis, and other indicators, particularly prevalence, the risk of developing and dying of cancer, and how these indicators change over time
- to examine regional differences in selected cancer sites
- to provide a dataset for scientific research upon application
- to conduct analyses and studies on cancer and to publish the results in national and international journals
- to publish a report on cancer incidence and trends in Germany in consultation with the state cancer registries every two years (»Cancer in Germany«)
- to write a summarized report on cancer in Germany every five years; the first edition will be released in 2026
- to complement classic print-products with interactive analysis tools based on annually updated data and an expanded presence on the Internet
- to use additional data sources to describe all aspects of cancer in Germany
- to cooperate nationally and internationally
- to collaborate in scientific bodies as well as European and international organizations dedicated to cancer registration and cancer epidemiology (e.g. active participation in working groups of the German National Cancer Plan, in the Association of Population-based Cancer Registries in Germany (GEKID), in the Plattform §65c, International Association of Cancer Registries (IACR) membership)

The work of the German Centre for Cancer Registry Data is supported by a scientific advisory board as well as a scientific committee with an office at the RKI. The dataset at the German Centre for Cancer Registry Data can be provided for scientific research to third parties upon application. Further information on the application process as well as the German Centre for Cancer Registry Data is available on the Internet at www.krebsdaten.de/english.

Staff of the German Centre for Cancer Registry Data:

Dr. Klaus Kraywinkel, MSc (section head)
Dr. Benjamin Barnes, MEM (deputy section head)
Dr. Nina Buttmann-Schweiger, MPH
Dr. Stefan Dahm
Julia Fiebig, MSc
Manuela Franke
Ina Gurung-Schönfeld
Dr. Jörg Haberland
Maren Imhoff
André Kötschau
Stefan Meisegeier
Dr. Petra von Berenberg-Gossler
Dr. Antje Wienecke, MSc

5.2 Association of Population-based Cancer Registries in Germany

The Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V., GEKID) was formed in 2004 as a registered, non-profit association. GEKID's members include not only all population-based cancer registries in Germany, but also a tumour centre and interested scientists working in the field of cancer epidemiology.

In the field of cancer control, GEKID cooperates closely with the Federal Ministry of Health, particularly in the context of the National Cancer Plan, and with the German Centre for Cancer Registry Data based at the Robert Koch Institute. GEKID also participates actively in a wide range of scientific committees, especially in working groups determining the uniform data set for cancer registration in Germany.

The association's primary task is to harmonise cancer registration methods through standardisation, despite differences in legislation between the federal states. The comparability of results from the cancer registries can only be assured through nationwide cooperation. To promote such cooperation, GEKID published »The Manual of Population-based Cancer Registration« in 2008. Together with the Association of German Tumour Centres (ADT), this manual was updated ten years later in 2018 and expanded to include elements of clinical cancer registration. The manual is available via the GEKID Homepage.

Furthermore, GEKID is a mutual point of contact for the population-based cancer registries on all issues of common interest and represents the registries at the European level. GEKID is a member of the European Network of Cancer Registries (ENCR) and the International Association of Cancer Registries (IACR).

In its charter, GEKID has set itself the following tasks:

- to be the point of contact both for national and international cooperation partners and for the interested public
- to provide information on the status of cancer registration in Germany to the (professional) public and explain the aims of cancer registration
- to engage in joint information activities and thus help cancer registries to achieve and maintain completeness of case ascertainment
- to define standards on content as a basis for the comparability of population-based cancer registries
- to coordinate tasks involving multiple registries and foster contacts with clinical tumour documentation
- to initiate joint research activities
- to promote the scientific use of the population-based cancer registries
- to use the data to advance quality assurance in oncological care

Important results of GEKID activities in recent years:

- Enhancement of the different interactive GEKID-Atlas' regarding current cancer incidence, mortality and survival in the federal states as well as on area level and urban municipality, available via the GEKID-Homepage
- Continued development of the ADT/GEKID basis dataset for reporting to a registry as well as definitions for the data-exchange across registries and for forwarding data to the German Centre for Cancer Registry Data
- Evaluation and publication of results of survival analyses in Germany together with the German cancer registries, the German Cancer Research Centre, funded by the German Cancer Aid

Information on GEKID can be obtained on the Internet at www.gekid.de/home or from the respective regional member registries (see address section, appendix 5.4).

Contacts for the Association of Population-based Cancer Registries in Germany (see address section, appendix 5.4):

Prof. Dr. Alexander Katalinic
(Chair of GEKID, Schleswig-Holstein Cancer Registry)
Dr. Alice Nennecke
(1st Vice-chair, Hamburg Cancer Registry)
Hiltraud Kajüter
(2nd Vice-chair, North Rhine-Westphalia Cancer Registry)

5.3 KID – The Cancer Information Service provided by the German Cancer Research Center

The Cancer Information Service »KID« was founded in 1986 to provide personal information over the telephone to patients, their relatives and the interested public with questions regarding cancer. Today, doctors provide up-to-date, scientifically sound answers to around 33,300 questions every year by phone, by e-mail and in consultations in both Heidelberg and Dresden. Professionals involved with the care of persons with cancer also turn to the Cancer Information Service. The information on offer is individually tailored to the needs of the various target groups:

- Patients as well as their family and friends are interested primarily in detailed information relating to diagnosis and treatment options, living with the disease and additional sources of assistance within the healthcare system. For interested citizens, the main focus is on risk factors, cancer prevention and early detection or on current cancer research. The comprehensive information of the Cancer Information Service strengthens the health literacy of individuals and creates the basis for more equal communication with physicians, so that those affected are able to make an informed and participative decision.
- Professionals in occupations involved in cancer care receive pertinent information on the telephone and via e-mail quickly, reliably, competently, and based on the best available scientific evidence. The clear preparation of research results and the individual compilation of relevant literature generate direct added value for patient care.

Via its website www.krebsinformationsdienst.de the Cancer Information Service conveys the latest knowledge about cancer, useful addresses, additional contacts, tips for further links and information material. 890,000 individual visitors per month used this website in 2020. Additionally, the service posts breaking news and invites discussion on the social networking sites Facebook and Instagram. For professionals, the website offers relevant information on medical research and provides links to further scientific sources. Newsletters for medical professionals, especially for psycho-oncologists, convey current topics on cancer.

The Cancer Information Service is provided by the German Cancer research Center (DKFZ) in Heidelberg, the largest bio-medical research institution in Germany. The service is financed by funds from the Federal Ministry of Education and Research (BMBF), the State of Baden-Württemberg's Ministry of Science, Research and Art (MWK) and the Federal Ministry of Health (BMG). Thus, the service provides information independently, free from conflicts of interest and free of charge. In its capacity as national reference centre for cancer information, the Cancer Information Service is committed to providing the highest possible standard of information. Through its evaluation research, the Service also provides feedback on how cancer patients and their relatives experience health care in Germany.

Further information on the mission and methods of the Cancer Information Service can be found by following the link: www.krebsinformationsdienst.de/info/cancer-information-service.pdf

Cancer Information Service (KID)
Telephone: + 49 (0)800 – 420 30 40,
(free within Germany), daily from 08:00 to 20:00
E-Mail: krebsinformationsdienst@dkfz.de
Answers usually within 2 working days
Internet: www.krebsinformationsdienst.de and
www.facebook.com/krebsinformationsdienst

Cancer Information Service.med
Telephone: +49 (0)800 – 430 40 50,
(free within Germany), daily from 08:00 to 20:00
E-Mail: kid.med@dkfz.de
Answers usually within 2 working days
Internet: www.krebsinformationsdienst.de/fachkreise

Contacts at the Cancer Information Service KID (also see address section, appendix 5.4):

Dr. Susanne Weg-Remers
Head of the Cancer Information Service (KID)
Dr. Andrea Penzkofer
Head of the Working Group »Knowledge Management« at KID

5.4 Addresses

Krebsregister **Baden-Württemberg** (Baden-Württemberg Cancer Registry)
Epidemiologisches Krebsregister (Population-based Cancer Registry)
Deutsches Krebsforschungszentrum Heidelberg (German Cancer Research Center)
Im Neuenheimer Feld 581
69120 Heidelberg
Telephone: 06221/42 42 20
E-Mail: ekr-bw@dkfz.de
Internet: www.krebsregister-bw.de

Krebsregister Baden-Württemberg (Baden-Württemberg Cancer Registry)
Vertrauensstelle (Baden-Württemberg Confidentiality Unit)
bei der Deutschen Rentenversicherung (German Pension Insurance) Baden-Württemberg
Gartenstraße 105
76135 Karlsruhe
Telephone: 0721/82 57 90 00 Telefax: 0721/82 59 97 90 99
E-Mail: vs@drv-bw.de
Internet: www.krebsregister-bw.de

Klinische Landesregisterstelle (KLR) des Krebsregisters Baden-Württemberg (Clinical Registration Unit)
bei der Baden-Württembergischen Krankenhausgesellschaft e.V. (Baden-Württemberg Hospital Association)
Birkenwaldstraße 149
70191 Stuttgart
Telephone: 0711/13 79 09-0 Telefax: 0711/13 79 09-999
E-Mail: info@klr-krbw.de
Internet: www.krebsregister-bw.de

Bayerisches Krebsregister (Bavarian Cancer Registry)
Zentralstelle für Krebsfrüherkennung und Krebsregistrierung
(Center for Early Cancer Detection and Cancer Registration)
Schweinauer Hauptstraße 80
90441 Nürnberg
Telephone: 09131/68 08 29 20 Telefax: 09131/68 08 29 05
E-Mail: zkfr@lgl.bayern.de
Internet: www.krebsregister-bayern.de

Gemeinsames Krebsregister der Länder **Berlin, Brandenburg, Mecklenburg-Vorpommern, Sachsen-Anhalt** und der Freistaaten **Sachsen** und **Thüringen** (GKR)
(Joint Cancer Registry of Berlin, Brandenburg, Mecklenburg-West Pomerania, Saxony-Anhalt, Saxony, Thuringia)
Brodauer Straße 16–22
12621 Berlin
Telephone: 030/56 58 11 00 (R) 030/56 58 12 00 (V)
Telefax: 030/56 58 11 99 (R) 030/56 58 12 99 (V)
E-Mail: registerstelle@gkr.berlin.de
vertrauensstelle@gkr.berlin.de
Internet: http://www.krebsregister.berlin.de

Bremer Krebsregister (Bremen Cancer Registry)
Auswertungsstelle (Analysis Unit)
Leibniz-Institut für Präventionsforschung und Epidemiologie – BIPS GmbH
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Achterstraße 30
28359 Bremen
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E-Mail: krebsregister@leibniz-bips.de
Internet: www.krebsregister.bremen.de

Vertrauensstelle des Bremer Krebsregisters (Confidentiality Unit of the Bremen Cancer Registry)
Kassenärztliche Vereinigung Bremen (Bremen Association of Statutory Health Insurance Physicians)
Achterstraße 30
28359 Bremen
Telephone: 0421/21 85 69 99
E-Mail: info.krebsregister@kvhb.de

Hamburgisches Krebsregister (Hamburg Cancer Registry)
Freie und Hansestadt Hamburg
Behörde für Wissenschaft, Forschung, Gleichstellung und Bezirke (Ministry of Science, Research, Equality and Districts)
Süderstraße 30
20097 Hamburg
Telephone: 040/4 28 37-22 11 Telefax: 040/42 79-4 85 03
E-Mail: hamburgischeskrebsregister@bwfgb.hamburg.de
Internet: www.hamburg.de/krebsregister

Landesauswertungsstelle des **Hessischen** Krebsregisters (State Analysis Unit of the Hessian Cancer Registry)
Lurgiallee 10
60439 Frankfurt am Main
Telephone: 069/58 00 13-400 Telefax: 0611/32 76 44-814
E-Mail: krebsregister@hlpug.hessen.de
Internet: www.hessisches-krebsregister.de

Vertrauensstelle des Hessischen Krebsregisters (Confidentiality Unit of the Hessian Cancer Registry)
Lurgiallee 10
60439 Frankfurt am Main
Telephone: 069/5 66 08 76-0
E-Mail: info@hessisches-krebsregister.de
Internet: www.hessisches-krebsregister.de

Epidemiologisches Krebsregister **Niedersachsen** (Lower Saxony Population-based Cancer Registry)
Registerstelle (Registry Unit) – OFFIS CARE GmbH
Industriestraße 9
26121 Oldenburg
Telephone: 0441/36 10 56 12
E-Mail: registerstelle@krebsregister-niedersachsen.de
Internet: www.krebsregister-niedersachsen.de

Niedersächsisches Landesgesundheitsamt (Lower Saxony Health Authority)
Vertrauensstelle Epidemiologisches Krebsregister Niedersachsen (Confidentiality Unit of the Lower Saxony Population-based Cancer Registry)
Roesebeckstraße 4–6
30449 Hannover
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E-Mail: vertrauensstelle.ekn@nlga.niedersachsen.de
Internet: www.krebsregister-niedersachsen.de

Landeskrebsregister **Nordrhein-Westfalen** gGmbH (North Rhine-Westphalia Cancer Registry)
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Krebsregister **Rheinland-Pfalz** gGmbH (Rhineland-Palatinate Cancer Registry)
Große Bleiche 46
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Internet: www.krebsregister-rlp.de

Krebsregister **Saarland** (Saarland Cancer Registry)
Ministerium für Soziales, Gesundheit, Frauen und Familie (Ministry of Social Affairs, Health, Women and Family)
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(R) = Registerstelle (Registry Unit) (V) = Vertrauensstelle (Confidentiality Unit)

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Vertrauensstelle des Krebsregisters (Confidentiality Unit of the Schleswig-Holstein Cancer Registry)
bei der Ärztekammer Schleswig-Holstein (at the Schleswig-Holstein Medical Association)
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Deutsches Kinderkrebsregister (German Childhood Cancer Registry)
Abteilung Epidemiologie von Krebs im Kindesalter (EpiKiK) (Division of Childhood Cancer Epidemiology)
Institut für Medizinische Biometrie, Epidemiologie und Informatik (IMBEI)
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(R) = Registerstelle (Registry Unit) (V) = Vertrauensstelle (Confidentiality Unit)

5.5 Sources for international comparisons of cancer incidence and mortality

for the years 2017 – 2018, if not otherwise stated. Access period: March to September 2021

Netherlands:	Netherlands Cancer Registry https://iknl.nl/nkr-cijfers
Sweden, Finland, Denmark:	NORDCAN – Association of the Nordic Cancer Registries (ANCR) https://nordcan.iarc.fr/en
Poland:	Krajowy Rejestr Nowotworów http://onkologia.org.pl/raporty/#tabela_nowotwor
Czech Republic:	SVOD Web Portal https://www.svod.cz/?sec=aktuality&lang=en
Switzerland:	Incidence only available for 2017. Provided by NICER – National Institute for Cancer Epidemiology and Registration https://www.nicer.org/ Mortality: Eurostat, Statistical Office of the European Union https://ec.europa.eu/eurostat/web/health/data/database Data for mortality for C17, C21, C23 – C24, C38.4, C45.0, C47, C49, C62, C81 only available for the years 2013 to 2017 from: https://www.nicer.org/
Belgium:	Incidence: Belgian Cancer Registry http://www.kankerregister.org/ Mortality: Eurostat, Statistical Office of the European Union https://ec.europa.eu/eurostat/web/health/data/database
France:	Incidence projected for 2017/2018 from previous data, classified by ICD-O-3 topography Provided by FRANCIM – French Network of Cancer registries Defossez G, Le Guyader, Peyrou S, Uhry Z, Grosclaude P, Colonna M, Dantony E, et al. Estimations nationales de l'incidence et de la mortalité par cancer en France métropolitaine entre 1990 et 2018. Volume 1 – Tumeurs solides. Saint Maurice (Fra): Sante publique France, 2019. 372 p. Volume 2 – Hémopathies malignes. Étude à partir des registres des cancers du réseau Francim. Saint-Maurice (Fra): Santé publique France, 2019. 169 p. https://www.e-cancer.fr/ Mortality only available for 2016 from: Eurostat, Statistical Office of the European Union https://ec.europa.eu/eurostat/web/health/data/database
USA:	National Cancer Institute, Surveillance, Epidemiology, and End Results (SEER) Program, classified according to ICD-O-3 topography https://seer.cancer.gov/canques/incidence.html http://seer.cancer.gov/canques/mortality.html
England:	Incidence and mortality only available for 2017 from Office for National Statistics https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/datasets/cancerregistrationstatisticscancerregistrationstatisticsengland
Austria:	STATISTIK AUSTRIA, Austrian Cancer Registry and Official cause of death statistics (Access date: 17.12.2020)
Additional data on mortality:	If not available via national sources or Eurostat: WHO Mortality Database: https://www.who.int/data/data-collection-tools/who-mortality-database All rates were standardised according to the old European Standard Population using available age-specific rates or numbers of cases and population data
Childhood cancer:	International Agency for Research on Cancer. International Incidence of Childhood Cancer https://iicc.iarc.fr/results/comparative-tables

5.6 Publications with participation/with results of German population-based cancer registries 2019 – 2021

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Arndt V, Holleczek B, Kajüter H, et al. (2020) Data from Population-based Cancer Registration for Secondary Data Analysis: Methodological Challenges and Perspectives. Gesundheitswesen 82 (S 01): S62 – S71. doi: 10.1055/a-1009-6466

Arndt V, Kraywinkel K, Zeissig SR (2019) Beiträge der Epidemiologie bei der Primärprävention von Krebserkrankungen. Onkologe 25(S1): 7 – 13 doi: 101007/s00761-019-0600-7

Arndt V, Mehnert-Theuerkauf A, Singer, S et al. (2021) Cancer Survivorship – Leben mit Krebs/Leben nach Krebs. Onkologe 27 (8): 714 – 716. doi: 10.1007/s00761-021-00992-x

Bannon F, Di Carlo V, Harewood R, et al. CONCORD Working Group (2019) Survival trends for primary liver cancer, 1995 – 2009: analysis of individual data for 578,740 patients from 187 population-based registries in 36 countries (CONCORD-2) Ann Cancer Epidemiol 3: 6. doi: 10.21037/ace.2019.07.01

Barnes B (2020) Primärprävention von Plattenepithelkarzinomen des Ösophagus und des Anus. Onkologe 26 (4): 367 – 370. doi: 10.1007/s00761-020-00743-4

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In 2018, an estimated 233,000 women and 265,000 men in Germany were newly diagnosed with cancer. Although for many types of cancer there have recently been declining incidence rates, an increase to around 510,000 cases of disease is expected by 2022 due to demographic changes. Further analyses and information can be found at www.krebsdaten.de/english.

Initial analyses of the impact of the COVID-19 pandemic on diagnosis and care of people with cancer in 2020 are presented in a separate chapter, using various data sources and published results.

From the end of 2022, essential data of the nationwide clinical cancer registration will also be provided to the ZfKD, in addition to the epidemiological data. In perspective, these will also be included in future editions of this report.