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CANCER REGISTRY DATA

GEKID

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Foreword

Ten years ago, the Cancer Screening and Registry Act (KFRG) laid the foundation for nationwide clinical cancer registration in Germany, which provides for the recording of therapies and disease progression in addition to the already well-established epidemiological cancer registration. The federal states have created the legal requirements, and new structures have been established. Existing epidemiological cancer registries have been expanded into clinical-epidemiological cancer registries, and new structures for nationwide clinical cancer registration have been established. The formation of the new structures and the resulting changes did not always run smoothly. For example, the Joint Cancer Registry (GKR) of the federal states of Berlin, Brandenburg, Mecklenburg-West Pomerania, Saxony-Anhalt and the Free States of Saxony and Thuringia was dissolved at the turn of 2022/23, and the tasks previously performed were transferred to the respective new structures in the federal states. The GKR emerged in the 1990s from the former National Cancer Registry of the German Democratic Republic (GDR), which had been registering cancer cases since 1952 and had long played a pioneering role internationally.

However, it is not only at state level that changes have been made to data collection. The Act on the Consolidation of Cancer Registry Data of 18 August 2021 also made adjustments that directly affect the Centre for Cancer Registry Data (ZfKD) at the Robert Koch Institute. The previous Scientific Advisory Board, which advised on data applications received, has been replaced by two new bodies: an Advisory Board and a Scientific Committee. The Advisory Board has the task of advising the Centre for Cancer Registry Data on its tasks and supporting the definition of standards for the technical, semantic, syntactic and organisational interoperability of the data. The Scientific Committee is responsible for commenting on applications for the use of data and for helping to define the general requirements for the risk assessment of data to be made available for research purposes.

The scope of the data transmitted to the ZfKD each year by the state cancer registries has been expanded and adapted to clinical cancer registration. In particular, data on the clinical course and the most important treatment data have been added and are now also available to the ZfKD. For the transmission of the expanded dataset and to promote interoperability, a new interface specification for the ZfKD delivery dataset was created at the end of 2022. This specification is binding for the transmission of the state cancer registries to the ZfKD and is based on the XML structure for the transmission of the uniform oncological basic dataset (oBDS-3.0.0) and was commented on by the Advisory Board. The specification has been implemented by the state cancer registries and the ZfKD, and the first data with the extended dataset has been transmitted. Starting with the diagnosis year 2020, a new dataset is being created that will gradually be incorporated into the RKI's reporting and made available for research purposes in the coming years.

Here too, the Act on the Consolidation of Cancer Registry Data has introduced new requirements that must be observed. As there may be an increased risk of re-identification due to the breadth of the extended data set, in certain cases requested data can only be provided in aggregated form or via controlled remote access.

With the European Commission's draft regulation on the creation of a European Health Data Space, as well as other federal legislative plans in a similar direction, which are intended to enable the linking of cancer registry data with other data, it is already foreseeable that the coming decade will also bring many changes in cancer registration.

The ZfKD will also undergo changes: In all likelihood, after 15 years at the Robert Koch Institute, it will become part of the new Federal Institute for Prevention and Education in Medicine (BIPAM) from 2025, meaning that this report will be the last in the "RKI design".

In times of change, it is all the more pleasing that the ZfKD has once again succeeded in compiling reliable data on cancer incidence in the 14th edition of *Cancer in Germany*. The report confirms the decline in diagnosed cancer cases in the first year of the COVID-19 pandemic, which has also been reported internationally in hospital statistics and by individual registries. The cancer registry data will help to deepen our understanding of the impact of the pandemic on the care and prognosis of people suffering from cancer, particularly due to its depth of detail and population-based nature.

Tobias Hartz
Managing Director of the Lower Saxony Clinical Cancer Registry, spokesperson for the § 65c platform and Chairman of the Advisory Board at the ZfKD

1 Population-based cancer registration in Germany

1.1 Objectives and tasks of population-based cancer registries

Population-based cancer registries are facilities for collecting, storing, processing, analysing and interpreting data that reflect the occurrence, course and, in some cases, the treatment of cancer in defined registration areas (e.g. a federal state). However, the data from these registries are also an indispensable basis for further studies in the search for the causes of carcinogenesis, for the assessment of early detection measures and for the care of tumour patients in a region. Findings from population-based cancer registries include:

In Germany, around 500,000 people are newly diagnosed with cancer every year.

Data from population-based cancer registries can be used to describe the incidence of cancer, i.e. the frequency with which cancers occur per year in a specific population. The incidence is calculated according to cancer type, age and gender as well as other characteristics. Reliable data on incidence is an indispensable prerequisite for describing the extent and type of cancer burden in a population.

For some years now, the incidence of lung cancer among women under 50 in Germany has been almost as high as among men of the same age.

Only with data from population-based cancer registries can the development (trend) of incidence over time be reliably observed. The registries play a central role in monitoring these trends as part of health reporting.

Regional differences in the incidence of malignant melanoma of the skin can be observed within Europe and Germany.

Population-based cancer registries can analyse the spatial distribution of cancers. They also have the task of analysing observed clusters of cancers. Further clarification of these clusters with regard to possible causes usually requires targeted analytical studies.

In recent years, the prospects of survival after cancer have largely converged in eastern and western Germany.

Population-based cancer registries carry out survival analyses on all patients suffering from cancer in their region. Population-based survival rates are an important parameter for evaluating the effectiveness of diagnosis, treatment and aftercare for cancer. German registry data is also regularly used for large international comparative studies of survival rates, e.g. within Europe.

Between 2015 and 2030, the number of new cancer cases in Germany is expected to rise by around 23%, primarily due to demographic trends.

The forecast of the future number of new cancer cases is an important aspect of demand planning in the healthcare system, which can be determined on the basis of the registries.

The data from population-based cancer registries are also used for research into the causes of cancer, for the assessment of early cancer detection and for healthcare research. Corresponding studies investigate questions such as:

- What are the causes of childhood leukaemia?
- Are women who receive hormone replacement therapy for menopausal symptoms more likely to develop breast cancer?
- Does lung cancer occur more frequently in people in a certain occupational group?
- Is there an increased incidence of cancer in the vicinity of oil and gas production facilities?
- Does early detection of skin cancer lead to a reduction in advanced tumour stages in the population?
- Are there differences in the care of oncological patients depending on where they live (e.g. between urban and rural regions)?
- How quickly are new or updated guideline recommendations implemented in practice?

Population-based cancer registries enable all cases of cancer occurring in a defined population to be considered for research projects. The protection of the privacy of those affected and the patient's right to informational self-determination require comprehensive precautions for the protection and safeguarding of personal data, which are guaranteed in all epidemiological registries by state law. For certain studies, especially those that involve additional surveys or data collection, the consent of those affected is also a prerequisite. If participation is high, it can be largely ensured that the results of such studies are reliable and robust. Population-based case-control studies and cohort studies therefore utilise data from population-based cancer registries to research the causes and risks of cancer.

Further and more specific questions can also be analysed based on the registry data, for example:

- Detailed analyses of survival prospects after cancer
- Investigating the quality of life of long-term cancer survivors
- Occurrence of secondary tumours after treatment of the first tumour
- Evaluation of cancer screening measures, such as mammography screening or colon cancer screening, in particular early detection colonoscopy
- Studies on the relationship between socioeconomic class and cancer incidence and mortality
- Cooperation with the cancer centres, e.g. in assessing the long-term survival of patients treated there.

One focus of the analyses with data from the population-based cancer registries in recent years has been survival after cancer, one of the most important outcome parameters in oncological care. Together with the German Cancer Research Centre (DKFZ) in Heidelberg, researchers from the cancer registries and the Centre for Cancer Registry Data (ZfKD) were able to investigate survival after cancer in detail and publish their findings internationally. For the first time, rare tumours were also investigated and 10-year survival rates were published. A total of around 50 publications were produced on this topic. Survival after diagnosis of selected tumour types was also compared with international data, particularly with the US SEER (Surveillance, Epidemiology, and End Results) registries. Overall, the results for people with cancer in Germany are very good. However, there are also diagnoses, e.g. breast cancer in women over 75, where survival rates in Germany are lower than in the USA. Such differences may have various causes, which will be investigated in more detail in in-depth studies.

A particular challenge for population-based cancer registries is the evaluation of organised cancer screening programmes introduced in Germany. For example, the data from population-based registries can be used to assess whether and to what extent a reduction in advanced cancers is occurring in the target population. By linking the cancer registry data with the data of the respective early detection programme, the aim is also to show the desired reduction in mortality among participants in such a measure. An initial focus is the evaluation of the mammography screening programme, which has been introduced throughout Germany since 2009. For many years, the population-based cancer registries have routinely provided data for the evaluation reports on mammography screening (https://fachservice.mammo-programm.de/), which are used for quality assurance and assessments of the programme. Another complex task is the identification of interval carcinomas (occurrence of breast cancer within two years of a negative screening examination). Some results from individual federal states have already been published and show that the targets set out in the European guidelines are being achieved there.

The cancer registry data is also used in the evaluation of (opportunistic) skin cancer screening. In addition, the use of cancer registry data for the evaluation of the screening programmes for colorectal cancer and cervical cancer, which have been redesigned on the basis of the Cancer Screening and Registry Act (KFRG), will start in 2024 – with an invitation and information system and continuous quality and success monitoring – in order to investigate the effects of the two screening programmes, which have been introduced at population level in July 2019 and January 2020, respectively.

A longer-term task of the population-based cancer registries is also to review the effectiveness of the vaccination against human papillomavirus (HPV) for girls and boys aged 9 to 14, which aims to reduce the number of HPV-related cancers. Among women in particular, a significant reduction in new cases of cervical cancer and its precursors is expected.

The population-based cancer registries are also involved in the NAKO, a national health study with 200,000 participants. Over the long-term course of the study, the cancer registries provide information on the occurrence of new cancers in the participants, provided they have agreed to a corresponding data linkage. This provides crucial support for research into the causes of cancer development.

Comprehensive, population-based cancer registries are required to fulfil the aforementioned objectives and tasks of cancer registration. This comprehensive coverage has been enshrined in law in all federal states since 2009. In addition, following the entry into force of the Federal Cancer Registry Data Act in the same year, the possibilities for the consolidation and analysis of cancer registry data at federal level were further improved by the establishment of the Centre for Cancer Registry Data (ZfKD) at the Robert Koch Institute (RKI).

In order to be able to consolidate information on a person's cancer from different sources, the data in the cancer registries is recorded in a way that enables multiple reports to be linked to the same person.

A reliable analysis of the data is only possible with a high level of coverage (at least 90% of all cancers). This is why the cooperation of all doctors and dentists involved in diagnosis, treatment or aftercare is crucial for the informative value of the data from a population-based cancer registry. Patients should also be encouraged to actively participate in cancer registration. Ask your attending physician to report the relevant data on your illness to the relevant cancer registry! In this way, you may contribute to a better assessment of the epidemiological incidence

of cancer, to cancer research and thus also to the improvement of cancer detection, treatment and follow-up care.

1.2 Current development of cancer registration in Germany

Since 2009, all new cancer cases have been systematically recorded throughout Germany on the basis of federal and state laws. Since the end of 2011, all state cancer registries have provided their data annually in a standardised format to the ZfKD at the RKI. These data form the basis for the analyses carried out by the ZfKD, which are presented in this 14th edition of *Cancer in Germany*.

A milestone in the further development of cancer registration in Germany was the passing of the Cancer Early Detection and Registry Act (KFRG) in 2013. In consequence, all federal states were obliged to establish an extended clinical cancer registration for quality assurance purposes in addition to the epidemiological cancer registration, including the collection of detailed data on therapy and the course of the diseases. This has now been established in all federal states; in most federal states, epidemiological and clinical cancer registration have been combined into one integrated registration. The technical implementation of nationwide clinical cancer registration in clinics and practices is largely complete, and diagnosis, treatment and the course of the disease are comprehensively documented. This successful changeover was a major challenge not only for doctors and the documenters in surgeries and clinics, but also for the registries themselves. At the end of 2020, all registries were able to fulfil the funding criteria previously agreed upon with the statutory health insurance funds.

This is also reflected in an improved data basis for this report (see Chapter 2). The estimated incidence for the most recent diagnosis years (2019 – 2020) corresponds to the recorded incidence in 13 of 16 federal states and thus for around 95 % of the population. For the Eastern federal states, the ZfKD currently only has data that was transmitted by the Joint Cancer Registry shortly before its dissolution at the end of 2022. In the meantime, the respective state cancer registries are responsible for epidemiological reporting and therefore also for transmitting the data to the ZfKD themselves. However, the necessary adjustments (e.g. for the linkage with the mortality data) have not yet been established everywhere, and in some cases the relevant state laws have not yet been adapted. Although the estimated incidence for 2020 nationwide is only around 1 % higher than the number of new cancer cases counted, it was nonetheless decided to postpone the final step from estimating to counting the nationwide incidence until the processing of data from all federal states has been finally established at the ZfKD.

The "Act on the Consolidation of Cancer Registry Data", which came into force at the end of August 2021, stipulates that from the end of 2022, the main data on therapy and disease progression collected as part of clinical cancer registration will also be consolidated nationwide at the ZfKD. The primary aim of the law is to improve the possibilities for the scientific utilisation of data from German cancer registries. The extended dataset can be applied for at the ZfKD since mid-2023 – the first applications have already been received. With the newly established external scientific committee, the ZfKD has developed guidelines for the evaluation of applications, which primarily implement the assessment of the re-identification risk required by law.

In addition, the deadline for data transmission was reduced from two years to one year after the end of a calendar year. The data set delivered to the ZfKD for the first time at the beginning of 2023 should therefore already include cancers newly diagnosed in 2021. However, an analysis of the data revealed that, at the time of data delivery, not all federal states had succeeded in shortening the time periods for the reporting process and the data processing in the registries, which had become even more complex due to the clinical data. Also due to the incidence rates, which were influenced by the COVID-19 pandemic at least in 2020 and are therefore difficult to forecast for the following years (see 3.1), it was therefore decided not to extend the reporting period for this edition to 2021 and to skip the usual short-term forecast of incidence rates (through 2024) this time.

In a further step, a concept for a platform solution for the cross-regional use of high-resolution data, available in the registries but not at the ZfKD, is currently being developed my multiple stakeholders and will be available by the end of 2024. The improved dovetailing of cancer registration in the paediatric and adult sectors is the focus of another multidisciplinary working group.

In order to further standardise cancer registration in Germany and coordinate state-specific regulations, the "Platform §65c" was founded in 2015 with experts from all clinical cancer registries. In recent years, the platform has already supported the practical implementation of the KFRG across federal state borders, proposed a common approach to open questions, defined national standards and created synergies in IT implementation. The Association of Population-based Cancer Registries in Germany (GEKID) and the Association of German Tumour Centres (ADT) actively support the platform. The ZfKD is also

involved here, as the harmonisation of data is an important prerequisite for the high quality and usability of the nationwide dataset.

The data from the German cancer registries will also continue to be utilised at an international level. Together with data from other European countries, these are presented 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 researchers from the field of cancer epidemiology as well as all population-based cancer registries, has continued to focus intensively on the regional presentation of cancer registry data in recent years. The GEKID's interactive cancer atlas on current cancer incidence and cancer mortality in the federal states has been completely redesigned for this purpose. In addition to incidence and mortality, the aspect of survival was analysed on a small area level at the level of districts and urban municipalities. This means that the cancer data can be viewed and compared in the overall German overview with interactive tools in regional resolution. The atlases can be accessed via the GEKID website at www.gekid.de and offer interactive comparisons in cartographic form for 26 cancers.

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

These examples illustrate that the focus of population-based cancer registration in Germany has shifted from pure data collection or case counting to active scientific utilisation of the data. This development is of essential importance, because without in-depth scientific analyses, the knowledge gained from the collected data would be limited. Finally, the anonymised data compiled from all registries can also be used by external researchers upon application to the ZfKD – a possibility that will certainly become even more important as the database expands over time. In certain cases, the new "Act on the Consolidation of Cancer Registry Data" also permits the scientific use of pseudonymised individual data. The numerous contributions of the cancer registries and the ZfKD have also become an important component of health reporting.

The collection of clinical data, which now covers not only the occurrence but also the entire course of oncological diseases, has ushered in a completely new era in Germany. The data from the cancer registries can now be used for comprehensive quality assurance and increasingly also for healthcare research. In the foreseeable future, they will also allow detailed analyses of cancer care under pandemic conditions and thus supplement the more readily available but inevitably limited analyses of health insurance or hospital data.

This will further increase the importance of cancer registration for oncological research and care and thus also the benefits for patients with cancer. Overall, the current development of cancer registration and utilisation of data on cancer incidence in Germany is positive and has considerable prospects for the future. With its comprehensive clinical cancer registration, Germany has become an international leader in this field.

2 Methodological aspects

2.1 Estimation of 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 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 14 (for men) diagnosis groups.

If age-specific mortality in the study region averaged was fewer than five deaths per year and sex, the modelled incidence rate 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 tumor 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 the diagnosis year 2020, 13 of 16 federal states achieved over 95% completeness for "total cancer" (both sexes combined). Another registry had completeness between 90% and 95%. In the two remaining registries, a completeness between 80% and 90% was achieved.

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: Registration for at least 10 years, estimated completeness over the last five years ≥ 90%. 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 the inci-

dence rates in the registers were modelled by register-specific axis intercepts as random effects. The regression was fitted to the reference data, stratified by sex, diagnosis and age group. The registry of Saxony-Anhalt did not yet meet the above quality criteria for any year. For this registry, the incidence was first estimated for the years 2011 to 2013 using the ratio of incidence to mortality in the reference data and the mortality in Saxony-Anhalt. As with the reference data, these estimated incidences were used to fit the regression parameters so that specific characteristics of the registry 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 (NMSC, 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 seven registries (Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, North Rhine-Westphalia, Hesse, Rhineland-Palatinate, Saarland and Saxony) whose data were considered to be complete, at least for a certain period of time. Due to the data situation, nationwide incidence estimates for NMSC were limited to the period 2006 to 2020. Generally, estimated NMSC incidence is associated with 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 in international publications.

2.3 Indicators and data presentation

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

Age-specific rate

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 relationship 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 in this report shows, cancer incidence rates often 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 standardization. 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 general 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 may differ considerably due to the presence or absence of relevant risk factors. The *DevCan*[1] software developed by the National Cancer Institute in the USA was used for the calculations.

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 neighboring 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 shown from 1999 to 2021. The data source is the official cause of death statistics of the Federal Statistical Office (www.gbe-bund.de).

Regional comparison

The estimated age-standardised incidence rates (old European Standard) in the federal states for the period 2019 to 2020 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.

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. 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: 2019 to 2020).

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 percentage points were considered. If this criterion was met by fewer than four regions, the range was not shown. Presumably, this range is 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 may also apply to most internationally published results.

Distribution of tumour stages

The spread of solid malignant tumours at diagnosis in 2019 to 2020 by sex was evaluated using the TNM classification (8th edition). 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). 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 were included.

Prevalence (up to 25 years after diagnosis)

Prevalence refers to the number of people alive at a given time (in this case 31 December 2020) who have previously been diagnosed with cancer. The 5-year prevalence, for example, only takes into account people who have been diagnosed with cancer within the last 5 years. The prevalence was extrapolated using the Pisani[2] method from the incidence estimate for Germany (see Chapter 2.2) and from survival rates derived using the Kaplan-Meier method. To derive the 25-year prevalence, the incidence estimate was extended to the year 1995. When calculating the survival rates, data from persons who were highly likely to have died but whose death or date of death was not reported to the cancer registry (e.g. after moving to another federal state) were excluded[3]. Survival rates were also corrected for the proportion of incidence reports that are only documented by death certificates (DCO cases)[4]. Due to the corrections, all registries except Berlin and Saxony-Anhalt could be used for the survival time 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.

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3 Dahm S, Barnes B, Kraywinkel K (2023) *Detection of missed deaths in cancer registry data to reduce bias in long-term survival estimation.* Front Oncol Mar 9:13. doi: 10.3389/fonc.2023.1088657

4 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 incident cancer cases in Germany 2020
not including non-melanoma skin cancer (C44)

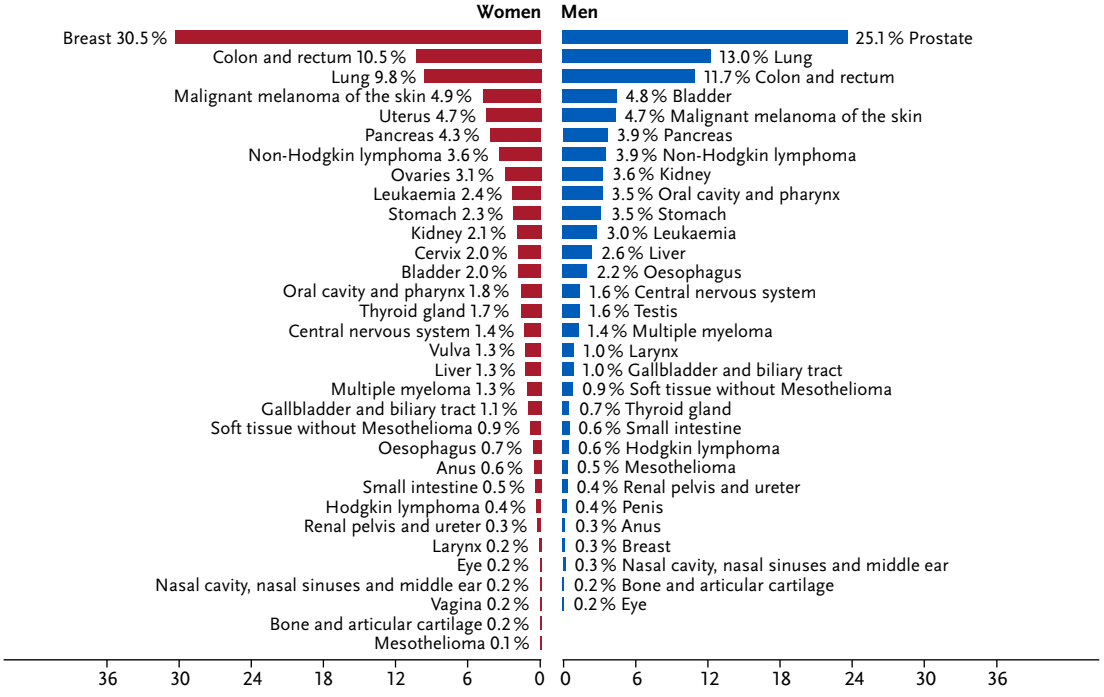


Figure 3.0.2
Most frequent tumour sites when cancer was cause of death in Germany 2020

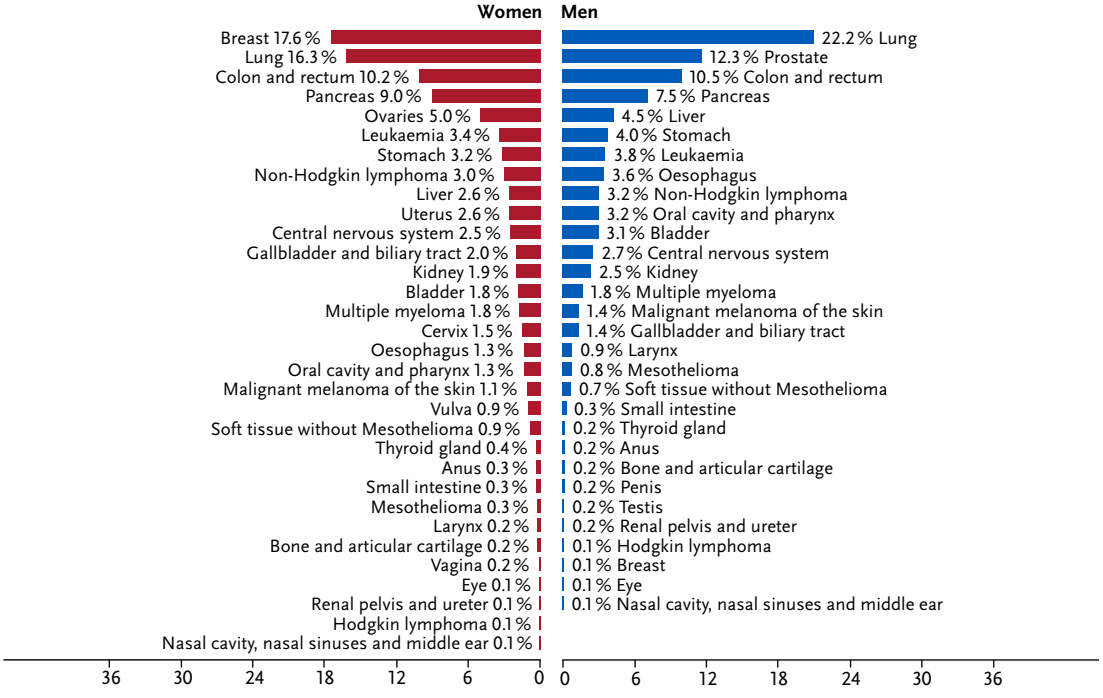


Table 3.0.1
Estimated numbers of incident cancer cases and numbers of deaths from cancer in Germany 2020
Source for numbers of deaths from cancer: Official cause of death statistics, Federal Statistical Office, Wiesbaden

		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	4,050	9,140	5.8	15.3	1,397	3,955	1.7	6.3
Oesophagus	C15	1,720	5,660	2.2	9.0	1,398	4,556	1.7	6.9
Stomach	C16	5,370	9,120	6.7	13.8	3,321	5,032	3.6	7.2
Small intestine	C17	1,210	1,540	1.7	2.4	330	417	0.4	0.6
Colon and rectum	C18 – C20	24,240	30,530	29.6	46.2	10,667	13,120	10.7	18.1
Anus	C21	1,500	810	2.3	1.3	355	261	0.4	0.4
Liver	C22	3,030	6,740	3.7	10.0	2,781	5,676	3.1	8.0
Gallbladder and biliary tract	C23, C24	2,600	2,530	2.9	3.6	2,102	1,738	2.1	2.3
Pancreas	C25	9,960	10,270	11.4	15.1	9,474	9,448	10.0	13.4
Nasal cavity, nasal sinuses and middle ear	C30, C31	440	680	0.7	1.2	86	139	0.1	0.2
Larynx	C32	510	2,690	0.8	4.3	198	1,070	0.2	1.6
Lung	C33, C34	22,590	34,100	31.4	51.8	17,066	27,751	21.9	40.5
Bone and articular cartilage	C40, C41	360	510	0.7	1.1	183	257	0.3	0.5
Malignant melanoma of the skin	C43	11,320	12,240	19.1	19.9	1,162	1,778	1.4	2.5
Non-melanoma skin cancer	C44	96,490	112,300	123.5	157.6	431	617	0.3	0.7
Mesothelioma	C45	290	1,190	0.3	1.5	263	1,054	0.3	1.3
Soft tissue without Mesothelioma	C46 – C49	2,190	2,420	3.4	4.0	908	927	1.2	1.4
Breast	C50	70,550	740	112.7	1.1	18,425	166	21.8	0.2
Vulva	C51	3,090		4.0		973		0.9	
Vagina	C52	390		0.5		164		0.2	
Cervix	C53	4,640		9.5		1,546		2.4	
Uterus	C54, C55	10,860		15.8		2,758		3.1	
Ovaries	C56	7,180		10.7		5,265		6.4	
Penis	C60		960		1.4		252		0.3
Prostate	C61		65,820		97.4		15,403		18.6
Testis	C62		4,060		10.1		197		0.4
Kidney	C64	4,830	9,330	6.6	15.2	2,034	3,121	1.9	4.2
Renal pelvis and ureter	C65, C66	770	1,130	0.9	1.6	143	189	0.1	0.2
Bladder	C67	4,630	12,500	5.2	17.6	1,935	3,942	1.7	4.9
Eye	C69	450	440	0.7	0.8	156	158	0.2	0.2
Central nervous system	C70 – C72	3,250	4,080	5.5	7.5	2,585	3,427	3.7	5.8
Thyroid gland	C73	3,980	1,780	8.6	3.6	396	295	0.4	0.4
Without specification of site	C80	5,080	5,470	5.5	7.8	5,204	5,434	5.2	7.6
Hodgkin lymphoma	C81	990	1,460	2.3	3.3	132	185	0.1	0.3
Non-Hodgkin lymphoma	C82 – C88	8,230	10,090	11.0	15.9	3,180	4,012	2.9	5.4
Multiple myeloma	C90	3,010	3,700	3.7	5.5	1,881	2,213	1.8	2.9
Leukaemia	C91 – C95	5,640	7,920	8.0	12.9	3,573	4,784	3.5	6.4
Other cancer sites		2,450	2,220	3.4	3.5	2,908	4,317	3.3	5.9
All cancers	C00 – C97	327,890	374,150	460.9	563.6	105,380	125,891	119.0	175.6
All cancers[2]	**C00 – C97o. C44**	**231,400**	**261,850**	**337.4**	**406.0**	**104,949**	**125,274**	**118.7**	**174.9**

[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		2019		2020		
	Women	Men	Women	Men		
Incident cases	244,000	279,700	231,400	261,800		
Crude incidence rate [1]	579.7	682.1	549.3	638.2		
Age-standardised incidence rate [1, 2]	356.5	437.6	337.4	406.0		
Median age at diagnosis	69	70	69	70		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	105,682	124,560	104,949	125,274	104,598	123,292
Crude mortality rate [1]	251.0	303.8	249.1	305.3	248.2	300.4
Age-standardised mortality rate [1, 2]	121.3	177.1	118.7	174.9	117.2	169.8
Median age at death	77	75	77	75	78	75
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	801,700	835,000	1,384.600	1,379.200	2,365.800	2,172.100
Absolute survival rate (2019 – 2020) [3]	58	52	47	39		
Relative survival rate (2019 – 2020) [3]	66	62	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. penetrating the surrounding tissue or spreading via 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 non-invasive papillary carcinomas of the bladder and certain neoplasms of the haematopoietic organs (e.g. myelodysplastic syndromes) are sometimes associated with greater risks and burdens for those affected than certain thyroid tumours, for example, which are histologically malignant but have a very favourable prognosis. In the central nervous system, on the other hand, the danger of neoplasms depends less on their biological behaviour and more on their localisation. The classification of neoplasms into benign, malignant and uncertain behaviour also shows historical changes, for example in bladder tumours. In the sum of all malignant neoplasms ("all cancers"), non-melanotic forms of skin cancer were not included, as is customary internationally, partly because they only make a very small contribution to cancer mortality, despite their frequency (see Chapter 3.14).

Malignant neoplasms can originate from different cell types in various organs of the body. The starting point for most cancers is the internal and external body surfaces (epithelia). About 70% of tumours are adenocarcinomas originating from glandular tissue alone. A further 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 haematopoietic bone marrow and lymphatic tissues. In addition, malignant tumours can also originate in connective and supporting tissue (e.g. sarcomas), in the supporting cells of the nervous system (gliomas) or in pigment-forming cells (melanomas).

According to estimates by the ZfKD, around 493,000 cases of cancer were diagnosed for the first time in Germany in 2020. Of these, approximately 261,800 occurred in men and 231,400 in women. About half of the cases involved breast (71,300), prostate (65,800), colon (54,800) or lung (56,700) (Table 3.0.1).

As in almost all European and North American cancer registries, there was a decline in the number of new cancer cases recorded in the registries in the

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

first year of the pandemic in 2020 compared to the previous year, which had already become apparent in Germany to a similar extent in the hospital diagnosis and surgery statistics. In a European comparison, this was still rather moderate in Germany at about 6%. The most significant declines, measured in absolute case numbers, were seen in colorectal cancer (–11%), malignant tumours of the larynx (–10%) and the prostate (–9%). In contrast, only around 1% fewer cases of cancer of the cervix, central nervous system and pancreas were recorded in 2020 than in 2019.

In addition to delays in the diagnosis of cancer, for example due to temporary restrictions on services and reduced utilisation of cancer screening, restrictions on reporting activities and data processing in the cancer registries may also play a role. It is not yet possible to say whether the chances of treatment and survival of people who developed cancer during the pandemic were impaired.

Age-standardised cancer mortality rates in Germany in 2019 – 2021 were 27% lower for men and 17% lower for women than 20 years ago. Compared to the European Union as a whole, cancer mortality in Germany in 2019/2020 was 4% higher for women and 5% lower for men.

About 1.6 million people in Germany are living with cancer that has been diagnosed in the last 5 years. It is estimated that more than 4.5 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 likely to be almost 10% higher.

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 gender. They are highly dependent on the type of tumour and range from results below 10% for malignant tumours of the pancreas and mesothelioma to values above 90% for malignant melanoma of the skin, testicular cancer and thyroid cancer (Figure 3.1.0).

Risk factors and early detection

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

Of these, tobacco consumption is the most significant. Around 19% of all cancers in Germany per year are attributable to smoking (attributable fraction). Obesity and lack of exercise also play a role. This has also been known for some time from observational, epidemiological studies. Possible biological mechanisms behind this association have become clearer as a result of recent research into metabolic syndrome. This chronic "metabolic imbalance" is associated with high blood pressure, high blood lipid and blood sugar levels. Inflammatory processes in fatty tissue are presumably involved in the development of cancer.

Among the nutrition-related individual factors, alcohol consumption plays an important role. A low intake of fruit, vegetables or fibre, often accompanied by a high proportion of red and processed meat in the diet, has been identified as a risk factor for several common types of tumour. In observational studies, however, the influence of individual foods and their ingredients cannot always be separated from that of the energy balance and other possible factors. Avoidable cancer risk factors also include the ultraviolet component of sunlight (UV radiation).

Many people in Germany overestimate the influence of harmful substances and contaminants in food, as well as that of environmental influences or workplace exposure. In individual cases, however, these factors can also play a significant role in the development of cancer in Germany. Examples include the regionally naturally occurring noble gas radon, which is held responsible for around 6% of lung cancer cases in Germany, or former occupational exposure to asbestos, which still leads to mesothelioma of the pleura or peritoneum today 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 in menopausal women, which has been identified as a risk factor for breast cancer.

Chronic infections are now known to be risk factors for some common types of cancer; about 4% of new cancer cases in Germany can be attributed to them. Vaccinations or causal therapies can help to reduce 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 the HPV vaccination: in addition to 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 are vaccinated. Studies have already shown a significantly reduced rate of precancerous lesions on the cervix for vaccinated women and a reduction in cervical cancer in women up to the age of 30.

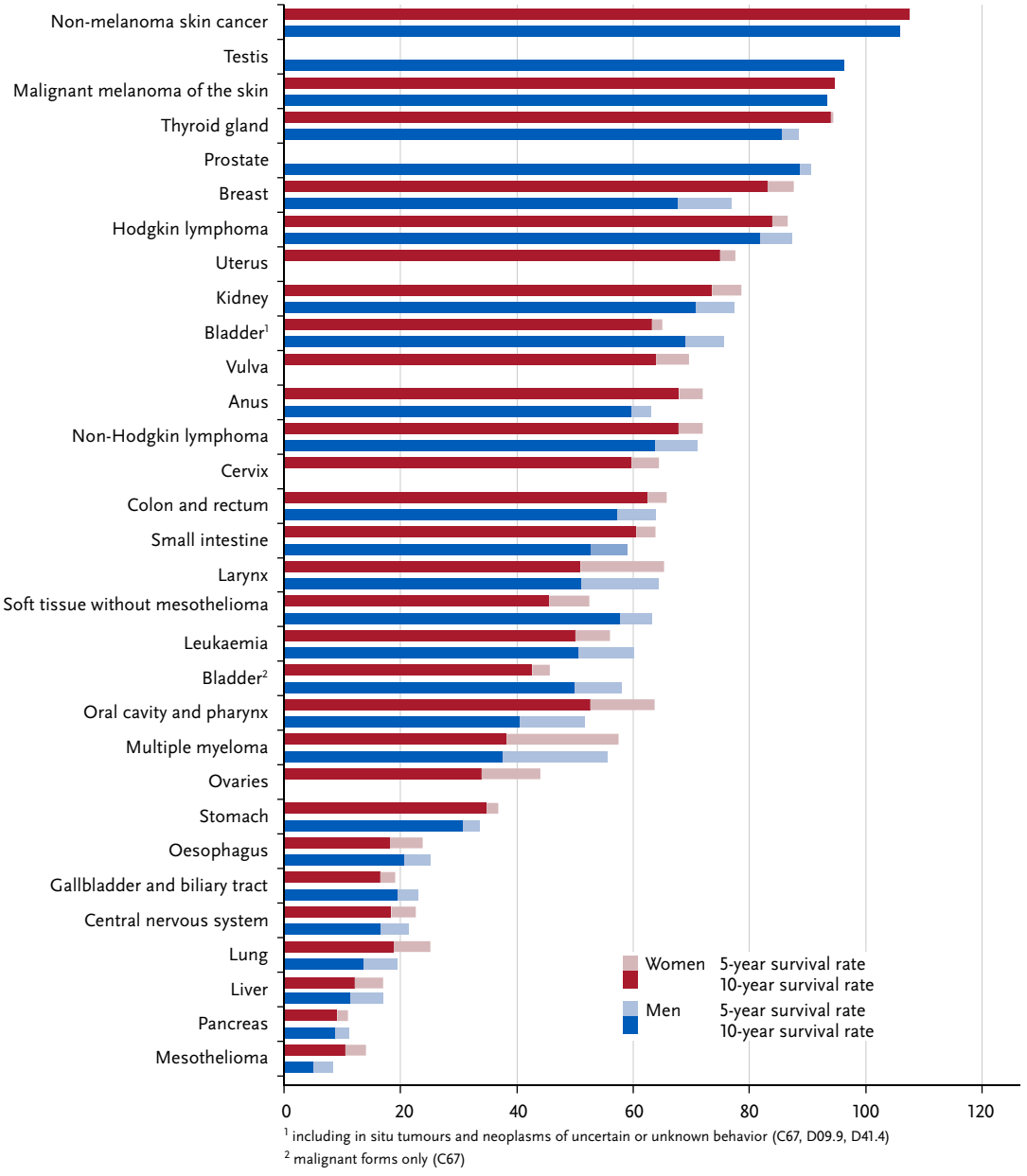
In addition to preventable risk factors, genetic causes can also increase the risk of developing cancer. Certain hereditary genetic mutations have been clearly

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 being found that can moderately or significantly increase the risk of developing certain tumours.

The most important, non-preventable risk factor for cancer is age, as the probability of cancer-causing genetic changes in the body's 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 2019 – 2020 (period analysis)



[1] including in situ tumours and neoplasms of uncertain or unknown behavior (C67, 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 – 2020/2021
per 100,000 (old European Standard)

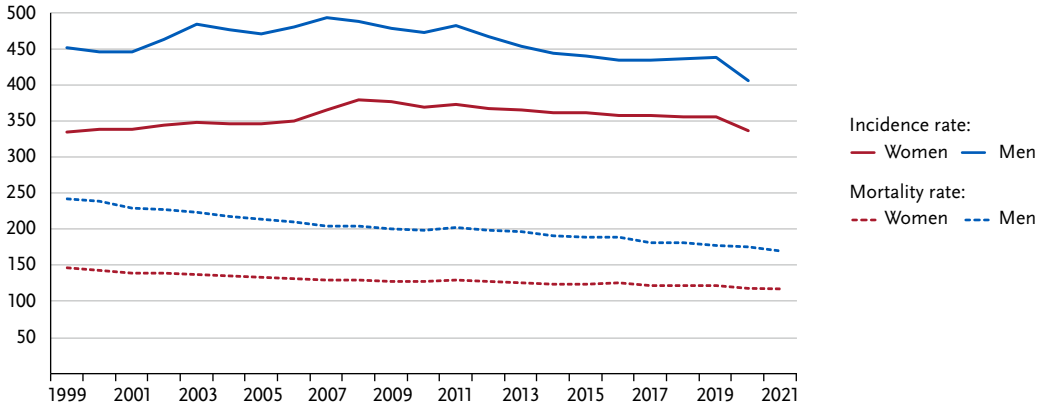


Figure 3.1.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C00-C97 without C44, Germany 1999 – 2020/2021

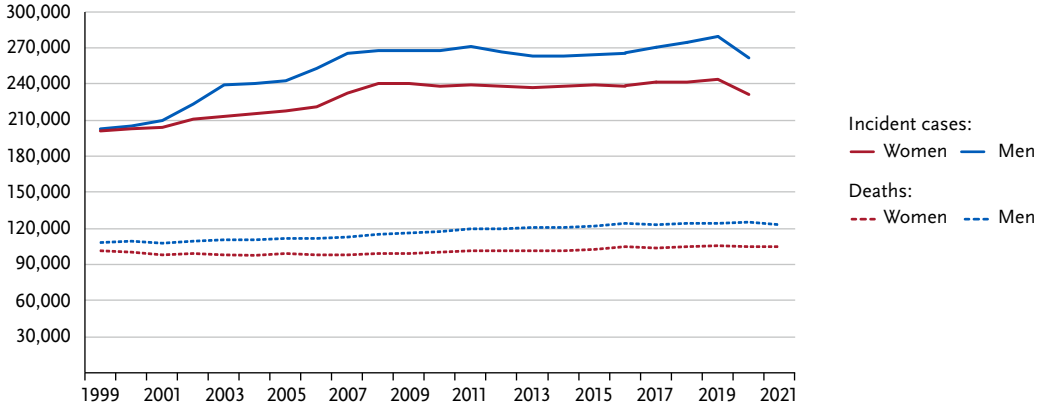


Figure 3.1.2
Age-specific incidence rates by sex, ICD-10 C00-C97 without C44, Germany 2019 – 2020
per 100,000

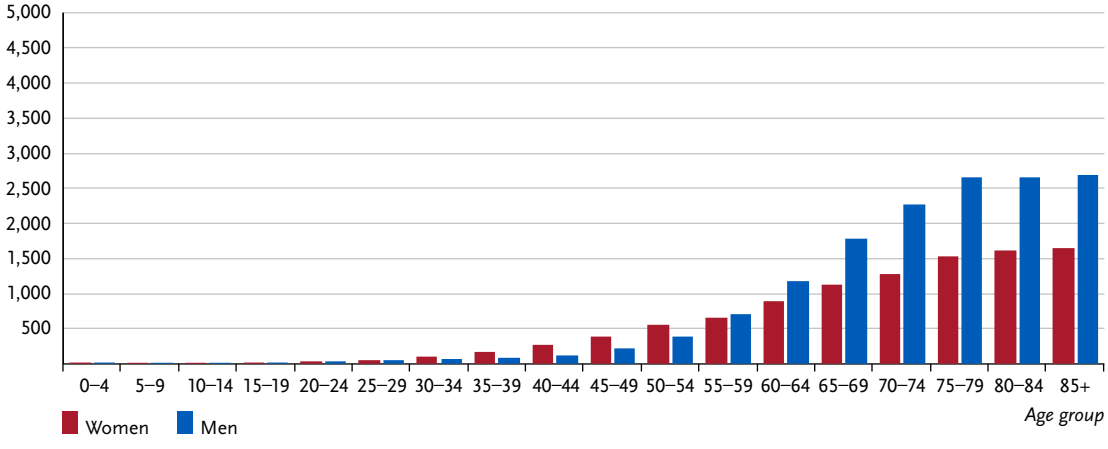


Table 3.1.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C00-C97 without C44, database 2019

	Risk of developing cancer				Mortality risk			
Women aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	2.3 %	(1 in 43)	44.1 %	(1 in 2)	0.3 %	(1 in 340)	20.3 %	(1 in 5)
45 years	4.9 %	(1 in 20)	42.9 %	(1 in 2)	0.9 %	(1 in 110)	20.1 %	(1 in 5)
55 years	8.5 %	(1 in 12)	40.3 %	(1 in 2)	2.4 %	(1 in 41)	19.6 %	(1 in 5)
65 years	13.5 %	(1 in 7)	35.7 %	(1 in 3)	4.9 %	(1 in 20)	18.0 %	(1 in 6)
75 years	17.5 %	(1 in 6)	27.8 %	(1 in 4)	8.0 %	(1 in 13)	14.9 %	(1 in 7)
Lifetime risk			44.5 %	(1 in 2)			20.2 %	(1 in 5)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	1.2 %	(1 in 85)	52.3 %	(1 in 2)	0.2 %	(1 in 480)	25.0 %	(1 in 4)
45 years	3.3 %	(1 in 30)	52.2 %	(1 in 2)	0.9 %	(1 in 110)	25.1 %	(1 in 4)
55 years	10.0 %	(1 in 10)	51.8 %	(1 in 2)	3.2 %	(1 in 31)	25.0 %	(1 in 4)
65 years	21.3 %	(1 in 5)	49.6 %	(1 in 2)	7.4 %	(1 in 14)	24.0 %	(1 in 4)
75 years	29.2 %	(1 in 3)	42.3 %	(1 in 2)	12.0 %	(1 in 8)	20.8 %	(1 in 5)
Lifetime risk			52.1 %	(1 in 2)			24.8 %	(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 2019 – 2020

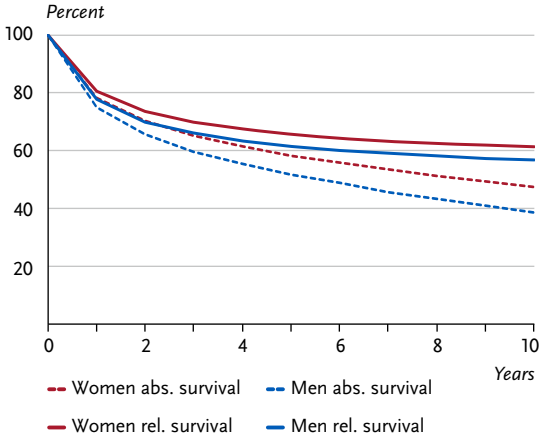


Figure 3.1.5
Relative 5-year survival by UICC stage and sex, ICD-10 C00 – C97 without C44, Germany 2019 – 2020
Not included because UICC stages are site-specific.

Figure 3.1.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C00 – C97 without C44, 2019 – 2020
per 100,000 (old European Standard)

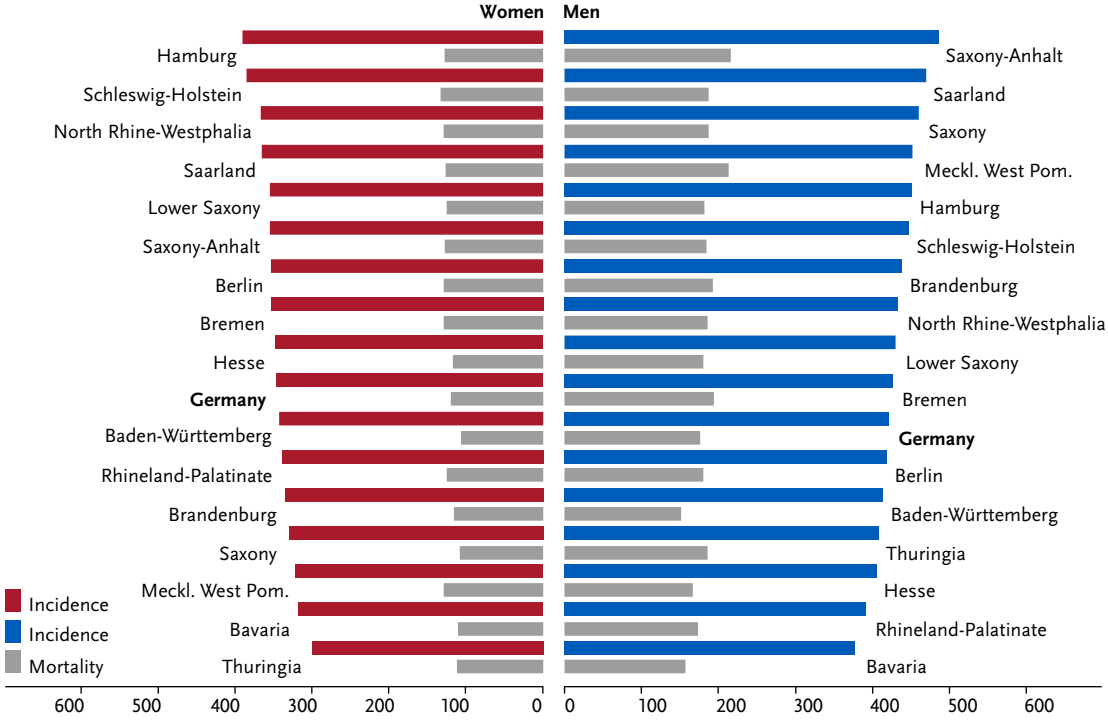
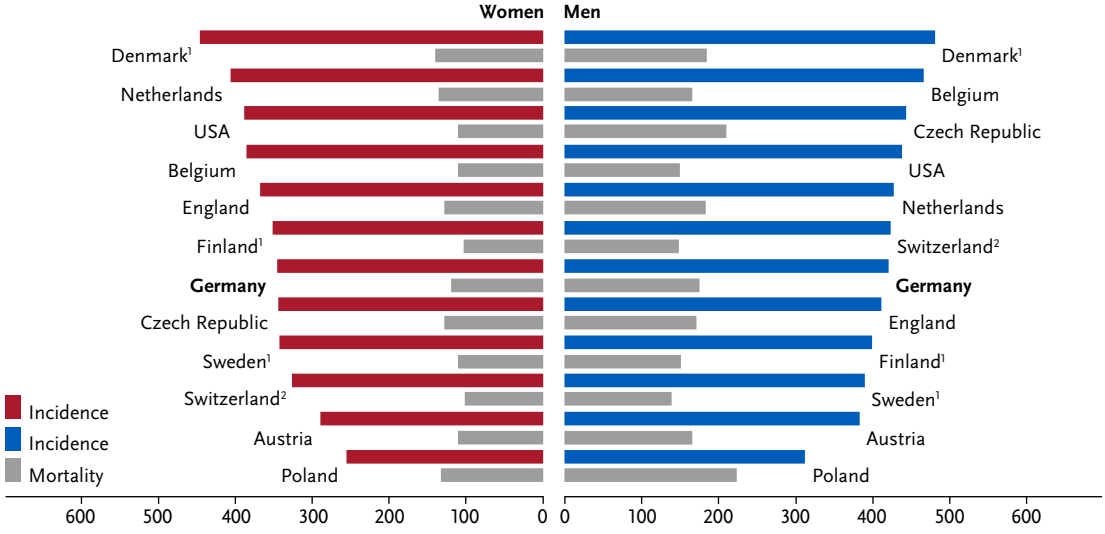


Figure 3.1.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C00 – C97 without C44, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] incl. D09.0 – D09.1, D30.1 – D30.9 D32 – D33, D35.2 – D35.4, D41.1 – D41.9, D42 – D43, D44.3 – D44.5
[2] Switzerland: incidence data for 2015 – 2019

3.2 Oral cavity and pharynx

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	4,490	9,730	4,050	9,140		
Crude incidence rate [1]	10.7	23.7	9.6	22.3		
Age-standardised incidence rate [1, 2]	6.6	16.6	5.8	15.3		
Median age at diagnosis	67	64	68	65		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	1,479	3,888	1,397	3,955	1,421	3,796
Crude mortality rate [1]	3.5	9.5	3.3	9.6	3.4	9.2
Age-standardised mortality rate [1, 2]	1.9	6.3	1.7	6.3	1.7	5.9
Median age at death	73	67	74	67	72	68
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	14,800	29,600	23,800	47,700	34,700	69,400
Absolute survival rate (2019 – 2020) [3]	57 (54 – 65)	46 (42 – 53)	41 (39 – 44)	31 (27 – 36)		
Relative survival rate (2019 – 2020) [3]	64 (62 – 73)	52 (46 – 61)	53 (50 – 58)	41 (35 – 47)		

[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. Histologically, 84 % are squamous cell carcinomas, which originate in particular from the mucous membranes of the oral cavity, nasopharynx, oropharynx and hypopharynx. About 3 % of neoplasms in the oral cavity and pharynx are adenocarcinomas, which occur mainly in the salivary glands. Men develop the disease more frequently and two to three years earlier than women. The age-standardised incidence rates increased for both genders between 1999 and 2011. Since 2011, they have remained more or less constant for women and have even fallen slightly for men. The corresponding mortality rates have fallen slightly for men over the entire period, and are almost unchanged for women.

Overall, women have higher relative 5-year survival rates (64 %) compared to men (52 %). A lower proportion of cancers of the floor of the mouth, tongue and throat that are promoted by tobacco and alcohol consumption, which are associated with lower survival rates, contribute to this. According to the UICC tumour staging data currently only available for oral cavity cancers (C02 – C06), about one in three oral cavity tumours in women is diagnosed at early stage I, but only one in four in men.

Risk factors

The most important risk factors for the development of cancer in the oral cavity and pharynx are any form of tobacco and alcohol consumption. If both factors act together, the effect increases considerably. Another main risk factor is chronic infection with high-risk human papillomaviruses (HPV), especially HPV 16. HPV infections cause cancer in the oropharynx in particular, and 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 the development of cancer.

There is evidence that an unbalanced, vitamin-poor diet with excessive consumption of meat and fried food can increase the risk.

A genetic predisposition to the development of carcinomas in the head and neck area is also assumed, as an increased familial occurrence can be observed in isolated cases.

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

Figure 3.2.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C00 – C14, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

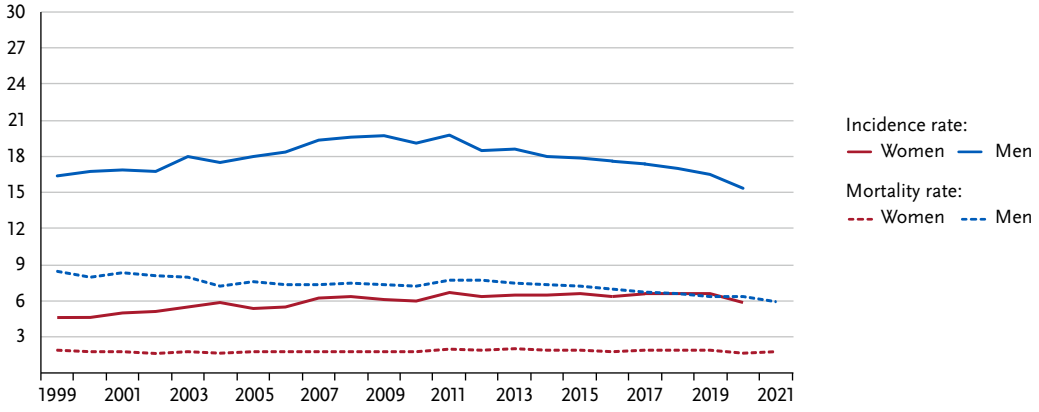


Figure 3.2.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C00 – C14, Germany 1999 – 2020/2021

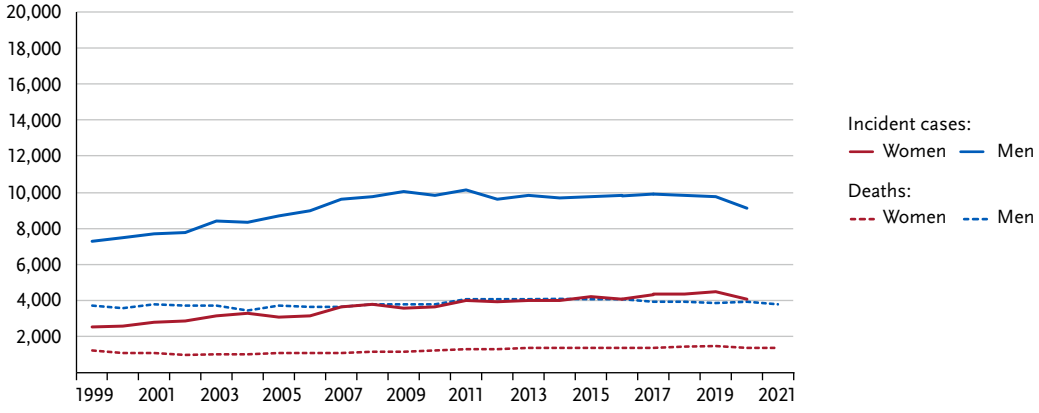


Figure 3.2.2
Age-specific incidence rates by sex, ICD-10 C00 – C14, Germany 2019 – 2020
per 100,000

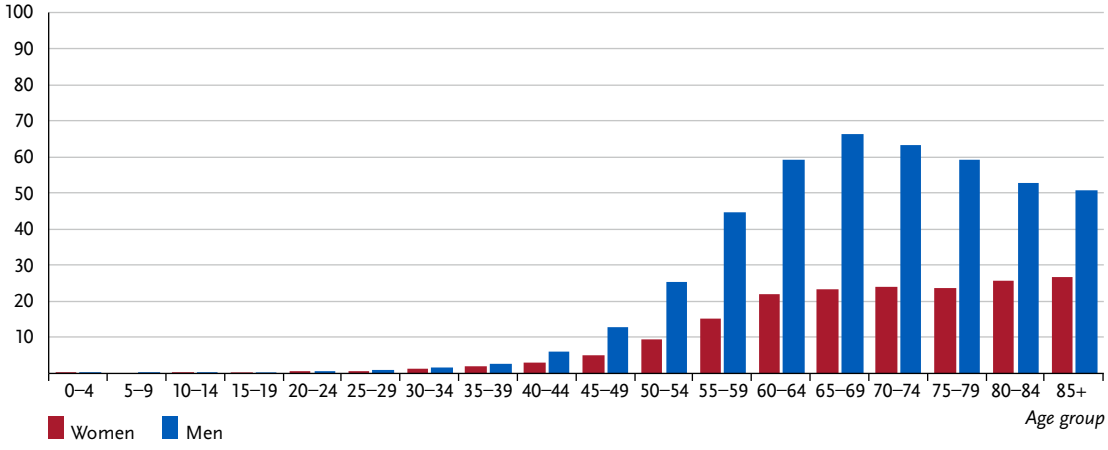


Table 3.2.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C00 – C14, database 2019

	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)	0.8 %	(1 in 125)	< 0.1 %	(1 in 24,100)	0.3 %	(1 in 360)
45 years	0.1 %	(1 in 1,200)	0.8 %	(1 in 128)	< 0.1 %	(1 in 6,100)	0.3 %	(1 in 360)
55 years	0.2 %	(1 in 530)	0.7 %	(1 in 140)	< 0.1 %	(1 in 2,000)	0.3 %	(1 in 380)
65 years	0.2 %	(1 in 420)	0.5 %	(1 in 182)	0.1 %	(1 in 1,300)	0.2 %	(1 in 440)
75 years	0.2 %	(1 in 460)	0.4 %	(1 in 285)	0.1 %	(1 in 1,100)	0.2 %	(1 in 600)
Lifetime risk			0.8 %	(1 in 123)			0.3 %	(1 in 360)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,200)	1.7 %	(1 in 59)	< 0.1 %	(1 in 11,600)	0.7 %	(1 in 140)
45 years	0.2 %	(1 in 470)	1.7 %	(1 in 60)	0.1 %	(1 in 1,700)	0.7 %	(1 in 140)
55 years	0.5 %	(1 in 200)	1.5 %	(1 in 66)	0.2 %	(1 in 520)	0.7 %	(1 in 150)
65 years	0.6 %	(1 in 170)	1.1 %	(1 in 90)	0.3 %	(1 in 380)	0.5 %	(1 in 190)
75 years	0.5 %	(1 in 210)	0.6 %	(1 in 150)	0.2 %	(1 in 450)	0.3 %	(1 in 310)
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 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

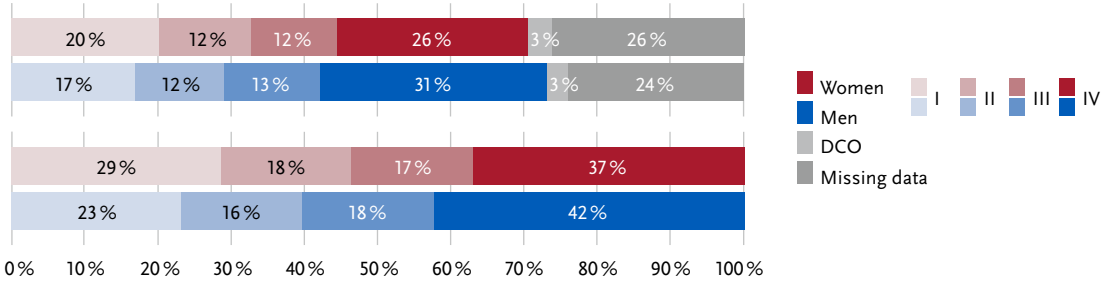


Figure 3.2.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C00 – C14, Germany 2019 – 2020

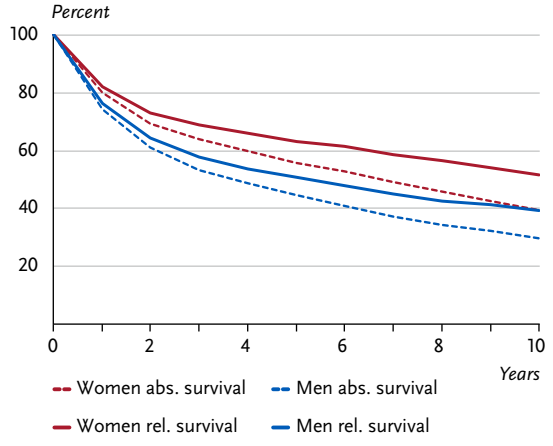


Figure 3.2.5
Relative 5-year survival by site and sex, ICD-10 C00 – C14, Germany 2019 – 2020

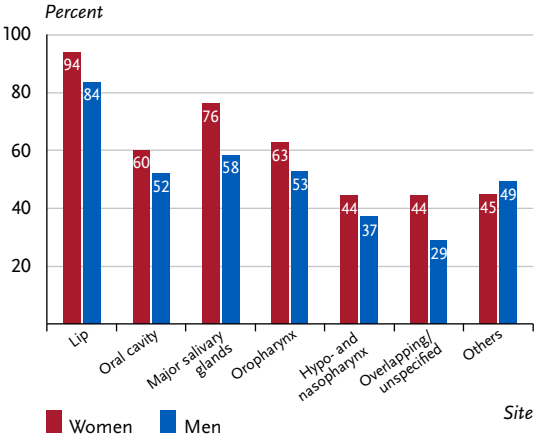


Figure 3.2.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C00 – C14, 2019 – 2020
per 100,000 (old European Standard)

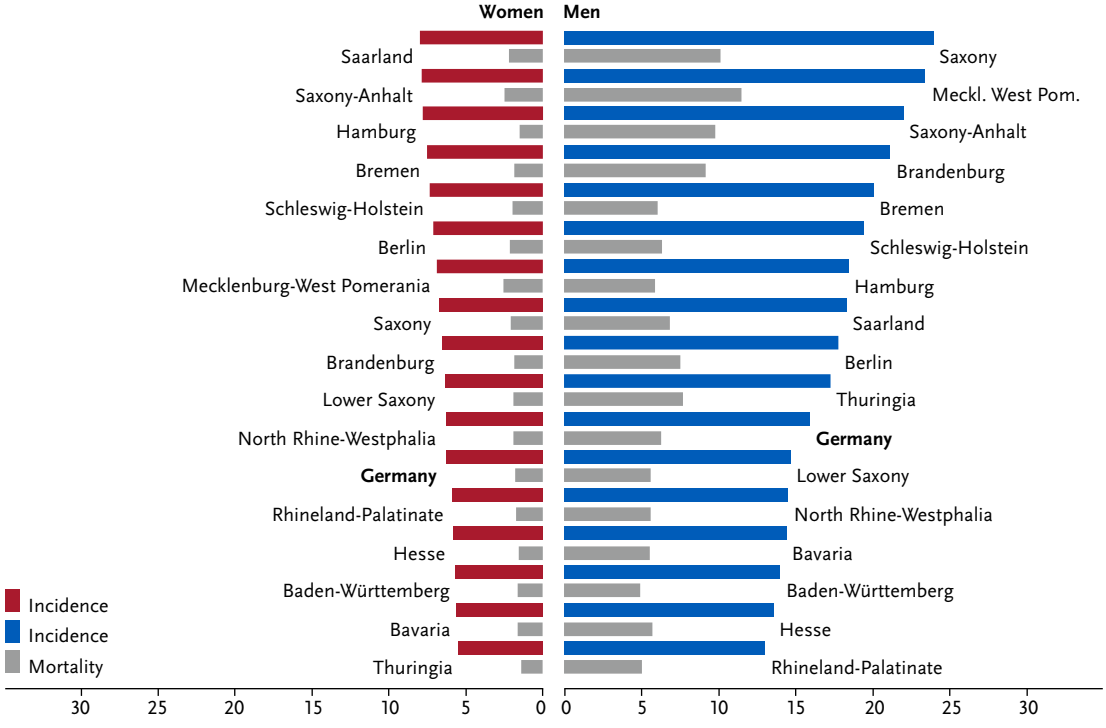
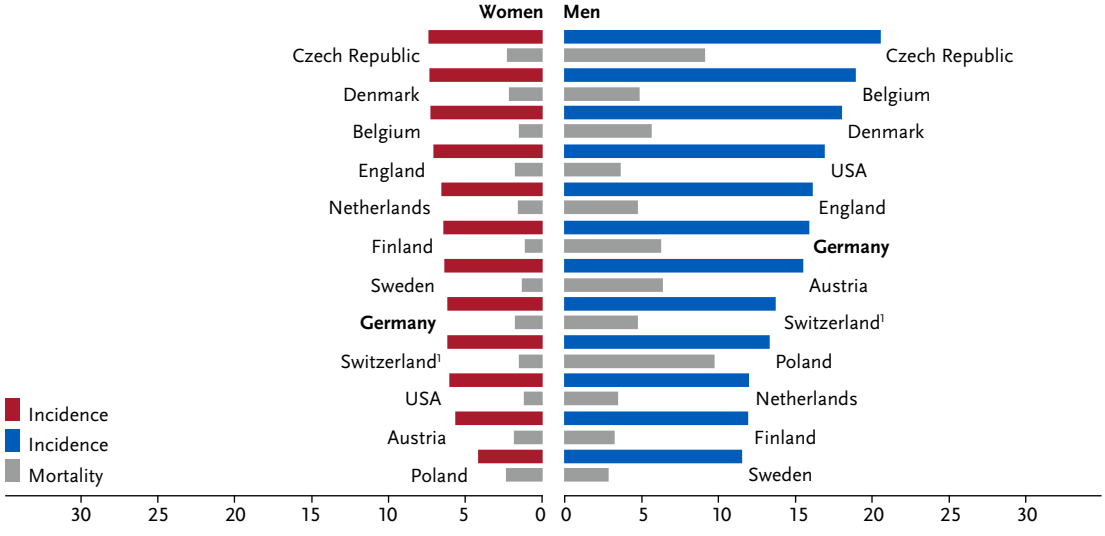


Figure 3.2.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C00 – C14, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.3 Oesophagus

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	1,660	5,890	1,720	5,660		
Crude incidence rate [1]	4.0	14.4	4.1	13.8		
Age-standardised incidence rate [1, 2]	2.2	9.4	2.2	9.0		
Median age at diagnosis	72	68	72	68		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	1,332	4,510	1,398	4,556	1,368	4,444
Crude mortality rate [1]	3.2	11.0	3.3	11.1	3.2	10.8
Age-standardised mortality rate [1, 2]	1.6	7.0	1.7	6.9	1.6	6.6
Median age at death	75	70	75	70	73	70
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	2,900	10,400	4,200	15,300	5,500	21,500
Absolute survival rate (2019 – 2020) [3]	21 (15 – 29)	22 (19 – 26)	14 (10 – 21)	15 (12 – 19)		
Relative survival rate (2019 – 2020) [3]	24 (17 – 33)	25 (22 – 31)	18 (13 – 29)	21 (16 – 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 causes about 1.3% of all cancer deaths in women and 3.6% in men. The age-standardised mortality rates have changed only marginally for both women and men since 1999. In Germany, men are diagnosed with oesophageal cancer three times more frequently and, on average, four years earlier than women at the age of 68. In both sexes, the incidence rates for the age groups under 60 are falling slightly, while they tend to rise in the older age groups.

Squamous cell carcinomas account for 41% of all oesophageal cancers. The proportion of adenocarcinomas, which occur almost exclusively at the junction with the stomach, has risen to 47% in recent years. Among men, the proportion of adenocarcinomas (51%) is now significantly higher than that of squamous cell carcinomas. With relative 5-year survival rates of 24% and 25% for women and men respectively, oesophageal carcinoma is one of the cancers with unfavourable survival prospects. Only just under one in three tumours is diagnosed at an early stage (UICC I/II).

Risk factors

In oesophageal cancer, a distinction is made between squamous cell carcinoma and the slightly more common adenocarcinoma. Adenocarcinomas often develop on the basis of gastro-oesophageal reflux disease (persistent reflux of gastric juice into the oesophagus, chronic heartburn). This leads to mucosal changes in the lower part of the oesophagus: a so-called Barrett's oesophagus develops, 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 are tobacco and alcohol consumption, especially in combination: when both factors come together, the harmful effect is amplified. Previous radiotherapy in the chest and neck area can also lead to an increased risk. People with head and neck tumours also have an increased risk of oesophageal cancer.

A motility disorder of the oesophagus and the sphincter muscle between the oesophagus and stomach (achalasia) significantly increases the risk of both squamous cell and adenocarcinomas. Burns to the oesophagus caused by alkalis or acids also lead to an increased risk. Familial clusters of cases of the disease have also been described. However, it is still unclear whether and to what extent hereditary predispositions or environmental factors play a role.

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

Figure 3.3.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C15, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

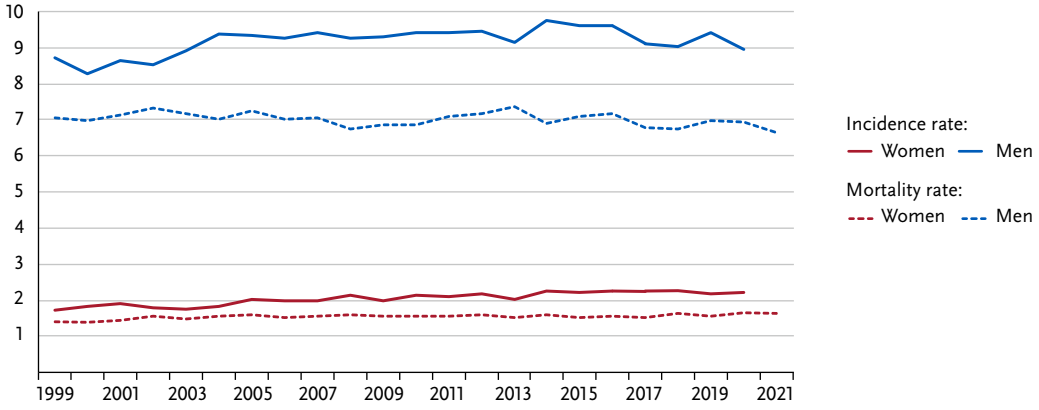


Figure 3.3.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C15, Germany 1999 – 2020/2021

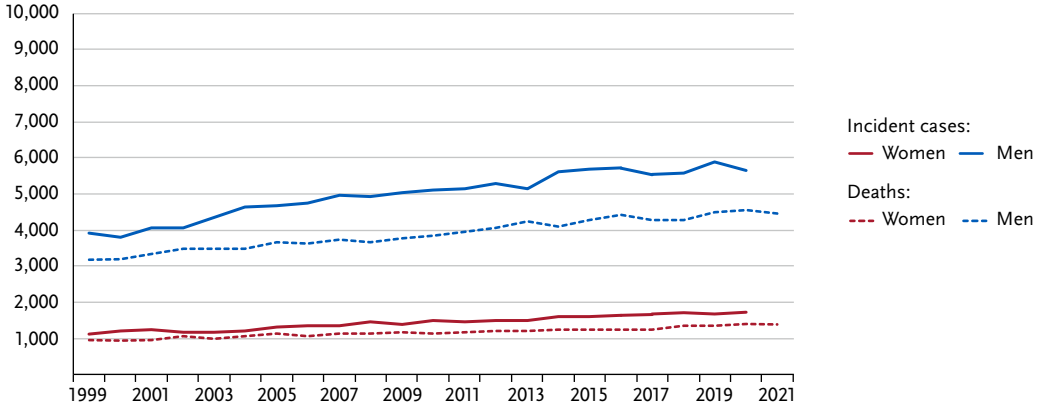


Figure 3.3.2
Age-specific incidence rates by sex, ICD-10 C15, Germany 2019 – 2020
per 100,000

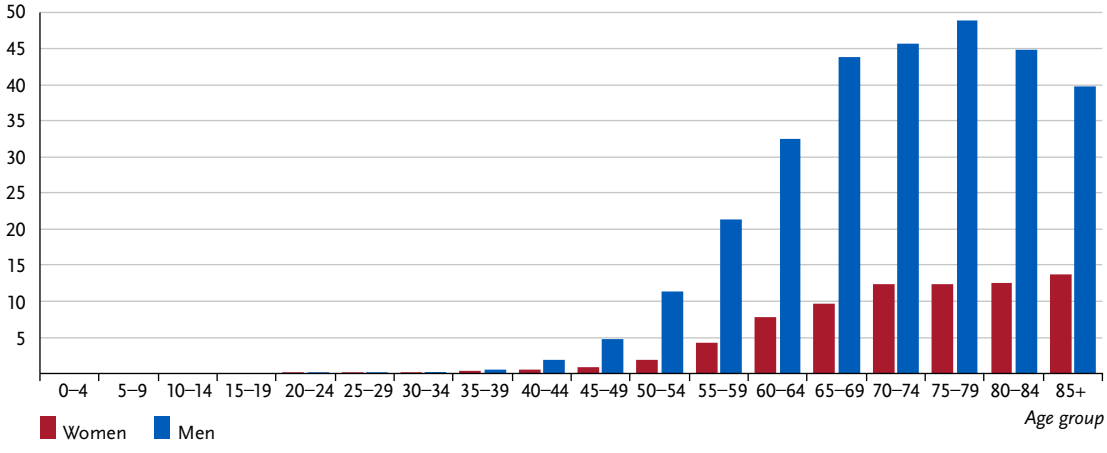


Table 3.3.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C15, database 2019

	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 19,200)	0.3 %	(1 in 320)	< 0.1 %	(1 in 54,400)	0.3 %	(1 in 400)
45 years	< 0.1 %	(1 in 6,400)	0.3 %	(1 in 330)	< 0.1 %	(1 in 11,900)	0.3 %	(1 in 400)
55 years	0.1 %	(1 in 1,800)	0.3 %	(1 in 340)	< 0.1 %	(1 in 2,600)	0.2 %	(1 in 400)
65 years	0.1 %	(1 in 980)	0.3 %	(1 in 400)	0.1 %	(1 in 1,400)	0.2 %	(1 in 450)
75 years	0.1 %	(1 in 900)	0.2 %	(1 in 590)	0.1 %	(1 in 1,000)	0.2 %	(1 in 590)
Lifetime risk			0.3 %	(1 in 330)			0.3 %	(1 in 400)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 8,400)	1.1 %	(1 in 93)	< 0.1 %	(1 in 10,600)	0.8 %	(1 in 120)
45 years	0.1 %	(1 in 1,200)	1.1 %	(1 in 93)	0.1 %	(1 in 1,900)	0.8 %	(1 in 120)
55 years	0.3 %	(1 in 380)	1.0 %	(1 in 98)	0.2 %	(1 in 580)	0.8 %	(1 in 120)
65 years	0.4 %	(1 in 240)	0.8 %	(1 in 120)	0.3 %	(1 in 310)	0.7 %	(1 in 140)
75 years	0.4 %	(1 in 260)	0.5 %	(1 in 190)	0.3 %	(1 in 300)	0.5 %	(1 in 200)
Lifetime risk			1.1 %	(1 in 94)			0.8 %	(1 in 120)

Figure 3.3.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C15, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

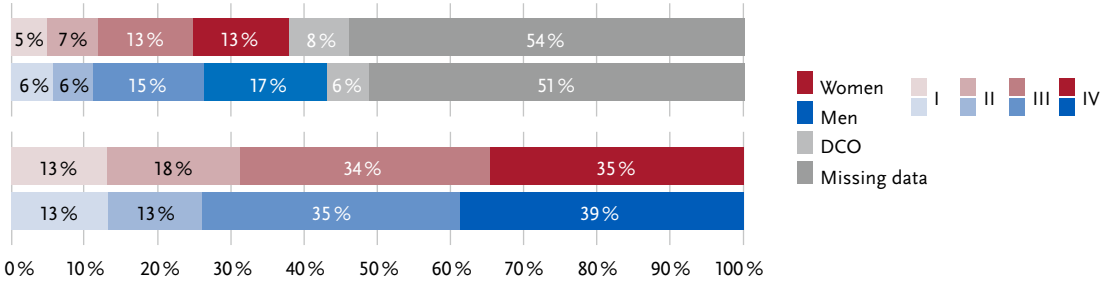


Figure 3.3.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C15, Germany 2019 – 2020

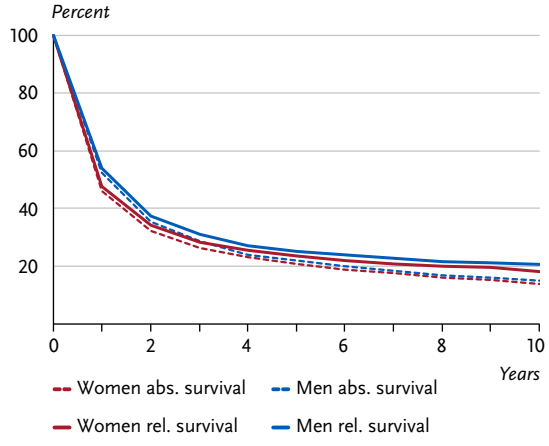


Figure 3.3.5
Relative 5-year survival by histology and sex, ICD-10 C15, Germany 2019 – 2020

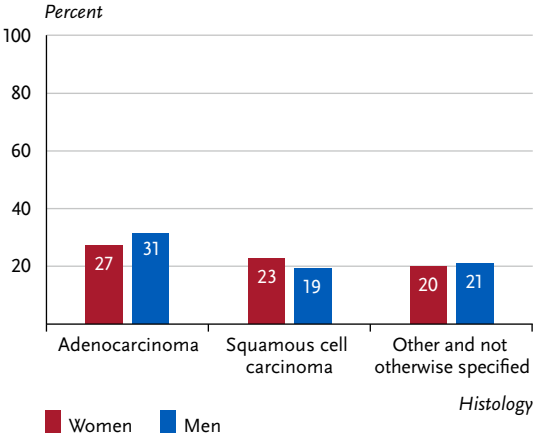


Figure 3.3.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C15, 2019 – 2020
per 100,000 (old European Standard)

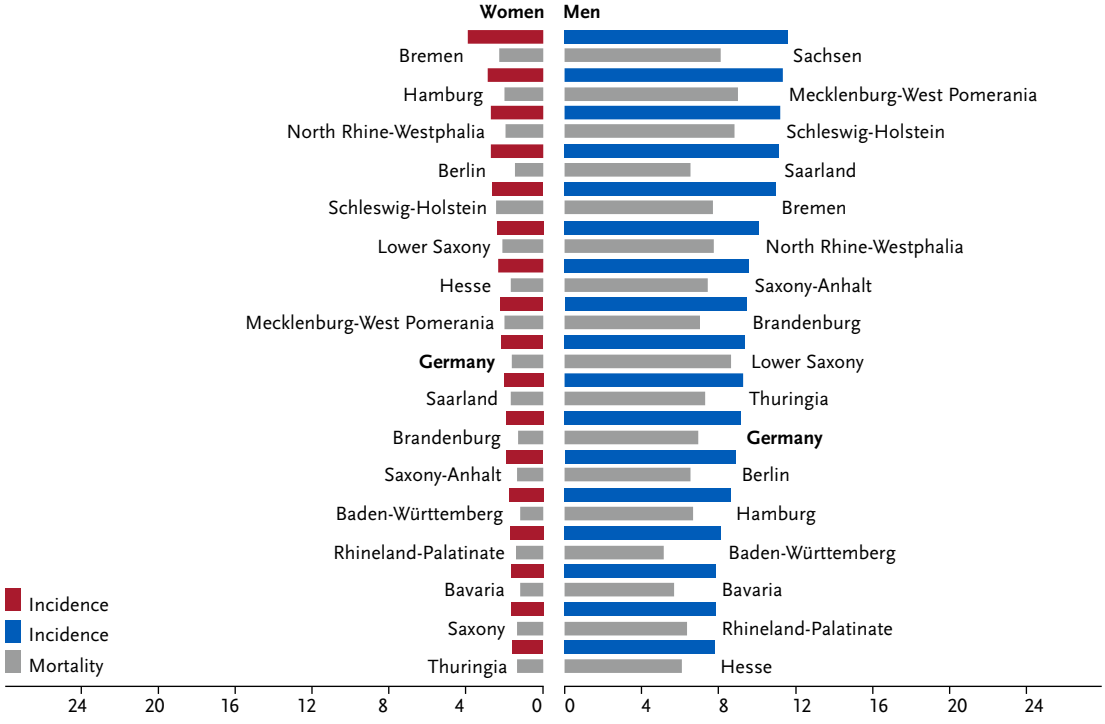
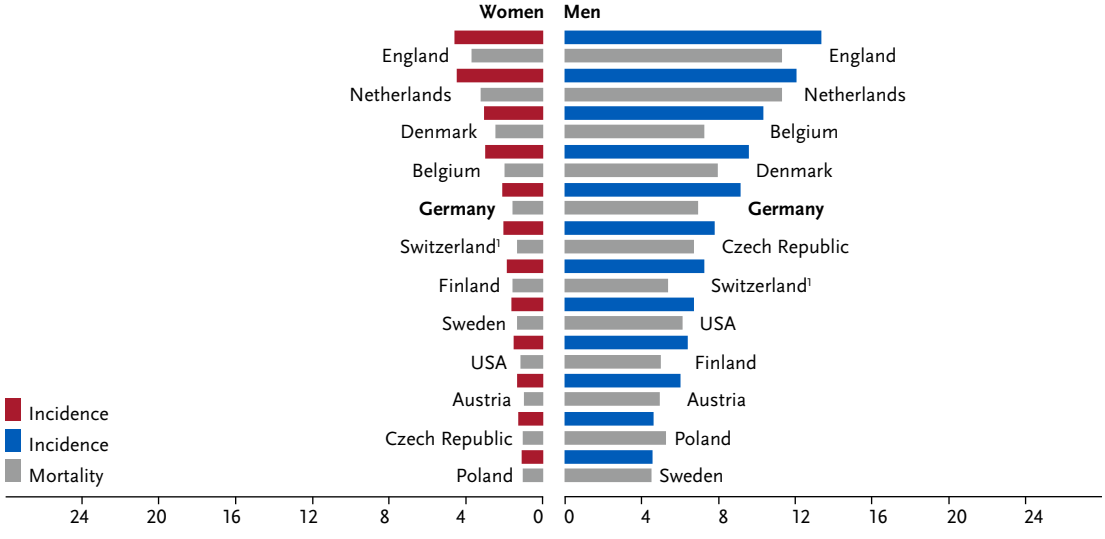


Figure 3.3.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C15, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.4 Stomach

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	5,990	9,480	5,370	9,120		
Crude incidence rate [1]	14.2	23.1	12.7	22.2		
Age-standardised incidence rate [1, 2]	7.5	14.5	6.7	13.8		
Median age at diagnosis	75	71	75	71		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	3,428	5,099	3,321	5,032	3,320	4,976
Crude mortality rate [1]	8.1	12.4	7.9	12.3	7.9	12.1
Age-standardised mortality rate [1, 2]	3.8	7.4	3.6	7.2	3.6	7.1
Median age at death	79	75	79	74	80	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	12,700	20,200	21,600	31,700	34,000	48,000
Absolute survival rate (2019 – 2020) [3]	31 (29 – 35)	28 (25 – 35)	24 (21 – 28)	20 (18 – 27)		
Relative survival rate (2019 – 2020) [3]	37 (34 – 41)	33 (31 – 42)	35 (30 – 43)	31 (28 – 42)		

[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 5,370 women and 9,120 men were diagnosed with a malignant tumour of the stomach in 2020. Compared to women, tumours in men occur around twice as often at the entrance to the stomach (cardia).

In Germany – as in other industrialised nations – a steady decline in the incidence and mortality rates of stomach cancer has been observed for decades. This trend is continuing in all age groups for both women and men. 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 and women at the age of 75. Relative 5-year survival rates of 37 % are currently calculated for women and 33 % for men. Although the survival prospects have improved recently, they remain rather unfavourable compared to other cancers. In almost 40 % of cases, the disease is already metastasised at the time of diagnosis (UICC IV).

Risk factors

The most important risk factor for stomach cancer is a bacterial infection of the stomach with Helicobacter pylori. This infection triggers chronic inflammation of the stomach lining, which can lead to the development of cancer. An infection with the Epstein-Barr virus is suspected to be associated with around 5 to 10 % of stomach cancers.

Smoking and high alcohol consumption also increase the risk of cancer. Dietary risk factors include foods preserved by salting, high salt consumption and processed meat products. Low socio-economic status, previous stomach surgery and pernicious anaemia are also associated with an increased incidence of stomach cancer. At the transition from the stomach to the oesophagus, gastroesophageal reflux disease probably increases the risk.

First-degree relatives of a patient 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 times higher. It is unclear whether the familial risk is due to a shared lifestyle, a shared genetic predisposition or a combination of both factors. However, there are also confirmed hereditary syndromes with a very high risk of stomach cancer.

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

Figure 3.4.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C16, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

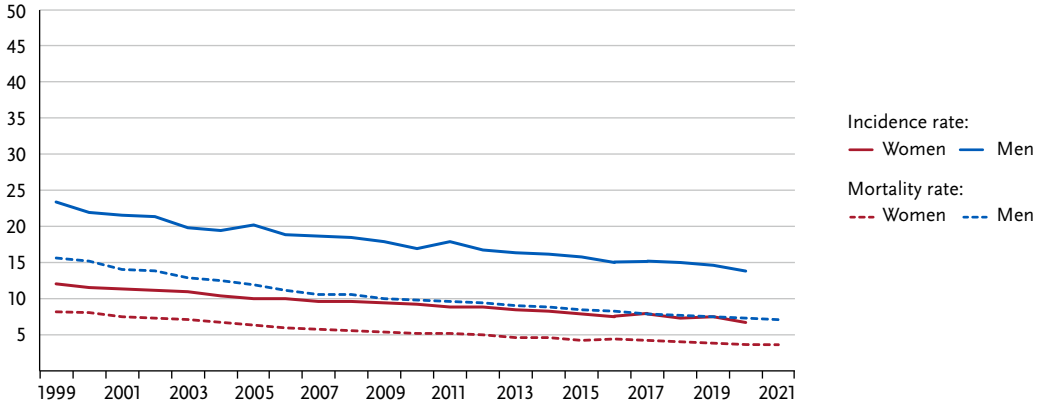


Figure 3.4.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C16, Germany 1999 – 2020/2021

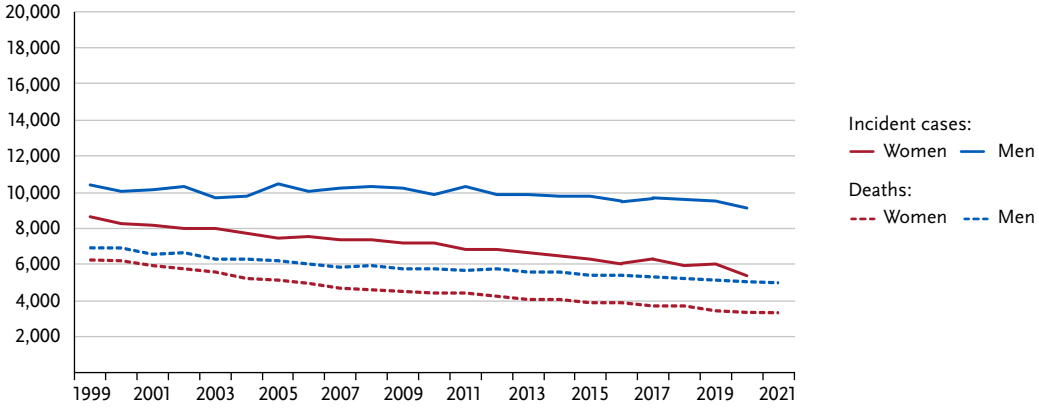


Figure 3.4.2
Age-specific incidence rates by sex, ICD-10 C16, Germany 2019 – 2020
per 100,000

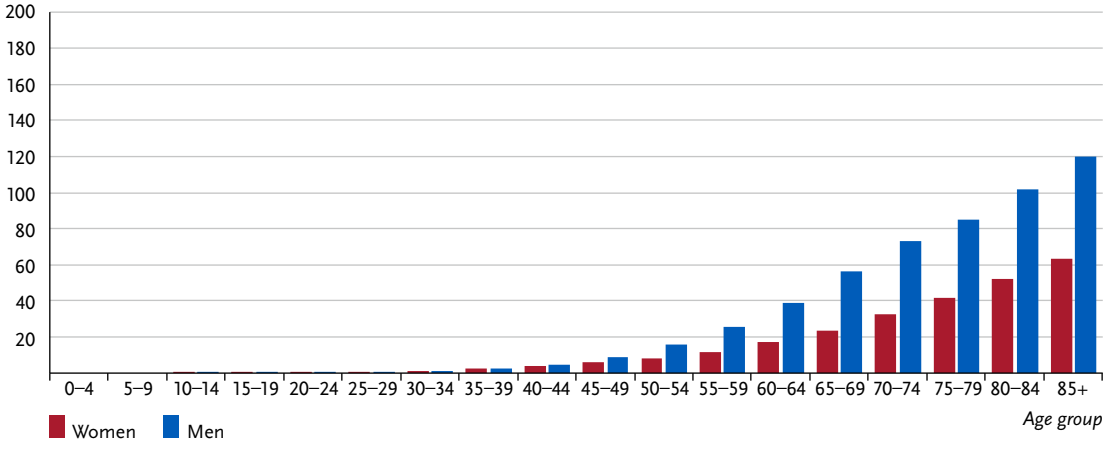


Table 3.4.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C16, database 2019

	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 2,800)	1.1 %	(1 in 89)	< 0.1 %	(1 in 7,000)	0.7 %	(1 in 150)
45 years	0.1 %	(1 in 1,300)	1.1 %	(1 in 91)	0.0 %	(1 in 3,300)	0.7 %	(1 in 150)
55 years	0.1 %	(1 in 690)	1.0 %	(1 in 96)	0.1 %	(1 in 1,500)	0.6 %	(1 in 160)
65 years	0.3 %	(1 in 360)	0.9 %	(1 in 110)	0.1 %	(1 in 760)	0.6 %	(1 in 170)
75 years	0.4 %	(1 in 230)	0.7 %	(1 in 130)	0.3 %	(1 in 380)	0.5 %	(1 in 190)
Lifetime risk			1.1 %	(1 in 89)			0.7 %	(1 in 150)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 2,800)	1.8 %	(1 in 55)	< 0.1 %	(1 in 6,500)	1.0 %	(1 in 98)
45 years	0.1 %	(1 in 800)	1.8 %	(1 in 56)	0.1 %	(1 in 1,900)	1.0 %	(1 in 99)
55 years	0.3 %	(1 in 310)	1.7 %	(1 in 58)	0.1 %	(1 in 710)	1.0 %	(1 in 100)
65 years	0.6 %	(1 in 170)	1.5 %	(1 in 65)	0.3 %	(1 in 350)	0.9 %	(1 in 110)
75 years	0.8 %	(1 in 130)	1.2 %	(1 in 84)	0.5 %	(1 in 220)	0.8 %	(1 in 120)
Lifetime risk			1.8 %	(1 in 56)			1.0 %	(1 in 99)

Figure 3.4.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C16, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

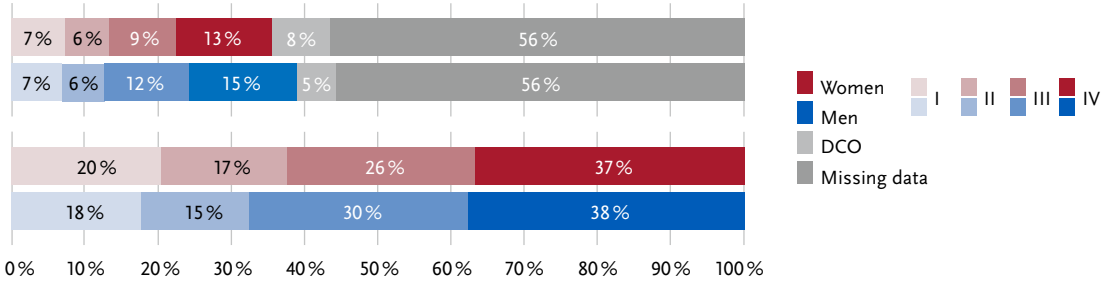


Figure 3.4.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C16, Germany 2019 – 2020

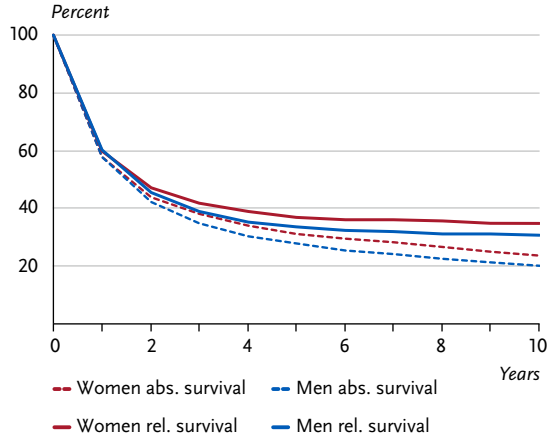


Figure 3.4.5
Relative 5-year survival by histology and sex, ICD-10 C16, Germany 2019 – 2020

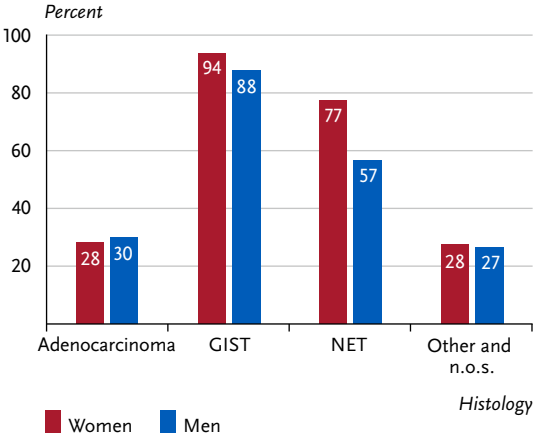


Figure 3.4.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C16, 2019 – 2020
per 100,000 (old European Standard)

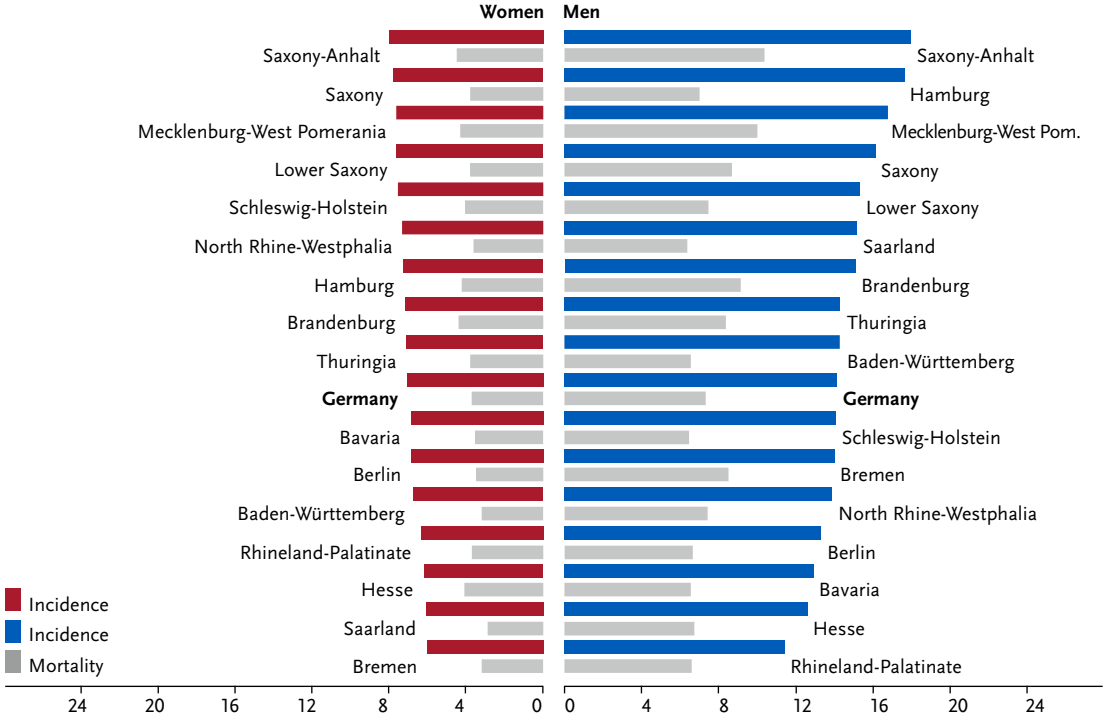
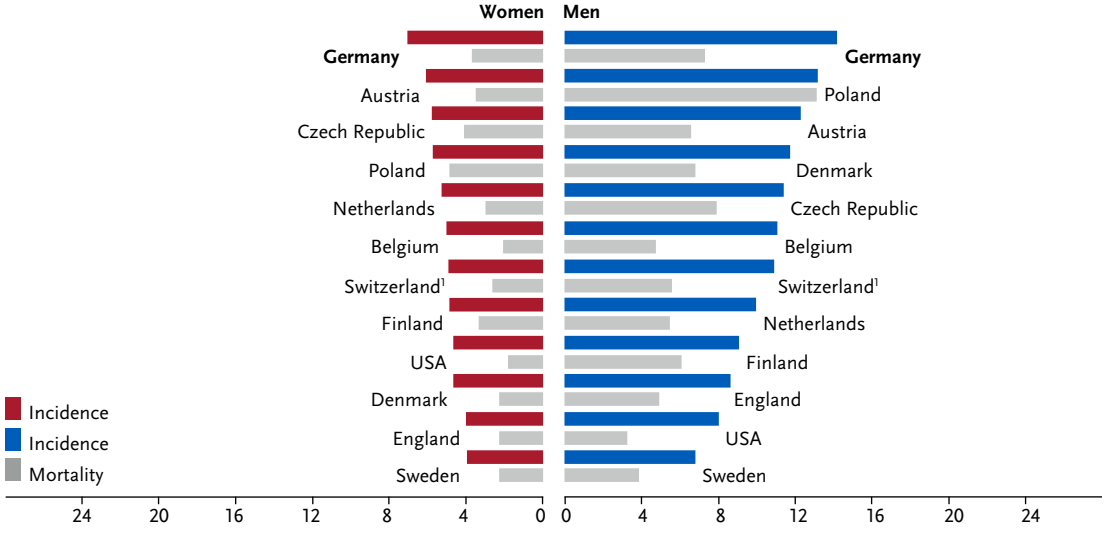


Figure 3.4.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C16, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.5 Small intestine

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	1,300	1,570	1,210	1,540		
Crude incidence rate [1]	3.1	3.8	2.9	3.8		
Age-standardised incidence rate [1, 2]	1.9	2.5	1.7	2.4		
Median age at diagnosis	69	68	70	70		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	314	377	330	417	347	384
Crude mortality rate [1]	0.7	0.9	0.8	1.0	0.8	0.9
Age-standardised mortality rate [1, 2]	0.4	0.6	0.4	0.6	0.4	0.5
Median age at death	77	74	77	76	76	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	4,100	5,100	6,900	8,000	9,600	10,900
Absolute survival rate (2019 – 2020) [3]	57 (44 – 69)	50 (39 – 58)	47	37 (30 – 42)		
Relative survival rate (2019 – 2020) [3]	64 (49 – 76)	59 (47 – 69)	61	53 (43 – 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 and risk factors

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

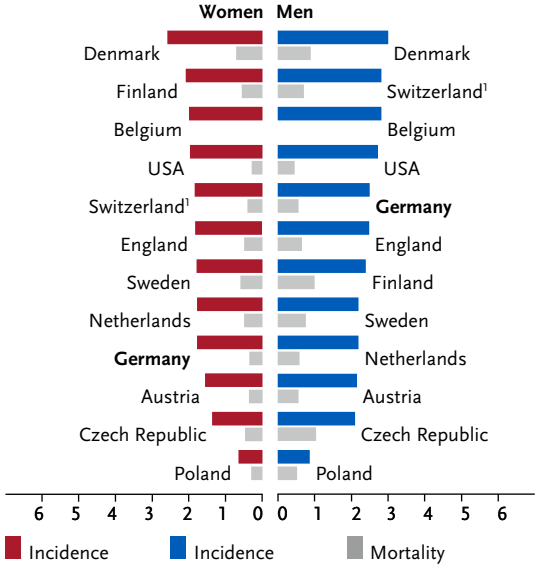
Gastrointestinal stromal tumours (GIST) account for a good 10 % of cases. In total, about 2,750 people in Germany were diagnosed with cancer of the small intestine in 2020, 1,210 of whom were women. Incidence and mortality rates have recently stabilised after a significant increase until around 2015. The 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 neuroendocrine tumours NET of the small intestine. The most relevant risk factor is generally a family history of cancer, followed by obesity and diabetes.

Hereditary diseases such as Lynch syndrome, Peutz-Jeghers syndrome, familial juvenile polyposis and cystic fibrosis as well as chronic inflammatory bowel disease (Crohn's disease) increase the risk of adenocarcinomas in 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).

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

Figure 3.5.1
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C17, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

Figure 3.5.2
Age-standardised incidence and mortality rates by sex, ICD-10 C17, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

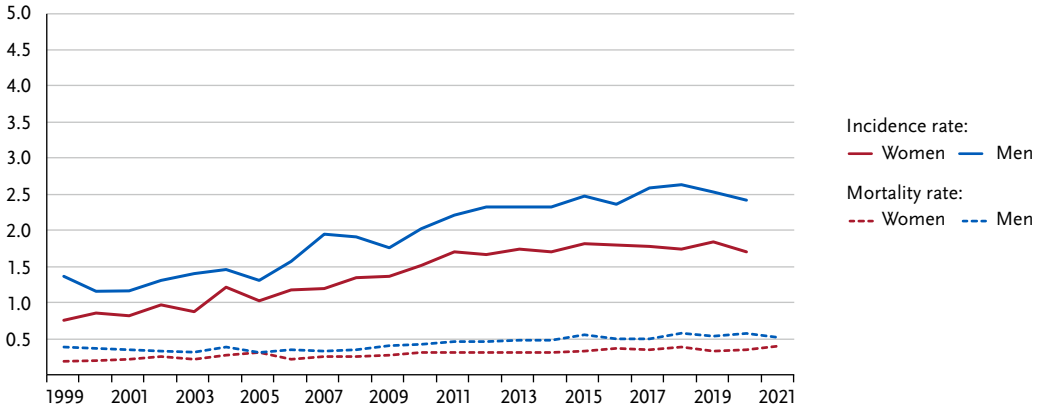


Figure 3.5.3
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C17, Germany 2019 – 2020

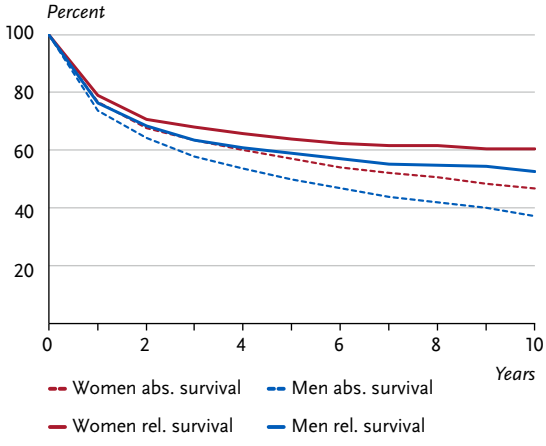


Figure 3.5.4
Relative 5-year survival by histology and sex, ICD-10 C17, Germany 2019 – 2020

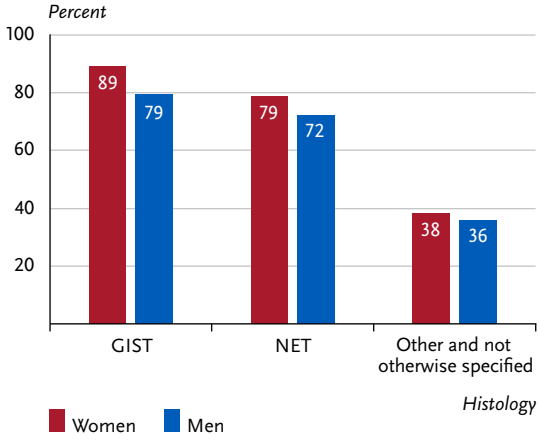
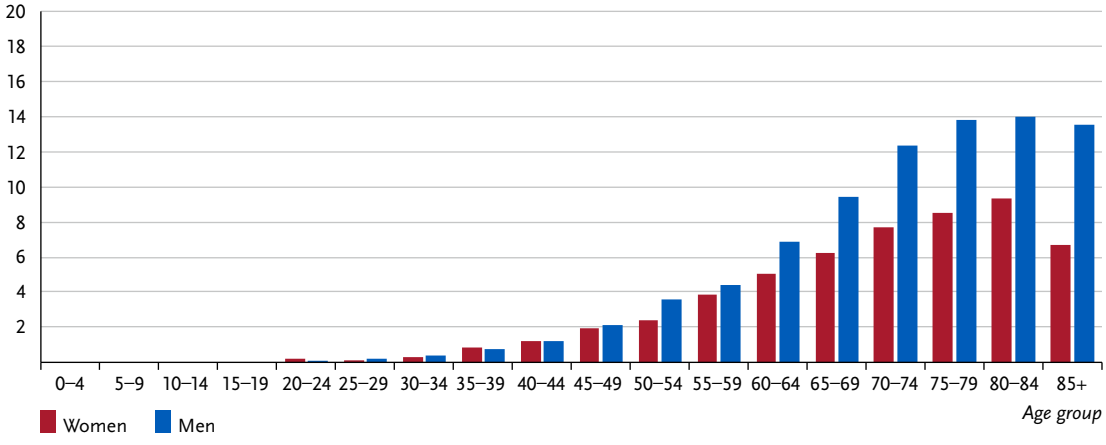


Figure 3.5.5
Age-specific incidence rates by sex, ICD-10 C17, Germany 2019 – 2020
per 100,000



3.6 Colon and rectum

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	27,170	34,040	24,240	30,530		
Crude incidence rate [1]	64.6	83.0	57.5	74.4		
Age-standardised incidence rate [1, 2]	33.2	51.8	29.6	46.2		
Median age at diagnosis	75	72	75	71		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	11,016	13,032	10,667	13,120	10,303	12,713
Crude mortality rate [1]	26.2	31.8	25.4	32	24.5	30.9
Age-standardised mortality rate [1, 2]	11.2	18.3	10.7	18.1	10.3	17.4
Median age at death	80	76	80	76	81	76
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	89,100	109,400	149,000	180,500	250,300	290,100
Absolute survival rate (2019 – 2020) [3]	54 (53 – 56)	52 (51 – 54)	40 (39 – 41)	36 (34 – 38)		
Relative survival rate (2019 – 2020) [3]	66 (64 – 68)	64 (62 – 67)	62 (60 – 66)	57 (54 – 62)		

[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 nine cases of cancer in Germany affects the colon or rectum. In 2020, about 30,530 men and 24,240 women were diagnosed with colorectal cancer. Thus, one in 15 men and one in 19 women will be diagnosed with colorectal 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 patients develop the disease after the age of 70, with only around 10 % of cancers occurring before the age of 55. This corresponds to a comparatively high median age at diagnosis of 75 (women) and 71 (men). After a short-term increase, a decline in age-standardised incidence rates has been observed since around 2003. Except for the ascending colon, the rate of new cases is decreasing in all sections of the colon. The annual decline in age-standardised mortality rates over the last 10 years is even more pronounced, averaging 2.5 % to 3 %. The relative 5-year survival rates with colorectal cancer are around 66 % and 64 % for women and men, respectively.

Risk factors and early detection

The most important risk factors for colorectal cancer are tobacco use and obesity. These are followed by a lack of exercise and a low-fibre diet. People who regularly drink alcohol 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 frequently 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 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 55 (women) or 50 (men), the statutory cancer screening programme offers a colonoscopy. If necessary, colon polyps that could develop into cancer can be removed. If the findings are normal, a repeat colonoscopy can be conducted 10 years later. As an alternative to a colonoscopy, the stool test can be used. 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 – 2020/2021
per 100,000 (old European Standard)

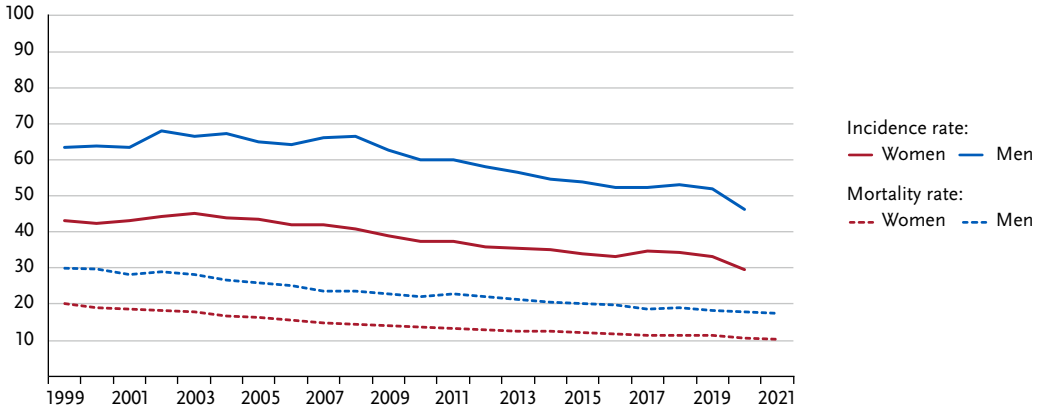


Figure 3.6.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C18 – C20, Germany 1999 – 2020/2021

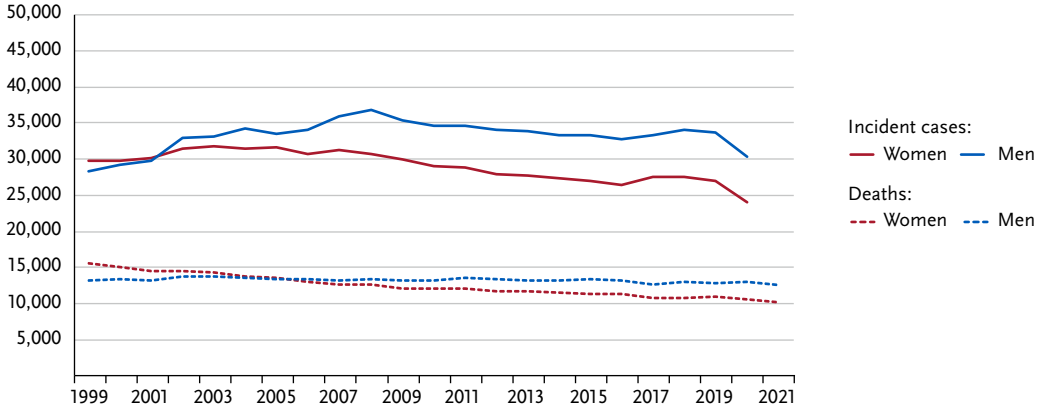


Figure 3.6.2
Age-specific incidence rates by sex, ICD-10 C18 – C20, Germany 2019 – 2020
per 100,000

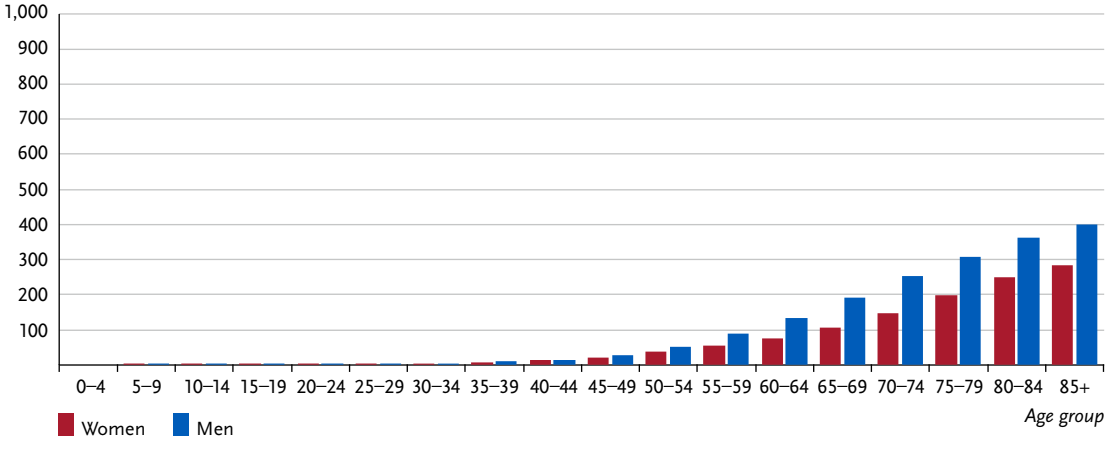


Table 3.6.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C18 – C20, database 2019

	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 830)	5.4 %	(1 in 19)	< 0.1 %	(1 in 4,300)	2.3 %	(1 in 44)
45 years	0.3 %	(1 in 290)	5.3 %	(1 in 19)	0.1 %	(1 in 1,400)	2.3 %	(1 in 44)
55 years	0.7 %	(1 in 130)	5.0 %	(1 in 20)	0.2 %	(1 in 500)	2.2 %	(1 in 45)
65 years	1.4 %	(1 in 72)	4.5 %	(1 in 22)	0.4 %	(1 in 230)	2.1 %	(1 in 47)
75 years	2.1 %	(1 in 47)	3.6 %	(1 in 28)	0.9 %	(1 in 110)	1.9 %	(1 in 51)
Lifetime risk			5.4 %	(1 in 19)			2.3 %	(1 in 44)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 790)	6.6 %	(1 in 15)	0.0 %	(1 in 4,300)	2.7 %	(1 in 37)
45 years	0.4 %	(1 in 230)	6.6 %	(1 in 15)	0.1 %	(1 in 1,000)	2.7 %	(1 in 37)
55 years	1.2 %	(1 in 85)	6.4 %	(1 in 16)	0.3 %	(1 in 320)	2.7 %	(1 in 37)
65 years	2.2 %	(1 in 45)	5.7 %	(1 in 17)	0.7 %	(1 in 140)	2.6 %	(1 in 38)
75 years	2.9 %	(1 in 34)	4.5 %	(1 in 22)	1.3 %	(1 in 77)	2.4 %	(1 in 42)
Lifetime risk			6.6 %	(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 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

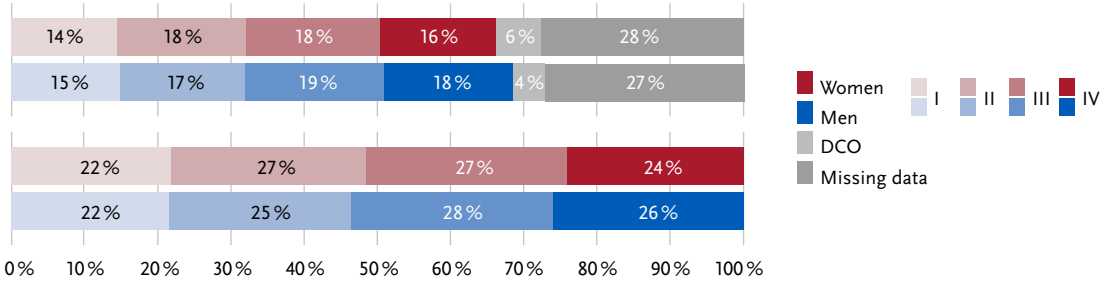


Figure 3.6.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C18 – C20, Germany 2019 – 2020

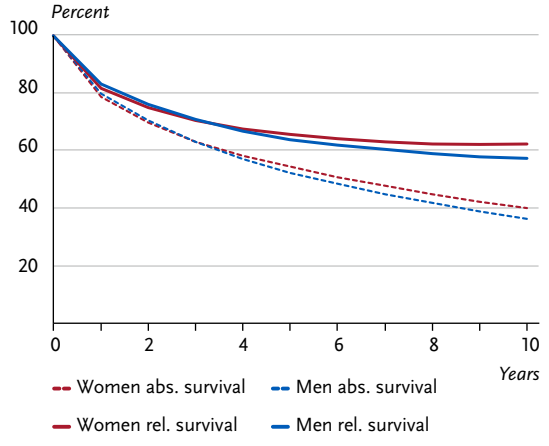


Figure 3.6.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C18 – C20, Germany 2019 – 2020

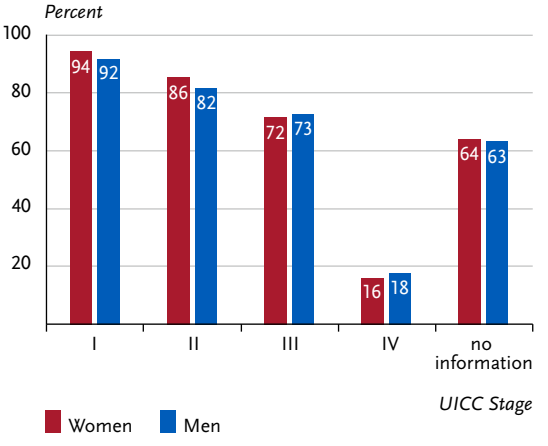


Figure 3.6.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C18 – C20, 2019 – 2020
per 100,000 (old European Standard)

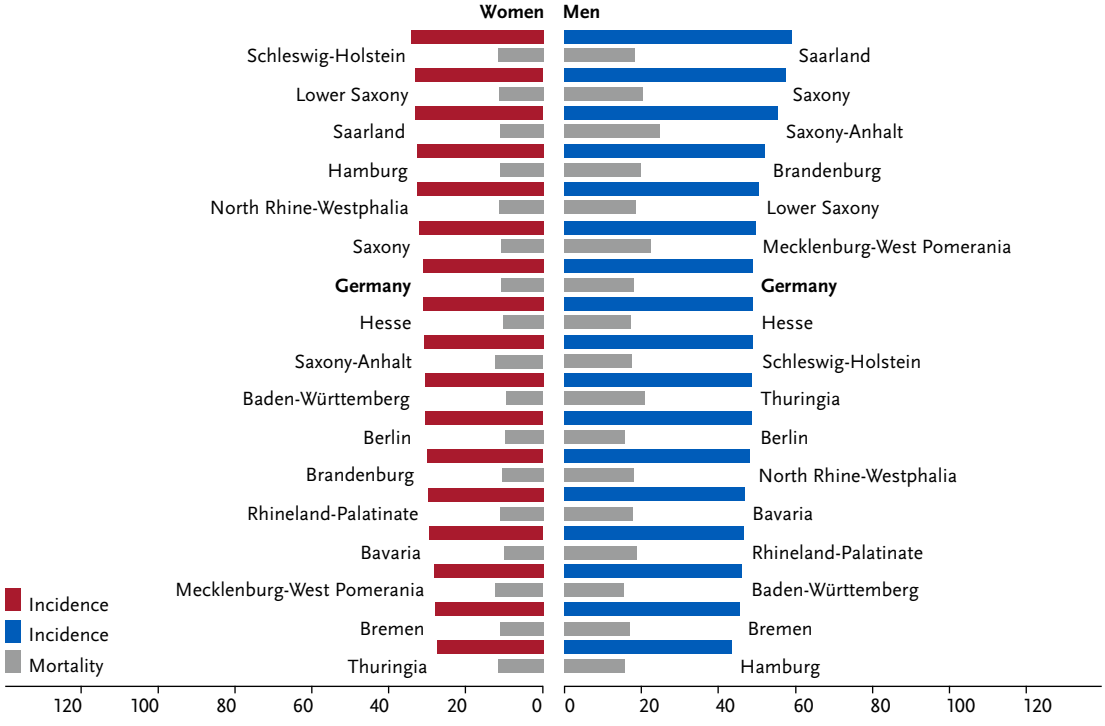
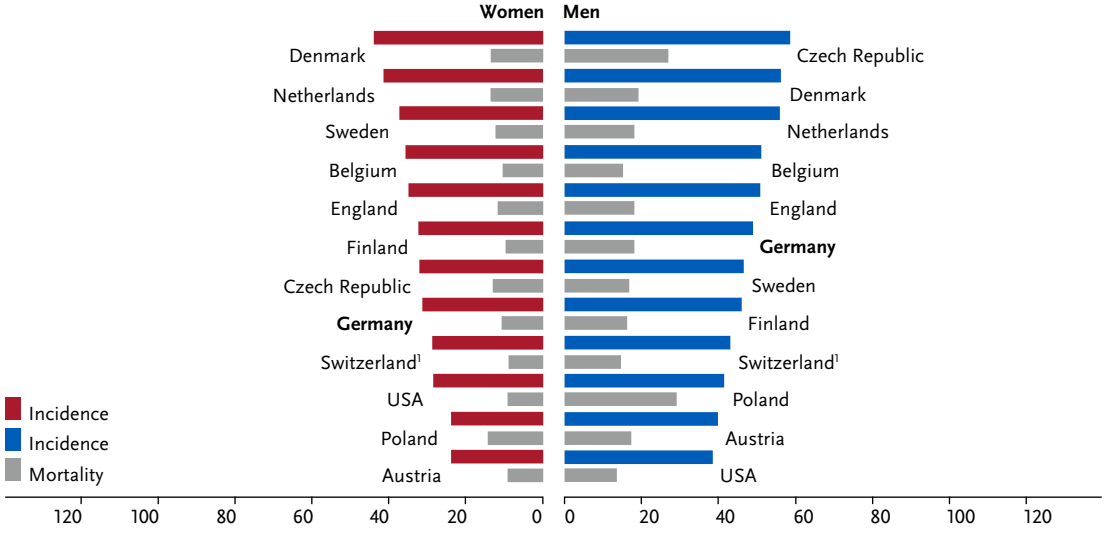


Figure 3.6.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C18 – C20, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.7 Anus

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	1,510	900	1,500	810		
Crude incidence rate [1]	3.6	2.2	3.6	2.0		
Age-standardised incidence rate [1, 2]	2.3	1.6	2.3	1.3		
Median age at diagnosis	65	64	64	65		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	340	208	355	261	301	231
Crude mortality rate [1]	0.8	0.5	0.8	0.6	0.7	0.6
Age-standardised mortality rate [1, 2]	0.4	0.3	0.4	0.4	0.3	0.4
Median age at death	75	70	75	70	77	69
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	5,800	3,000	9,200	4,600	13,300	6,800
Absolute survival rate (2019 – 2020) [3]	64 (60 – 72)	55	54 (51 – 62)	45		
Relative survival rate (2019 – 2020) [3]	72 (69 – 80)	63	68 (64 – 78)	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)

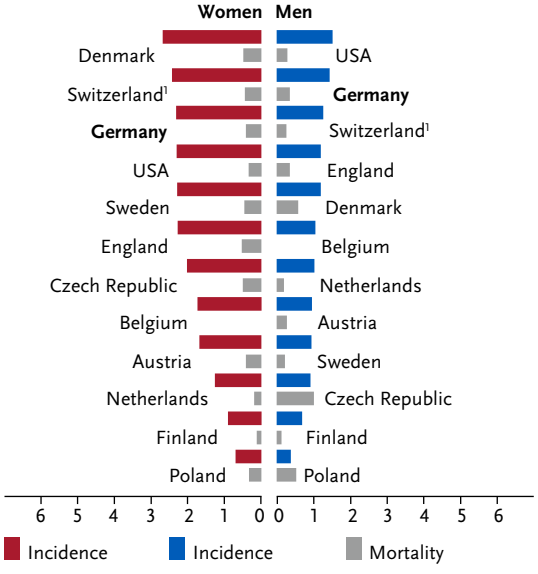
Epidemiology and risk factors

Cancers of the anus are predominantly squamous cell carcinomas. In 2020, about 2,300 people were diagnosed with anal cancer, 1,500 of whom were women. Contrary to the trend of decreasing incidence rates of colorectal cancer, both the incidence rate and the mortality rate of anal cancer have increased substantially over the last 20 years. An increase in incidence is also described internationally. The relative 5-year survival rates of patients with anal cancer are about 72 % for women and 63 % for men.

In Germany, about 90 % of anal carcinomas can be traced back to a persistent infection with human papillomavirus (HPV). Related risk factors are certain sexual practices (frequently changing sexual contacts, passive anal intercourse) and chronic immunosuppression (especially due to HIV infection or organ transplantation). Smoking also increases the risk. Men with same-sex contacts (MSM) and an HIV infection have the highest risk of anal carcinoma.

The Standing Commission on Vaccination (STIKO) recommends vaccination against HPV regardless of gender, 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, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

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

Figure 3.7.2
Age-standardised incidence and mortality rates by sex, ICD-10 C21, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

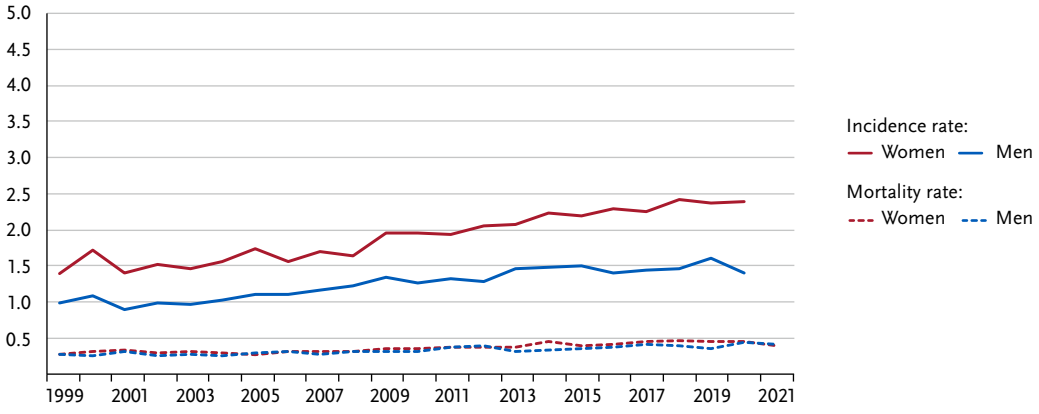


Figure 3.7.3
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C21, Germany 2019 – 2020

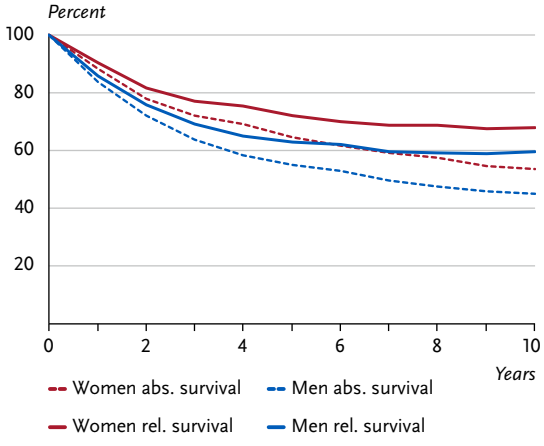


Figure 3.7.4
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C21, Germany 2019 – 2020

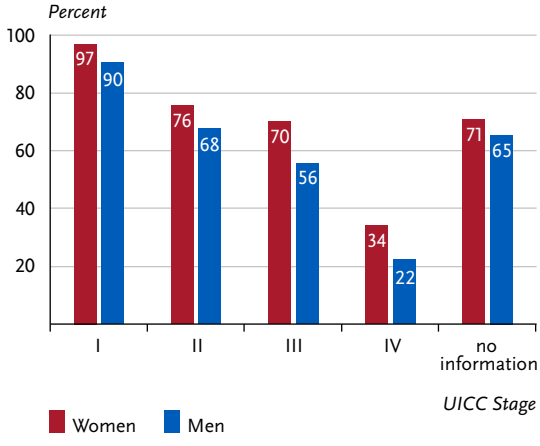
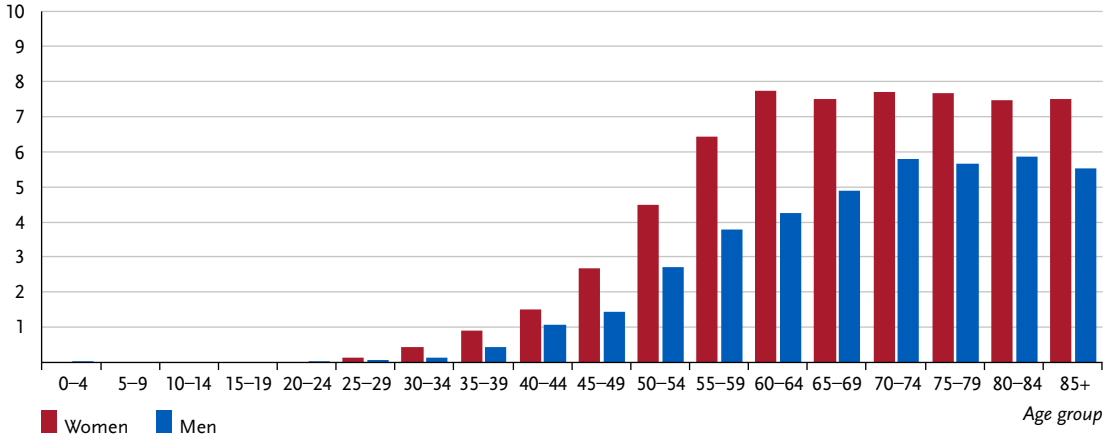


Figure 3.7.5
Age-specific incidence rates by sex, ICD-10 C21, Germany 2019 – 2020
per 100,000



3.8 Liver

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	3,100	6,910	3,030	6,740		
Crude incidence rate [1]	7.4	16.9	7.2	16.4		
Age-standardised incidence rate [1, 2]	3.8	10.5	3.7	10.0		
Median age at diagnosis	74	71	74	72		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	2,649	5,519	2,781	5,676	2,692	5,455
Crude mortality rate [1]	6.3	13.5	6.6	13.8	6.4	13.3
Age-standardised mortality rate [1, 2]	3.0	7.9	3.1	8.0	3.0	7.7
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	4,300	9,600	5,900	12,800	7,400	16,200
Absolute survival rate (2019 – 2020) [3]	15 (11 – 34)	14 (12 – 17)	9 (5 – 28)	8 (4 – 10)		
Relative survival rate (2019 – 2020) [3]	17 (13 – 38)	17 (14 – 21)	12 (6 – 36)	11 (7 – 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 9,800 new cases per year, with almost 8,200 deaths (2021). Approximately one in 170 women and one in 80 men in Germany will develop a malignant liver tumour during their lifetime. The relative 5-year survival rates for women and men are around 17%. Around 59% of malignant liver tumours arise from liver cells (hepatocellular carcinoma) and 31% from cells of the intrahepatic bile ducts (cholangiocarcinoma). The latter proportion is higher among women.

Since 1999, the age-standardised incidence and mortality rates have risen slightly for both sexes. For some years now, 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.

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 or high alcohol consumption. Non-alcohol-related fatty liver disease, which also increases the risk of liver cancer, is becoming increasingly important. They can also be the result of diabetes mellitus or metabolic syndrome. These, in turn, are very often caused by obesity.

Chronic hepatitis B virus infection is a risk factor for liver cancer, even without liver cirrhosis. This is particularly true in Africa and South-East Asia. Smoking also increases the risk of developing the 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 carcinomas of the bile ducts within the liver. There is no statutory screening programme for the early detection of liver cancer for the general population. In the case of existing liver cirrhosis or chronic hepatitis, regular ultrasound checks should be offered.

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

Figure 3.8.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C22, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

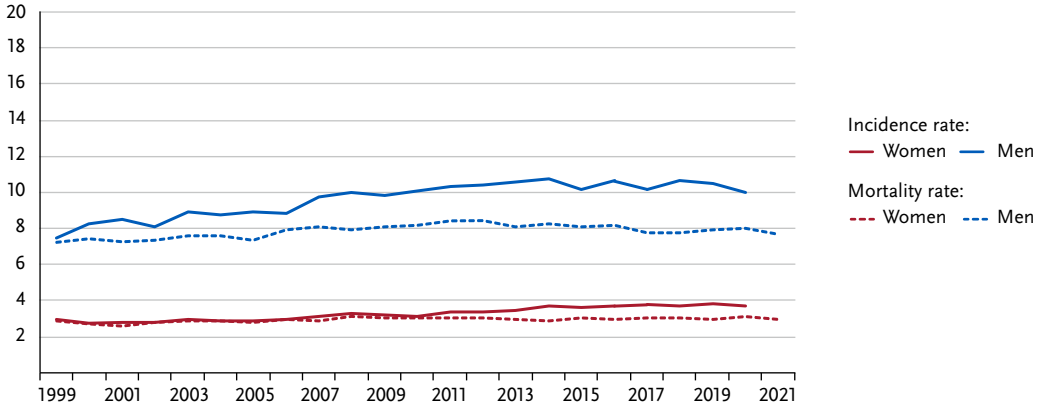


Figure 3.8.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C22, Germany 1999 – 2020/2021

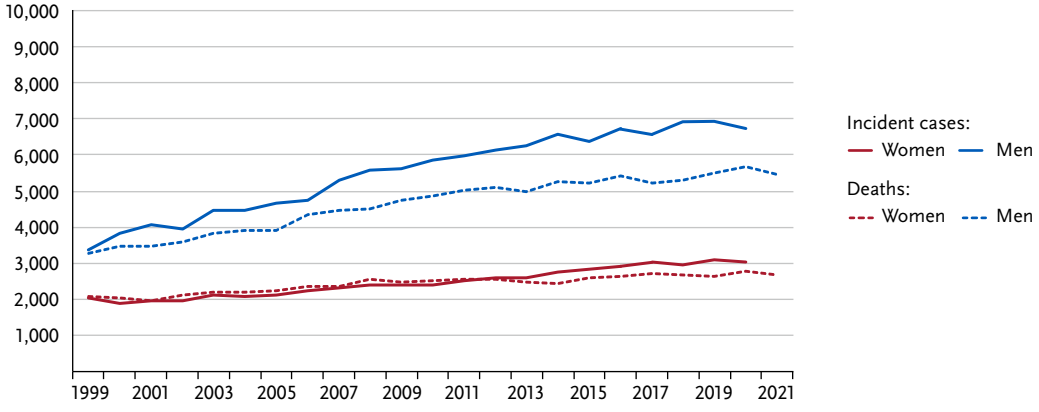


Figure 3.8.2
Age-specific incidence rates by sex, ICD-10 C22, Germany 2019 – 2020
per 100,000

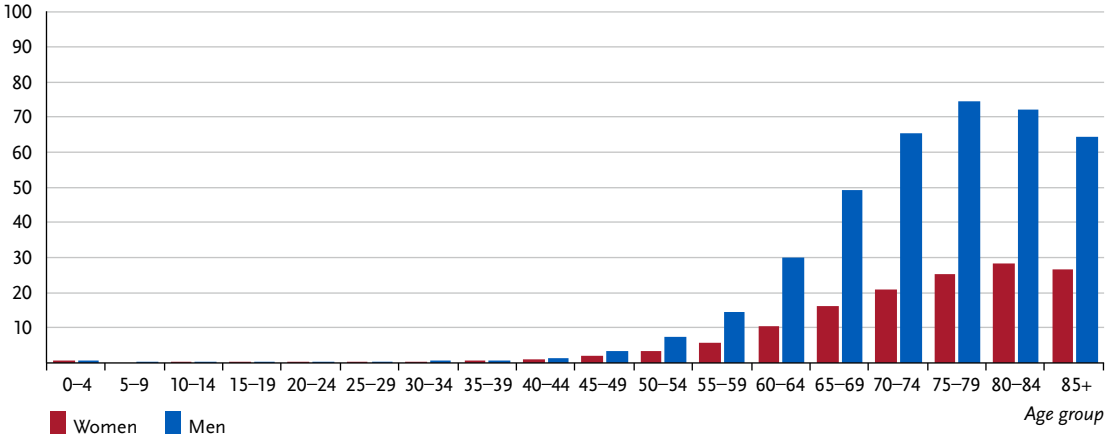


Table 3.8.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C22, database 2019

	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 10,400)	0.6 %	(1 in 170)	< 0.1 %	(1 in 18,000)	0.5 %	(1 in 200)
45 years	< 0.1 %	(1 in 3,900)	0.6 %	(1 in 180)	0.0 %	(1 in 6,300)	0.5 %	(1 in 200)
55 years	0.1 %	(1 in 1,200)	0.6 %	(1 in 180)	0.1 %	(1 in 1,800)	0.5 %	(1 in 200)
65 years	0.2 %	(1 in 560)	0.5 %	(1 in 200)	0.1 %	(1 in 740)	0.5 %	(1 in 220)
75 years	0.2 %	(1 in 430)	0.4 %	(1 in 280)	0.2 %	(1 in 460)	0.4 %	(1 in 270)
Lifetime risk			0.6 %	(1 in 170)			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 8,200)	1.3 %	(1 in 77)	< 0.1 %	(1 in 14,200)	1.1 %	(1 in 93)
45 years	0.1 %	(1 in 1,800)	1.3 %	(1 in 77)	0.0 %	(1 in 3,200)	1.1 %	(1 in 92)
55 years	0.2 %	(1 in 440)	1.3 %	(1 in 77)	0.2 %	(1 in 660)	1.1 %	(1 in 92)
65 years	0.5 %	(1 in 190)	1.2 %	(1 in 86)	0.4 %	(1 in 260)	1.0 %	(1 in 97)
75 years	0.6 %	(1 in 170)	0.8 %	(1 in 120)	0.5 %	(1 in 190)	0.8 %	(1 in 130)
Lifetime risk			1.3 %	(1 in 77)			1.1 %	(1 in 94)

Figure 3.8.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C22, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

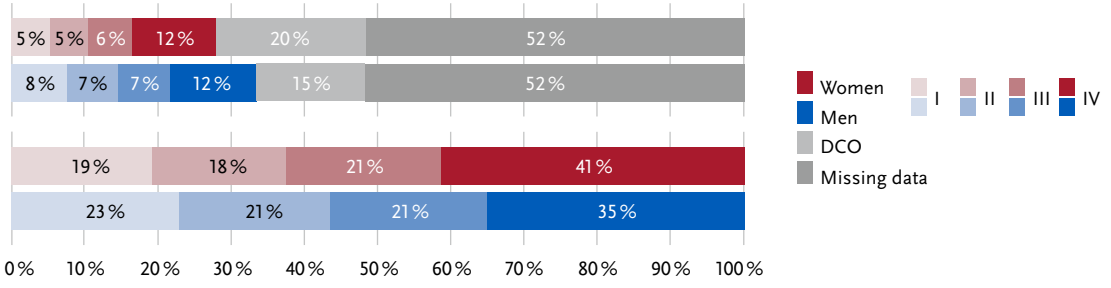


Figure 3.8.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C22, Germany 2019 – 2020

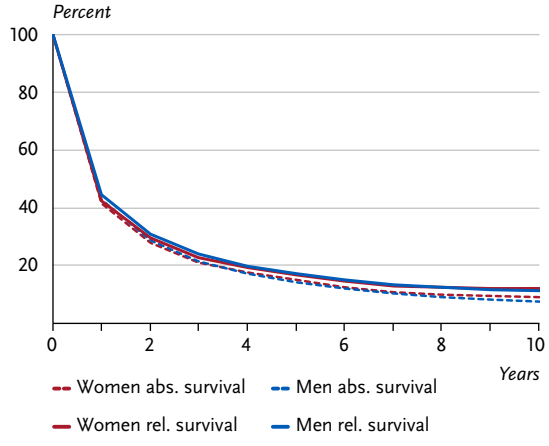


Figure 3.8.5
Relatives 5-year survival by site and sex, ICD-10 C22, Germany 2019 – 2020

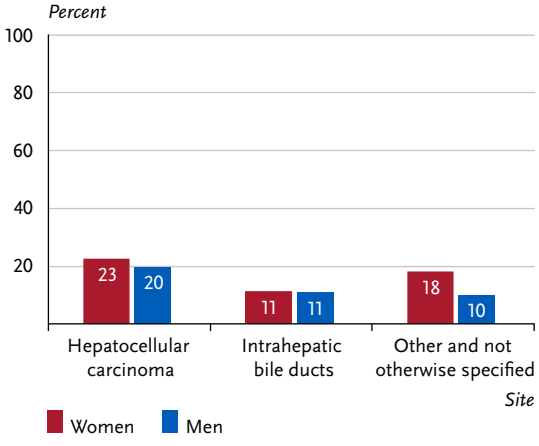


Figure 3.8.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C22, 2019 – 2020
per 100,000 (old European Standard)

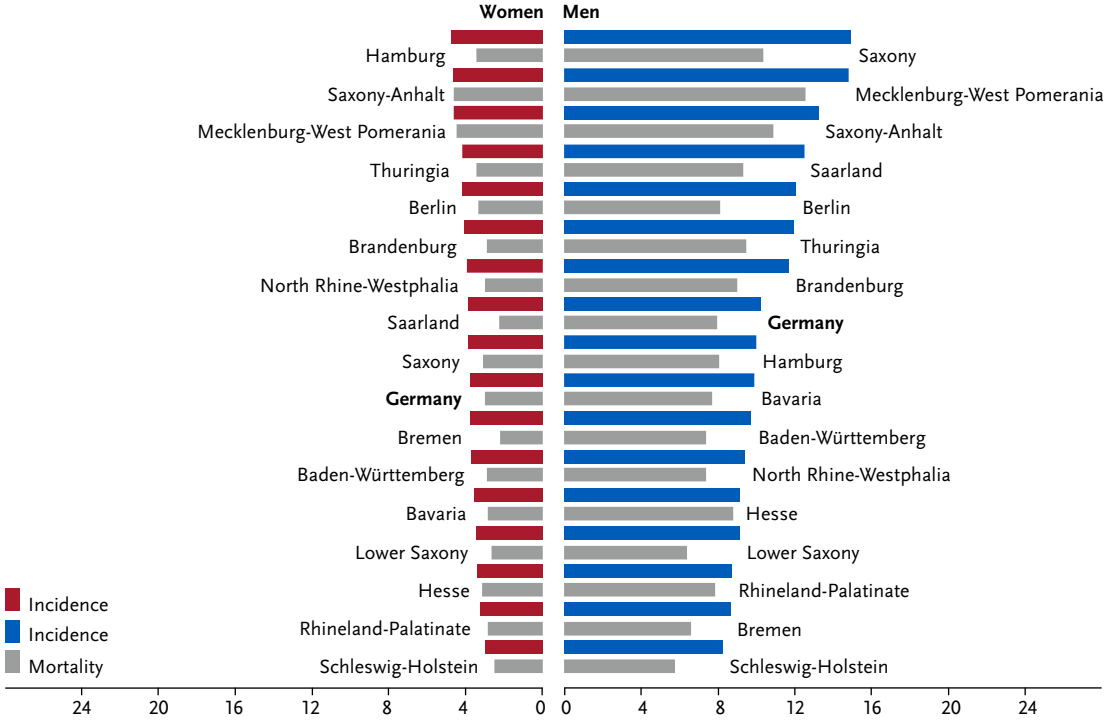
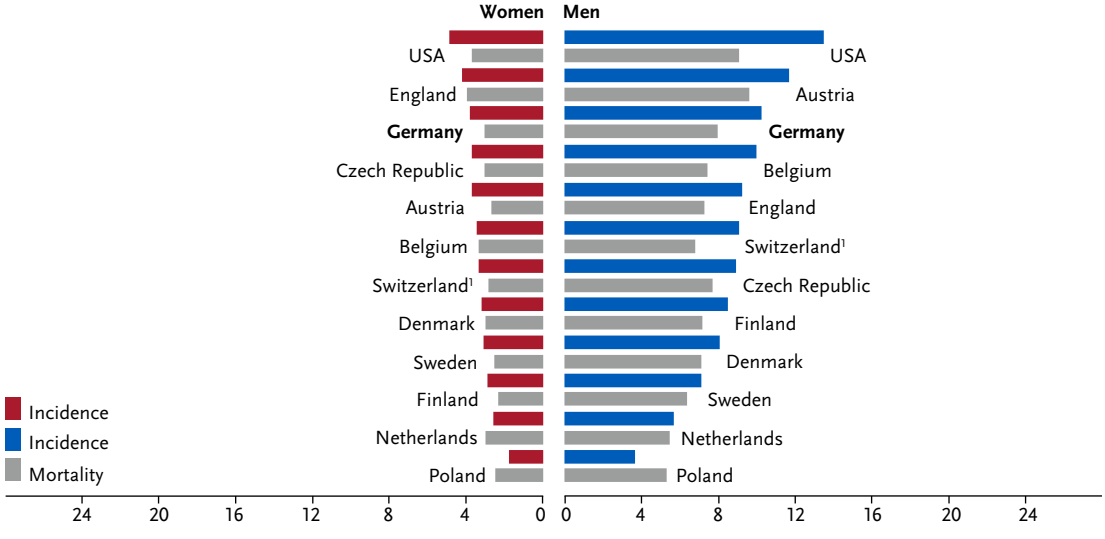


Figure 3.8.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C22, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.9 Gallbladder and biliary tract

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	2,630	2,580	2,600	2,530		
Crude incidence rate [1]	6.2	6.3	6.2	6.2		
Age-standardised incidence rate [1, 2]	3.0	3.7	2.9	3.6		
Median age at diagnosis	77	75	76	75		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	2,031	1,691	2,102	1,738	1,992	1,683
Crude mortality rate [1]	4.9	4.1	5.0	4.3	4.8	4.1
Age-standardised mortality rate [1, 2]	2.1	2.3	2.1	2.3	2.0	2.3
Median age at death	79	76	80	77	80	76
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	3,900	3,900	5,900	5,600	9,100	7,600
Absolute survival rate (2019 – 2020) [3]	16 (12 – 22)	19 (11 – 22)	11 (9 – 16)	13 (8 – 16)		
Relative survival rate (2019 – 2020) [3]	19 (15 – 25)	23 (14 – 26)	16 (12 – 22)	20 (12 – 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, around 5,130 new cases of malignant tumours of the gallbladder (approx. 28 %) and the bile ducts outside the liver (72 %) were diagnosed in 2020. The proportion of bile duct tumours outside the liver was significantly higher among men (81 %) than among women (63 %). Histologically, the tumours were predominantly adenocarcinomas. Of the tumours of the bile ducts, around 9 % were so-called Klatskin tumours.

The risk of developing these cancers increases continuously with age. One in 200 women and one in 200 men will develop a tumour of the gallbladder or bile ducts in the course of their lives.

Since 1999, the age-standardised incidence and mortality rates among women have fallen, particularly in relation to cancer of the gallbladder. Among men, the incidence has remained largely constant, with a slight decline in recent years. The age-standardised mortality rate fell until around 2009, only to rise again slightly thereafter.

The relative 5-year survival rates for malignant tumours of the gallbladder and bile ducts are rather low at 19 % for women and 23 % for men.

Risk factors

The causes of bile duct and gallbladder carcinomas have not been clearly identified. The main common risk factor is age. Primary sclerosing cholangitis (PSC) is also considered a risk factor for both cancers. Other possible risk factors for bile duct carcinomas outside the liver are anomalies of the bile ducts (Caroli malformation), bile duct stones in the common bile duct, choledochal cysts and chronic inflammatory bowel disease. Large gallbladder polyps, inflammation of the gallbladder (and its consequence, the porcelain gallbladder), gallbladder stones and obesity can increase the risk of gallbladder cancer.

Screening examinations of the general population have not proven useful. Regular check-ups can be considered for certain risk groups (such as patients with gallbladder polyps, stones or PSC).

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

Figure 3.9.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C23 – C24, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

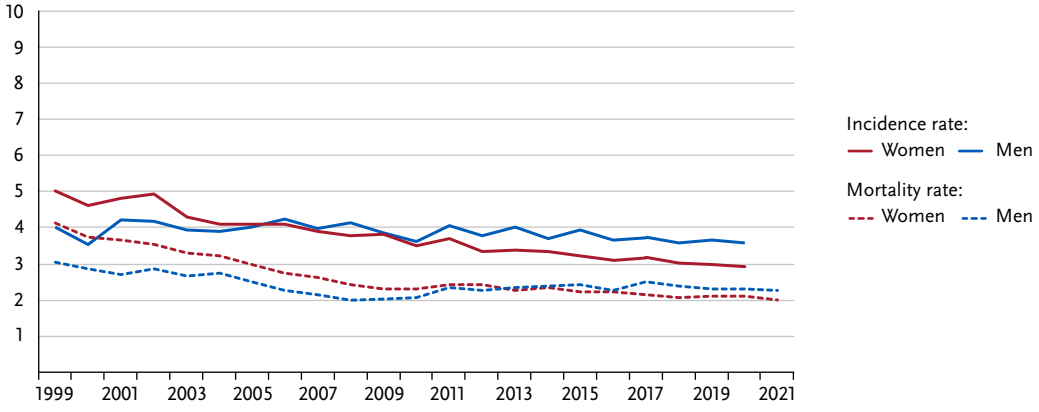


Figure 3.9.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C23 – C24, Germany 1999 – 2020/2021

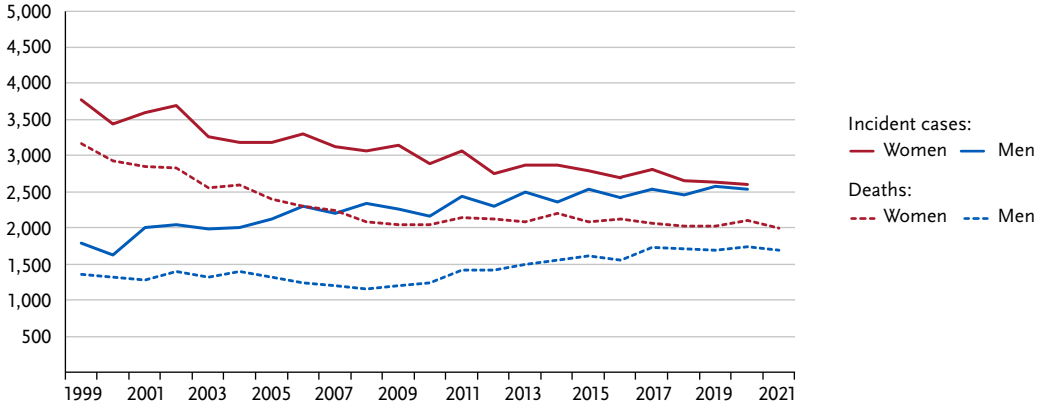


Figure 3.9.2
Age-specific incidence rates by sex, ICD-10 C23 – C24, Germany 2019 – 2020
per 100,000

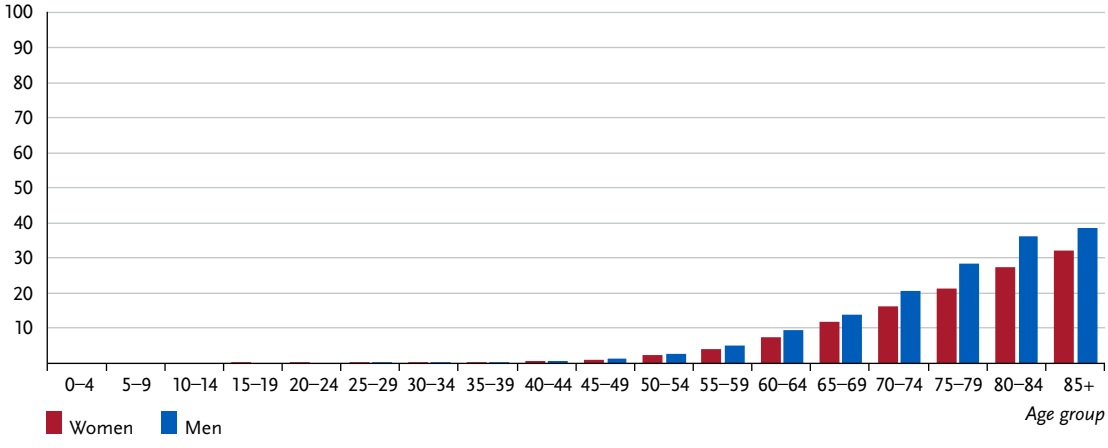


Table 3.9.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C23 – C24, database 2019

	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 17,500)	0.5 %	(1 in 200)	< 0.1 %	(1 in 47,300)	0.4 %	(1 in 250)
45 years	< 0.1 %	(1 in 5,100)	0.5 %	(1 in 200)	< 0.1 %	(1 in 9,200)	0.4 %	(1 in 250)
55 years	0.1 %	(1 in 1,800)	0.5 %	(1 in 210)	< 0.1 %	(1 in 2,900)	0.4 %	(1 in 250)
65 years	0.1 %	(1 in 740)	0.5 %	(1 in 220)	0.1 %	(1 in 1,100)	0.4 %	(1 in 260)
75 years	0.2 %	(1 in 470)	0.4 %	(1 in 270)	0.2 %	(1 in 590)	0.3 %	(1 in 310)
Lifetime risk			0.5 %	(1 in 200)			0.4 %	(1 in 250)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 26,600)	0.5 %	(1 in 200)	< 0.1 %	(1 in 72,700)	0.3 %	(1 in 290)
45 years	< 0.1 %	(1 in 4,600)	0.5 %	(1 in 100)	< 0.1 %	(1 in 11,400)	0.3 %	(1 in 290)
55 years	0.1 %	(1 in 1,400)	0.5 %	(1 in 200)	< 0.1 %	(1 in 3,000)	0.3 %	(1 in 290)
65 years	0.2 %	(1 in 630)	0.5 %	(1 in 220)	0.1 %	(1 in 970)	0.3 %	(1 in 290)
75 years	0.3 %	(1 in 390)	0.4 %	(1 in 260)	0.2 %	(1 in 550)	0.3 %	(1 in 330)
Lifetime risk			0.5 %	(1 in 200)			0.3 %	(1 in 290)

Figure 3.9.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C23 – C24.1, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

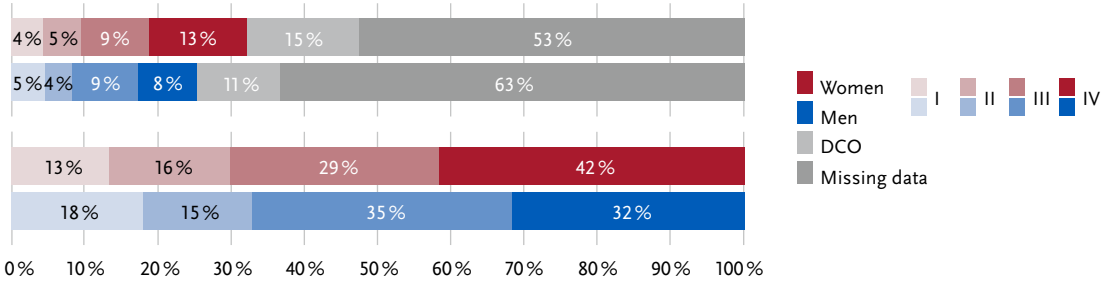


Figure 3.9.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C23 – C24, Germany 2019 – 2020

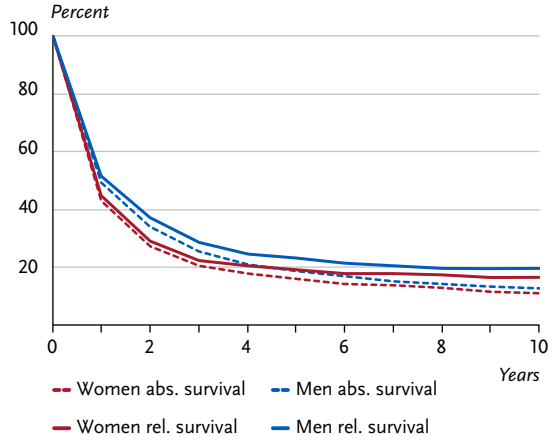


Figure 3.9.5
Relative 5-year survival by site and sex, ICD-10 C23 – C24, Germany 2019 – 2020

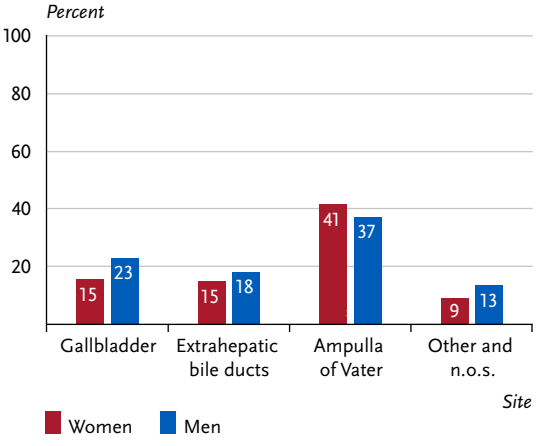


Figure 3.9.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C23 – C24, 2019 – 2020
per 100,000 (old European Standard)

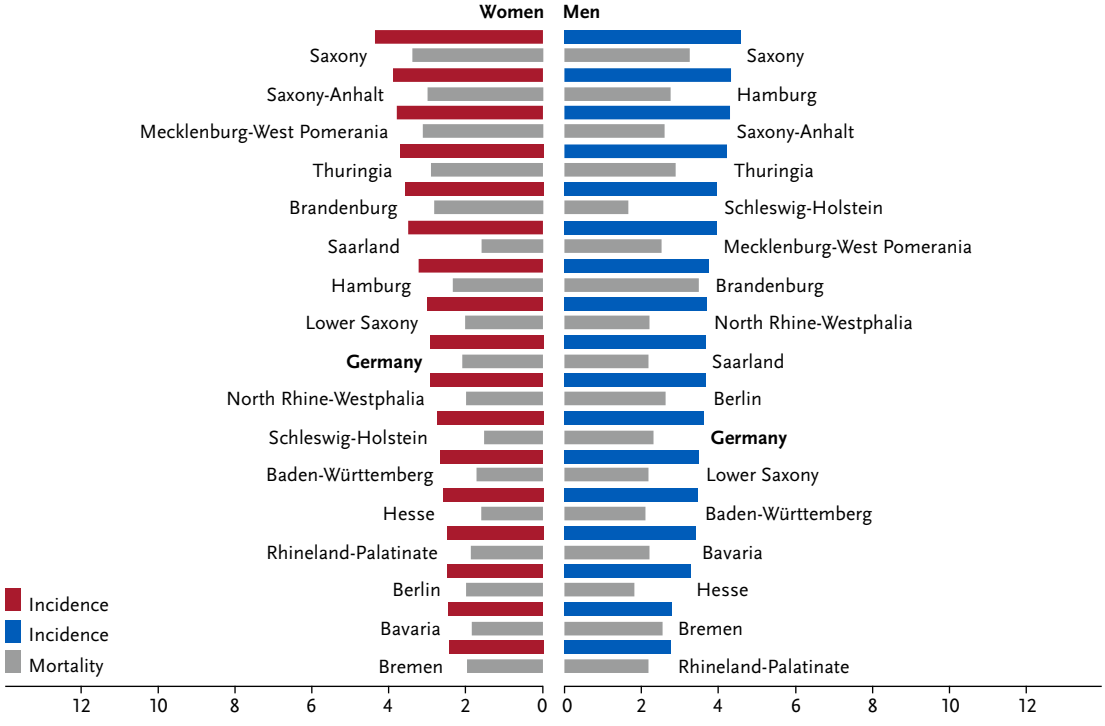
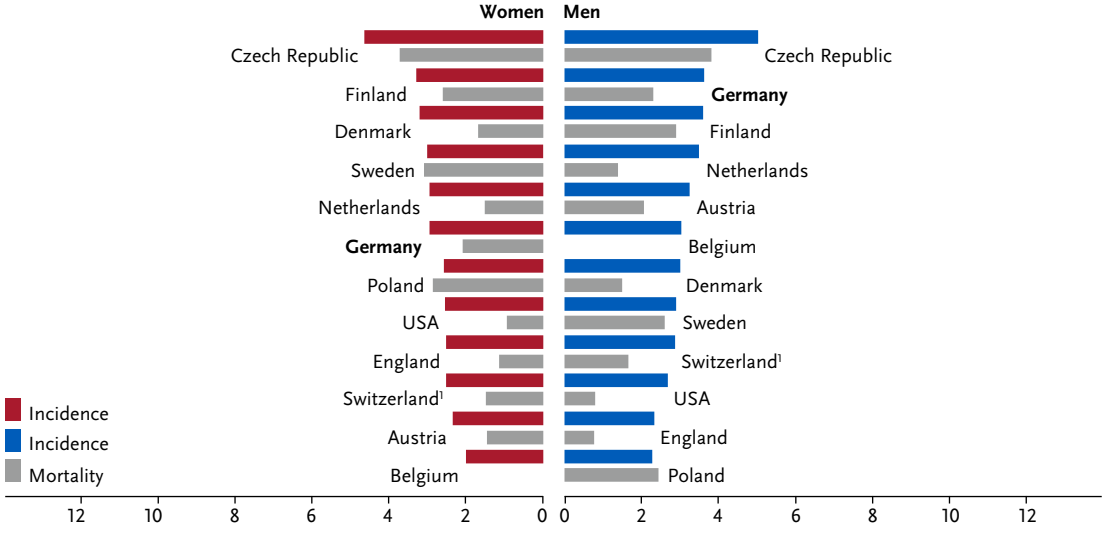


Figure 3.9.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C23 – C24, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.10 Pancreas

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	10,140	10,150	9,960	10,270		
Crude incidence rate [1]	24.1	24.8	23.6	25.0		
Age-standardised incidence rate [1, 2]	11.6	15.1	11.4	15.1		
Median age at diagnosis	76	72	76	72		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	9,638	9,584	9,474	9,448	9,602	9,570
Crude mortality rate [1]	22.9	23.4	22.5	23	22.8	23.3
Age-standardised mortality rate [1, 2]	10.3	13.8	10.0	13.4	10.0	13.3
Median age at death	78	74	78	74	80	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	11,600	11,500	15,100	15,700	17,900	19,200
Absolute survival rate (2019 – 2020) [3]	10 (8 – 14)	9 (6 – 12)	7 (6 – 10)	6 (4 – 8)		
Relative survival rate (2019 – 2020) [3]	11 (9 – 16)	11 (6 – 14)	9 (8 – 14)	9 (6 – 12)		

[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 2020, about 20,200 people were diagnosed with pancreatic cancer (pancreatic carcinoma). Due to the unfavourable prognosis, almost as many people died from this disease. Since the end of the 1990s, the age-standardised incidence and mortality rates have risen slightly, particularly in the older age groups of 65 years and over. The absolute number of new cases and deaths for both sexes has risen continuously over the years, partly due to demographic trends.

Malignant neoplasms of the pancreas often cause no or only unspecific symptoms in the early stages, meaning that the tumour is often only detected late. The relative 5-year survival rate is therefore extremely unfavourable. In Germany, it is 11% for women and men with pancreatic cancer. This means that pancreatic carcinoma has the lowest survival rate of all cancers apart from mesothelioma. With a proportion of 9.0% (women) and 7.5% (men), it is the fourth most common 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 recognised risk factors. Diabetes (type 2 diabetes mellitus) 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 HIV) are associated with the development of pancreatic cancer. First-degree relatives of patients with pancreatic cancer are affected more frequently than average. This may be due to hereditary factors, such as a BRCA 2 mutation, or a shared lifestyle. People who frequently eat processed meat products, smoked or grilled foods could also increase their 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 – 2020/2021
per 100,000 (old European Standard)

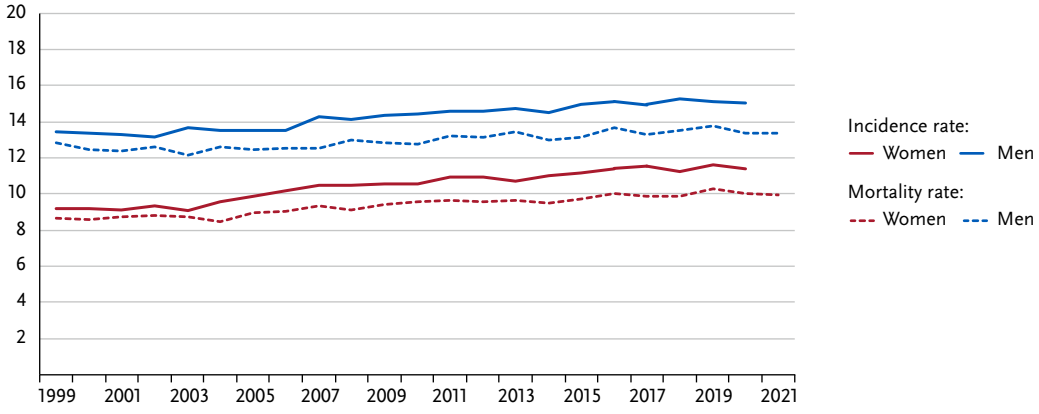


Figure 3.10.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C25, Germany 1999 – 2020/2021

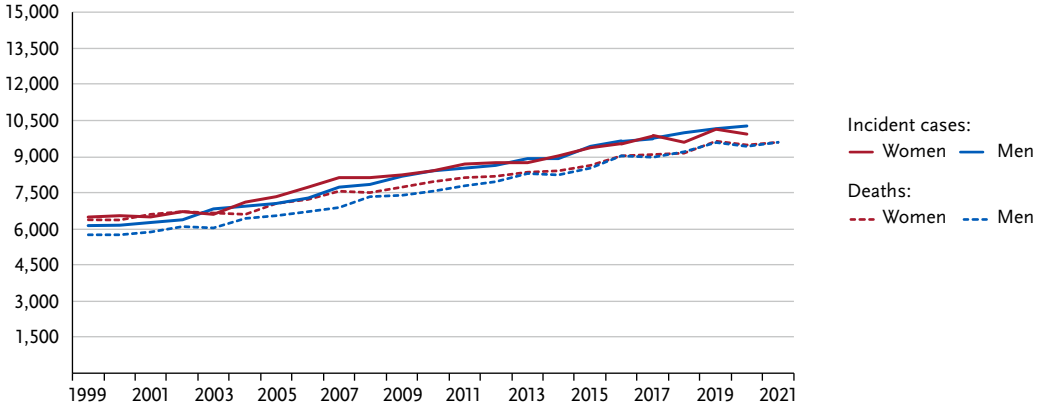


Figure 3.10.2
Age-specific incidence rates by sex, ICD-10 C25, Germany 2019 – 2020
per 100,000

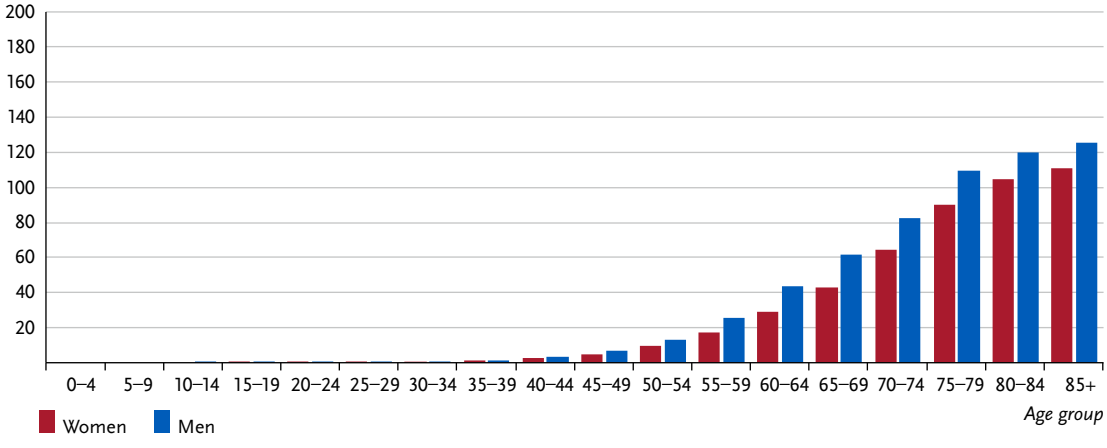


Table 3.10.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C25, database 2019

	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)	1.9 %	(1 in 52)	< 0.1 %	(1 in 11,400)	1.9 %	(1 in 54)
45 years	0.1 %	(1 in 1,300)	1.9 %	(1 in 52)	0.1 %	(1 in 2,000)	1.9 %	(1 in 54)
55 years	0.2 %	(1 in 440)	1.9 %	(1 in 53)	0.2 %	(1 in 540)	1.8 %	(1 in 54)
65 years	0.5 %	(1 in 190)	1.7 %	(1 in 58)	0.5 %	(1 in 210)	1.7 %	(1 in 57)
75 years	0.8 %	(1 in 120)	1.4 %	(1 in 73)	0.8 %	(1 in 120)	1.4 %	(1 in 69)
Lifetime risk			1.9 %	(1 in 52)			1.8 %	(1 in 54)
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 52)	< 0.1 %	(1 in 8,200)	1.9 %	(1 in 53)
45 years	0.1 %	(1 in 970)	1.9 %	(1 in 52)	0.1 %	(1 in 1,300)	1.9 %	(1 in 53)
55 years	0.3 %	(1 in 300)	1.9 %	(1 in 53)	0.3 %	(1 in 360)	1.9 %	(1 in 54)
65 years	0.7 %	(1 in 150)	1.7 %	(1 in 58)	0.6 %	(1 in 170)	1.7 %	(1 in 57)
75 years	0.9 %	(1 in 110)	1.3 %	(1 in 75)	0.9 %	(1 in 110)	1.4 %	(1 in 70)
Lifetime risk			1.9 %	(1 in 52)			0.4 %	(1 in 54)

Figure 3.10.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C25, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

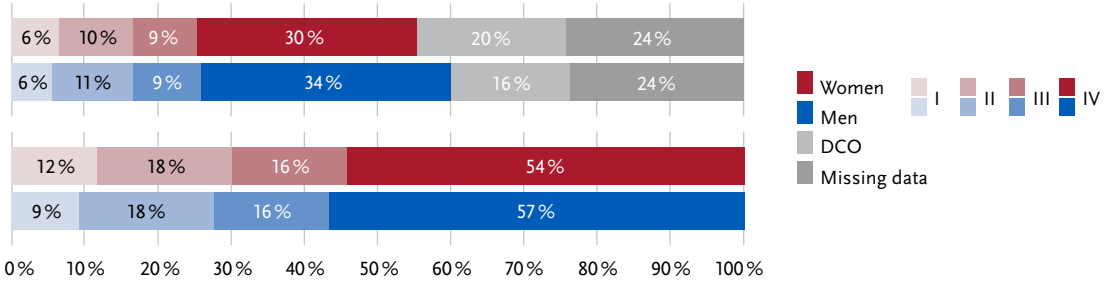


Figure 3.10.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C25, Germany 2019 – 2020

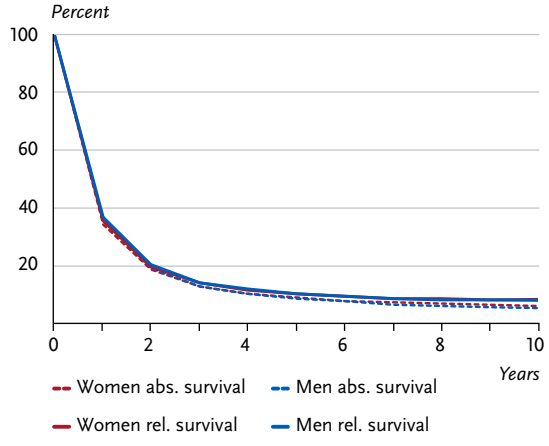


Figure 3.10.5
Relative 5-year survival by histology and sex, ICD-10 C25, Germany 2019 – 2020

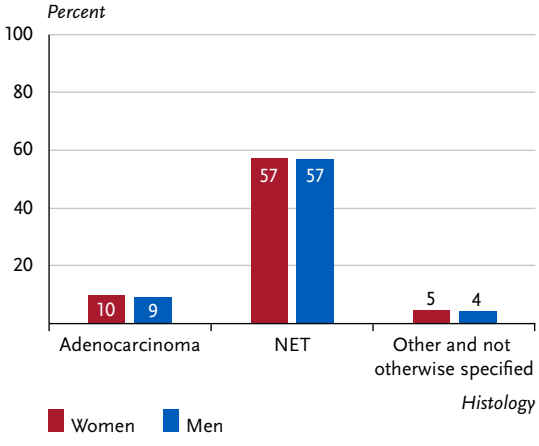


Figure 3.10.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C25, 2019 – 2020
per 100,000 (old European Standard)

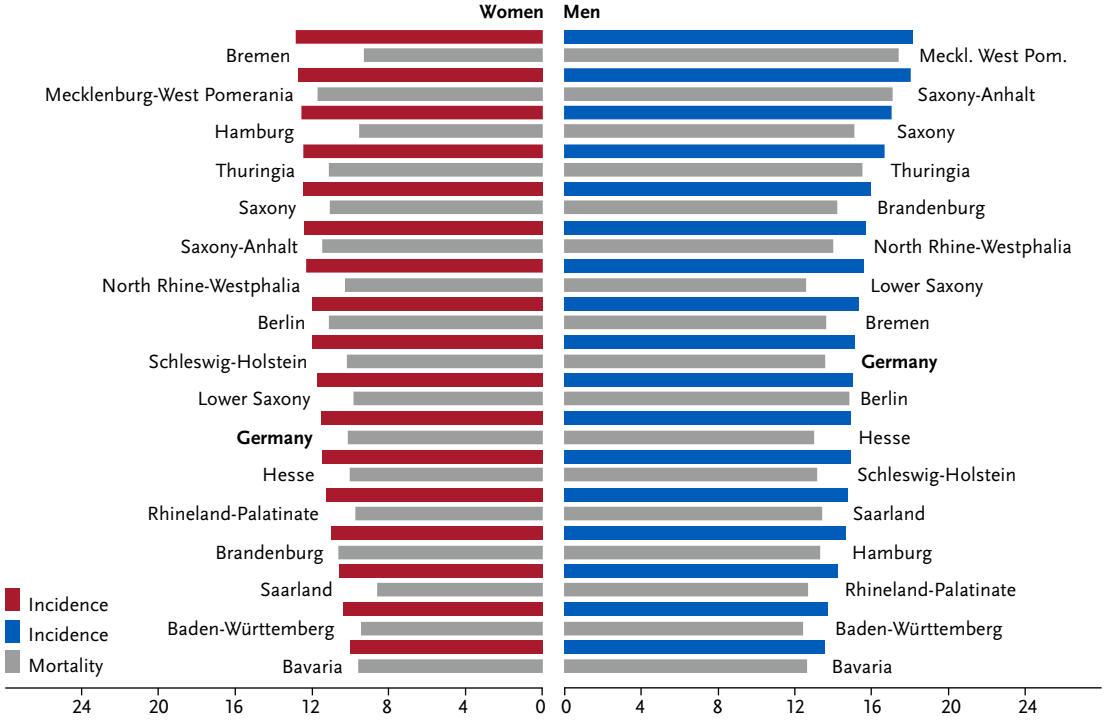
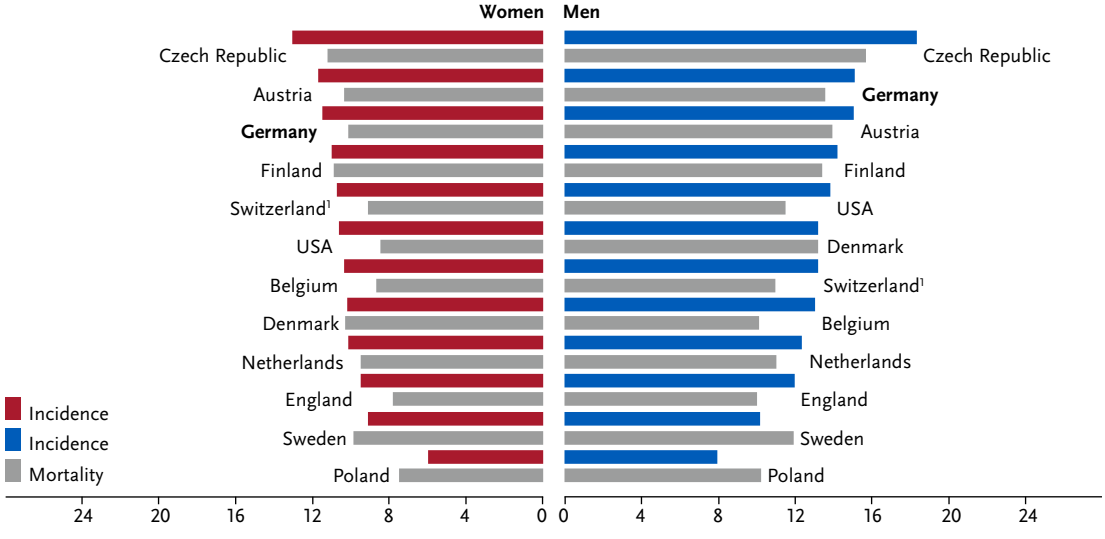


Figure 3.10.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C25, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.11 Larynx

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

Incidence	2019		2020			
	Women	Men	Women	Men		
Incident cases	550	2,990	510	2,690		
Crude incidence rate [1]	1.3	7.3	1.2	6.5		
Age-standardised incidence rate [1, 2]	0.9	4.9	0.8	4.3		
Median age at diagnosis	66	67	67	67		
Mortality	**2019**		**2020**		**2021**	
	Women	Men	Women	Men	Women	Men
Deaths	213	1,217	198	1,070	195	1,107
Crude mortality rate [1]	0.5	3.0	0.5	2.6	0.5	2.7
Age-standardised mortality rate [1, 2]	0.3	1.8	0.2	1.6	0.2	1.6
Median age at death	73	70	74	71	70	72
Prevalence and survival rates	**5 years**		**10 years**		**25 years**	
	Women	Men	Women	Men	Women	Men
Prevalence	2,000	10,400	3,400	17,300	5,300	28,200
Absolute survival rate (2019 – 2020) [3]	60	56 (48 – 59)	42	37 (30 – 41)		
Relative survival rate (2019 – 2020) [3]	65	64 (54 – 69)	51	51 (40 – 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

The larynx is almost only ever affected by squamous cell carcinomas. Men develop it significantly more often than women: Of the approximately 3,200 new cases in 2020, only about one in six affected women. Over the course of a lifetime, one in 200 men and only one in 1,000 women in Germany will develop laryngeal cancer. In 2020, the median age at diagnosis was 67 for women and men, which is earlier than for cancer overall. The age-specific incidence rates for women and men peak between the ages of 65 and 75.

The incidence and mortality rates for men have been falling 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 (65%) and men (64%) do not differ significantly. At 55%, a higher proportion of early tumour stages (stages I/II) are diagnosed in men than in women at 49% (according to the 8th TNM edition).

Risk factors

Regular cigarette consumption as well as excessive consumption of alcohol are the 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 uranium, aerosols containing sulphuric acid, polycyclic aromatic hydrocarbons and coal and tar products. Cement and wood dust appear to be less significant.

Infections with human papillomaviruses (HPV), in particular with the HPV high-risk type 16, are responsible for the development of a small proportion of laryngeal carcinomas.

The influence of lifestyle and diet is not yet clear, 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 laryngeal carcinomas sometimes occur more frequently 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 – 2020/2021
per 100,000 (old European Standard)

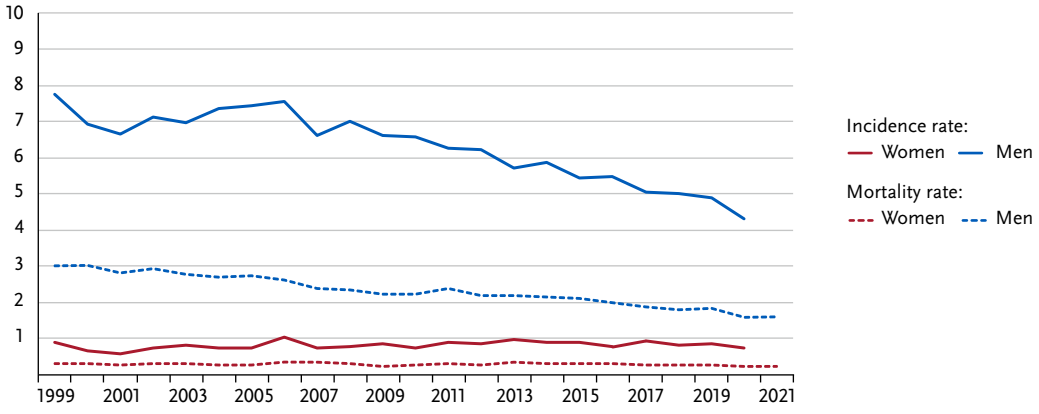


Figure 3.11.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C32, Germany 1999 – 2020/2021

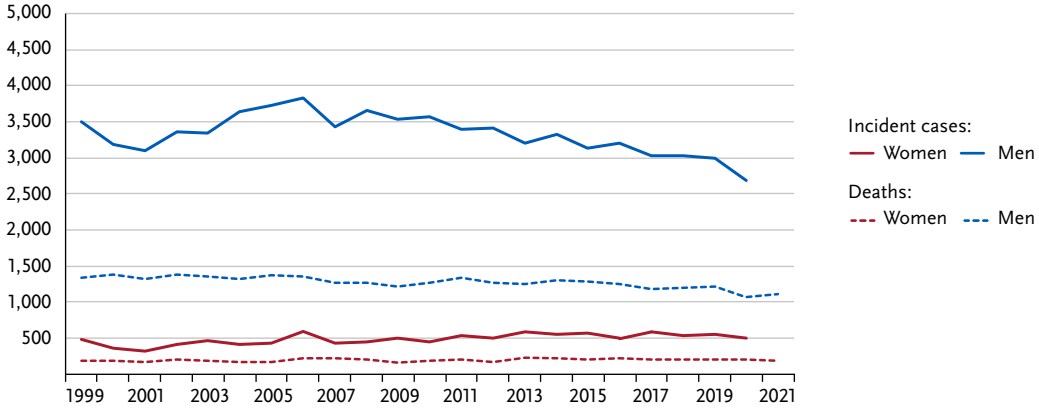


Figure 3.11.2
Age-specific incidence rates by sex, ICD-10 C32, Germany 2019 – 2020
per 100,000

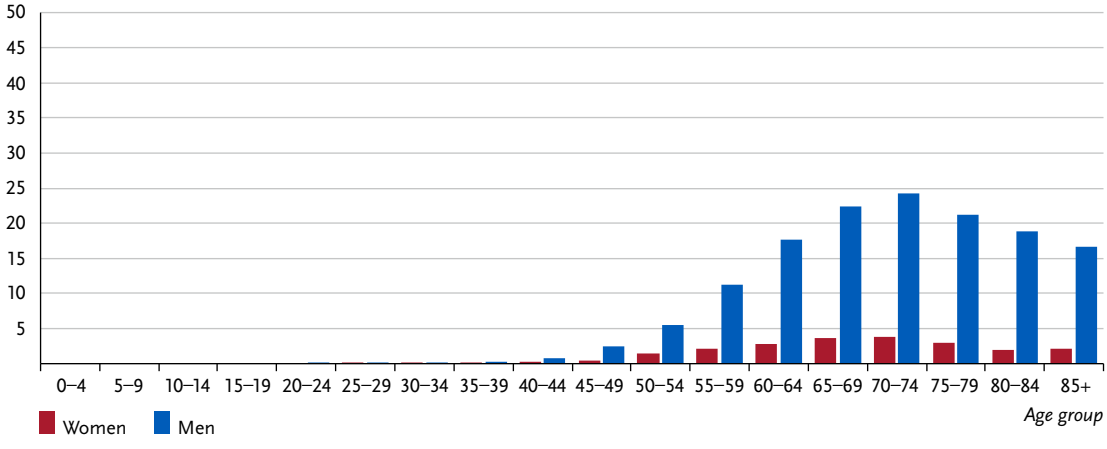


Table 3.11.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C32, database 2019

	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 36,000)	0.1 %	(1 in 1,000)	< 0.1 %	(1 in 2.143,900)	< 0.1 %	(1 in 2,500)
45 years	< 0.1 %	(1 in 10,700)	0.1 %	(1 in 1,100)	< 0.1 %	(1 in 124,100)	< 0.1 %	(1 in 2,500)
55 years	< 0.1 %	(1 in 3,800)	0.1 %	(1 in 1,200)	< 0.1 %	(1 in 16,400)	< 0.1 %	(1 in 2,500)
65 years	< 0.1 %	(1 in 2,700)	0.1 %	(1 in 1,600)	< 0.1 %	(1 in 5,900)	< 0.1 %	(1 in 2,800)
75 years	< 0.1 %	(1 in 4,300)	0.0 %	(1 in 3,300)	< 0.1 %	(1 in 6,700)	< 0.1 %	(1 in 4,700)
Lifetime risk			0.1 %	(1 in 1,000)			< 0.1 %	(1 in 2,500)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 12,300)	0.5 %	(1 in 180)	< 0.1 %	(1 in 91,600)	0.2 %	(1 in 440)
45 years	< 0.1 %	(1 in 2,300)	0.5 %	(1 in 190)	< 0.1 %	(1 in 8,400)	0.2 %	(1 in 430)
55 years	0.1 %	(1 in 690)	0.5 %	(1 in 190)	< 0.1 %	(1 in 2,100)	0.2 %	(1 in 440)
65 years	0.2 %	(1 in 450)	0.4 %	(1 in 250)	0.1 %	(1 in 1,200)	0.2 %	(1 in 510)
75 years	0.2 %	(1 in 590)	0.2 %	(1 in 430)	0.1 %	(1 in 1,100)	0.1 %	(1 in 720)
Lifetime risk			0.5 %	(1 in 190)			0.2 %	(1 in 440)

Figure 3.11.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C32, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

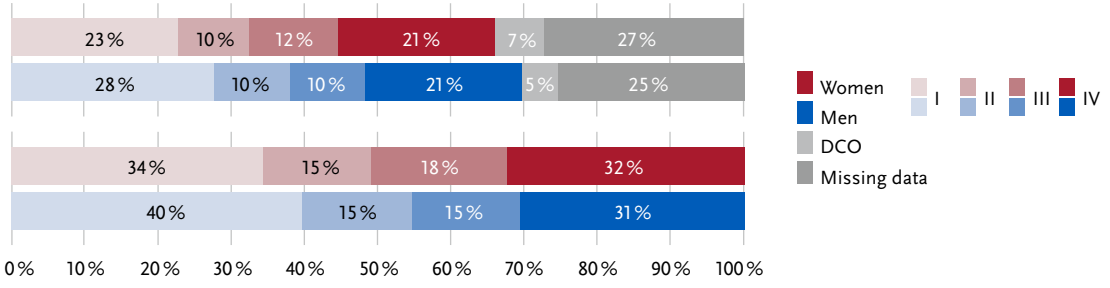


Figure 3.11.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C32, Germany 2019 – 2020

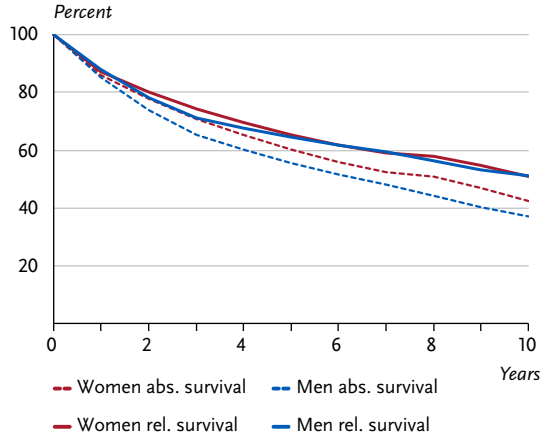


Figure 3.11.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C32, Germany 2019 – 2020

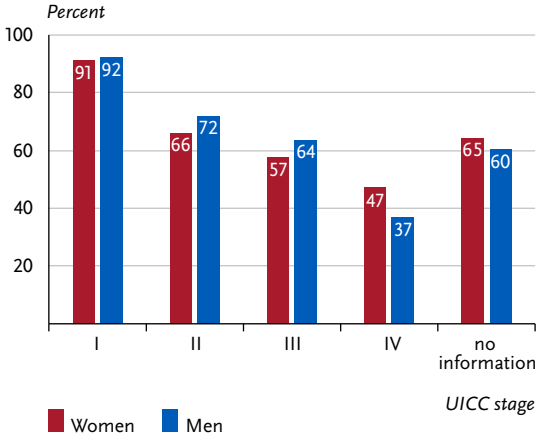


Figure 3.11.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C32, 2019 – 2020
per 100,000 (old European Standard)

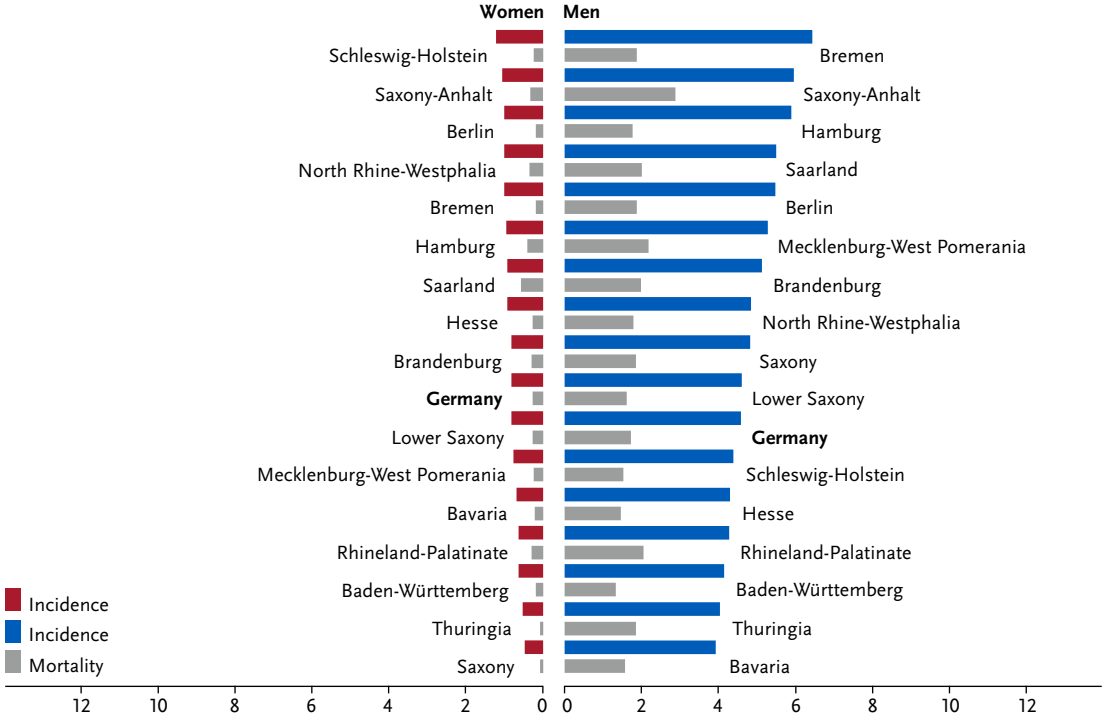
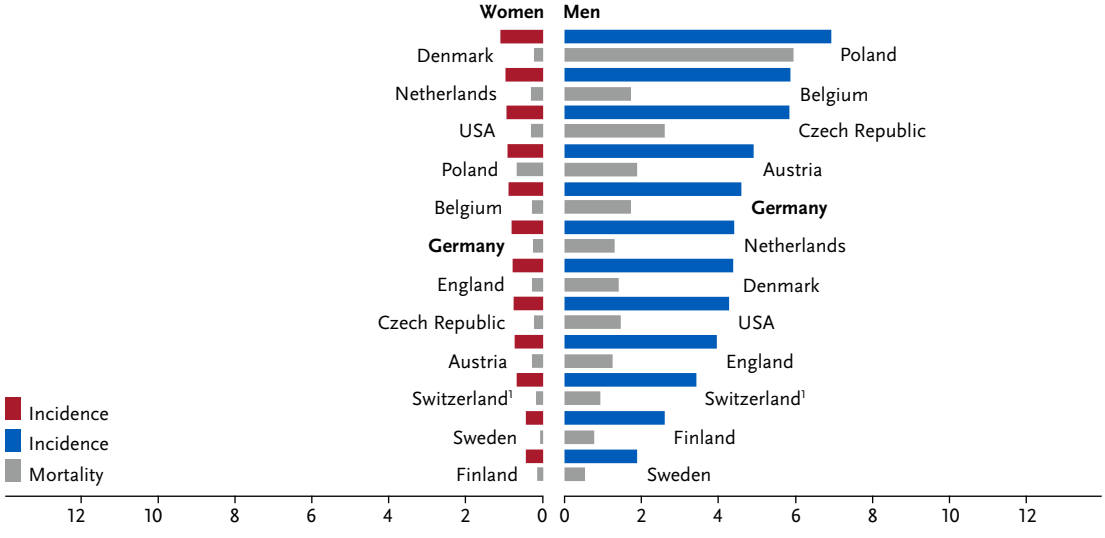


Figure 3.11.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C32, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.12 Lung

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	23,720	35,890	22,590	34,100		
Crude incidence rate [1]	56.3	87.5	53.6	83.1		
Age-standardised incidence rate [1, 2]	33.4	55.0	31.4	51.8		
Median age at diagnosis	69	70	69	70		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	16,999	27,882	17,066	27,751	17,413	27,225
Crude mortality rate [1]	40.4	68	40.5	67.6	41.3	66.3
Age-standardised mortality rate [1, 2]	22.2	41.1	21.9	40.5	22.1	39.3
Median age at death	72	72	72	72	71	72
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	41,300	55,500	57,500	77,300	72,400	101,300
Absolute survival rate (2019 – 2020) [3]	23 (20 – 27)	17 (15 – 20)	15 (13 – 18)	10 (8 – 13)		
Relative survival rate (2019 – 2020) [3]	25 (22 – 30)	19 (17 – 23)	19 (17 – 25)	14 (12 – 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 2020, about 22,600 women and 34,100 men developed malignant tumours of the lung, and 17,066 women and 27,751 men died of the disease.

The age-standardised incidence and mortality rates develop 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 have now 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 25% in women and 19% in men. Histologically, three main types are distinguished: Adenocarcinomas account for 44% of cases, squamous cell carcinomas for about 21% and small cell bronchial carcinomas 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 disease rates for women can be seen in Denmark and for men in Belgium.

Risk factors and early detection

Tobacco smoking is the main risk factor for the development of lung cancer. In Germany, an estimated nine out of ten cases in men and about eight out of ten cases in women are due to active smoking. Passive smoking also increases the risk of cancer.

Other risk factors play a smaller role. Diesel exhaust and particulate matter are the most important risk factors among air pollutants.

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.

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 cancer screening programmes 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 – 2020/2021
per 100,000 (old European Standard)

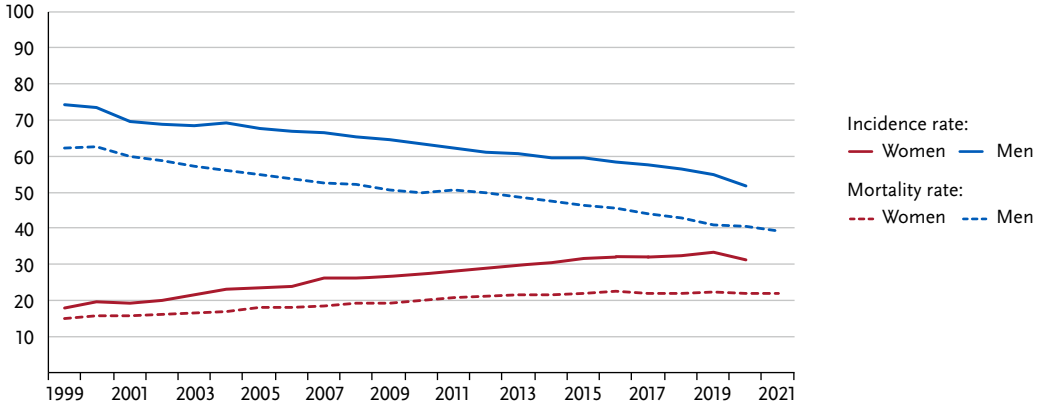


Figure 3.12.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C33 – C34, Germany 1999 – 2020/2021

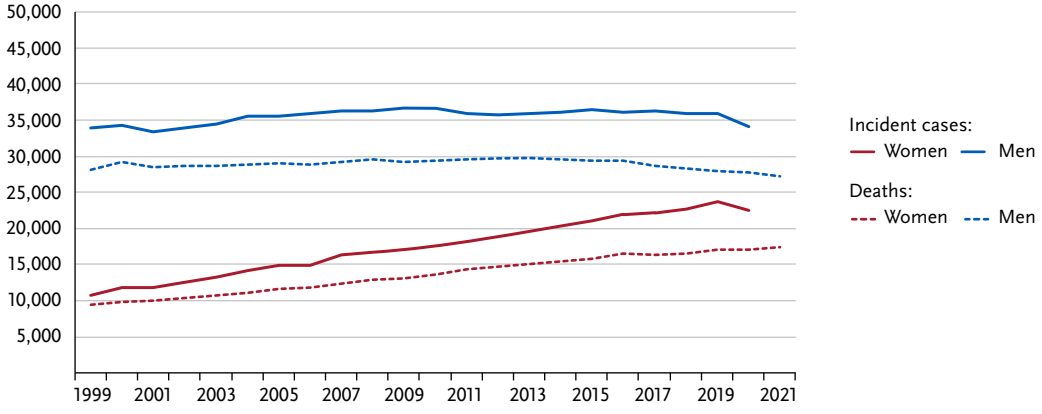


Figure 3.12.2
Age-specific incidence rates by sex, ICD-10 C33 – C34, Germany 2019 – 2020
per 100,000

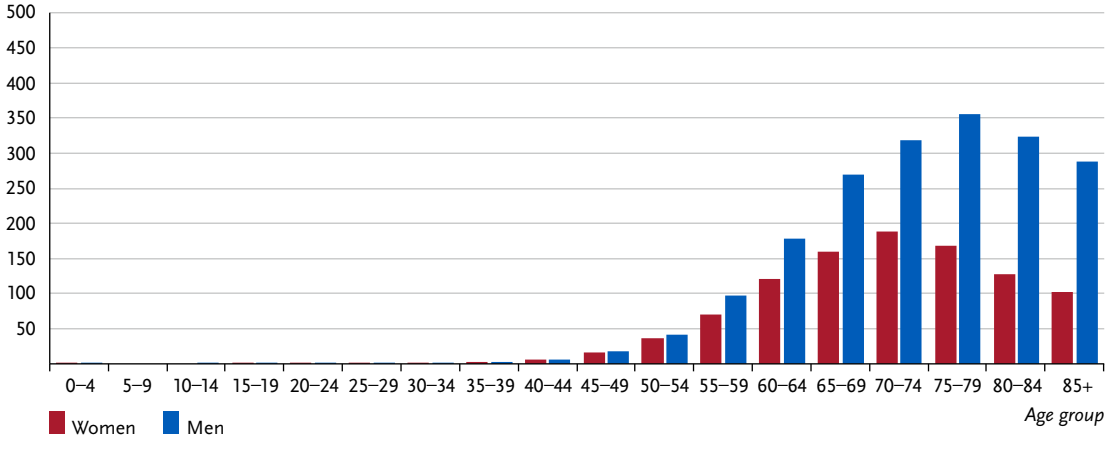


Table 3.12.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C33 – C34, database 2019

	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 1,900)	4.3 %	(1 in 23)	< 0.1 %	(1 in 4,400)	3.1 %	(1 in 32)
45 years	0.3 %	(1 in 350)	4.3 %	(1 in 23)	0.2 %	(1 in 620)	3.1 %	(1 in 32)
55 years	1.0 %	(1 in 100)	4.1 %	(1 in 25)	0.6 %	(1 in 170)	3.0 %	(1 in 33)
65 years	1.0 %	(1 in 61)	3.3 %	(1 in 31)	1.1 %	(1 in 90)	2.6 %	(1 in 39)
75 years	1.3 %	(1 in 75)	1.9 %	(1 in 54)	1.1 %	(1 in 93)	1.7 %	(1 in 60)
Lifetime risk			4.3 %	(1 in 23)			3.1 %	(1 in 32)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 1,900)	6.7 %	(1 in 15)	< 0.1 %	(1 in 3,800)	5.3 %	(1 in 19)
45 years	0.3 %	(1 in 300)	6.7 %	(1 in 15)	0.2 %	(1 in 500)	5.4 %	(1 in 19)
55 years	1.4 %	(1 in 72)	6.6 %	(1 in 15)	0.9 %	(1 in 100)	5.4 %	(1 in 19)
65 years	2.7 %	(1 in 37)	5.8 %	(1 in 17)	2.0 %	(1 in 50)	4.9 %	(1 in 21)
75 years	2.8 %	(1 in 36)	3.9 %	(1 in 26)	2.4 %	(1 in 41)	3.6 %	(1 in 28)
Lifetime risk			6.6 %	(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 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

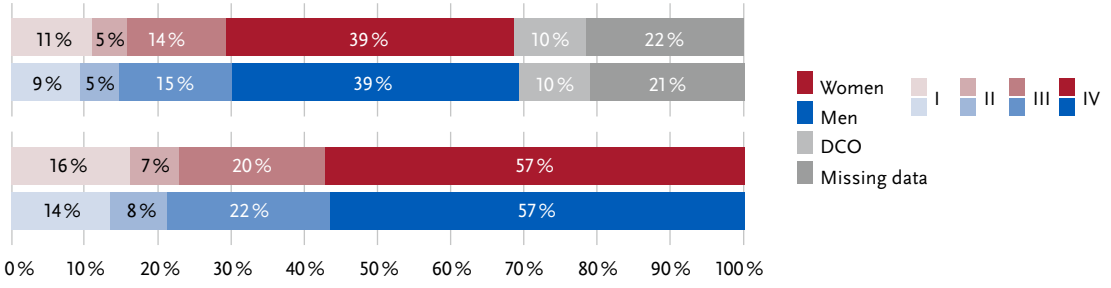


Figure 3.12.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C33 – C34, Germany 2019 – 2020

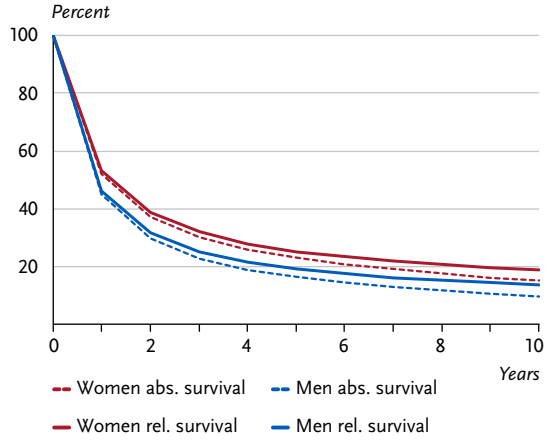


Figure 3.12.5
Relative 5-year survival by histology and sex, ICD-10 C33 – C34, Germany 2019 – 2020

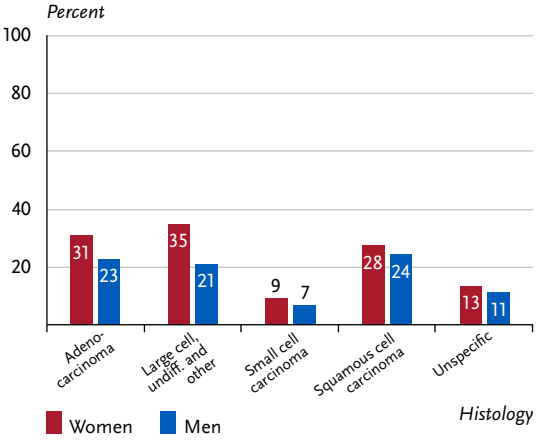


Figure 3.12.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C33 – C34, 2019 – 2020
per 100,000 (old European Standard)

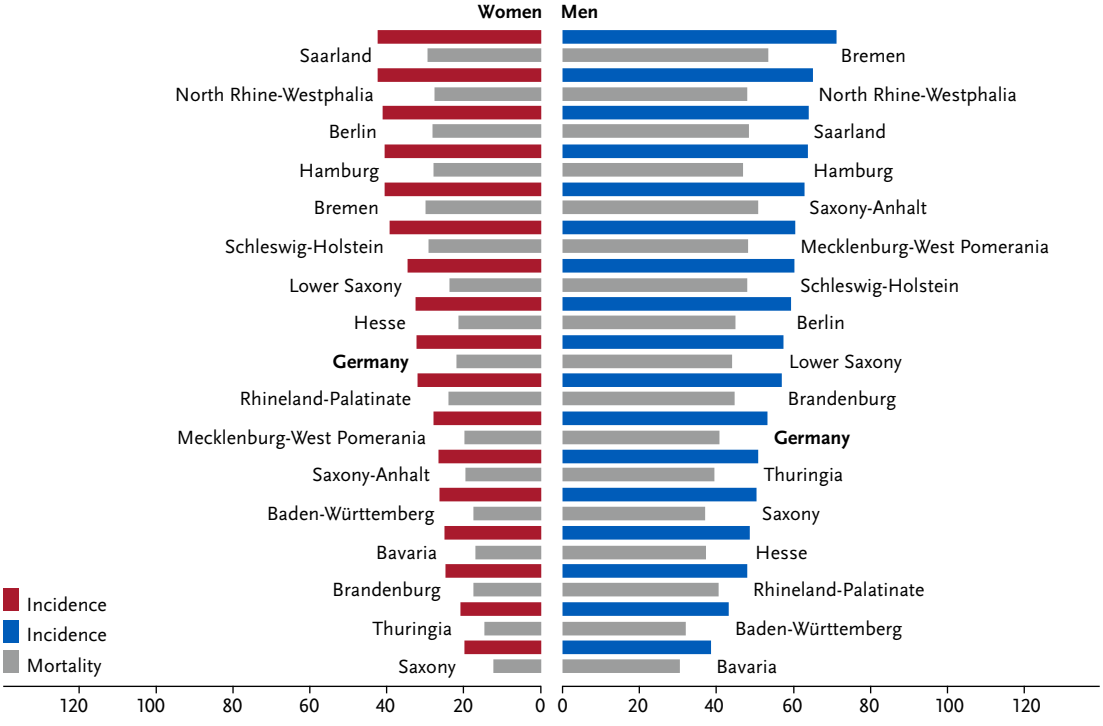
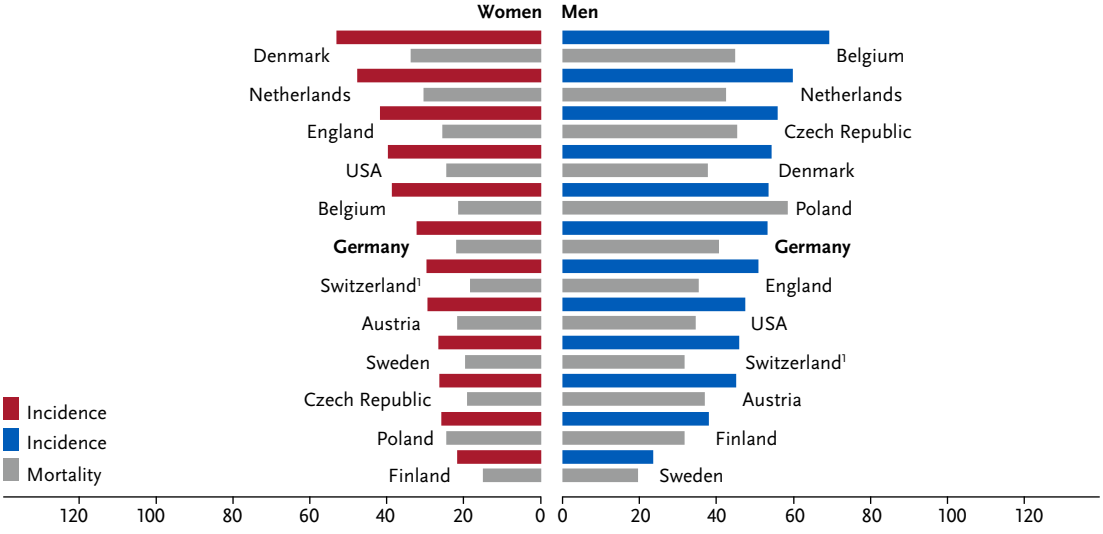


Figure 3.12.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C33 – C34, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.13 Malignant melanoma of the skin

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	11,720	13,130	11,320	12,240		
Crude incidence rate [1]	27.8	32.0	26.9	29.8		
Age-standardised incidence rate [1, 2]	19.8	21.5	19.1	19.9		
Median age at diagnosis	63	69	63	69		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	1,232	1,789	1,162	1,778	1,236	1,692
Crude mortality rate [1]	2.9	4.4	2.8	4.3	2.9	4.1
Age-standardised mortality rate [1, 2]	1.4	2.6	1.4	2.5	1.4	2.4
Median age at death	78	75	78	76	79	76
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	52,300	54,000	95,200	93,600	166,800	145,300
Absolute survival rate (2019 – 2020) [3]	85 (81 – 89)	78 (73 – 80)	76 (69 – 81)	65 (56 – 68)		
Relative survival rate (2019 – 2020) [3]	95 (92 – 97)	94 (89 – 96)	95 (87 – 97)	93 (83 – 97)		

[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 2020, about 23,560 people in Germany were diagnosed with malignant melanoma of the skin, including 11,320 women. The average age at diagnosis for women is comparatively low at 63, while the average age at diagnosis for men is 69. The age-standardised incidence rates for women and men rose sharply around 2008. This is probably due to the skin cancer screening programme introduced in Germany in July 2008. Since 2012, the incidence rate for women has fallen slightly and remained roughly constant for men, with a decline in 2020. Mortality rates have hardly changed for either sex since 1999. The predominant type of malignant melanoma is superficial spreading melanoma, which is associated with a favourable prognosis. Other forms, in particular nodular and amelanotic melanoma, have a substantially less favourable prognosis. Currently, the relative 5-year survival rate for women with malignant melanoma of the skin in Germany is 95% and 94% for men. Around 67% of all melanomas are discovered at an early tumour stage (UICC I). Among women, melanomas often occur on the lower extremities (legs and hips), among men predominantly on the trunk.

Risk factors and early detection

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

The most important congenital risk factors include particularly large pigmented moles ("liver spots") already present at birth and a light-coloured skin type. For persons already diagnosed with a melanoma, the risk of developing another melanoma increases. If at least one first-degree relative has a malignant melanoma, this may indicate an increased familial risk due to inherited mutations. Depending on the type of mutation and the gene affected, the risk of melanoma can be increased to varying degrees. A significant risk factor is also the number of benign pigmented moles that have appeared in the course of a lifetime, as well as the occurrence of atypical (dysplastic) pigmented moles.

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

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

Figure 3.13.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C43, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

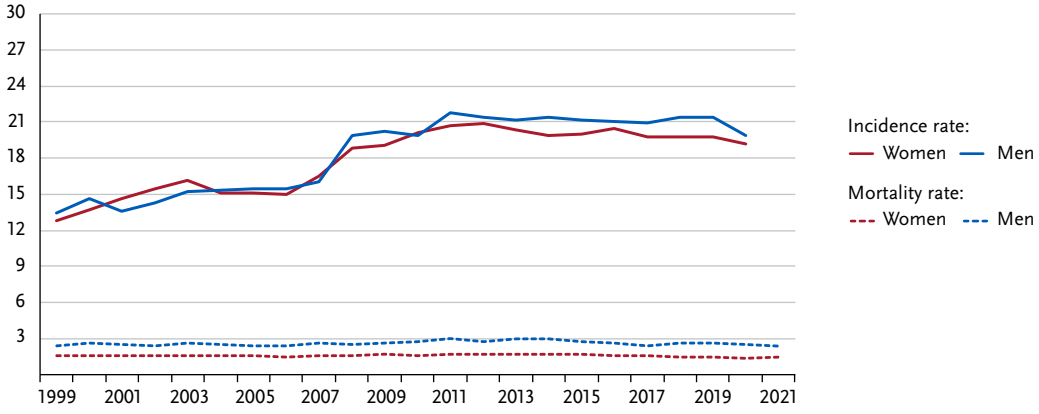


Figure 3.13.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C43, Germany 1999 – 2020/2021

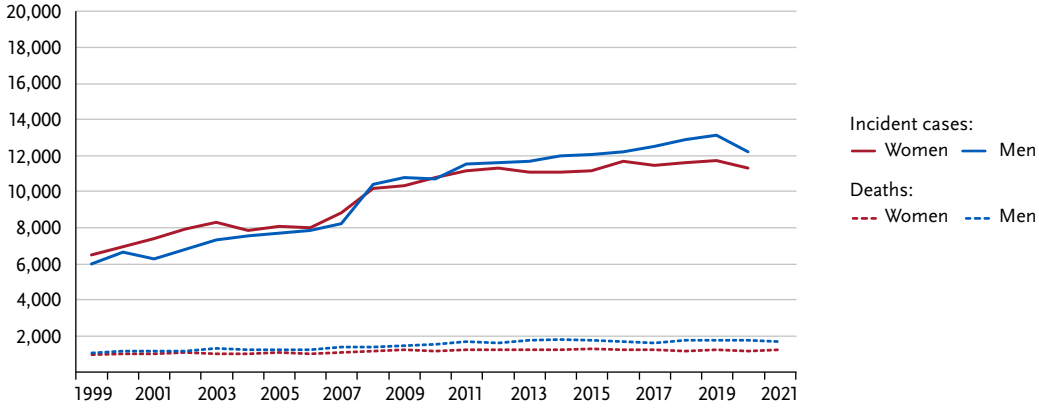


Figure 3.13.2
Age-specific incidence rates by sex, ICD-10 C43, Germany 2019 – 2020
per 100,000

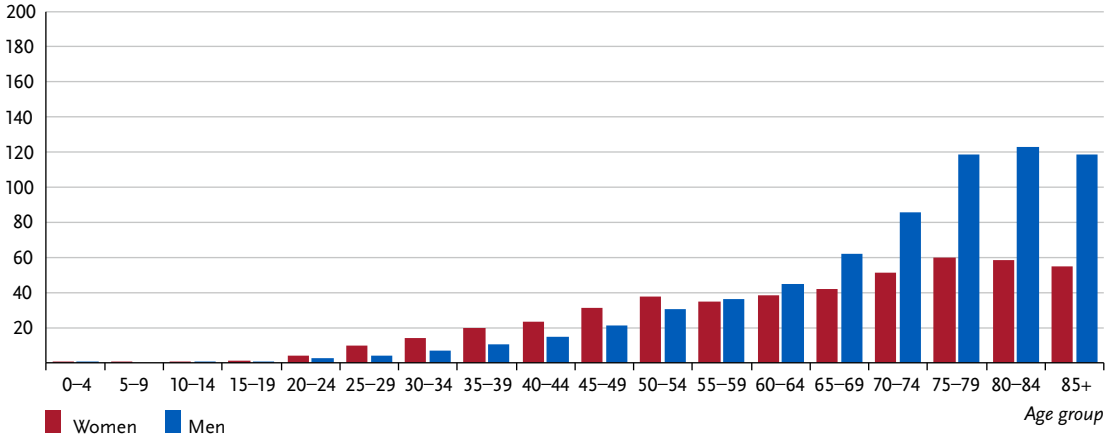


Table 3.13.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C43, database 2019

	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 450)	2.0 %	(1 in 50)	< 0.1 %	(1 in 18,800)	0.2 %	(1 in 420)
45 years	0.3 %	(1 in 290)	1.8 %	(1 in 56)	< 0.1 %	(1 in 6,400)	0.2 %	(1 in 430)
55 years	0.4 %	(1 in 270)	1.5 %	(1 in 68)	< 0.1 %	(1 in 4,400)	0.2 %	(1 in 450)
65 years	0.5 %	(1 in 220)	1.2 %	(1 in 86)	< 0.1 %	(1 in 2,100)	0.2 %	(1 in 480)
75 years	0.5 %	(1 in 190)	0.8 %	(1 in 130)	0.1 %	(1 in 1,100)	0.2 %	(1 in 540)
Lifetime risk			2.1 %	(1 in 47)			0.2 %	(1 in 420)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	0.1 %	(1 in 750)	2.4 %	(1 in 42)	< 0.1 %	(1 in 10,000)	0.4 %	(1 in 280)
45 years	0.3 %	(1 in 380)	2.3 %	(1 in 44)	< 0.1 %	(1 in 4,500)	0.3 %	(1 in 290)
55 years	0.4 %	(1 in 240)	2.1 %	(1 in 48)	< 0.1 %	(1 in 2,400)	0.3 %	(1 in 290)
65 years	0.7 %	(1 in 140)	1.8 %	(1 in 54)	0.1 %	(1 in 1,100)	0.3 %	(1 in 310)
75 years	1.0 %	(1 in 100)	1.4 %	(1 in 70)	0.2 %	(1 in 580)	0.3 %	(1 in 340)
Lifetime risk			2.4 %	(1 in 42)			0.4 %	(1 in 280)

Figure 3.13.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C43, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

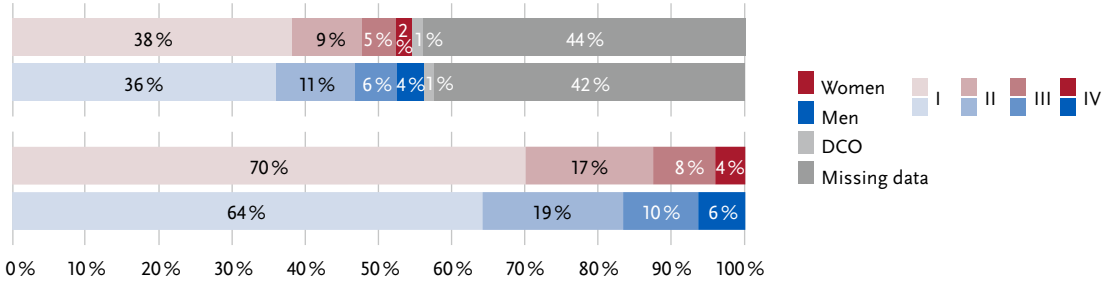


Figure 3.13.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C43, Germany 2019 – 2020

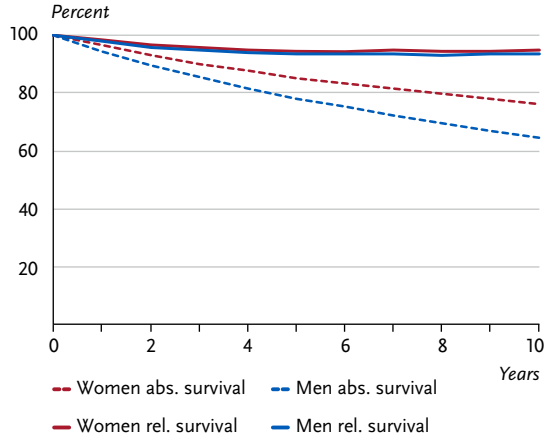


Figure 3.13.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C43, Germany 2019 – 2020

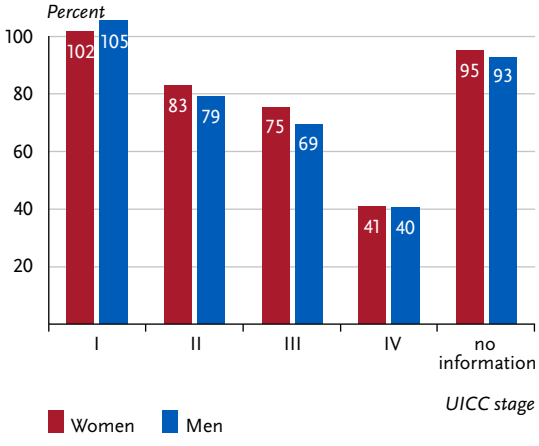


Figure 3.13.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C43, 2019 – 2020
per 100,000 (old European Standard)

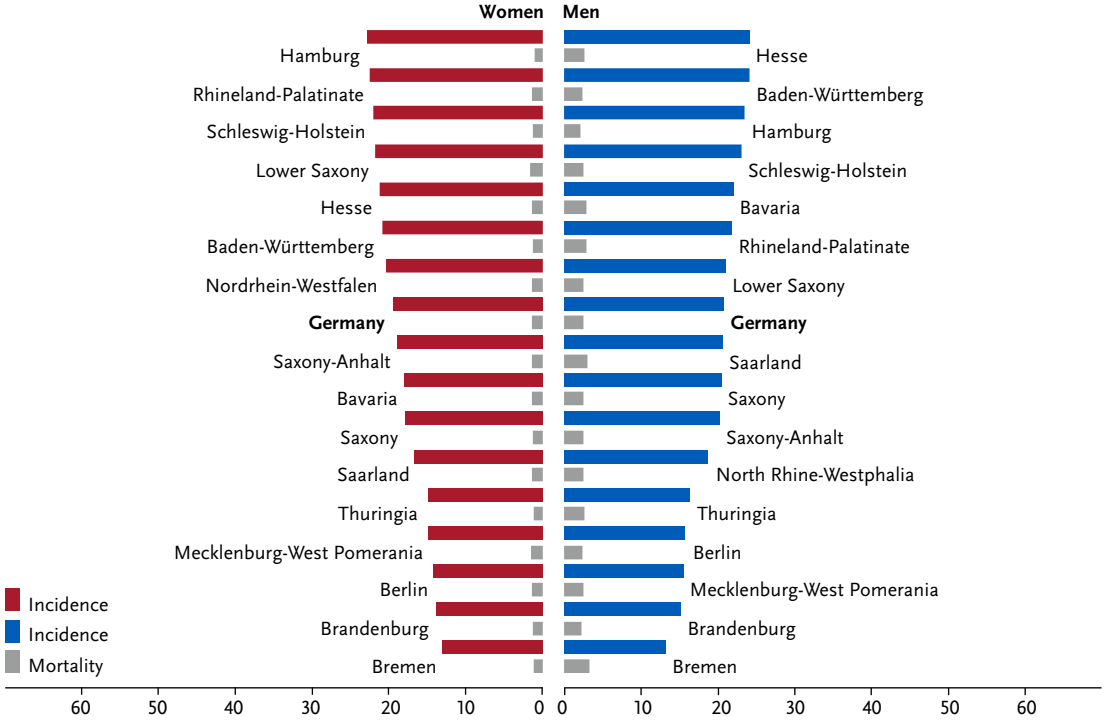
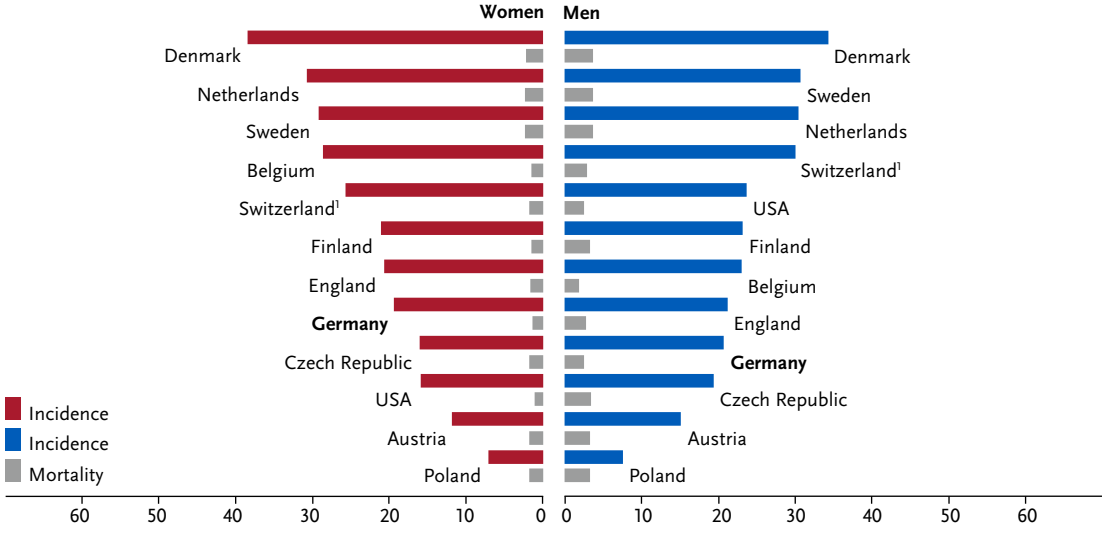


Figure 3.13.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C43, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.14 Non-melanoma skin cancer

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	103,710	118,720	96,490	112,300		
Crude incidence rate [1]	246.4	289.5	229.0	273.7		
Age-standardised incidence rate [1, 2]	133.7	168.8	123.5	157.6		
Median age at diagnosis	74	75	74	75		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	445	631	431	617	464	714
Crude mortality rate [1]	1.1	1.5	1.0	1.5	1.1	1.7
Age-standardised mortality rate [1, 2]	0.4	0.8	0.3	0.7	0.3	0.8
Median age at death	87	83	87	83	88	84
Survival rates		**5 years**		**10 years**		
	Women	Men	Women	Men		
Absolute survival rate (2019 – 2020) [3]	85 (84 – 86)	79 (77 – 81)	69 (68 – 71)	60 (57 – 63)		
Relative survival rate (2019 – 2020) [3]	103 (102 – 105)	103 (99 – 105)	108 (104 – 111)	106 (100 – 110)		

[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

Almost three quarters of non-melanotic forms of skin cancer are basal cell carcinomas (basaliomas). These only metastasise in exceptional cases, especially if the immune defence 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 quality of life. Around a quarter are squamous cell carcinomas, which mainly affect older people. Around two thirds of these tumours occur on the head or neck. One of the rarer forms is Merkel cell carcinoma, which belongs to the group of neuroendocrine tumours. In 2020, an estimated 209,000 people in Germany were diagnosed with non-melanotic skin cancer for the first time, compared to 1,180 deaths in 2021. After the introduction of skin cancer screening in mid-2008, the incidence rose significantly, although a slight decline has recently become apparent. Even if the international data situation is less good than for malignant melanoma, it can be assumed that the incidence of the disease has increased significantly in western industrialised nations in recent decades.

Risk factors

Anyone who has ever had non-melanoma skin cancer has an increased risk of developing it again. Actinic keratoses increase the risk of squamous cell carcinoma. Non-melanoma skin cancer can also develop after long-term exposure to arsenic, on skin damaged by radiation (for example after radiotherapy) or during immunosuppressive therapy, for example after an organ transplant.

The statutory cancer screening programme provides for a skin examination every two years by a doctor (dermatologist or General practitioner with appropriate training) 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 – 2020/2021
per 100,000 (old European Standard)

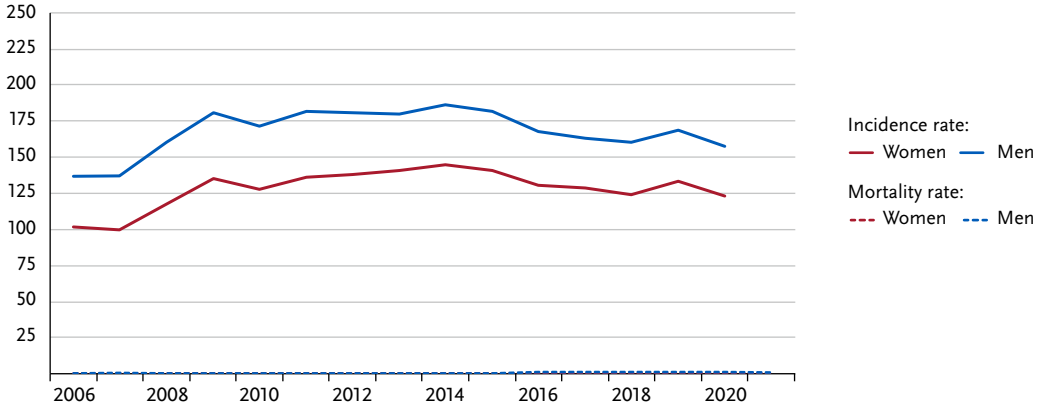


Figure 3.14.2
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C44, Germany 2019 – 2020

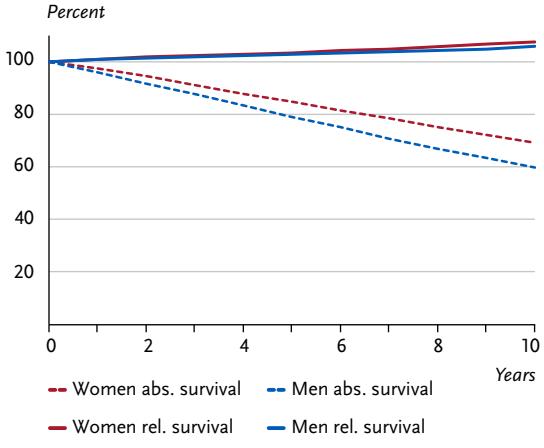


Figure 3.14.3
Relative 5-year survival by histology and sex, ICD-10 C44, Germany 2019 – 2020

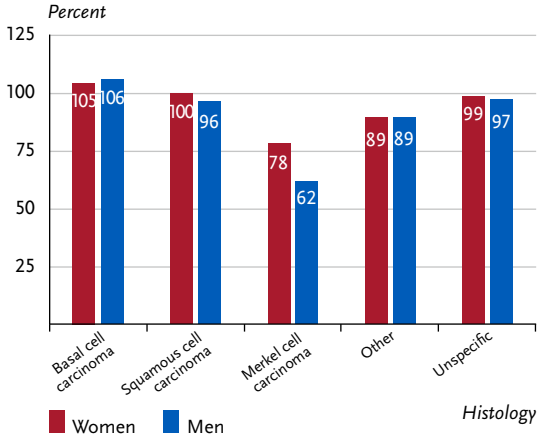
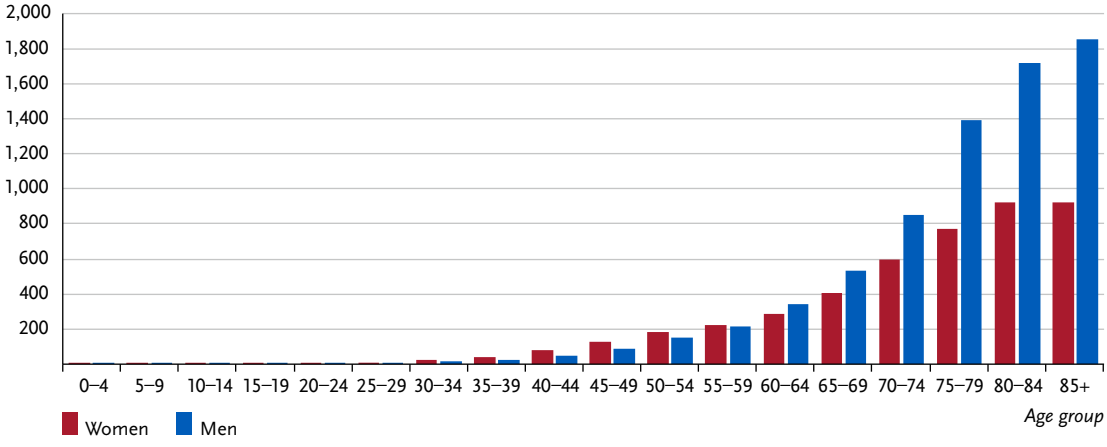


Figure 3.14.4
Age-specific incidence rates by sex, ICD-10 C44, Germany 2019 – 2020
per 100,000



3.15 Mesothelioma

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	330	1,270	290	1,190		
Crude incidence rate [1]	0.8	3.1	0.7	2.9		
Age-standardised incidence rate [1, 2]	0.4	1.6	0.3	1.5		
Median age at diagnosis	76	77	76	77		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	274	1,156	263	1,054	242	1,046
Crude mortality rate [1]	0.7	2.8	0.6	2.6	0.6	2.5
Age-standardised mortality rate [1, 2]	0.3	1.5	0.3	1.3	0.2	1.3
Median age at death	78	78	78	79	80	79
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	500	1,500	800	1,700	1,700	2,200
Absolute survival rate (2019 – 2020) [3]	12	7	8	3		
Relative survival rate (2019 – 2020) [3]	14	8	10	5		

[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 mainly occurs in older men. The most common localisation is the pleura; the disease is rarely diagnosed in the peritoneum. In 2020, around 290 women and 1,190 men were diagnosed in Germany. In the last 10 years, the incidence and mortality rates in Germany have been falling continuously, and the absolute numbers have also recently declined slightly. Comparatively high incidence rates can be seen today in north-west Germany at (former) shipbuilding sites, for example in Bremen and neighbouring regions and in some cases also at steel industry sites, such as in the Ruhr area. Occasionally, regions around former production sites for asbestos products are also affected. With relative 5-year survival rates of 14% for women and 8% for men, mesothelioma is one of the tumour diseases with a very unfavourable prognosis; accordingly, the number of annual deaths (1,288 in 2021) is only slightly lower than the number of new cases.

Risk factors

Asbestos exposure is responsible for the majority of newly diagnosed mesotheliomas. The risk depends primarily on the type of fibre and the amount of asbestos inhaled. The processing of asbestos was generally banned in Germany in 1993 and later throughout the EU. However, a decline in the number of mesothelioma cases is only expected with a time lag, as there can be a period of 30 to 50 years between exposure and the manifestation of the disease.

People who worked in the construction industry are primarily at an increased risk of asbestos exposure. In 2020, 824 asbestos-related mesotheliomas were recognised as occupational diseases by the employers' liability insurance associations. In addition to occupational exposure, contact with asbestos can also occur in the private sphere, e.g. when washing asbestos-contaminated clothing or during private 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 radiotherapy 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 – 2020/2021
per 100,000 (old European Standard)

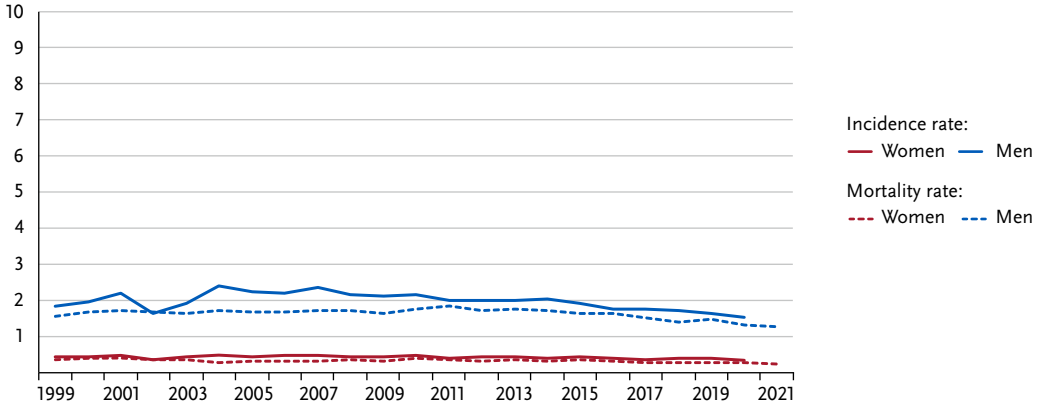


Figure 3.15.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C45, Germany 1999 – 2020/2021

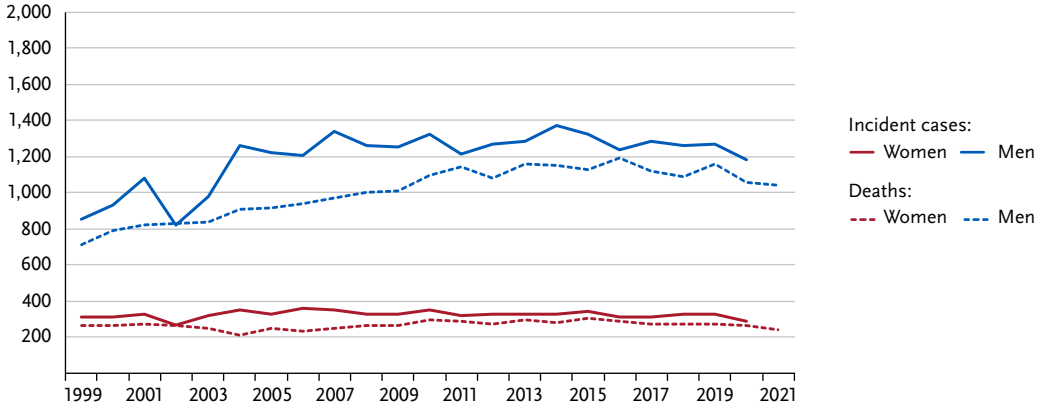


Figure 3.15.2
Age-specific incidence rates by sex, ICD-10 C45, Germany 2019 – 2020
per 100,000

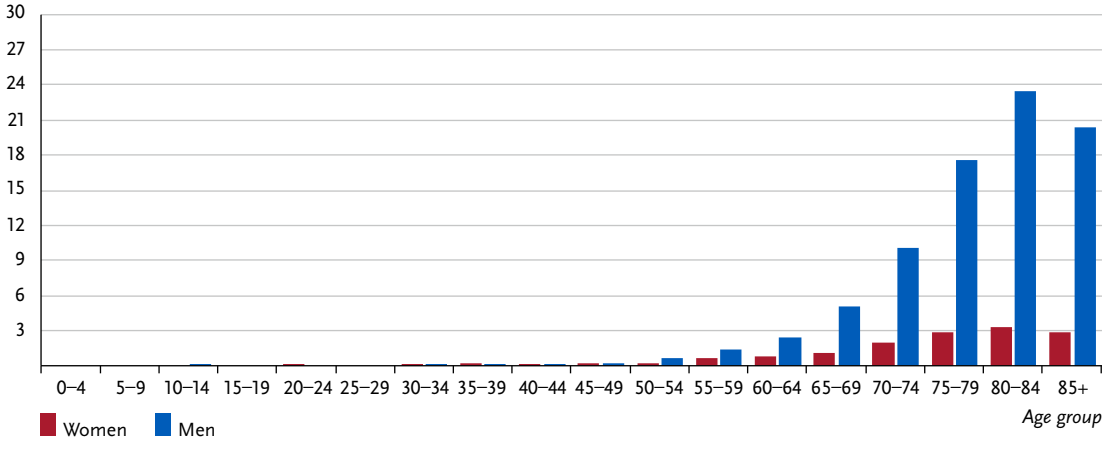


Table 3.15.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C45, database 2019

	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 46,400)	0.1 %	(1 in 1,600)	< 0.1 %	(1 in 253,600)	0.1 %	(1 in 1,900)
45 years	< 0.1 %	(1 in 34,400)	0.1 %	(1 in 1,700)	< 0.1 %	(1 in 82,500)	0.1 %	(1 in 1,900)
55 years	< 0.1 %	(1 in 12,800)	0.1 %	(1 in 1,700)	< 0.1 %	(1 in 22,400)	0.1 %	(1 in 1,900)
65 years	< 0.1 %	(1 in 6,600)	0.1 %	(1 in 1,900)	< 0.1 %	(1 in 7,800)	< 0.1 %	(1 in 2,000)
75 years	< 0.1 %	(1 in 3,700)	< 0.1 %	(1 in 2,400)	< 0.1 %	(1 in 3,700)	< 0.1 %	(1 in 2,400)
Lifetime risk			0.1 %	(1 in 1,600)			0.1 %	(1 in 1,900)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 141,500)	0.3 %	(1 in 400)	< 0.1 %	(1 in 188,400)	0.2 %	(1 in 430)
45 years	< 0.1 %	(1 in 17,600)	0.3 %	(1 in 400)	< 0.1 %	(1 in 25,500)	0.2 %	(1 in 420)
55 years	< 0.1 %	(1 in 5,000)	0.3 %	(1 in 390)	< 0.1 %	(1 in 6,600)	0.2 %	(1 in 420)
65 years	0.1 %	(1 in 1,400)	0.3 %	(1 in 390)	0.1 %	(1 in 1,500)	0.2 %	(1 in 400)
75 years	0.2 %	(1 in 610)	0.2 %	(1 in 430)	0.2 %	(1 in 660)	0.2 %	(1 in 440)
Lifetime risk			0.2 %	(1 in 410)			0.2 %	(1 in 430)

Figure 3.15.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C45, Germany 2019-2020
(top: incl. missing data and DCO cases; bottom: valid values only)

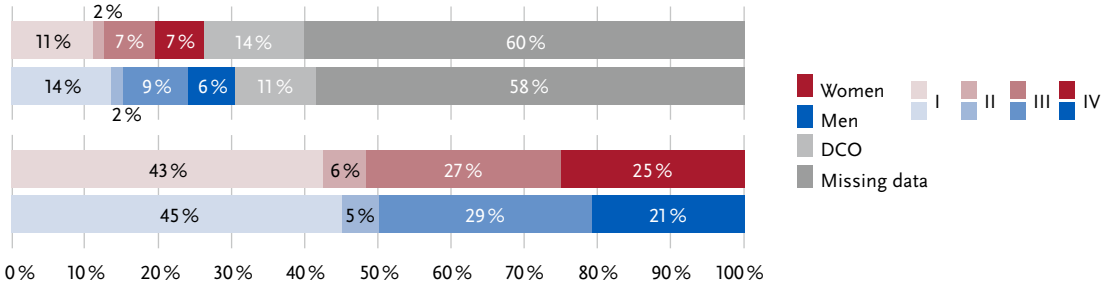


Figure 3.15.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C45, Germany 2019 – 2020

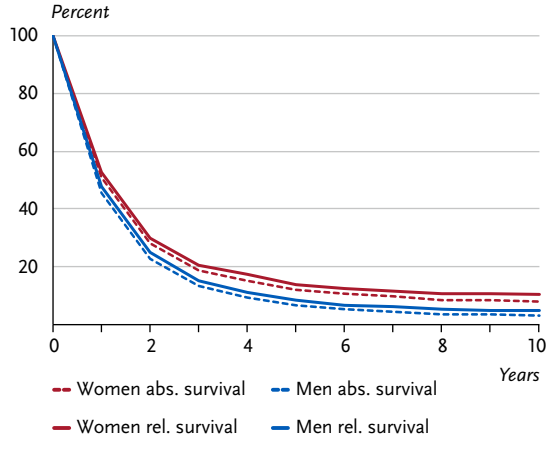


Figure 3.15.5
Relatives 5-year survival by site and sex, ICD-10 C45, Germany 2019 – 2020

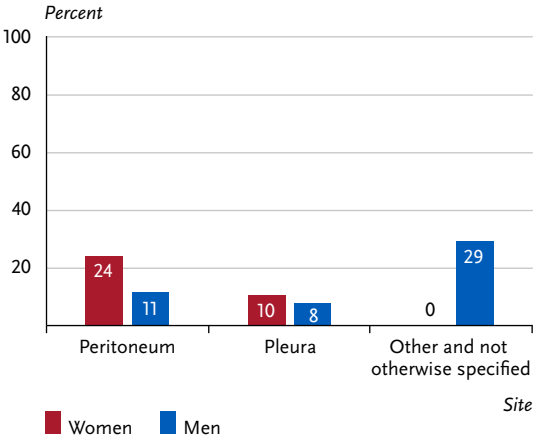


Figure 3.15.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C45, 2019 – 2020
per 100,000 (old European Standard)

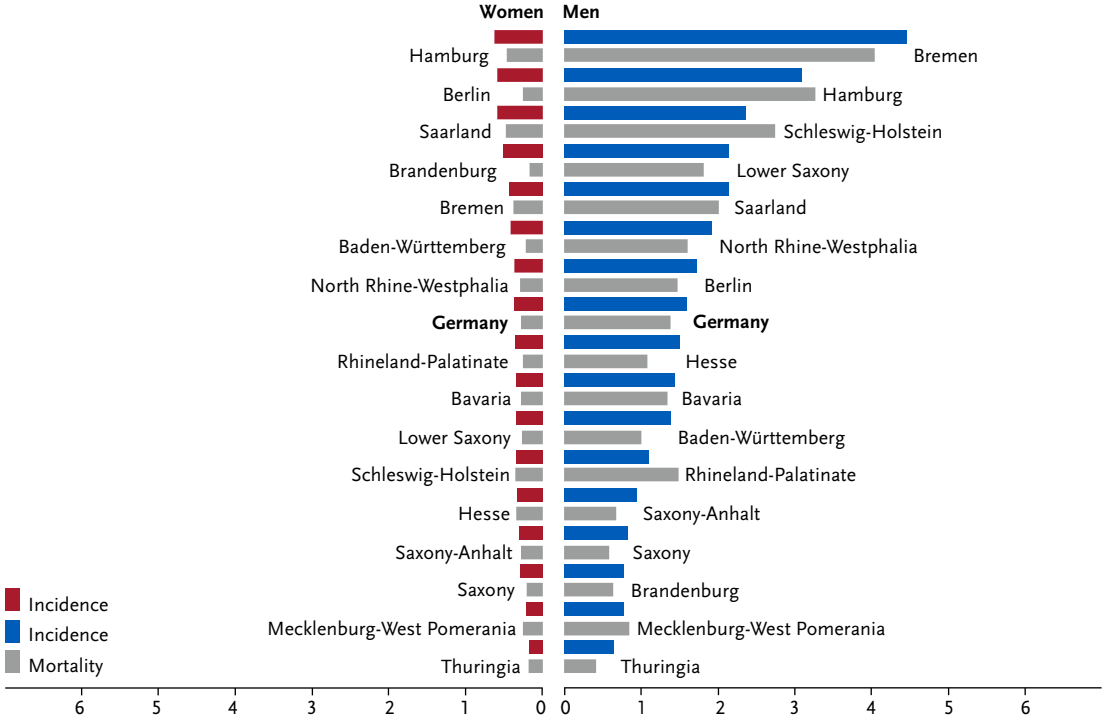
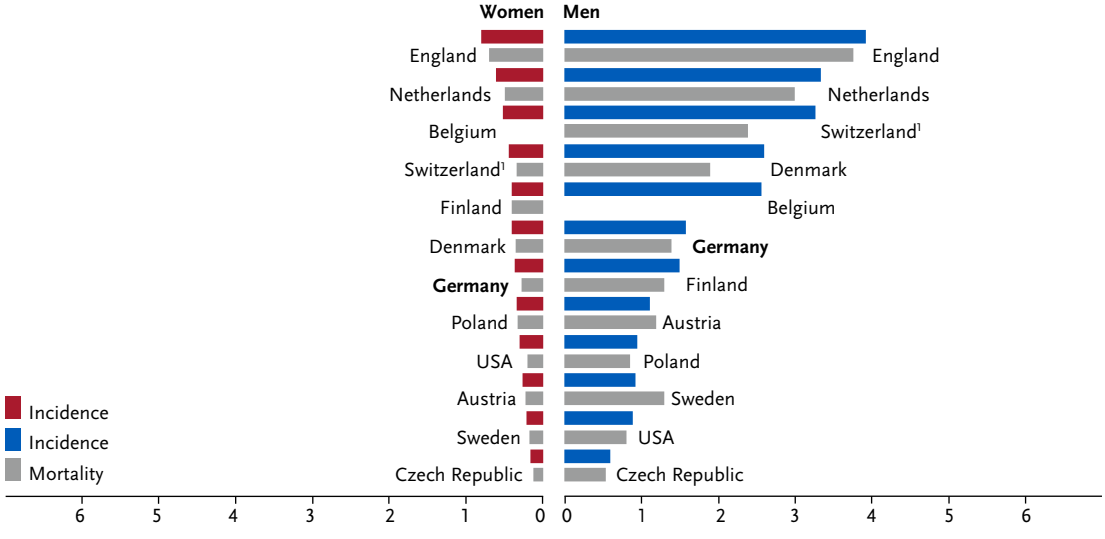


Figure 3.15.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C45, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.16 Malignant neoplasms of soft tissue without mesothelioma

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	2,160	2,550	2,190	2,420		
Crude incidence rate [1]	5.1	6.2	5.2	5.9		
Age-standardised incidence rate [1, 2]	3.4	4.3	3.4	4.0		
Median age at diagnosis	68	69	69	69		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	991	961	908	927	964	909
Crude mortality rate [1]	2.3	2.4	2.2	2.2	2.3	2.3
Age-standardised mortality rate [1, 2]	1.3	1.5	1.2	1.4	1.3	1.4
Median age at death	74	72	74	73	72	72
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	7,000	7,900	11,100	12,900	18,000	20,300
Absolute survival rate (2019 – 2020) [3]	47 (34 – 53)	53 (39 – 57)	35 (25 – 43)	40 (33 – 45)		
Relative survival rate (2019 – 2020) [3]	53 (39 – 61)	63 (46 – 69)	46 (31 – 54)	58 (44 – 65)		

[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 tissue, the peritoneum and the retroperitoneal soft tissue behind it. They also include the rare Kaposi's sarcomas that occur on the skin (3% of the diagnostic group). Since, in contrast to carcinomas, soft tissue tumours do not predominantly develop from covering or glandular tissue, but from connective tissue structures, sarcomas represent the majority of soft tissue tumours overall.

Leiomyosarcoma originating in smooth muscle tissue and liposarcoma (malignant fatty tissue tumour) are the most common forms in adults alongside fibrosarcoma. In contrast, rhabdomyosarcomas originating in skeletal muscle tissue occur almost exclusively in children and adolescents. The approximately 4,600 new cases of malignant soft tissue tumours that have been diagnosed each year are compared to around 1,870 deaths. Age-standardised incidence and mortality rates for malignant soft tissue tumours have initially risen in Germany since 1999, but the rates have stabilised since around 2015.

Risk factors

In most cases, no clear cause for the development of a soft tissue sarcoma can be found. Sarcomas can occur more frequently in patients with rare hereditary tumour syndromes. The presence of one or more genetic variants is also likely to have an influence on the risk of developing the disease.

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

Environmental toxins and chemicals can possibly contribute to the development of sarcomas. A connection between vinyl chloride and angiosarcomas of the liver is considered certain. Chronic inflammatory processes presumably also increase the risk of soft tissue sarcomas. In addition, chronic lymphoedema following a mastectomy can, in rare cases, lead to the development of angiosarcoma (Stewart-Treves syndrome).

An influence of diet or other lifestyle factors such as smoking or alcohol 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 – 2020/2021
per 100,000 (old European Standard)

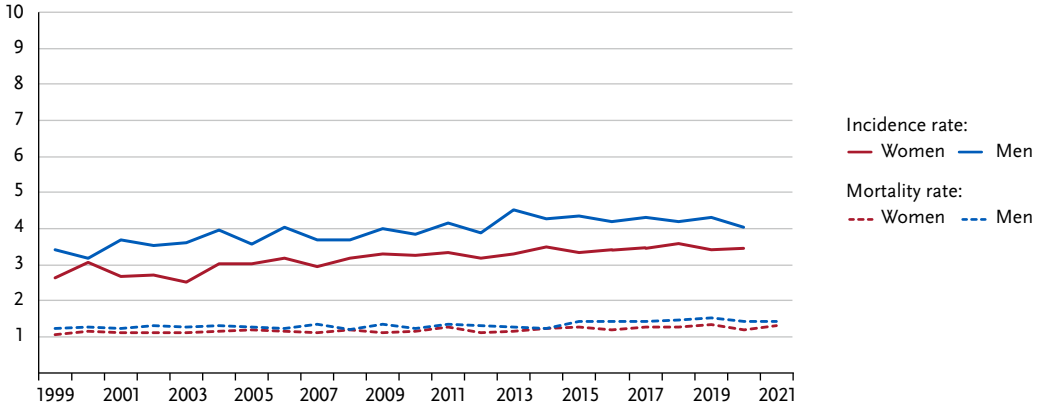


Figure 3.16.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C46 – C49, Germany 1999 – 2020/2021

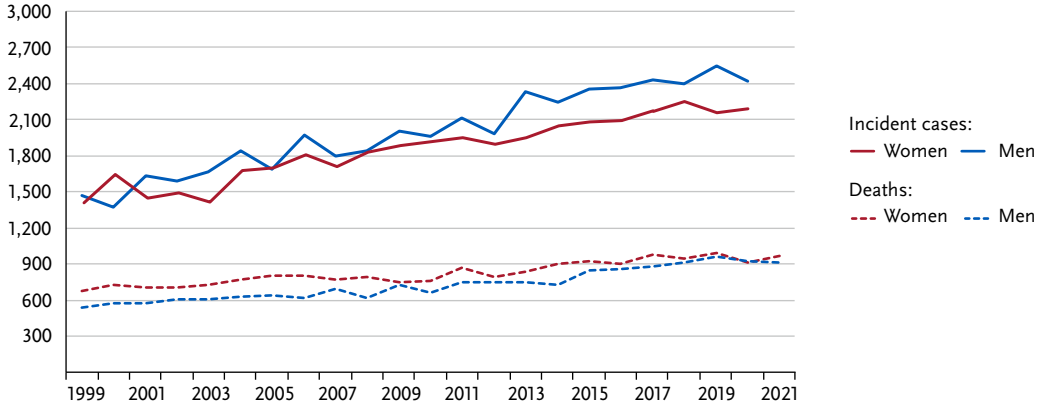


Figure 3.16.2
Age-specific incidence rates by sex, ICD-10 C46 – C49, Germany 2019 – 2020
per 100,000

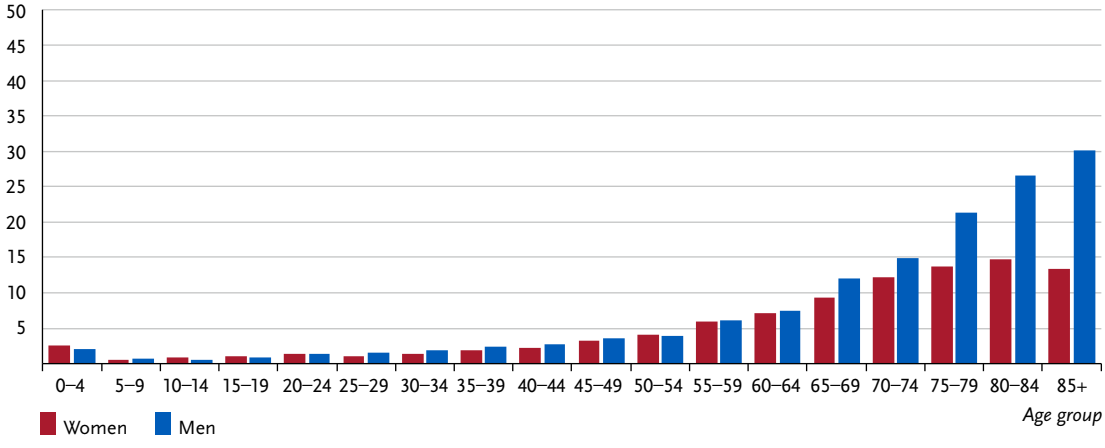


Table 3.16.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C46 – C49, database 2019

	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 4,600)	0.4 %	(1 in 280)	< 0.1 %	(1 in 14,900)	0.2 %	(1 in 560)
45 years	< 0.1 %	(1 in 2,700)	0.3 %	(1 in 290)	< 0.1 %	(1 in 7,600)	0.2 %	(1 in 580)
55 years	0.1 %	(1 in 1,600)	0.3 %	(1 in 320)	< 0.1 %	(1 in 4,100)	0.2 %	(1 in 620)
65 years	0.1 %	(1 in 990)	0.3 %	(1 in 380)	< 0.1 %	(1 in 2,200)	0.1 %	(1 in 690)
75 years	0.1 %	(1 in 850)	0.2 %	(1 in 550)	0.1 %	(1 in 1,500)	0.1 %	(1 in 890)
Lifetime risk			0.4 %	(1 in 250)			0.2 %	(1 in 530)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 3,800)	0.4 %	(1 in 220)	< 0.1 %	(1 in 13,500)	0.2 %	(1 in 570)
45 years	< 0.1 %	(1 in 2,400)	0.4 %	(1 in 230)	< 0.1 %	(1 in 8,000)	0.2 %	(1 in 580)
55 years	0.1 %	(1 in 1,500)	0.4 %	(1 in 250)	< 0.1 %	(1 in 3,900)	0.2 %	(1 in 610)
65 years	0.1 %	(1 in 800)	0.4 %	(1 in 280)	< 0.1 %	(1 in 2,300)	0.2 %	(1 in 660)
75 years	0.2 %	(1 in 530)	0.3 %	(1 in 330)	0.1 %	(1 in 1,200)	0.1 %	(1 in 740)
Lifetime risk			0.5 %	(1 in 210)			0.2 %	(1 in 530)

Figure 3.16.3
Proportion of morphologic groups of malignant soft tissue tumours by sex, ICD-10 C46 – C49, Germany 2019 – 2020

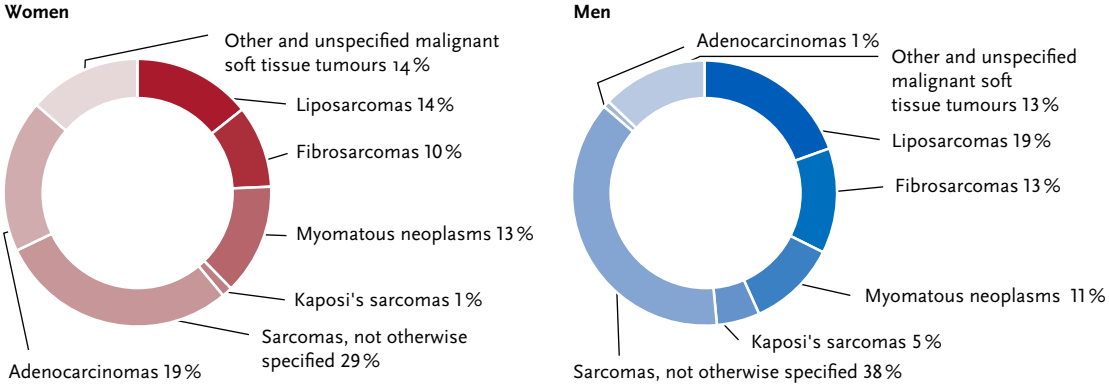


Figure 3.16.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C46 – C49, Germany 2019 – 2020

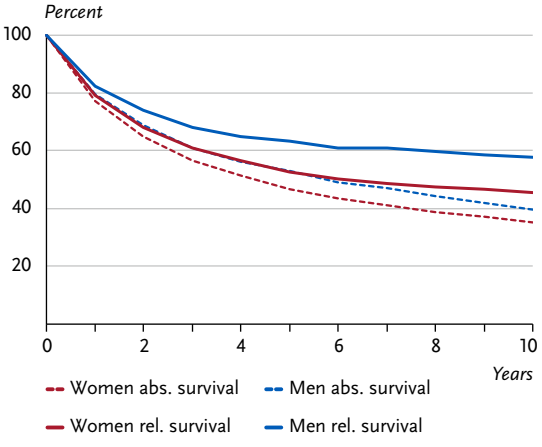


Figure 3.16.5
Relative 5-year survival by histology and sex, ICD-10 C46 – C49, Germany 2019 – 2020

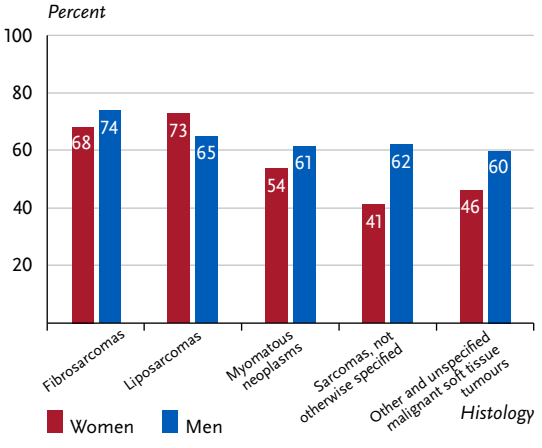


Figure 3.16.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C46 – C49, 2019 – 2020
per 100,000 (old European Standard)

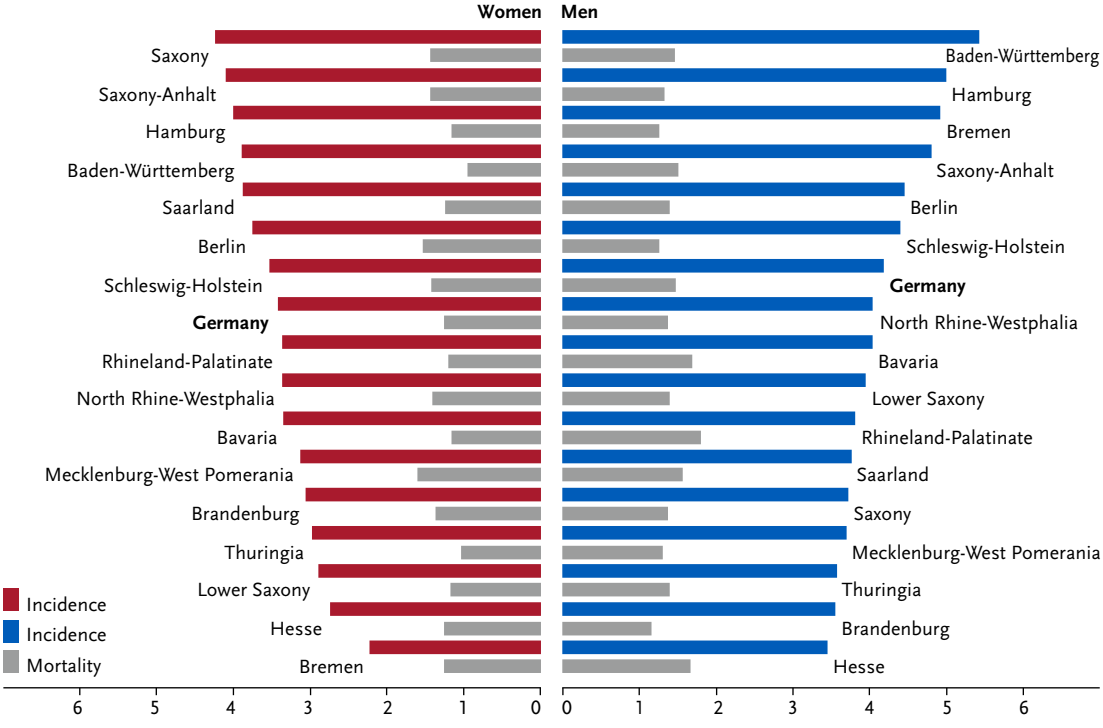
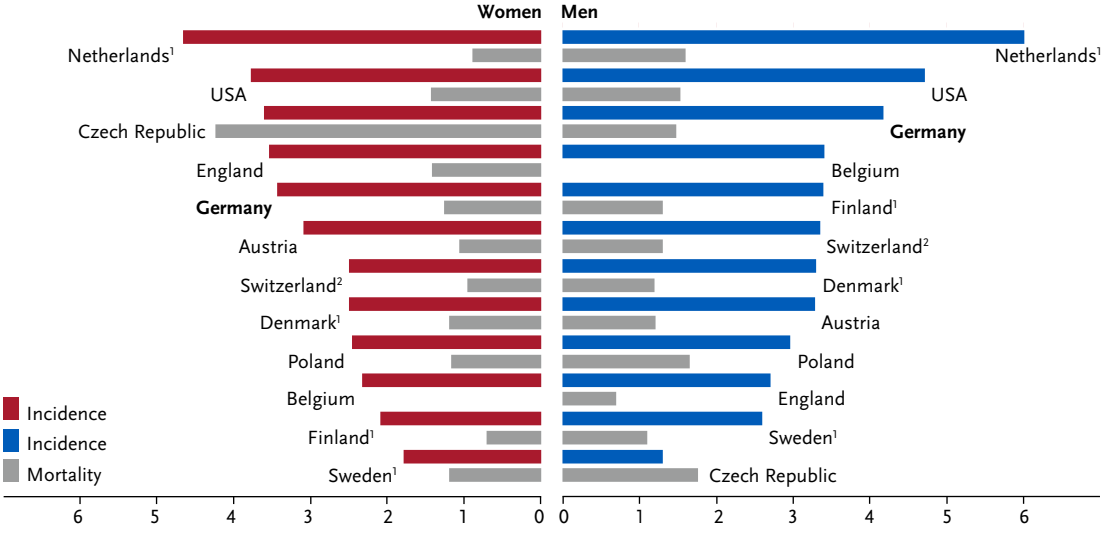


Figure 3.16.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C46 – C49, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Netherlands, Denmark, Sweden, Finland: data only for C49
[2] Switzerland: incidence data for 2015 – 2019

3.17 Breast

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	74,240	720	70,550	740		
Crude incidence rate [1]	176.4	1.7	167.5	1.8		
Age-standardised incidence rate [1, 2]	118.7	1.1	112.7	1.1		
Median age at diagnosis	65	71	65	71		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	18,519	193	18,425	166	18,479	157
Crude mortality rate [1]	44.0	0.5	43.7	0.4	43.8	0.4
Age-standardised mortality rate [1, 2]	22.3	0.3	21.8	0.2	21.5	0.2
Median age at death	76	75	77	75	78	76
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	315,000	2,800	570,900	4,600	1.013,800	6,500
Absolute survival rate (2019 – 2020) [3]	79 (77 – 81)	62	67 (63 – 70)	42		
Relative survival rate (2019 – 2020) [3]	88 (86 – 90)	77	83 (79 – 88)	68		

[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 around 70,550 new cases every year, breast cancer is by far the most common cancer in women. In addition, around 6,000 women are diagnosed with an in situ tumour every year. Around 1% of all new cases affect men.

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

Following the introduction of mammography screening between 2005 and 2009, the rates of new cases show a typical course with a significant increase at the beginning of the programme and a subsequent slow decline. It has been shown that fewer women in the screening age group now develop advanced tumours than before the introduction of screening.

Since the end of the 1990s, mortality rates from breast cancer have been falling continuously, in the last 10 years most strongly among women aged between 60 and 69.

Risk factors and early detection

Older age, a family history or hereditary changes in risk genes as well as radiotherapy of the breast in childhood or adolescence are important risk factors for breast cancer. Dense mammary gland tissue and certain previous breast diseases are also considered risk factors.

Hormone replacement therapy with oestrogen and progestogen can increase the risk of breast cancer, especially if taken over a longer period of time. Hormone-containing ovulation inhibitors ("the pill") increase the risk slightly. Women with an early first menstrual period and late onset of the menopause also have a statistically higher risk of developing (hormone-dependent) breast cancer. On the other hand, pregnancies carried to term reduce the risk of hormone-dependent breast cancer after the menopause: The younger a woman is when she gives birth to her first child, the greater the protective effect.

Exercise, a healthy diet, breastfeeding, a normal weight after the menopause and abstaining from alcohol and smoking reduce the risk of breast cancer.

The statutory cancer screening programme offers women over the age of 30 the opportunity to have a mammogram once a year. Currently, women between the ages of 50 and 69 are invited to have a mammogram every two years as part of the mammography screening programme; from mid-2024, the upper age limit will be raised to 75. There is an intensified early screening programme for women with a high risk of breast cancer, for example if they have a mutation of a risk gene.

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

Figure 3.17.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C50, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

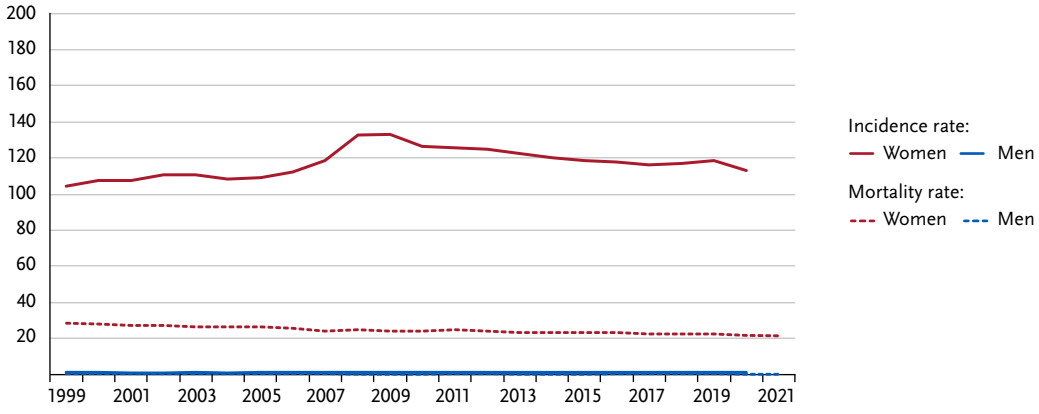


Figure 3.17.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C50, Germany 1999 – 2020/2021

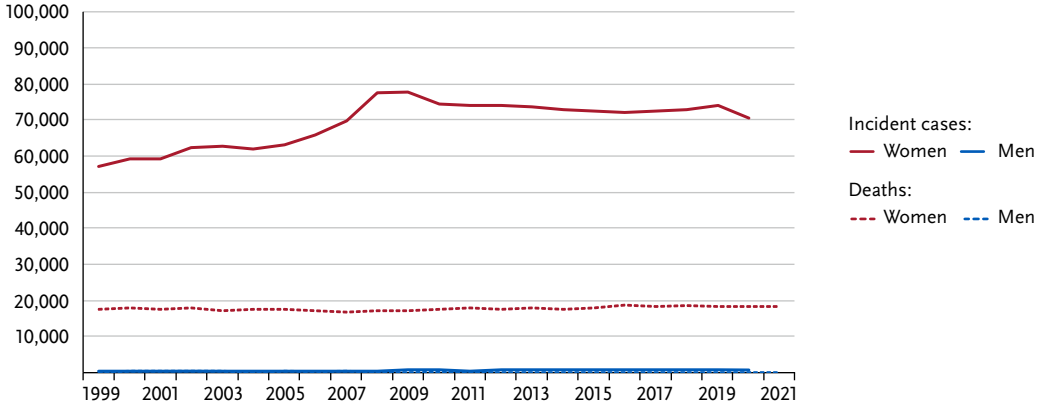


Figure 3.17.2
Age-specific incidence rates by sex, ICD-10 C50, Germany 2019 – 2020
per 100,000

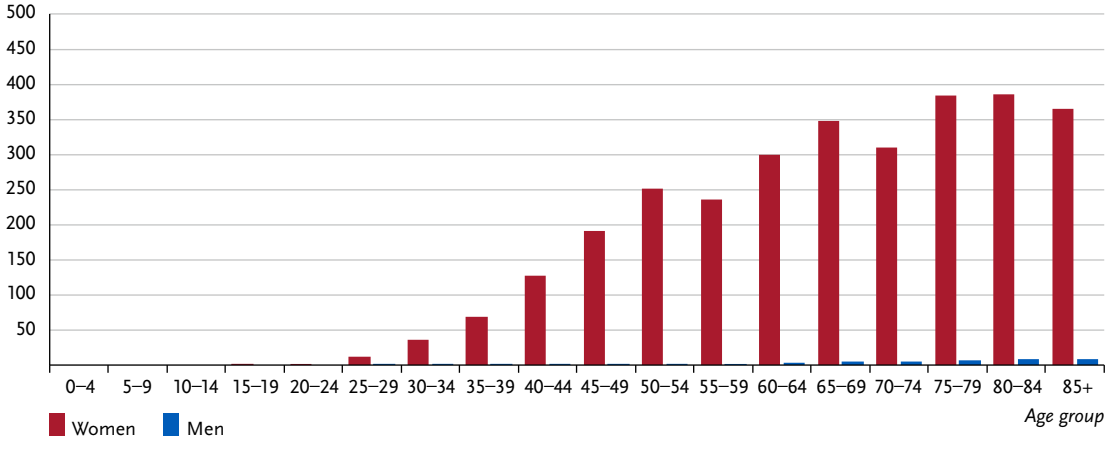


Table 3.17.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C50, database 2019

	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 99)	13.1 %	(1 in 8)	0.1 %	(1 in 1,000)	3.5 %	(1 in 28)
45 years	2.2 %	(1 in 45)	12.3 %	(1 in 8)	0.2 %	(1 in 410)	3.5 %	(1 in 29)
55 years	2.8 %	(1 in 35)	10.4 %	(1 in 10)	0.4 %	(1 in 230)	3.3 %	(1 in 31)
65 years	3.4 %	(1 in 29)	8.2 %	(1 in 12)	0.8 %	(1 in 130)	3.0 %	(1 in 34)
75 years	3.6 %	(1 in 28)	5.6 %	(1 in 18)	1.3 %	(1 in 77)	2.5 %	(1 in 40)
Lifetime risk			13.2 %	(1 in 8)			3.5 %	(1 in 28)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
35 years	< 0.1 %	(1 in 29,250)	0.1 %	(1 in 750)	< 0.1 %	(1 in 319,800)	< 0.1 %	(1 in 2,500)
45 years	< 0.1 %	(1 in 11,400)	0.1 %	(1 in 760)	< 0.1 %	(1 in 44,700)	< 0.1 %	(1 in 2,500)
55 years	< 0.1 %	(1 in 4,000)	0.1 %	(1 in 790)	< 0.1 %	(1 in 24,400)	< 0.1 %	(1 in 2,600)
65 years	< 0.1 %	(1 in 2,300)	0.1 %	(1 in 890)	< 0.1 %	(1 in 8,400)	< 0.1 %	(1 in 2,600)
75 years	0.1 %	(1 in 1,700)	0.1 %	(1 in 1,100)	< 0.1 %	(1 in 5,650)	< 0.1 %	(1 in 3,000)
Lifetime risk			0.1 %	(1 in 750)			< 0.1 %	(1 in 2,500)

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 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

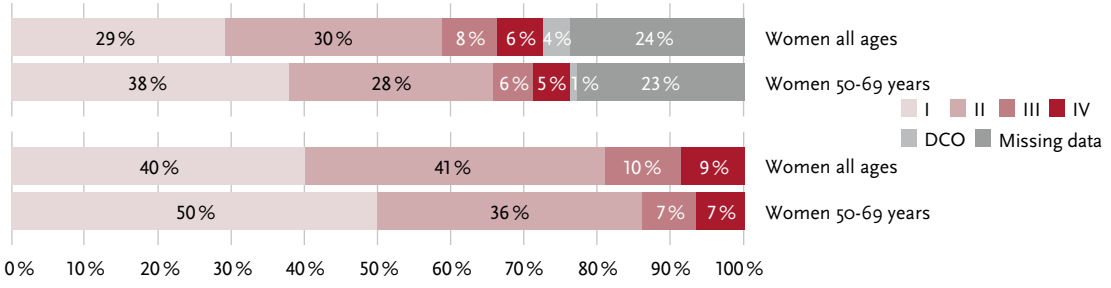


Figure 3.17.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C50, Germany 2019 – 2020

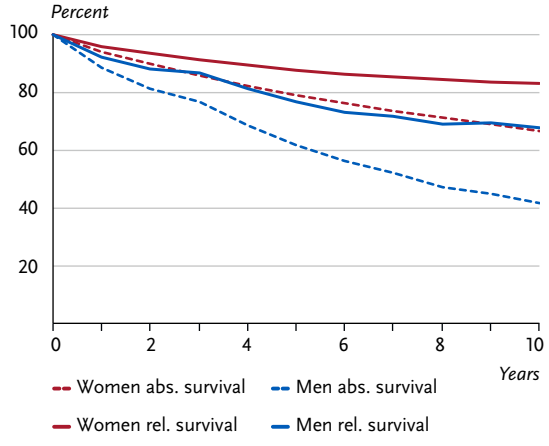


Figure 3.17.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), women, ICD-10 C50, Germany 2019 – 2020

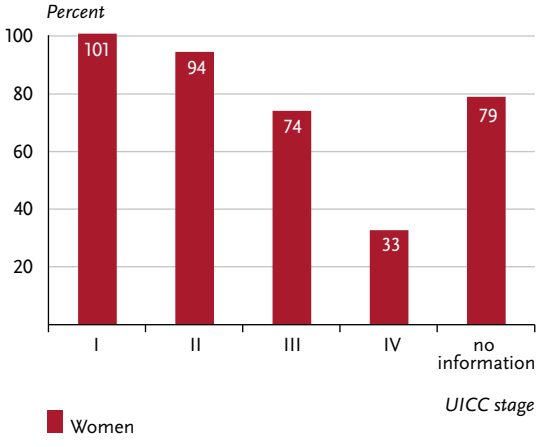


Figure 3.17.6
Age-standardised incidence and mortality rates in German federal states, women, ICD-10 C50, 2019 – 2020
per 100,000 (old European Standard)

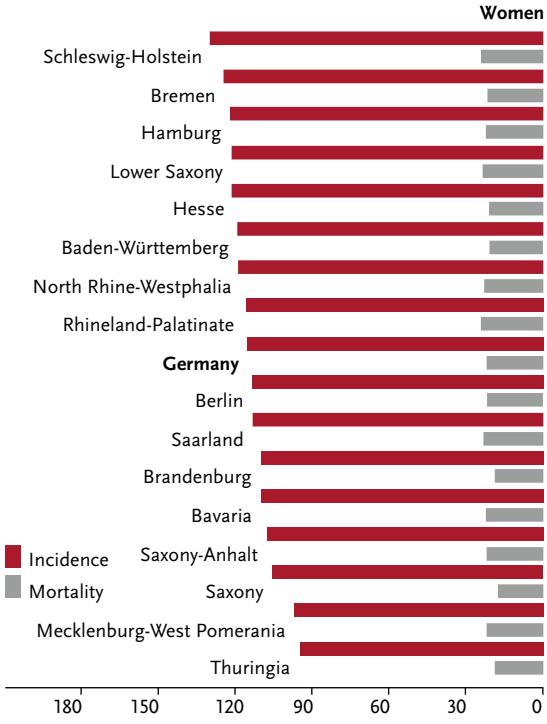
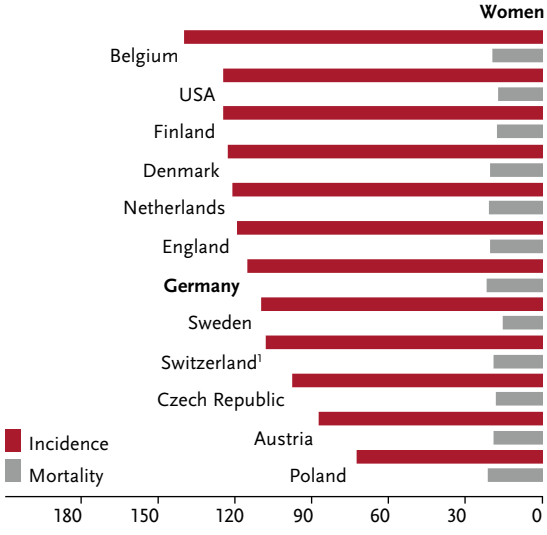


Figure 3.17.7
International comparison of age-standardised incidence and mortality rates, women, ICD-10 C50, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.18 Vulva

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

Incidence	2019	2020	
	Women	Women	
Incident cases	3,310	3,090	
Crude incidence rate [1]	7.9	7.3	
Age-standardised incidence rate [1, 2]	4.4	4.0	
Median age at diagnosis	73	73	
Mortality	**2019**	**2020**	**2021**
	Women	Women	Women
Deaths	1,016	973	1,014
Crude mortality rate [1]	2.4	2.3	2.4
Age-standardised mortality rate [1, 2]	1.0	0.9	1.0
Median age at death	81	81	82
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	11,700	19,800	27,500
Absolute survival rate (2019 – 2020) [3]	59 (51 – 66)	46 (37 – 55)	
Relative survival rate (2019 – 2020) [3]	70 (60 – 76)	64 (57 – 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

Until around 2010, a significant increase in the number of new cases and a slight increase in mortality rates from malignant vulvar tumours were observed in Germany. Since then, the rates have stabilised at a high level. HPV vaccination should reduce the incidence. However, as the disease mainly occurs at an older age, no effects on the incidence of vulvar carcinoma can be expected at the present time, as only very few cases occur in young women who have already benefited from the HPV vaccination.

In 2019/2020, about 3,100 to 3,300 women were diagnosed with a malignant neoplasm of the vulva each year, and 1,014 women died from this disease in 2021. The greatest burden of disease (incidence) is in women above the age of 70, with a median age at diagnosis of 73. The relative 5-year survival rate after diagnosis of a malignant vulvar tumour is 70%. Among tumours with valid stage information, diagnoses of tumours at small extent (stage I, limited to the vulva/perineum) are the most common (about seven out of ten valid cases). For a large proportion of cases (42%), however, no stage could be assigned.

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

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

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 vulvar carcinomas and their precursors are often caused by a chronic infection with human papillomaviruses (especially HPV 16). Younger women are usually affected. Keratinising vulvar carcinomas and their precursors develop independently of HPV, especially in older women. The main risk factors are autoimmune skin diseases such as lichen sclerosus. Smoking and long-term immunosuppression, e.g. after organ transplantation or HIV infection, also increase the risk of vulvar carcinoma. This promotes HPV infection and can therefore increase the risk of vulvar cancer. HPV-triggered cancers in the genital and anus, such as cervical cancer and anal carcinomas, their associated precursors, or Paget's disease of the vulva are further risk factors.

No targeted cancer screening programme is currently in place in Germany for vulvar cancer and its precursors. The entire vulva should always be examined as part of cervical cancer screening. HPV vaccination is considered a possible preventative measure.

Figure 3.18.1a
Age-standardised incidence and mortality rates, ICD-10 C51, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

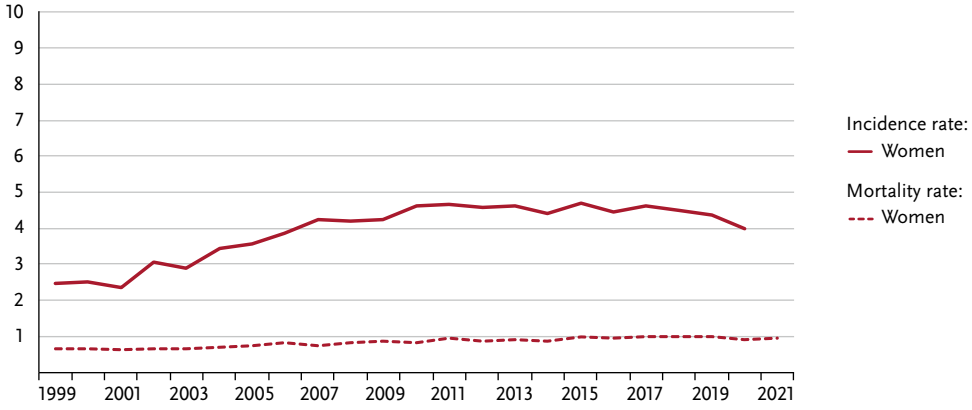


Figure 3.18.1b
Absolute numbers of incident cases and deaths, ICD-10 C51, Germany 1999 – 2020/2021

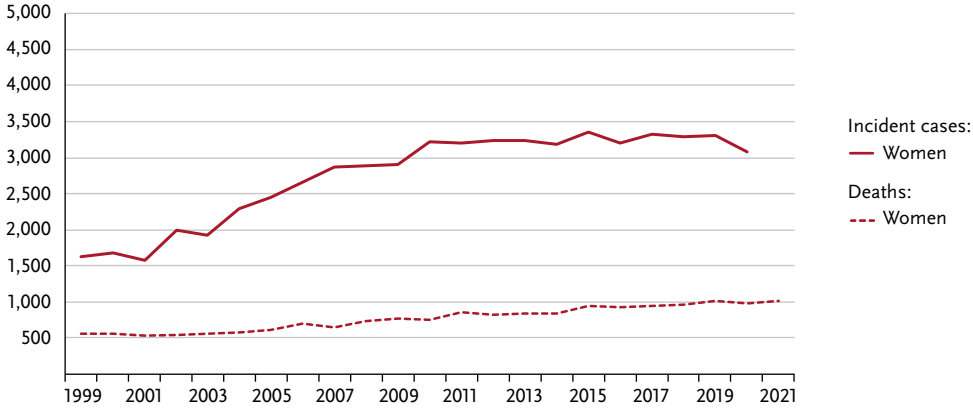


Figure 3.18.2
Age-specific incidence rates, ICD-10 C51, Germany 2019 – 2020
per 100,000

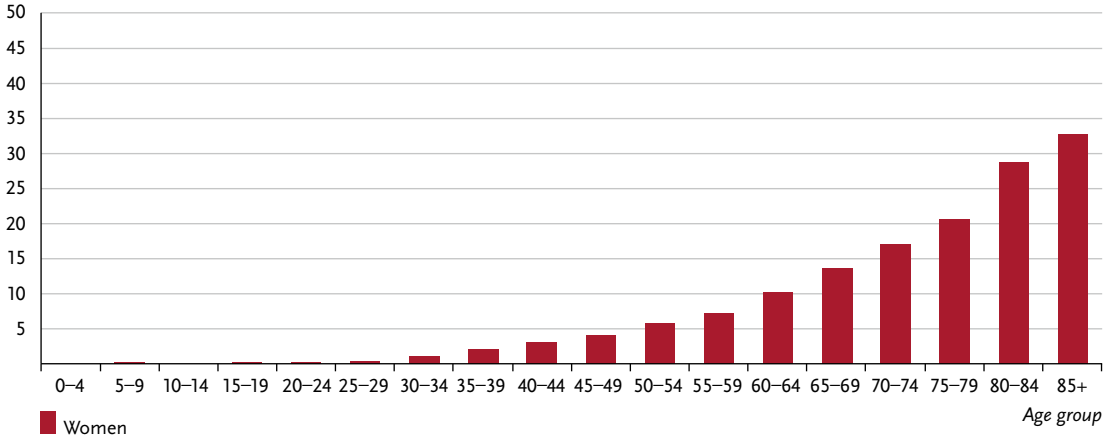


Table 3.18.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C51, database 2019

	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)	0.6 %	(1 in 160)	< 0.1 %	(1 in 48,300)	0.2 %	(1 in 490)
45 years	0.1 %	(1 in 1,900)	0.6 %	(1 in 170)	< 0.1 %	(1 in 19,600)	0.2 %	(1 in 490)
55 years	0.1 %	(1 in 1,100)	0.5 %	(1 in 180)	< 0.1 %	(1 in 6,500)	0.2 %	(1 in 500)
65 years	0.1 %	(1 in 670)	0.5 %	(1 in 200)	< 0.1 %	(1 in 3,200)	0.2 %	(1 in 500)
75 years	0.2 %	(1 in 460)	0.4 %	(1 in 260)	0.1 %	(1 in 1,200)	0.2 %	(1 in 530)
Lifetime risk			0.6 %	(1 in 160)			0.2 %	(1 in 500)

Figure 3.18.3
Distribution of UICC stages at diagnosis, ICD-10 C51, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

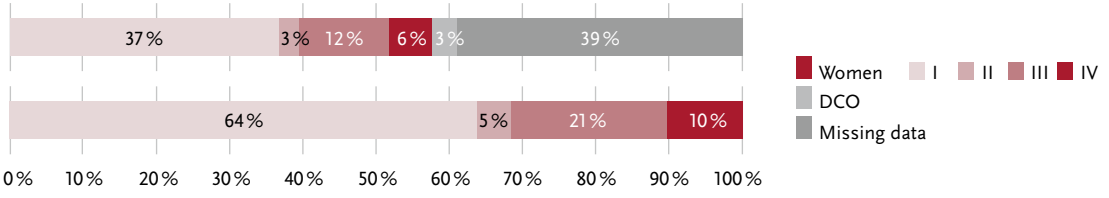


Figure 3.18.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C51, Germany 2019 – 2020

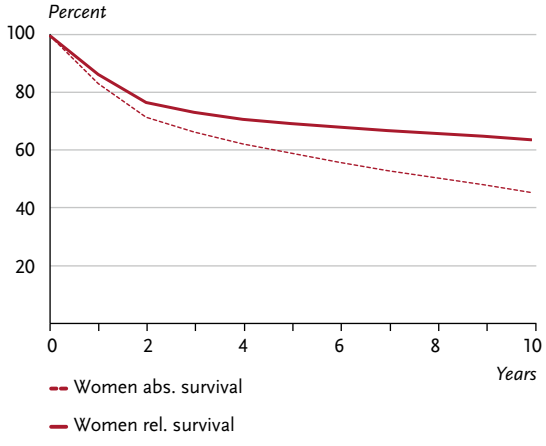


Figure 3.18.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), ICD-10 C51, Germany 2019 – 2020

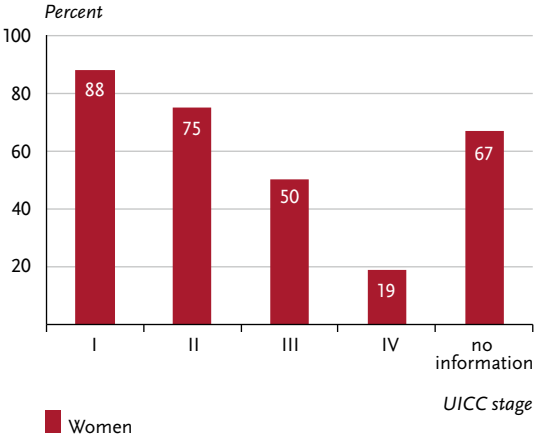


Figure 3.18.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C51, 2019 – 2020
per 100,000 (old European Standard)

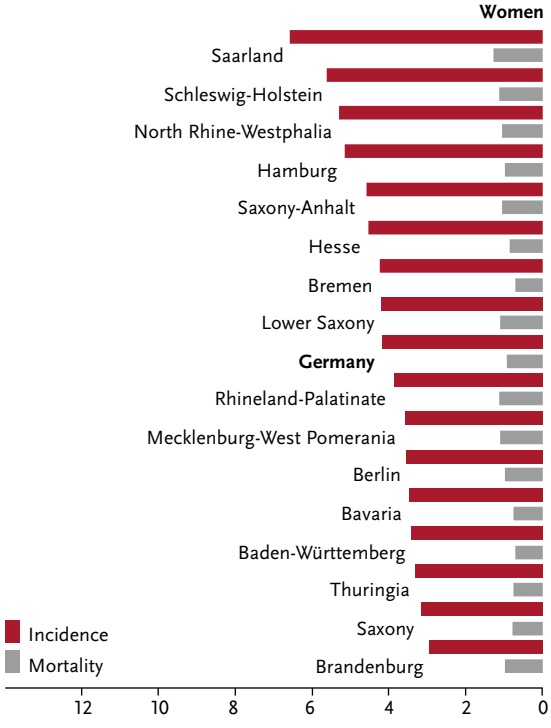
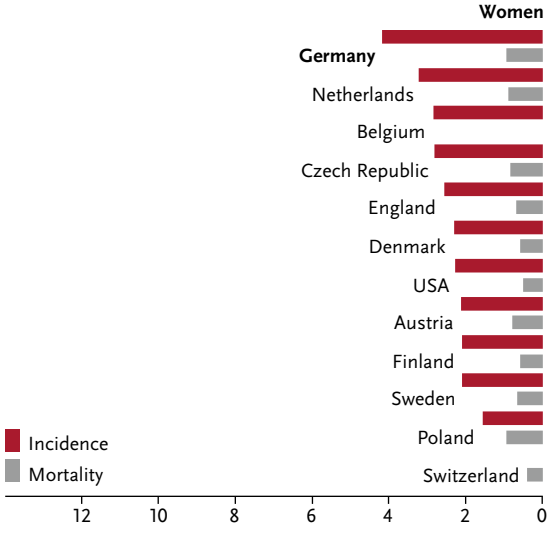


Figure 3.18.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C51, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



3.19 Cervix

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

Incidence	2019	2020	
	Women	Women	
Incident cases	4,700	4,640	
Crude incidence rate [1]	11.2	11.0	
Age-standardised incidence rate [1, 2]	9.4	9.5	
Median age at diagnosis	54	53	
Mortality	**2019**	**2020**	**2021**
	Women	Women	Women
Deaths	1,597	1,546	1,535
Crude mortality rate [1]	3.8	3.7	3.6
Age-standardised mortality rate [1, 2]	2.5	2.4	2.3
Median age at death	65	65	66
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	17,400	31,400	69,500
Absolute survival rate (2019 – 2020) [3]	62 (54 – 71)	54 (50 – 64)	
Relative survival rate (2019 – 2020) [3]	64 (56 – 74)	60 (55 – 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

In Germany, about 4,640 women were diagnosed with cervical cancer in 2020. In about seven out of ten women, cervical carcinoma originated from the squamous epithelial tissue of the cervical mucosa. Adenocarcinomas (about 20% of cervical carcinomas) tend to have a higher origin at the transition zone between the uterine body and the cervix. The rates of new invasive carcinoma of the cervix in women has been declining slightly for the last 10 years. First effects of the HPV vaccination should become apparent in the younger age groups in the coming years. The median age at diagnosis of invasive carcinoma is 53 years. About four in ten women with the disease are diagnosed at an early stage of the tumour (stage I). The much more common in situ carcinoma is usually discovered during screening in women between the ages of 35 and 40. A total of 1,535 women died from cervical cancer in Germany in 2021. The relative 5-year survival rate after the diagnosis of an invasive cervical tumour is 64%. In an international comparison, the mortality rates in countries with long-standing, well-organised screening programmes are significantly lower than in countries without such programmes.

Risk factors, early detection and prevention

The main cause of cervical cancer is sexually transmitted human papillomavirus (HPV). An asymptomatic HPV infection is common, but usually heals without consequences. Persistent infections with one or more of 12 high-risk viruses (primarily HPV 16 and 18) can lead to the development of cervical carcinoma via precursors. Other risk factors are smoking, other sexually transmitted pathogens, early onset of sexual activity, multiple births and immunosuppression, for example after organ transplantation or due to HIV infection. In the long term, oral contraceptives ("the pill") slightly increase the risk of development of cervical cancer.

The statutory cancer screening program offers an annual cervical smear test (Pap smear) and cytological examination for women aged 20 and over. 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 vaccination against HPV regardless of gender, primarily between the ages of 9 and 14. Statutory health insurance companies cover the costs of vaccination for young people up to the 18th birthday. The 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 – 2020/2021
per 100,000 (old European Standard)

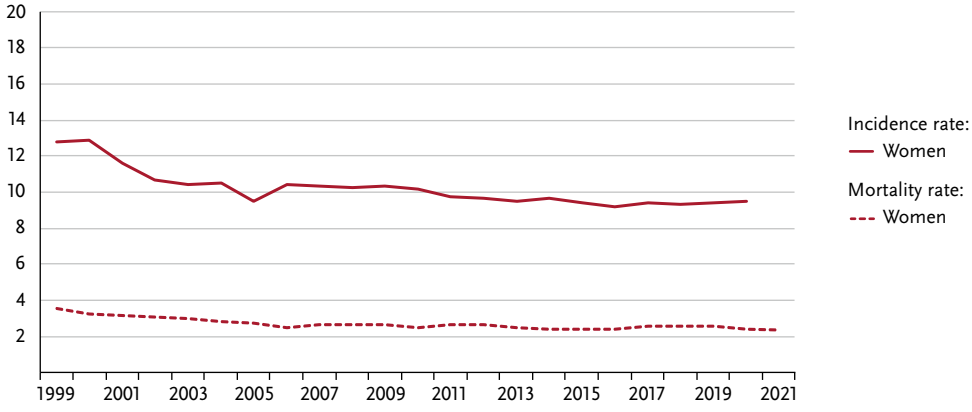


Figure 3.19.1b
Absolute numbers of incident cases and deaths, ICD-10 C53, Germany 1999 – 2020/2021

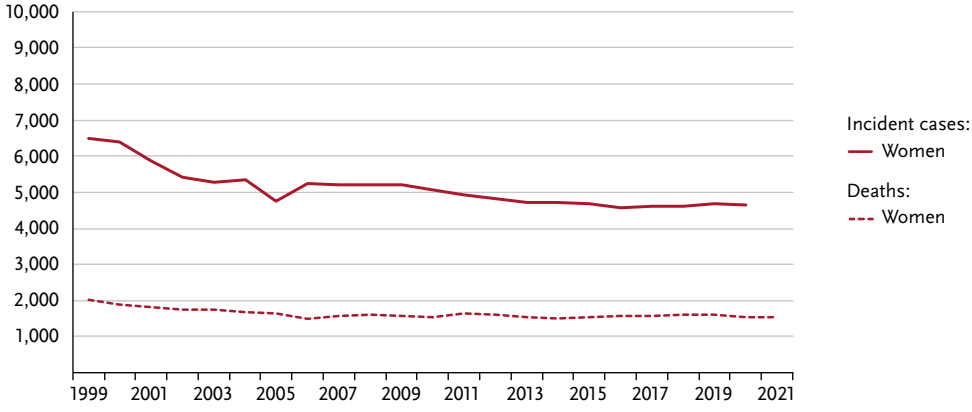


Figure 3.19.2
Age-specific incidence rates, ICD-10 C53, Germany 2019 – 2020
per 100,000

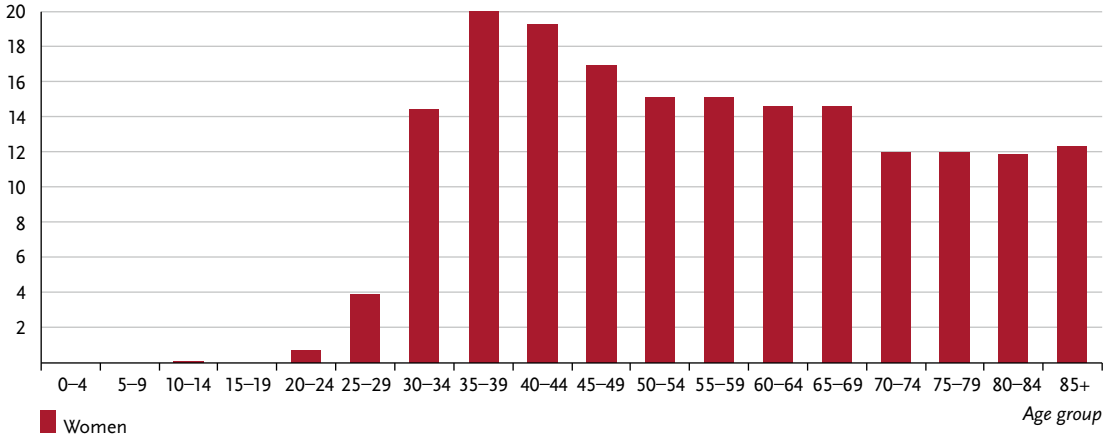


Table 3.19.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C53, database 2019

	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 18,100)	0.8 %	(1 in 120)	< 0.1 %	(1 in 118,200)	0.3 %	(1 in 350)
25 years	0.1 %	(1 in 1,000)	0.8 %	(1 in 120)	< 0.1 %	(1 in 12,100)	0.3 %	(1 in 350)
35 years	0.2 %	(1 in 540)	0.7 %	(1 in 130)	< 0.1 %	(1 in 4,200)	0.3 %	(1 in 360)
45 years	0.2 %	(1 in 630)	0.6 %	(1 in 180)	< 0.1 %	(1 in 2,400)	0.3 %	(1 in 390)
55 years	0.2 %	(1 in 660)	0.4 %	(1 in 240)	0.1 %	(1 in 1,700)	0.2 %	(1 in 450)
65 years	0.1 %	(1 in 780)	0.3 %	(1 in 360)	0.1 %	(1 in 1,500)	0.2 %	(1 in 580)
75 years	0.1 %	(1 in 960)	0.2 %	(1 in 590)	0.1 %	(1 in 1,400)	0.1 %	(1 in 850)
Lifetime risk			0.8 %	(1 in 120)			0.3 %	(1 in 350)

Figure 3.19.3
Distribution of UICC stages at diagnosis, ICD-10 C53, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

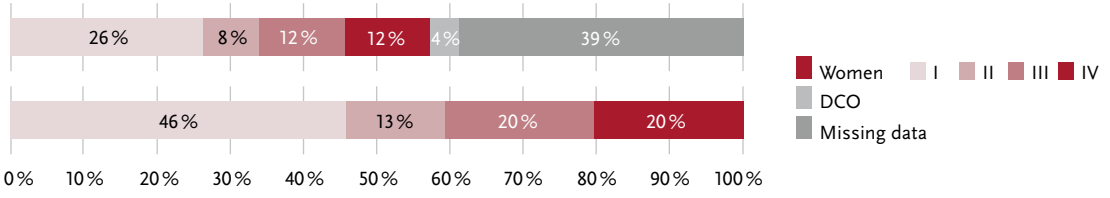


Figure 3.19.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C53, Germany 2019 – 2020

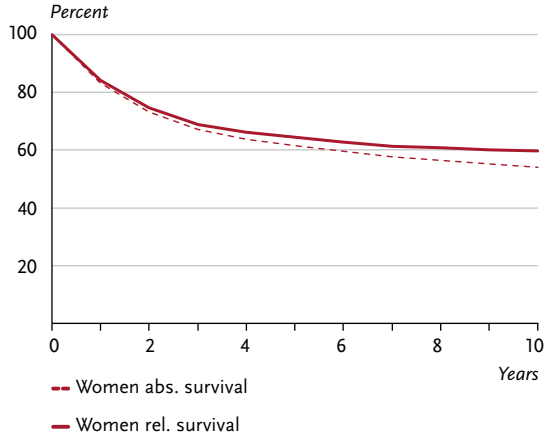


Figure 3.19.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), ICD-10 C53, Germany 2019 – 2020

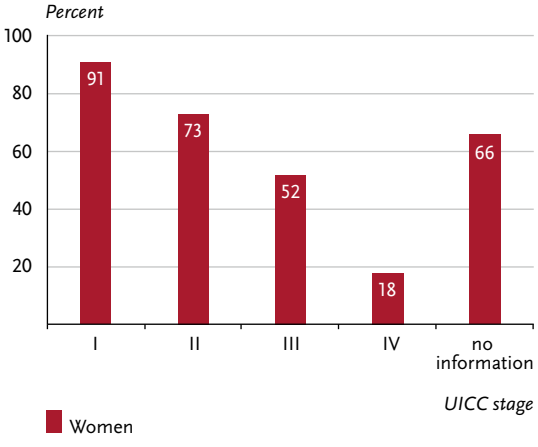


Figure 3.19.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C53, 2019 – 2020
per 100,000 (old European Standard)

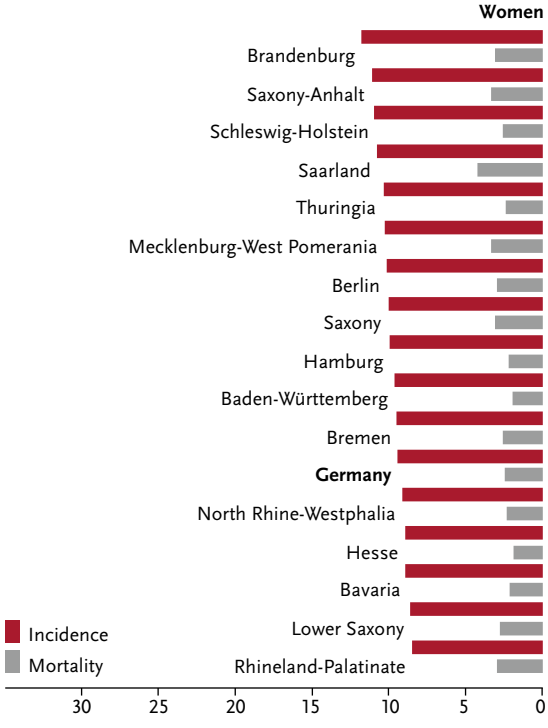
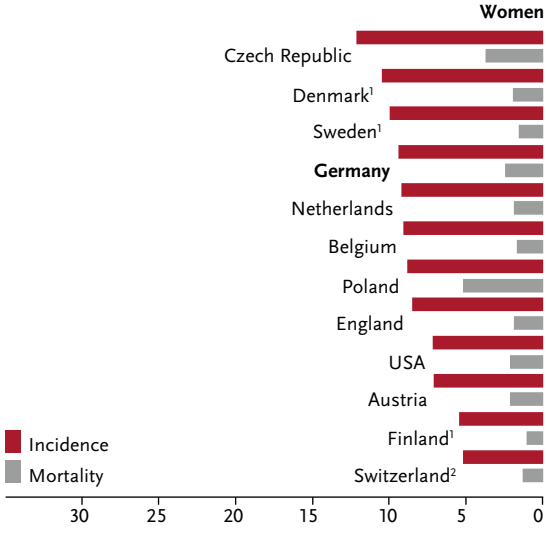


Figure 3.19.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C53, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Denmark, Sweden, Finland: data incl. C58
[2] Switzerland: incidence data for 2015 – 2019

3.20 Uterus

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

Incidence	2019	2020	
	Women	Women	
Incident cases	11,550	10,860	
Crude incidence rate [1]	27.4	25.8	
Age-standardised incidence rate [1, 2]	16.9	15.8	
Median age at diagnosis	67	67	
Mortality	**2019**	**2020**	**2021**
	Women	Women	Women
Deaths	2,659	2,758	2,634
Crude mortality rate [1]	6.3	6.5	6.2
Age-standardised mortality rate [1, 2]	3.0	3.1	2.9
Median age at death	77	77	78
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	44,900	79,100	145,900
Absolute survival rate (2019 – 2020) [3]	69 (67 – 75)	57 (55 – 62)	
Relative survival rate (2019 – 2020) [3]	78 (76 – 84)	75 (73 – 82)	

[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 about 10,860 new cases in 2020, malignant tumours of the uterus (corpus or endometrial carcinoma) are the fifth most common cancer (excluding non-melanoma skin cancer) in women and the most common of the female genital organs. Due to the good prognosis, the number of deaths from this disease is comparatively low at about 2,634 deaths in 2021. 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 incidence and mortality rates are rather small. Internationally, significantly higher incidence rates are reported from the USA, but also from the neighbouring Czech Republic. The age-standardised incidence and mortality rates of uterine cancer have recently remained almost constant after a continuous decline. The median age at diagnosis is 67 years. Histologically, most cancers of the uterine body are endometrioid adenocarcinomas, which originate from the glandular lining of the uterus. Seven out of ten corpus carcinomas for which valid stage information is available are already diagnosed in stage I, in which the tumour is still confined to the uterine body. However, around four in ten of all tumours could not be assigned to any stage. The relative 5-year survival rate for patients with uterine cancer in Germany is about 78%. At the end of 2020, there were about 145,900 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 cancers are hormone-dependent. Long-term oestrogen influence is a risk factor: an early first menstruation, a late menopause, childlessness, and ovarian diseases increase the risk. Similarly, oestrogens as monotherapy during menopause increases risk, while the combination with progestogens counteracts this. Oral contraceptives ("the pill"), especially oestrogen-progestogen combinations, reduce the risk. Obesity and lack of exercise also play a role in hormone-dependent tumours. Women with type 2 diabetes mellitus are also more likely to develop uterine cancer. Women who are treated for breast cancer with tamoxifen also have a slightly higher risk. Genetic mutations associated with hereditary colorectal cancer, hereditary non-polyposis colorectal carcinoma (HNPCC, Lynch syndrome), also increase the risk of developing uterine cancer.

In the rarer oestrogen-independent forms of uterine cancer, older age is considered a risk. Uterine exposure to radiotherapy can also increase the risk. The role of lifestyle-related or genetic factors remains unclear.

Figure 3.20.1a
Age-standardised incidence and mortality rates, ICD-10 C54 – C55, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

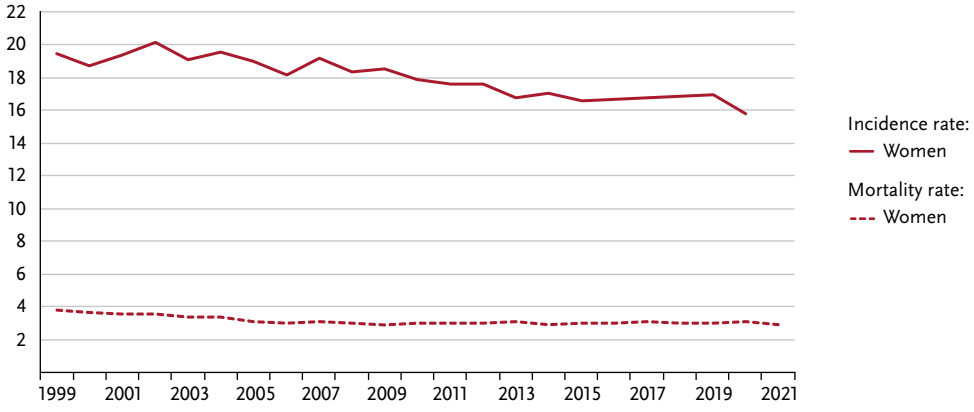


Figure 3.20.1b
Absolute numbers of incident cases and deaths, ICD-10 C54 – C55, Germany 1999 – 2020/2021

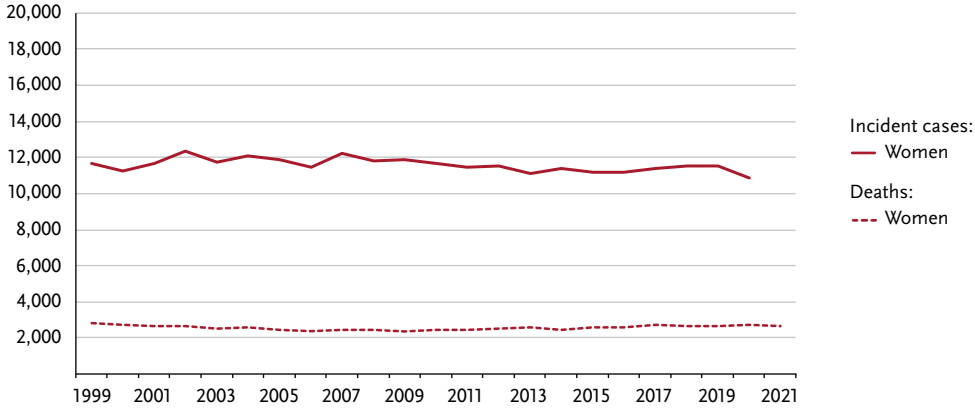


Figure 3.20.2
Age-specific incidence rates, ICD-10 C54 – C55, Germany 2019 – 2020
per 100,000

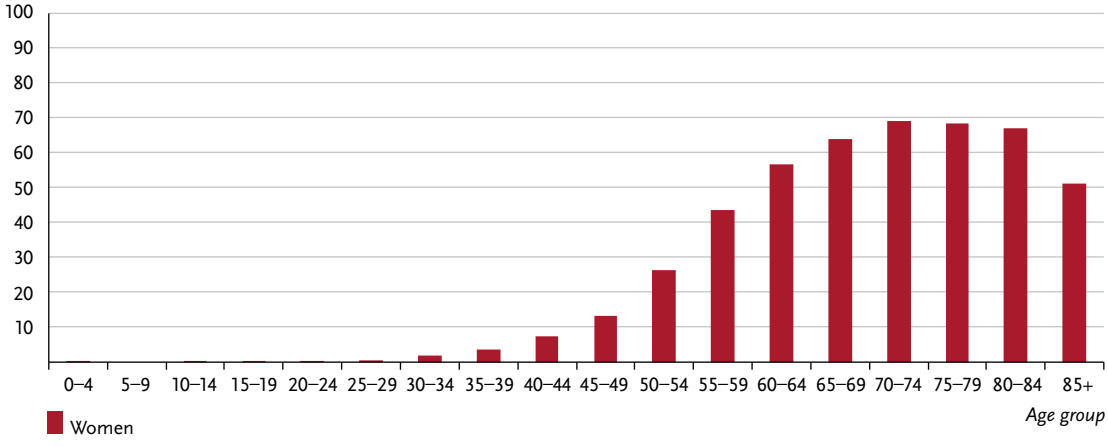


Table 3.20.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C54 – C55, database 2019

	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)	2.0 %	(1 in 49)	< 0.1 %	(1 in 17,200)	0.5 %	(1 in 200)
45 years	0.2 %	(1 in 470)	2.0 %	(1 in 50)	< 0.1 %	(1 in 6,000)	0.5 %	(1 in 200)
55 years	0.5 %	(1 in 200)	1.8 %	(1 in 55)	0.1 %	(1 in 1,600)	0.5 %	(1 in 200)
65 years	0.6 %	(1 in 150)	1.4 %	(1 in 71)	0.1 %	(1 in 760)	0.5 %	(1 in 220)
75 years	0.6 %	(1 in 160)	0.9 %	(1 in 120)	0.2 %	(1 in 470)	0.4 %	(1 in 270)
Lifetime risk			2.0 %	(1 in 49)			0.5 %	(1 in 200)

Figure 3.20.3
Distribution of UICC stages at diagnosis, ICD-10 C54 – C55, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

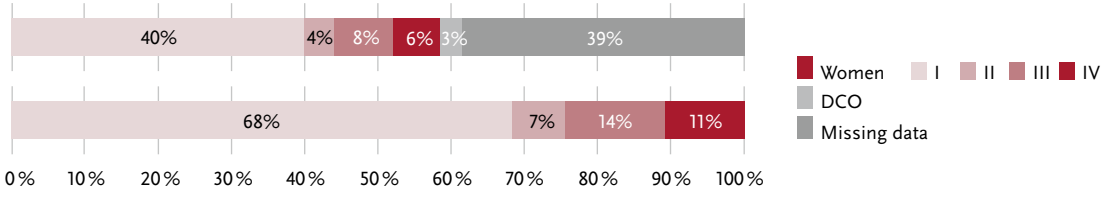


Figure 3.20.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C54 – C55, Germany 2019 – 2020

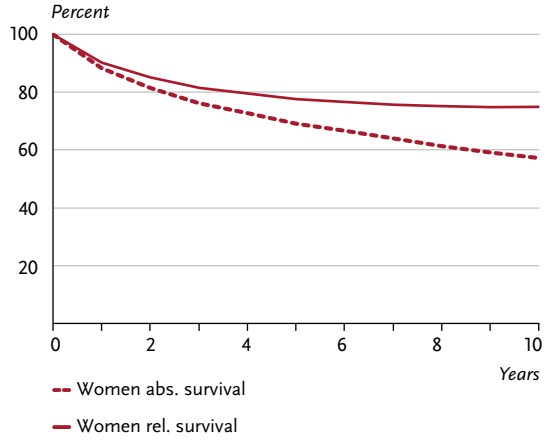


Figure 3.20.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), ICD-10 C54 – C55, Germany 2019 – 2020

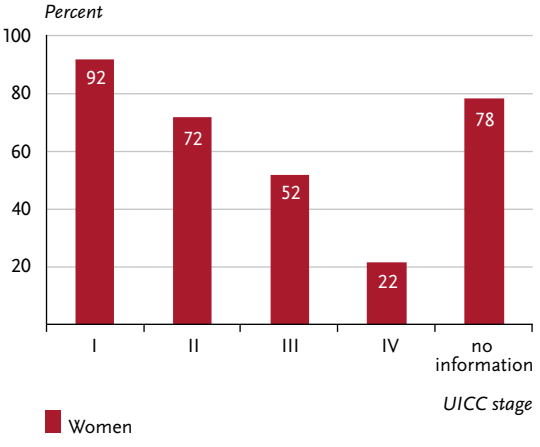


Figure 3.20.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C54 – C55, 2019 – 2020
per 100,000 (old European Standard)

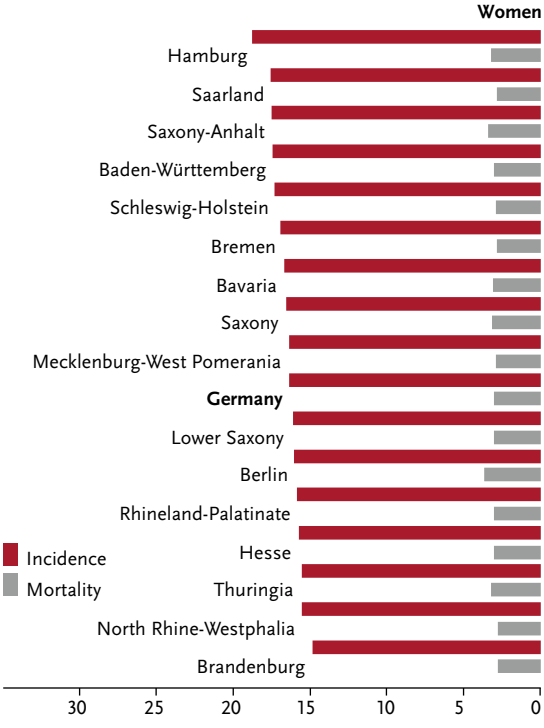
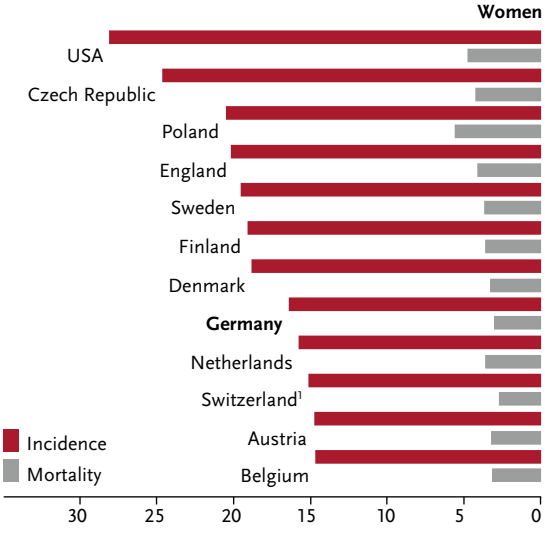


Figure 3.20.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C54 – C55, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.21 Ovaries

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

Incidence	2019	2020	
	Women	Women	
Incident cases	7,490	7,180	
Crude incidence rate [1]	17.8	17.0	
Age-standardised incidence rate [1, 2]	11.1	10.7	
Median age at diagnosis	68	68	
Mortality	**2019**	**2020**	**2021**
	Women	Women	Women
Deaths	5,291	5,265	5,379
Crude mortality rate [1]	12.6	12.5	12.8
Age-standardised mortality rate [1, 2]	6.5	6.4	6.3
Median age at death	75	75	74
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Women	Women	Women
Prevalence	21,700	34,400	61,900
Absolute survival rate (2019 – 2020) [3]	40 (37 – 47)	28 (26 – 32)	
Relative survival rate (2019 – 2020) [3]	44 (40 – 52)	34 (32 – 40)	

[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 (malignant neoplasm of the ovary) accounts for about one third of malignant neoplasms of the female genitalia and half of all deaths from cancer in these organs. The incidence rates increase continuously up to the age of 85, the median age at diagnosis is 68 years. Some rare forms of ovarian cancer, e.g. germ cell tumours, can already occur in childhood and young age. Histologically, however, malignant ovarian tumours are predominantly moderately to poorly differentiated serous adenocarcinomas. About one in 74 women will develop ovarian cancer in her lifetime. Incidence and mortality rates have continued to decrease significantly in Germany since the turn of the millennium, and the absolute numbers of new cases are also decreasing.

The survival prospects of patients with ovarian cancer are rather poor, partly due to the fact that the disease is often diagnosed at a late stage (73% in stage III/IV). The relative 5-year survival in stage III is currently 42% and falls to 21% in stage IV. If the disease is detected early, the relative survival rates are 90% in stage I.

Risk factors

The risk of developing ovarian cancer increases with age. Being overweight also plays a role. Hormonal factors also have an impact on the risk: childlessness and infertility increase the risk, while multiple childbirths and longer periods of breastfeeding reduce the risk. In women with multiple cysts in the ovaries, hormonal factors presumably increase the risk. Hormone replacement therapy, especially with oestrogen mono preparations in post-menopausal women is also a risk factor. On the other hand, ovulation inhibitors ("the pill") have a protective effect. Sterilisation by occlusion of the fallopian tubes reduces the risk of ovarian cancer. Since asbestos is also considered a risk factor for ovarian cancer, any occupational exposure must be reported as a suspected occupational disease.

Women whose first-degree relatives have had breast or ovarian cancer, as well as women with breast, uterine body or colorectal cancer themselves, are more likely to develop ovarian cancer. This is often due to genetic mutations in the BRCA1 or BRCA2 genes. There are other hereditary gene mutations that significantly increase the risk of developing the disease. According to new research findings, up to a quarter of patients are found to have such inherited mutations.

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

Figure 3.21.1a
Age-standardised incidence and mortality rates, ICD-10 C56, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

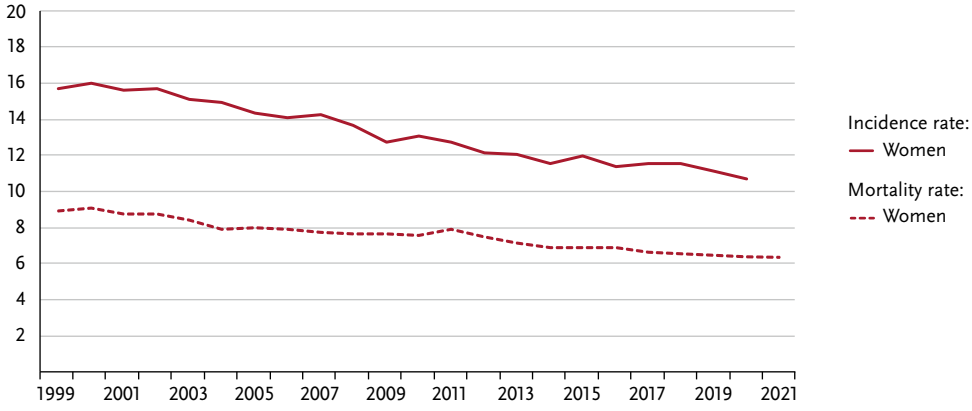


Figure 3.21.1b
Absolute numbers of incident cases and deaths, ICD-10 C56, Germany 1999 – 2020/2021

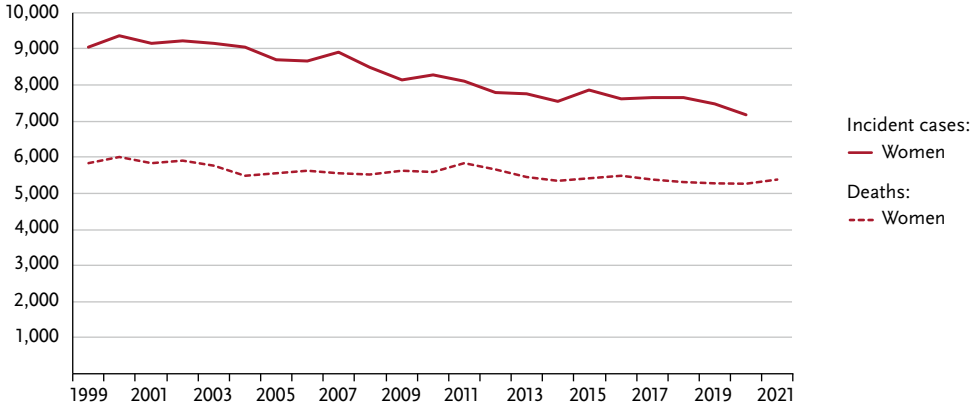


Figure 3.21.2
Age-specific incidence rates, ICD-10 C56, Germany 2019 – 2020
per 100,000

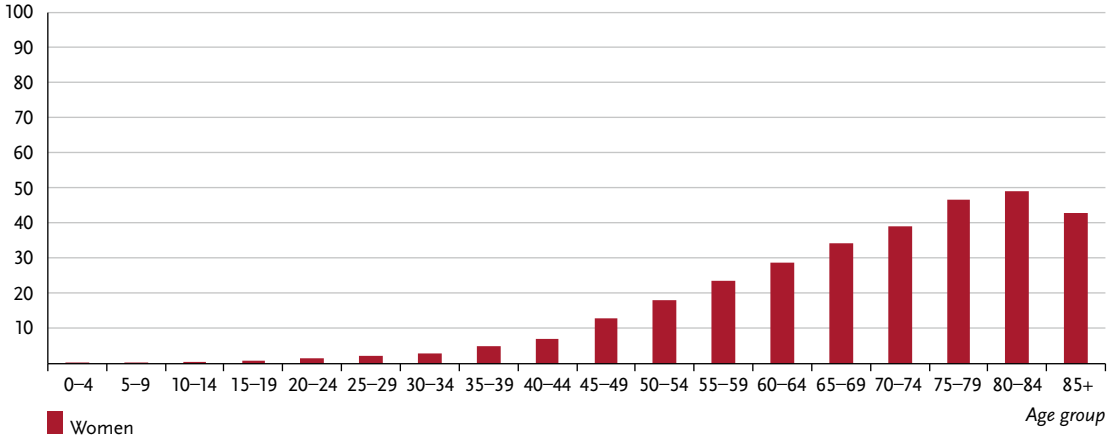


Table 3.21.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C56, database 2019

	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)	1.3 %	(1 in 76)	< 0.1 %	(1 in 6,400)	1.0 %	(1 in 100)
45 years	0.2 %	(1 in 650)	1.3 %	(1 in 79)	0.1 %	(1 in 1,700)	1.0 %	(1 in 100)
55 years	0.3 %	(1 in 380)	1.1 %	(1 in 88)	0.1 %	(1 in 690)	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 250)	0.6 %	(1 in 160)
Lifetime risk			1.4 %	(1 in 74)			1.0 %	(1 in 100)

Figure 3.21.3
Distribution of UICC stages at diagnosis, ICD-10 C56, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

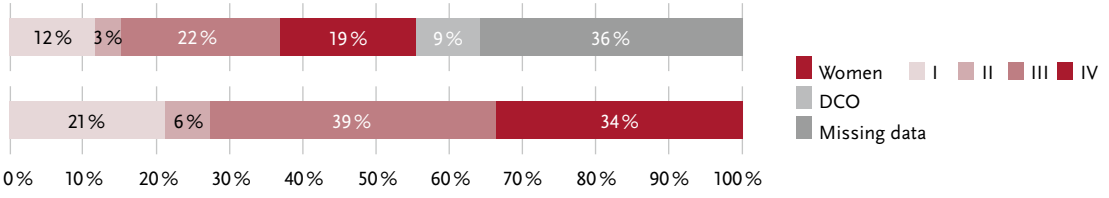


Figure 3.21.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C56, Germany 2019 – 2020

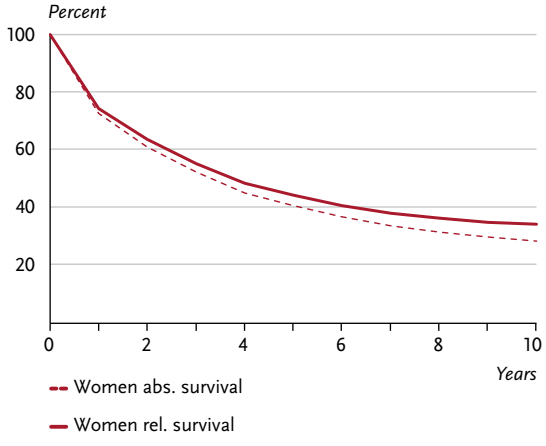


Figure 3.21.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), ICD-10 C56, Germany 2019 – 2020

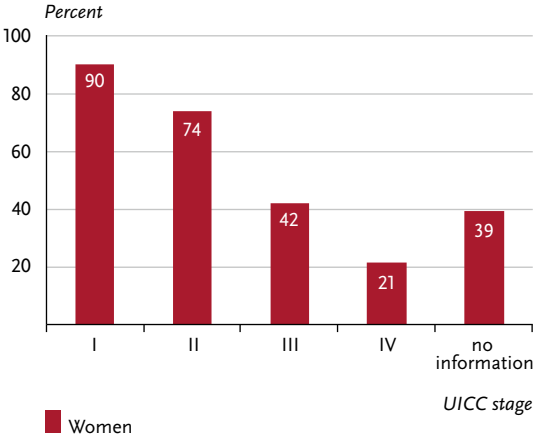


Figure 3.21.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C56, 2019 – 2020
per 100,000 (old European Standard)

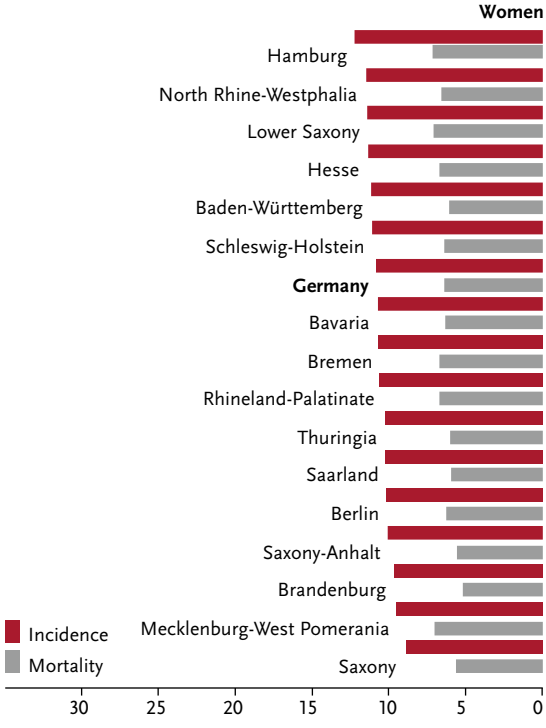


Figure 3.21.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C56, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)

[1] Denmark, Sweden, Finland: data incl. C57.0-4
[2] Switzerland: incidence data for 2015 – 2019

3.22 Prostate

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

Incidence	2019	2020	
	Men	Men	
Incident cases	72,620	65,820	
Crude incidence rate [1]	177.1	160.4	
Age-standardised incidence rate [1, 2]	108.7	97.4	
Median age at diagnosis	72	71	
Mortality	**2019**	**2020**	**2021**
	Men	Men	Men
Deaths	15,040	15,403	15,379
Crude mortality rate [1]	36.7	37.5	37.5
Age-standardised mortality rate [1, 2]	18.7	18.6	18.1
Median age at death	81	81	81
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Men	Men	Men
Prevalence	286,600	490,500	786,900
Absolute survival rate (2019 – 2020) [3]	75 (73 – 76)	57 (54 – 60)	
Relative survival rate (2019 – 2020) [3]	91 (89 – 91)	89 (85 – 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

The number of new cases of prostate cancer in 2020 was about 65,820. Following an increase in the early 2000s, the age-standardised incidence rate has been falling slightly since 2011 and has remained largely constant in recent years. A similar trend can be observed in many other western industrialised nations and is likely to be due to a long increase in the use of the PSA test (prostate-specific antigen) as an early detection test, which has recently tended to decline. In contrast to the incidence rate, the age-standardised mortality rate fell continuously until 2007 and has remained more or less stable since then. Compared with other countries in Central Europe, Germany is in the middle of the field in terms of prostate cancer incidence.

Prostate cancer rarely occurs before the age of 50: The risk of a 35-year-old man developing the disease in the next 10 years is less than 0.1%, whereas the risk for a 75-year-old man is about 7%.

The relative 5-year survival rate for men with prostate cancer is 91%. About two thirds of tumours are diagnosed at an early stage (I/II).

Risk factors and early detection

The causes for the development of prostate cancer and the factors influencing its progression are largely unknown. Age is an important risk factor. Men of black African origin develop the disease more frequently 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, and in some cases inherited changes in certain risk genes can be detected. In addition, chronic inflammation of the prostate and sexually transmitted diseases appear 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 a palpation of the prostate and lymph nodes once a year for men aged 45 years and over, in addition to questions about symptoms. The PSA test in the blood is currently not part of the general statutory screening programme.

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

Figure 3.22.1a
Age-standardised incidence and mortality rates, ICD-10 C61, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

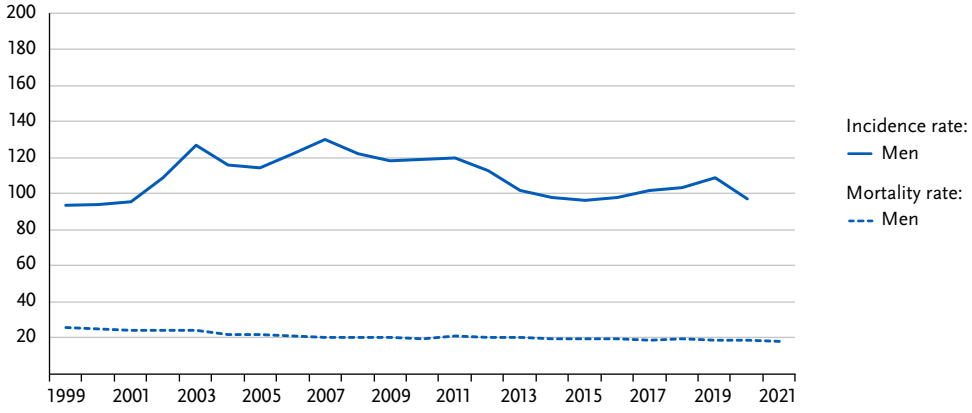


Figure 3.22.1b
Absolute numbers of incident cases and deaths, ICD-10 C61, Germany 1999 – 2020/2021

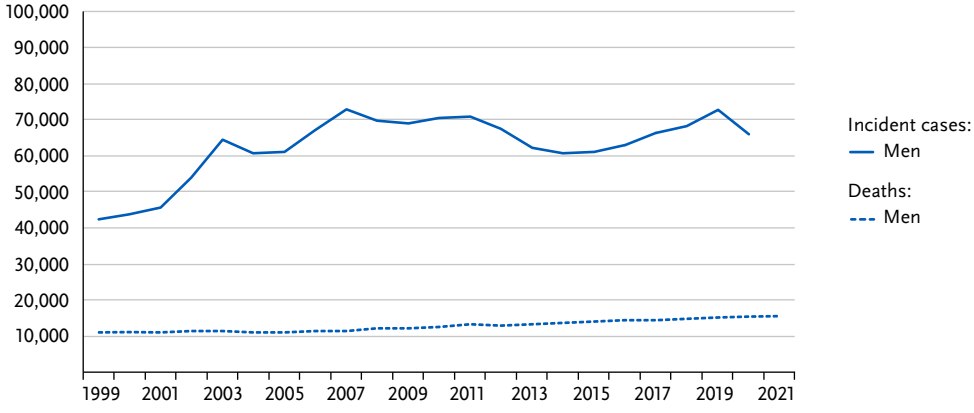


Figure 3.22.2
Age-specific incidence rates, ICD-10 C61, Germany 2019 – 2020
per 100,000

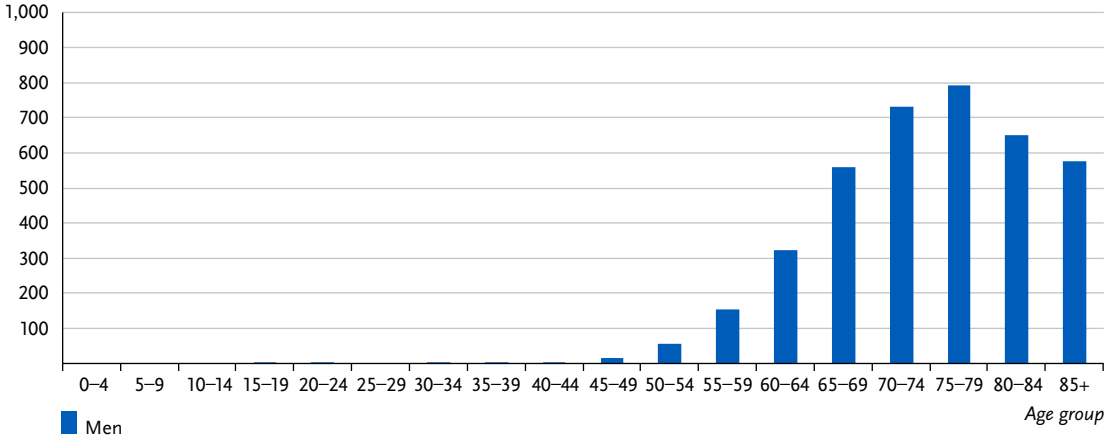


Table 3.22.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C61, database 2019

	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)	13.7 %	(1 in 7)	< 0.1 %	(1 in 152,200)	3.4 %	(1 in 30)
45 years	0.4 %	(1 in 240)	13.9 %	(1 in 7)	< 0.1 %	(1 in 5,500)	3.4 %	(1 in 29)
55 years	2.5 %	(1 in 40)	14.0 %	(1 in 7)	0.1 %	(1 in 700)	3.5 %	(1 in 28)
65 years	6.2 %	(1 in 16)	12.9 %	(1 in 8)	0.7 %	(1 in 150)	3.7 %	(1 in 27)
75 years	6.7 %	(1 in 15)	9.0 %	(1 in 11)	1.8 %	(1 in 54)	3.8 %	(1 in 26)
Lifetime risk			13.5 %	(1 in 7)			3.3 %	(1 in 30)

Figure 3.22.3
Distribution of UICC stages at diagnosis, ICD-10 C61, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

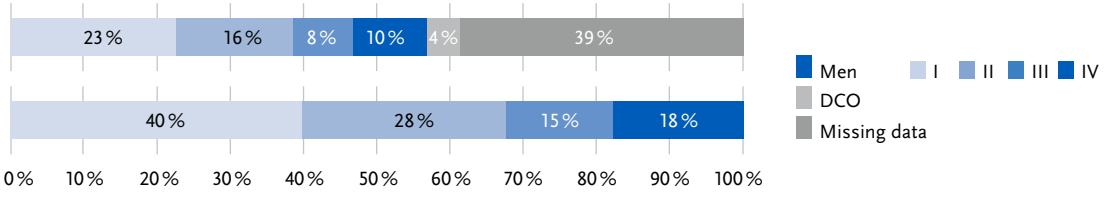


Figure 3.22.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C61, Germany 2019 – 2020

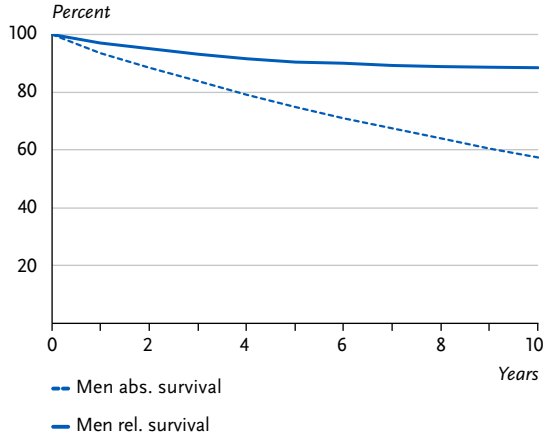


Figure 3.22.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), ICD-10 C61, Germany 2019 – 2020

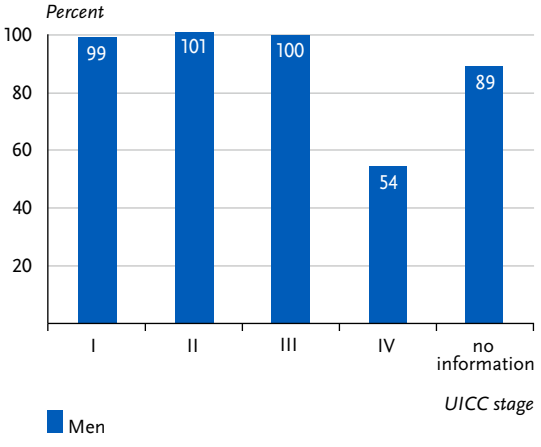


Figure 3.22.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C61, 2019 – 2020
per 100,000 (old European Standard)

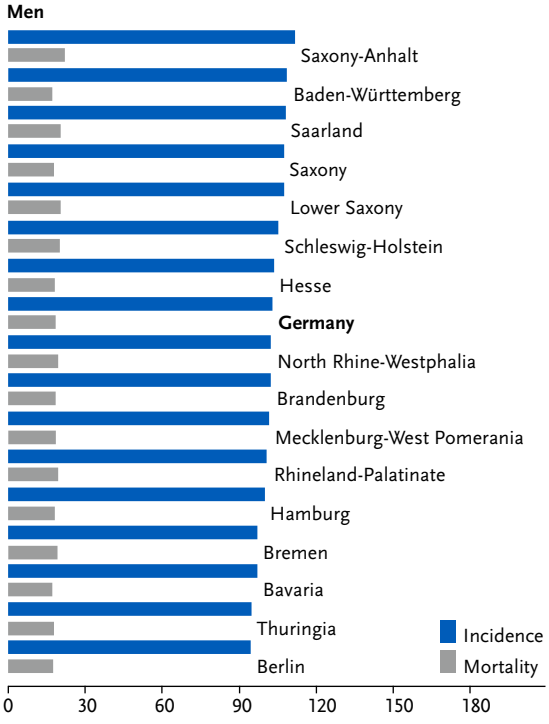
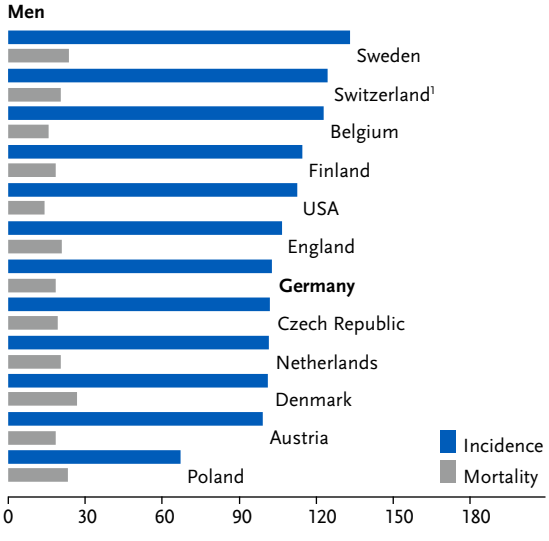


Figure 3.22.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C61, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.23 Testis

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

Incidence	2019	2020	
	Men	Men	
Incident cases	4,190	4,060	
Crude incidence rate [1]	10.2	9.9	
Age-standardised incidence rate [1, 2]	10.4	10.1	
Median age at diagnosis	38	37	
Mortality	**2019**	**2020**	**2021**
	Men	Men	Men
Deaths	158	197	179
Crude mortality rate [1]	0.4	0.5	0.4
Age-standardised mortality rate [1, 2]	0.3	0.4	0.4
Median age at death	54	54	55
Prevalence and survival rates	**5 years**	**10 years**	**25 years**
	Men	Men	Men
Prevalence	19,700	39,000	87,800
Absolute survival rate (2019 – 2020) [3]	95 (93 – 98)	92 (91 – 96)	
Relative survival rate (2019 – 2020) [3]	97 (95 – 99)	96 (95 – 100)	

[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 2020, about 4,060 men in Germany were diagnosed with testicular cancer. This makes it one of the rarer types of cancer, 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 26 % 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 remained almost constant recently, after a steady increase had been observed for decades, as in other European countries. About 90 % of testicular tumours for which a stage is known are diagnosed in stage I/II. Histologically, most testicular cancers are germ cell tumours, two thirds of which are seminomas. One in five cases are malignant teratomas or mixed forms of these.

Since the introduction of cis-platinum in chemotherapy for testicular cancer a good 30 years ago, the disease has become one of the most prognostically favourable malignant neoplasms with correspondingly high relative 5-year survival rates (most recently 97 %) and low mortality (179 deaths in 2021).

Risk factors and early detection

A confirmed risk factor for testicular cancer is undescended testis (cryptorchidism). In addition, men who have already had testicular cancer or a precursor are at 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 familial predisposition. Sons and brothers of men 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 findings, lifestyle and environmental factors do not play a role.

There is evidence 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 their reproductive organs once a year as part of statutory cancer screening programme.

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

Figure 3.23.1a
Age-standardised incidence and mortality rates, ICD-10 C62, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

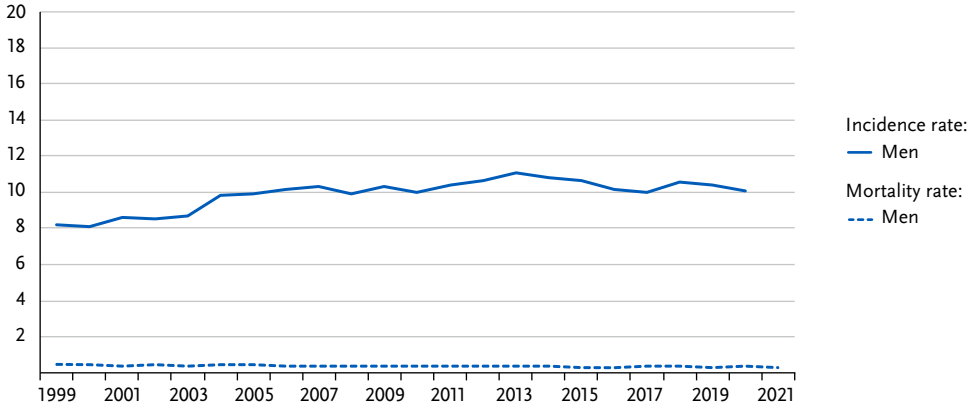


Figure 3.23.1b
Absolute numbers of incident cases and deaths, ICD-10 C62, Germany 1999 – 2020/2021

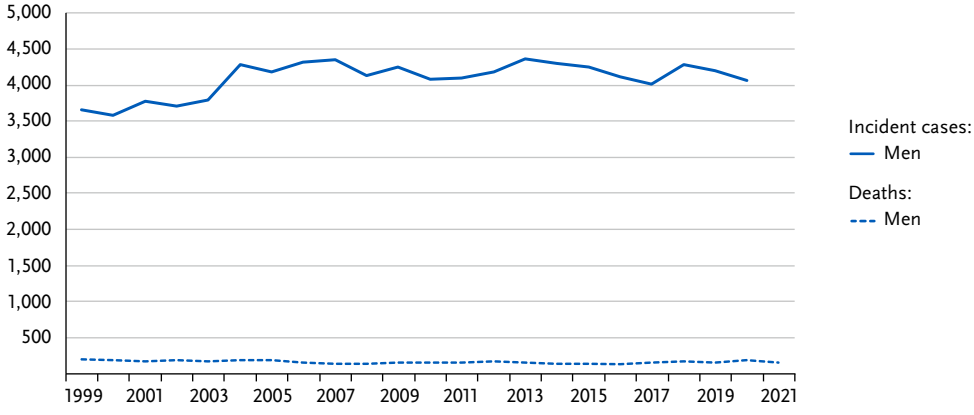


Figure 3.23.2
Age-specific incidence rates, ICD-10 C62, Germany 2019 – 2020
per 100,000

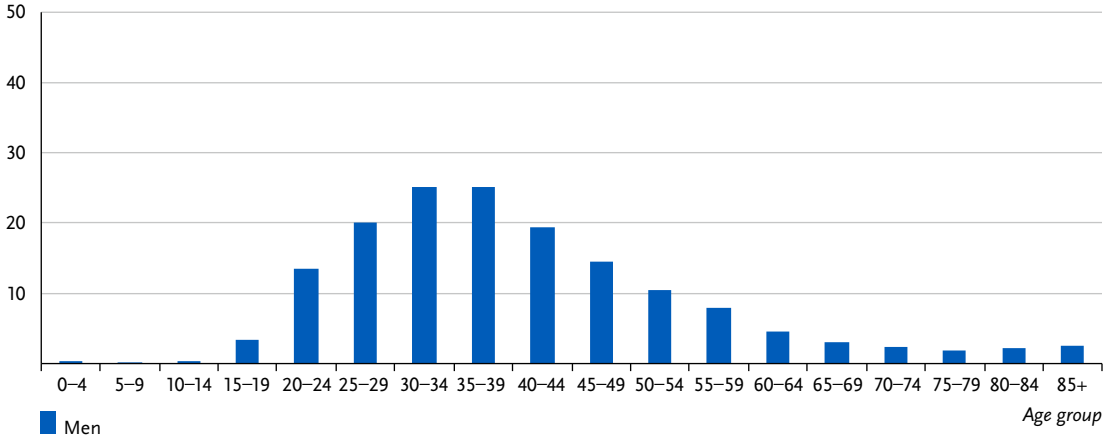


Table 3.23.2
Cancer incidence and mortality risks in Germany by age, ICD-10 C62, database 2019

	Erkrankungsrisiko				Sterberisiko			
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 68,600)	< 0.1 %	(1 in 3,500)
25 years	0.2 %	(1 in 450)	0.7 %	(1 in 150)	< 0.1 %	(1 in 28,000)	< 0.1 %	(1 in 3,600)
35 years	0.2 %	(1 in 440)	0.5 %	(1 in 220)	< 0.1 %	(1 in 25,000)	< 0.1 %	(1 in 4,100)
45 years	0.1 %	(1 in 770)	0.2 %	(1 in 440)	< 0.1 %	(1 in 19,400)	< 0.1 %	(1 in 4,900)
55 years	0.1 %	(1 in 1,700)	0.1 %	(1 in 990)	< 0.1 %	(1 in 21,800)	< 0.1 %	(1 in 6,400)
65 years	< 0.1 %	(1 in 3,600)	< 0.1 %	(1 in 2,100)	< 0.1 %	(1 in 28,100)	< 0.1 %	(1 in 8,200)
75 years	< 0.1 %	(1 in 6,100)	< 0.1 %	(1 in 4,200)	< 0.1 %	(1 in 17,700)	< 0.1 %	(1 in 9,200)
Lifetime risk			0.8 %	(1 in 130)			< 0.1 %	(1 in 3,400)

Figure 3.23.3
Distribution of UICC stages at diagnosis, ICD-10 C62, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

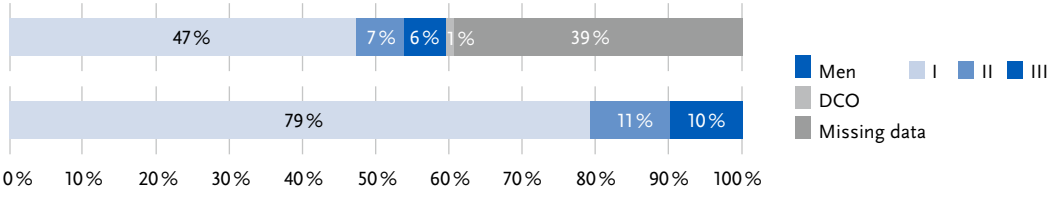


Figure 3.23.4
Absolute and relative survival rates up to 10 years after diagnosis, ICD-10 C62, Germany 2019 – 2020

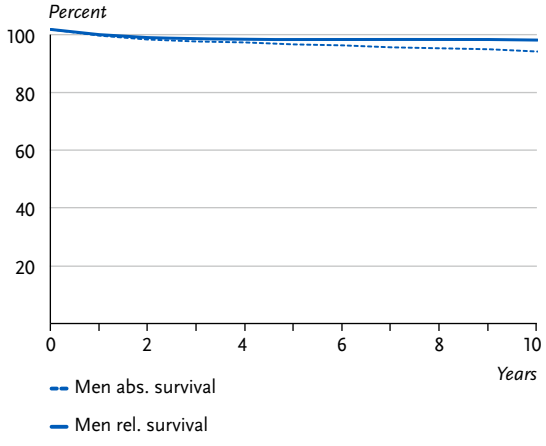


Figure 3.23.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM), ICD-10 C62, Germany 2019 – 2020

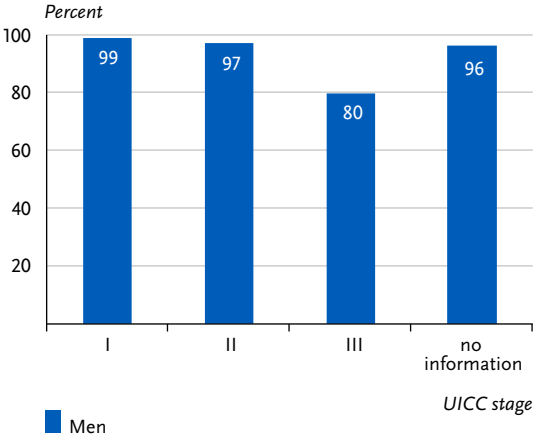


Figure 3.23.6
Age-standardised incidence and mortality rates in German federal states, ICD-10 C62, 2019 – 2020
per 100,000 (old European Standard)

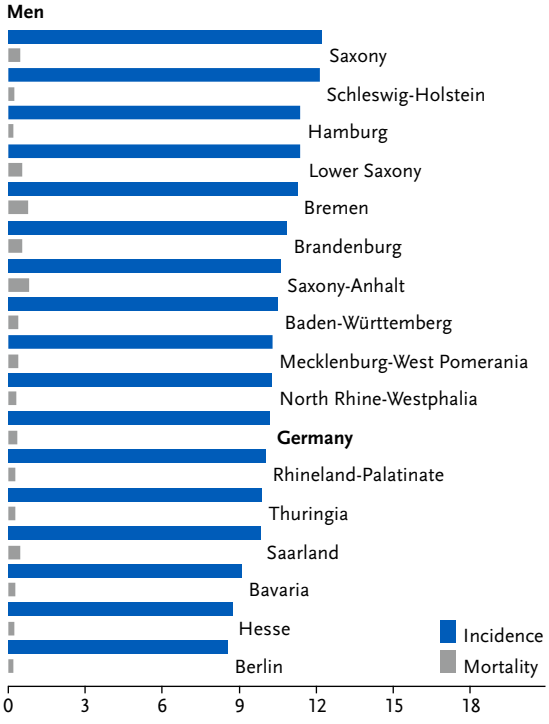
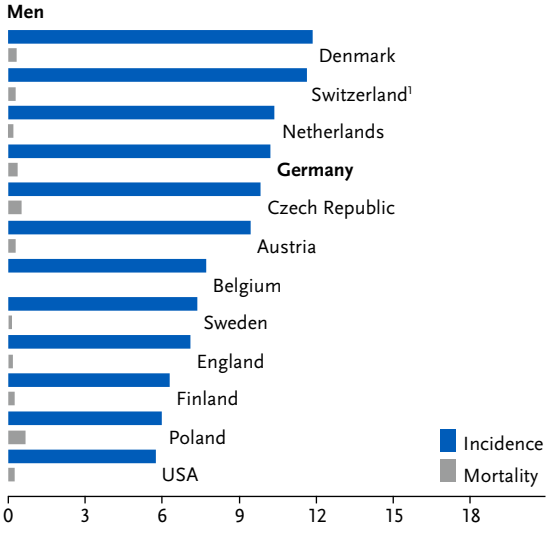


Figure 3.23.7
International comparison of age-standardised incidence and mortality rates, ICD-10 C62, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.24 Kidney

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	5,120	9,880	4,830	9,330		
Crude incidence rate [1]	12.2	24.1	11.5	22.7		
Age-standardised incidence rate [1, 2]	6.9	16.1	6.6	15.2		
Median age at diagnosis	71	68	71	68		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	1,920	3,230	2,034	3,121	1,790	3,070
Crude mortality rate [1]	4.6	7.9	4.8	7.6	4.2	7.5
Age-standardised mortality rate [1, 2]	1.8	4.5	1.9	4.2	1.7	4.1
Median age at death	81	77	81	77	81	77
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	19,400	36,300	35,400	63,800	61,300	104,200
Absolute survival rate (2019 – 2020) [3]	69 (66 – 74)	67 (62 – 72)	54 (49 – 60)	50 (45 – 56)		
Relative survival rate (2019 – 2020) [3]	79 (75 – 84)	77 (72 – 83)	74 (66 – 81)	71 (66 – 77)		

[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. Of all kidney tumours in adults, renal cell carcinomas (hypernephromas) are the most common, accounting for about 95%. In children, who are rarely affected, nephroblastomas (Wilms tumours) predominate. A total of about 14,160 new cases occurred in 2020, with men affected almost twice as often as women.

The age-standardised incidence rates show a slight decline for both sexes since around 2010. A slight downward trend can be observed in the age-standardised mortality rates for women and men over the entire observation period. The median age at diagnosis is 71 years for women and 68 years for men. The prognosis for renal carcinoma is comparatively favourable, with a relative 5-year survival rate of 79% for women and 77% for men. About 60% of all tumours are diagnosed at an early stage (UICC I). A regional comparison reveals higher incidence and mortality rates in the eastern federal states. Internationally, the incidence 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 to be the most important risk factors. A lack of physical activity also appears to increase the risk of developing kidney cancer. Chronic renal insufficiency favours tumours of this organ, regardless of their cause. It can be caused, for example, by drugs that damage the kidneys or repeated inflammation of the urinary tract. Even after a kidney transplant, the risk of developing renal cell carcinoma remains increased in immunosuppressed patients.

Trichloroethene or trichloroethylene can cause kidney cancer. If people have been heavily exposed to this solvent at work, renal cell carcinoma can therefore be recognised as an occupational disease.

A familial disposition presumably only plays a role in comparatively few patients. Around 4% of renal cell carcinomas occur in patients with complex hereditary diseases, such as those affected by von Hippel-Lindau syndrome. These genetic renal cell carcinomas are often multifocal, bilateral and occur more frequently at a younger age than kidney cancers in patients without a genetic predisposition.

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

Figure 3.24.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C64, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

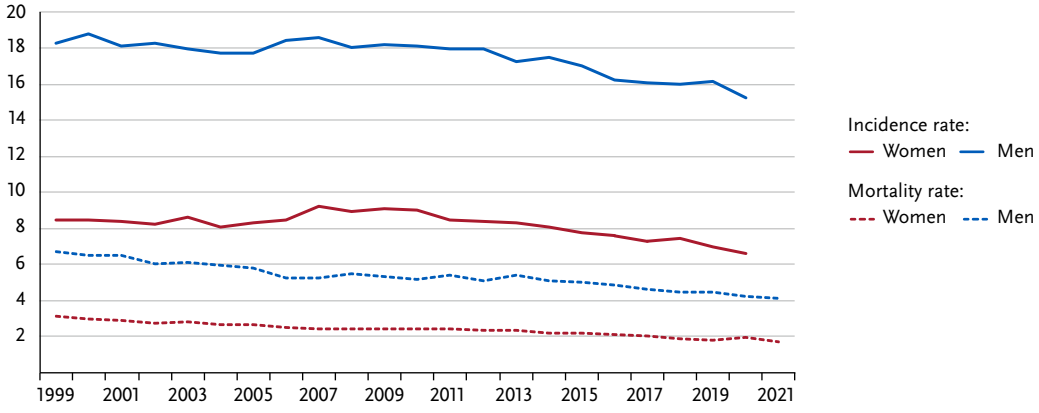


Figure 3.24.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C64, Germany 1999 – 2020/2021

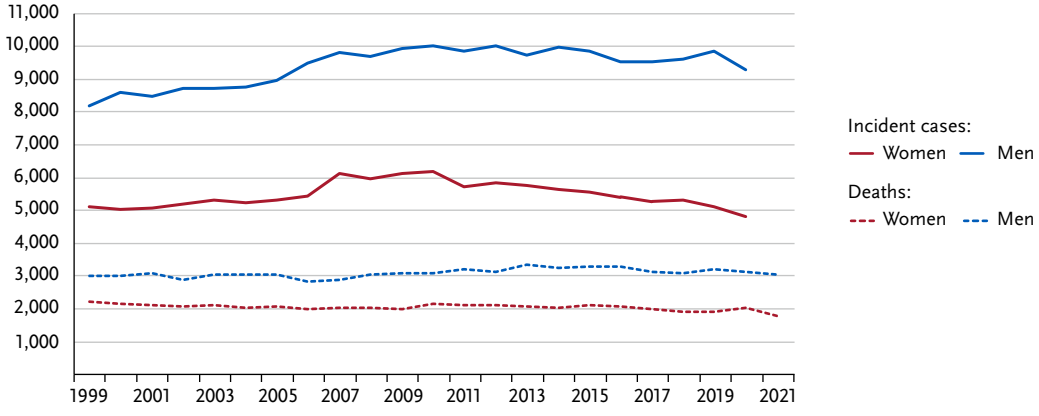


Figure 3.24.2
Age-specific incidence rates by sex, ICD-10 C64, Germany 2019 – 2020
per 100,000

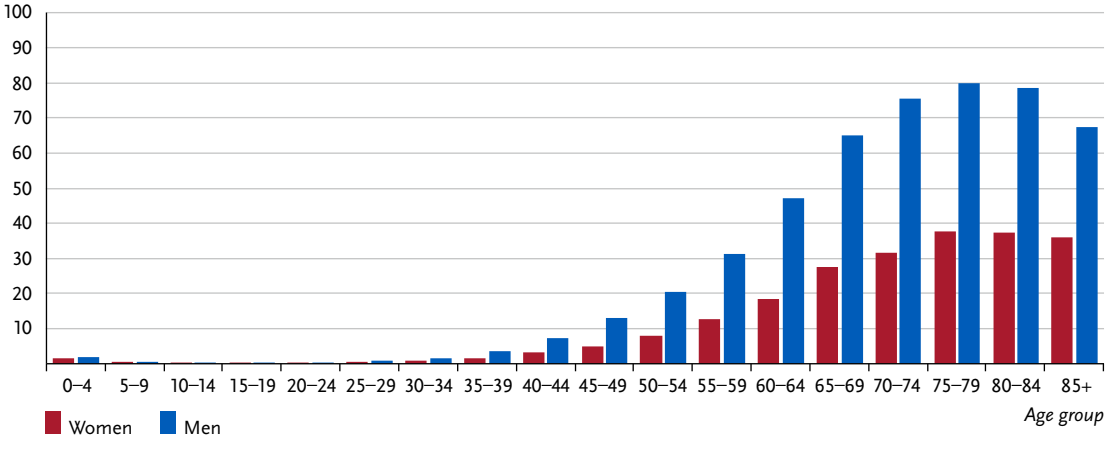


Table 3.24.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C64, database 2019

	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 3,800)	0.9 %	(1 in 110)	< 0.1 %	(1 in 42,300)	0.4 %	(1 in 260)
45 years	0.1 %	(1 in 1,600)	0.9 %	(1 in 110)	< 0.1 %	(1 in 16,900)	0.4 %	(1 in 260)
55 years	0.2 %	(1 in 630)	0.9 %	(1 in 120)	< 0.1 %	(1 in 4,000)	0.4 %	(1 in 260)
65 years	0.2 %	(1 in 350)	0.7 %	(1 in 140)	0.1 %	(1 in 1,500)	0.4 %	(1 in 260)
75 years	0.3 %	(1 in 300)	0.5 %	(1 in 200)	0.2 %	(1 in 590)	0.4 %	(1 in 280)
Lifetime risk			0.9 %	(1 in 110)			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 1,800)	1.8 %	(1 in 56)	< 0.1 %	(1 in 19,500)	0.7 %	(1 in 150)
45 years	0.2 %	(1 in 570)	1.8 %	(1 in 57)	< 0.1 %	(1 in 4,400)	0.7 %	(1 in 150)
55 years	0.4 %	(1 in 260)	1.6 %	(1 in 61)	0.1 %	(1 in 1,300)	0.7 %	(1 in 150)
65 years	0.6 %	(1 in 160)	1.4 %	(1 in 73)	0.2 %	(1 in 590)	0.6 %	(1 in 160)
75 years	0.7 %	(1 in 150)	0.9 %	(1 in 110)	0.3 %	(1 in 300)	0.6 %	(1 in 170)
Lifetime risk			1.8 %	(1 in 56)			0.7 %	(1 in 150)

Figure 3.24.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C64, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

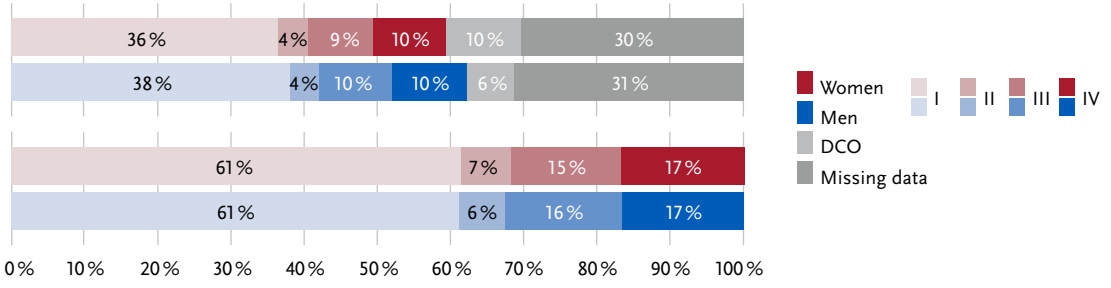


Figure 3.24.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C64, Germany 2019 – 2020

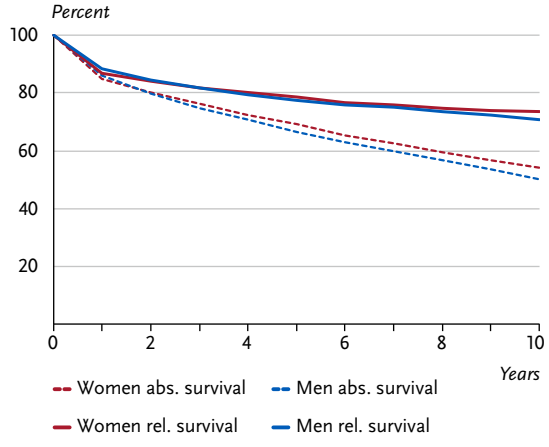


Figure 3.24.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C64, Germany 2019 – 2020

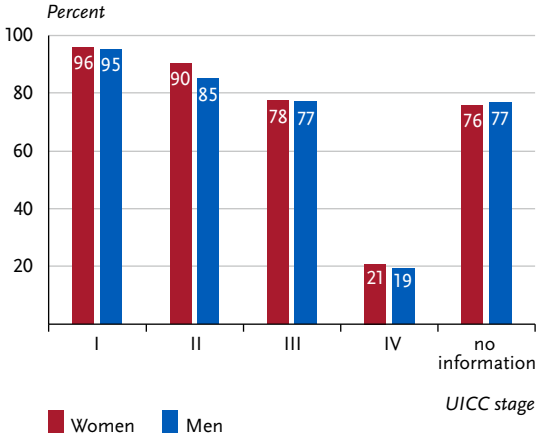


Figure 3.24.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C64, 2019 – 2020
per 100,000 (old European Standard)

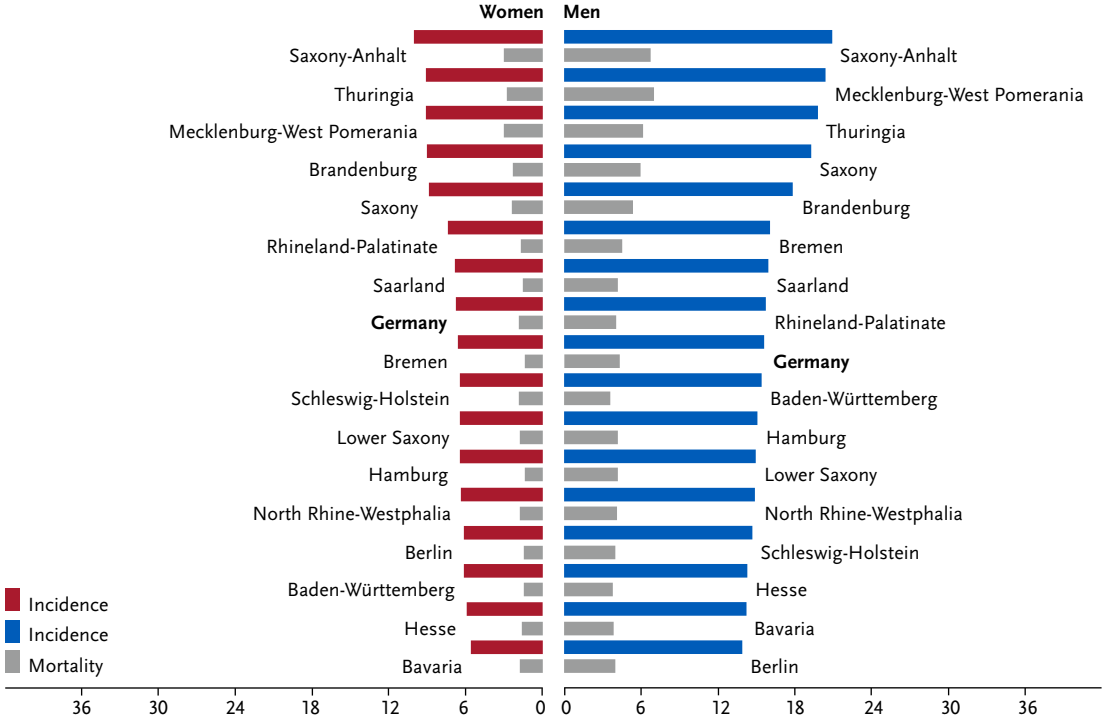
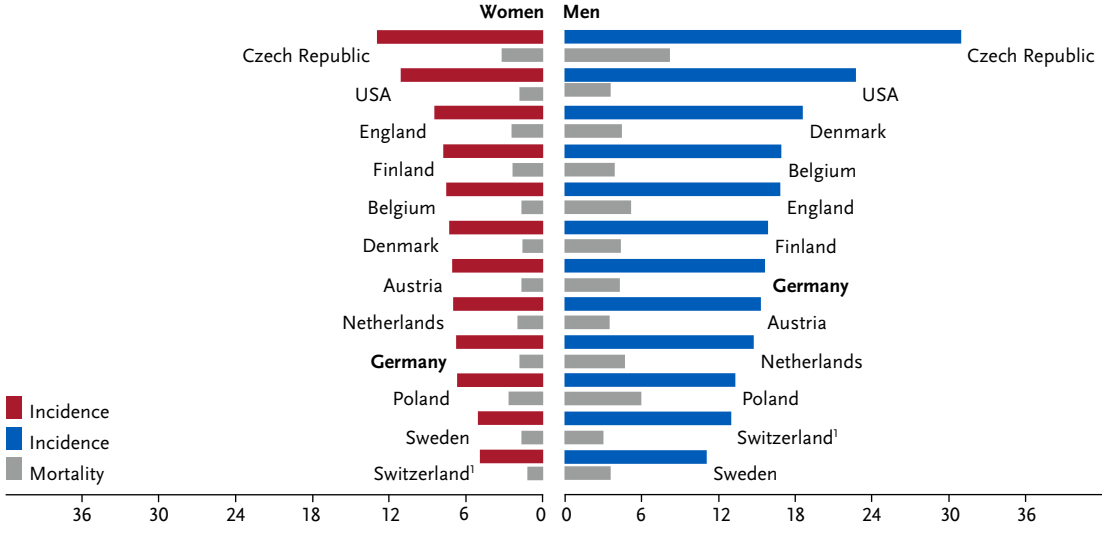


Figure 3.24.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C64, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.25 Bladder

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

Incidence	2019				2020					
	Women		Men		Women		Men			
Incident cases [4]	4,930	(7,790)	13,690	(24,410)	4,630	(7,540)	12,500	(23,270)		
Crude incidence rate [1, 4]	11.7	(18.5)	33.4	(59.5)	11.0	(17.9)	30.5	(56.7)		
Age-standardised incidence rate [1, 2, 4]	5.6	(9.3)	19.6	(35.4)	5.2	(8.9)	17.6	(33.2)		
Median age at diagnosis [4]	77	(75)	75	(74)	77	(76)	75	(74)		
Mortality	**2019**				**2020**				**2021**	
	Women		**Men**		**Women**		**Men**		**Women**	**Men**
Deaths	1,814		3,824		1,935		3,942		1,852	3,891
Crude mortality rate [1]	4.3		9.3		4.6		9.6		4.4	9.5
Age-standardised mortality rate [1, 2]	1.6		5.0		1.7		4.9		1.7	4.8
Median age at death	82		80		83		81		82	81
Prevalence and survival rates	**5 Jahre**				**10 Jahre**				**25 Jahre**	
	Women		**Men**		**Women**		**Men**		**Women**	**Men**
Prevalence	12,200		40,300		19,100		63,800		30,400	97,500
Absolute survival rate (2019 – 2020) [3]	37 (31 – 48)		45 (42 – 54)		27 (23 – 32)		29 (26 – 38)			
Relative survival rate (2019 – 2020) [3]	46 (38 – 58)		58 (53 – 67)		43 (35 – 50)		50 (44 – 62)			

[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 unkown behavior (D09.0, D41.4)

Epidemiology

Around 17,100 people were diagnosed with invasive bladder cancer in 2020, including 4,630 women. In addition, about 13,680 people were diagnosed with non-invasive papillary carcinomas and in situ carcinomas of the bladder. The latter in particular have an increased risk of tumour growth (progression) and recurrence of the disease (relapse). They are therefore of particular clinical relevance, although they are not currently classified as malignant tumours according to ICD-10. Urinary bladder cancers are predominantly urothelial tumours, which often occur simultaneously in different parts of the bladder and urinary tract.

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

The higher relative 5-year survival rates of men (58 %) compared to women (46 %) 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 substances have now largely disappeared from everyday working life in Europe. However, the latency period between exposure and the development of cancer is long, so that work-related bladder cancers continue to be registered. Cytostatic drugs used in cancer therapy and radiotherapy of this body region can increase the risk. Other drugs such as the antidiabetic drug pioglitazone also appear to trigger bladder cancer.

Air pollution and arsenic or chlorine in drinking water increase the risk of developing bladder cancer as well. Aristolochic acid from Aristolochia plants such as Easter lily also increases the risk of bladder cancer. Chronic inflammatory damage to the bladder mucosa increases the risk of the disease, too. 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 – 2020/2021
per 100,000 (old European Standard)

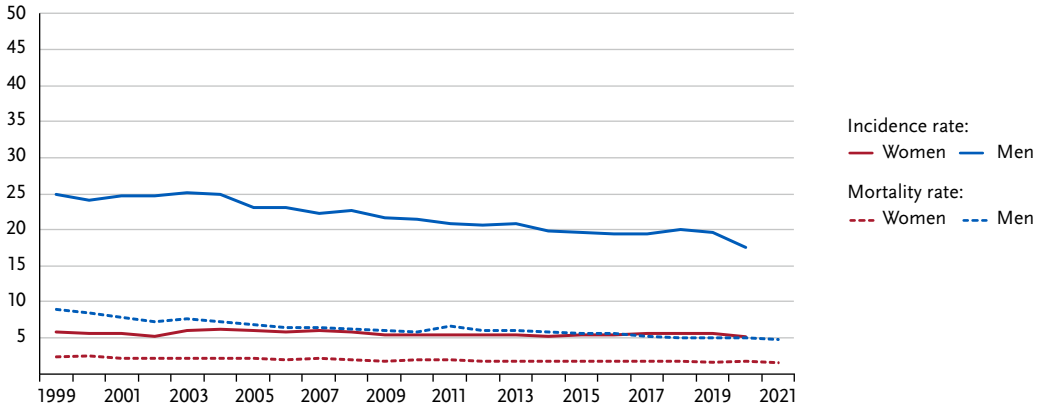


Figure 3.25.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C67, Germany 1999 – 2020/2021

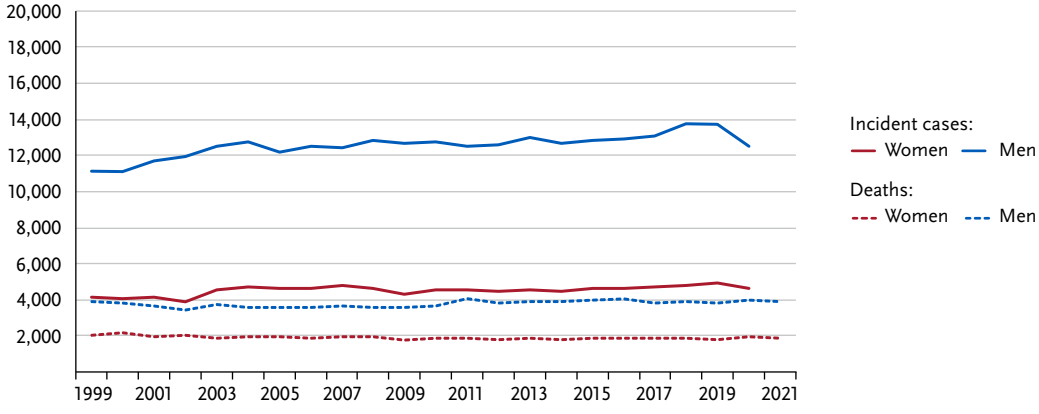


Figure 3.25.2
Age-specific incidence rates by sex, ICD-10 C67, Germany 2019 – 2020
per 100,000

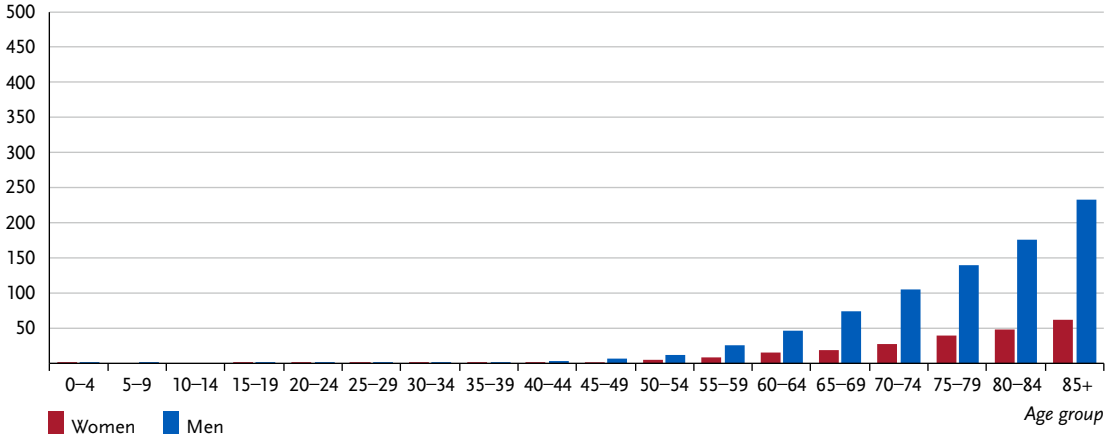


Table 3.25.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C67, database 2019

	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 9,000)	0.9 %	(1 in 110)	< 0.1 %	(1 in 43,900)	0.4 %	(1 in 270)
45 years	< 0.1 %	(1 in 2,600)	0.9 %	(1 in 110)	< 0.1 %	(1 in 16,800)	0.4 %	(1 in 270)
55 years	0.1 %	(1 in 860)	0.9 %	(1 in 110)	< 0.1 %	(1 in 4,800)	0.4 %	(1 in 270)
65 years	0.2 %	(1 in 430)	0.8 %	(1 in 120)	0.1 %	(1 in 1,800)	0.4 %	(1 in 270)
75 years	0.4 %	(1 in 250)	0.7 %	(1 in 150)	0.2 %	(1 in 640)	0.4 %	(1 in 280)
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 4,200)	2.7 %	(1 in 37)	< 0.1 %	(1 in 42,900)	0.9 %	(1 in 120)
45 years	0.1 %	(1 in 920)	2.7 %	(1 in 37)	< 0.1 %	(1 in 8,100)	0.9 %	(1 in 110)
55 years	0.4 %	(1 in 260)	2.7 %	(1 in 37)	0.1 %	(1 in 1,800)	0.9 %	(1 in 110)
65 years	0.9 %	(1 in 120)	2.6 %	(1 in 39)	0.2 %	(1 in 610)	0.9 %	(1 in 110)
75 years	1.3 %	(1 in 77)	2.2 %	(1 in 46)	0.4 %	(1 in 250)	1.0 %	(1 in 110)
Lifetime risk			2.7 %	(1 in 37)			0.9 %	(1 in 120)

Figure 3.25.3
Distribution of UICC stages at diagnosis by sex, ICD-10 C67, Germany 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

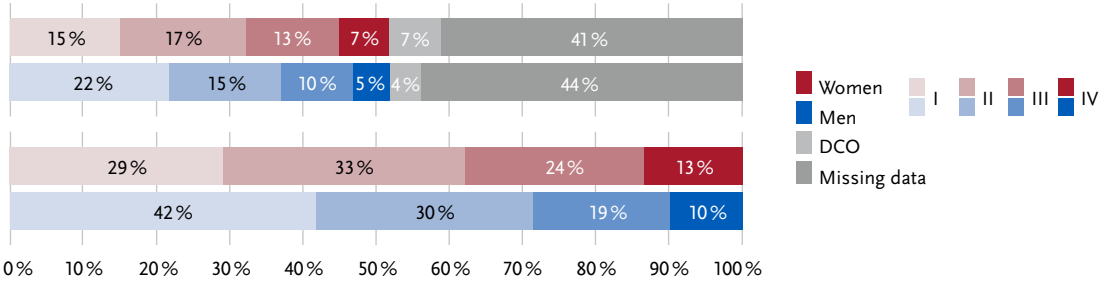


Figure 3.25.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C67, Germany 2019 – 2020

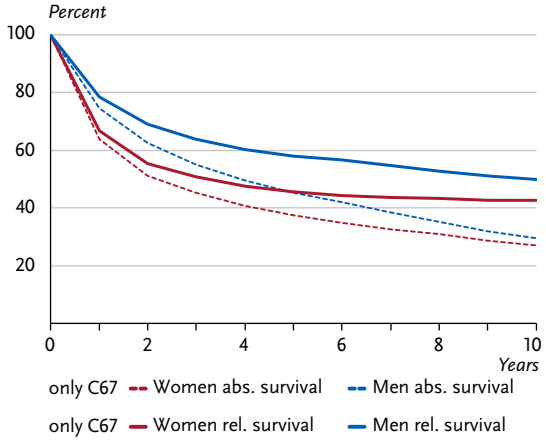


Figure 3.25.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C67, Germany 2019 – 2020

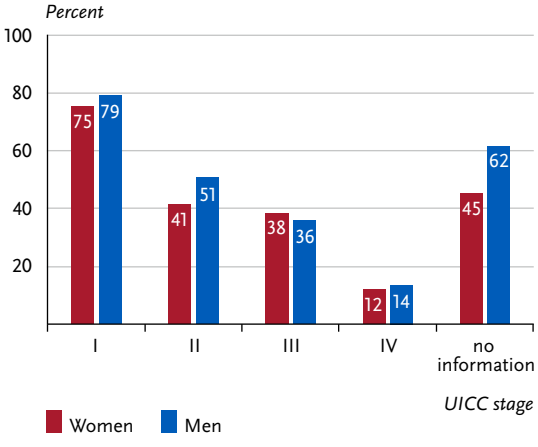
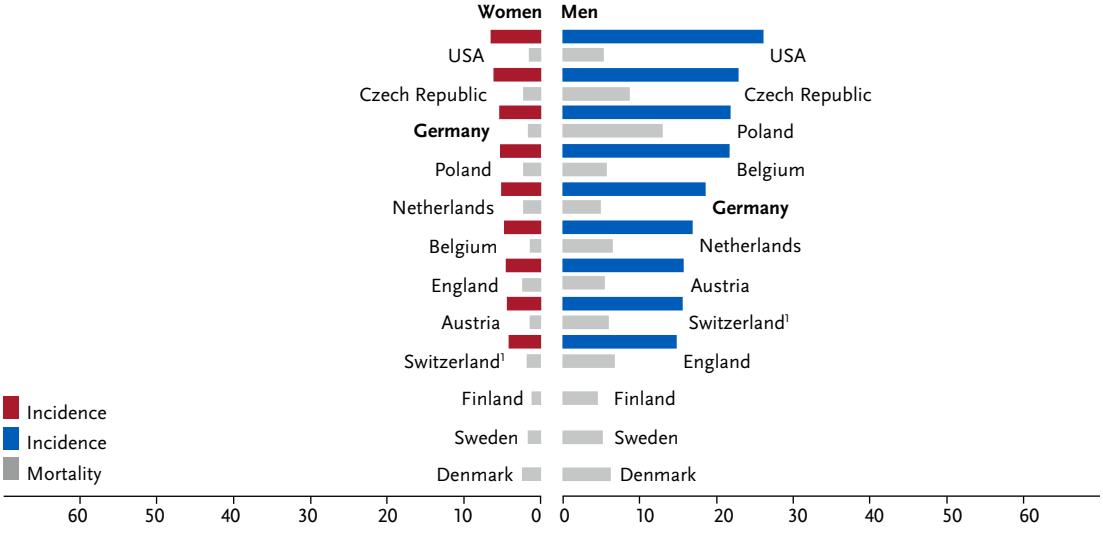


Figure 3.25.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C67, 2019 – 2020
per 100,000 (old European Standard)

Figure 3.25.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C67, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.26 Central nervous system

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	3,240	4,140	3,250	4,080		
Crude incidence rate [1]	7.7	10.1	7.7	10.0		
Age-standardised incidence rate [1, 2]	5.6	7.7	5.5	7.5		
Median age at diagnosis	65	64	66	63		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	2,583	3,430	2,585	3,427	2,610	3,406
Crude mortality rate [1]	6.2	8.3	6.1	8.3	6.2	8.3
Age-standardised mortality rate [1, 2]	3.8	5.9	3.7	5.8	3.9	5.7
Median age at death	70	67	70	67	68	67
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	6,000	7,500	9,700	11,200	15,700	18,500
Absolute survival rate (2019 – 2020) [3]	21 (19 – 27)	20 (17 – 26)	17 (13 – 22)	15 (10 – 21)		
Relative survival rate (2019 – 2020) [3]	23 (20 – 28)	21 (18 – 27)	18 (14 – 24)	17 (11 – 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% being spread across 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 good two thirds are glioblastomas (grade IV astrocytoma) with an unfavourable prognosis. In infants and young children, on the other hand, embryonal tumours predominate.

In 2020, about 3,250 women and 4,080 men were diagnosed with malignant CNS tumours in Germany. No significant changes in incidence and mortality rates have been observed since 1999. The relative 5-year survival rates for malignant CNS tumours are 23% for women and 21% for men. These figures do not include histologically benign CNS tumours or tumours of uncertain or unknown behaviour, which can also lead to complications or even death depending on their location. These diagnoses together account for about 7,000 new cases per year, almost two thirds of which originate from the meninges. Women are significantly more frequently affected.

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 radiotherapy in the head area, the risk of developing a brain tumour years later is slightly increased. This applies in particular to radiotherapy in childhood and adolescence. A diagnostic computer tomography scan in childhood can also probably 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. This applies in particular to people who use mobile phones frequently and for particularly long periods of time.

The role played by pollutants such as N-nitroso compounds or pesticides is not clearly understood. 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 suffer from a brain tumour, the risk of developing the disease increases statistically, 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 – 2020/2021
per 100,000 (old European Standard)

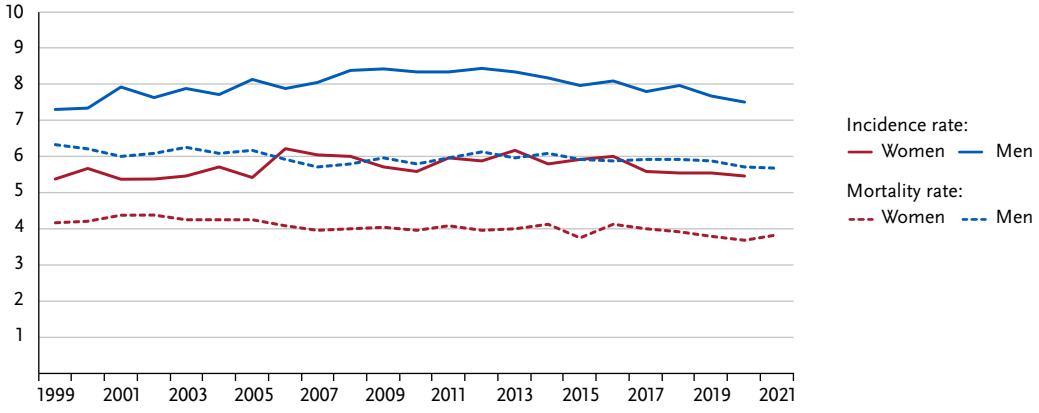


Figure 3.26.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C70 – C72, Germany 1999 – 2020/2021

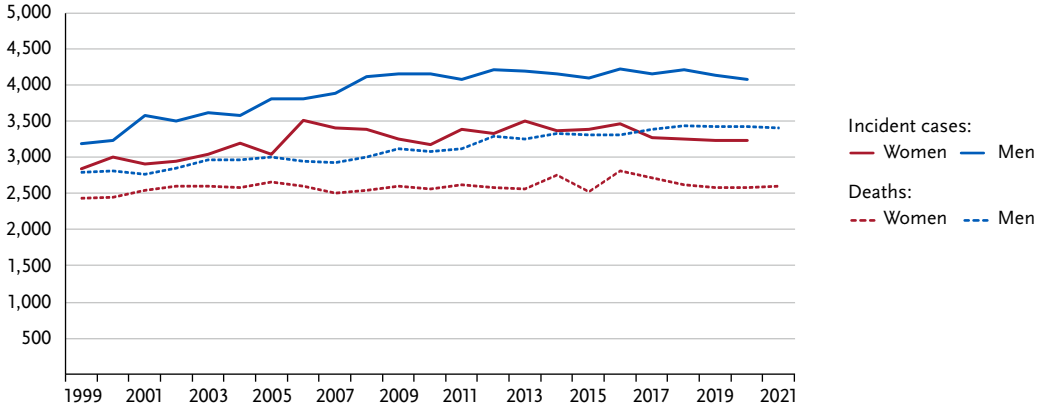


Figure 3.26.2
Age-specific incidence rates by sex, ICD-10 C70 – C72, Germany 2019 – 2020
per 100,000

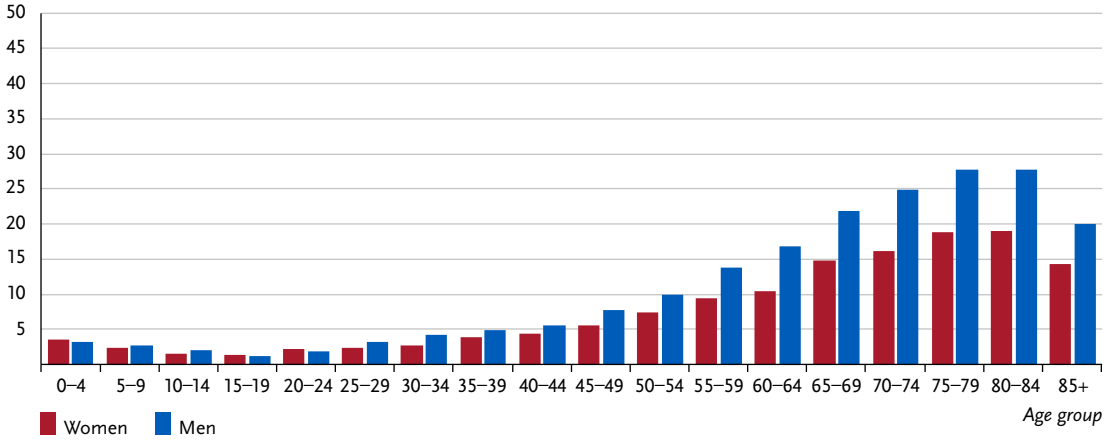
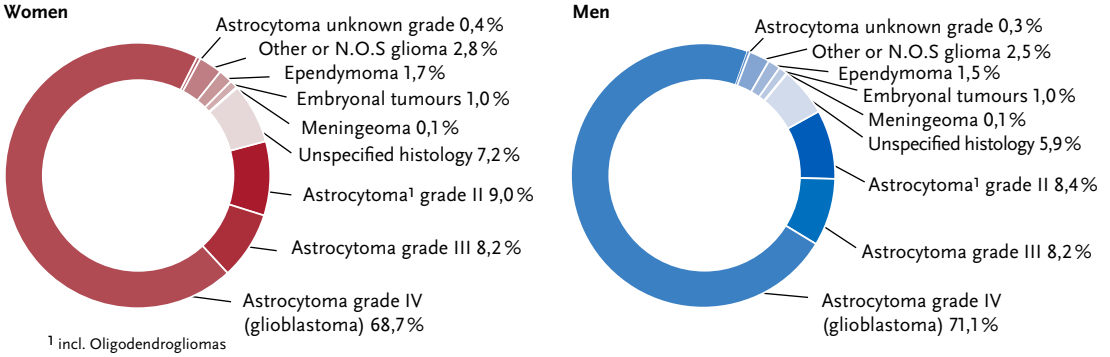


Table 3.26.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C70 – C72, database 2019

	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 2,400)	0.5 %	(1 in 190)	< 0.1 %	(1 in 6,200)	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 230)	0.1 %	(1 in 1,200)	0.4 %	(1 in 250)
65 years	0.1 %	(1 in 690)	0.3 %	(1 in 290)	0.1 %	(1 in 720)	0.3 %	(1 in 300)
75 years	0.2 %	(1 in 650)	0.2 %	(1 in 450)	0.2 %	(1 in 650)	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 3,200)	0.6 %	(1 in 170)
45 years	0.1 %	(1 in 1,100)	0.6 %	(1 in 160)	0.1 %	(1 in 1,500)	0.6 %	(1 in 180)
55 years	0.1 %	(1 in 700)	0.6 %	(1 in 180)	0.1 %	(1 in 780)	0.5 %	(1 in 190)
65 years	0.2 %	(1 in 460)	0.5 %	(1 in 220)	0.2 %	(1 in 480)	0.4 %	(1 in 230)
75 years	0.2 %	(1 in 450)	0.3 %	(1 in 340)	0.2 %	(1 in 470)	0.3 %	(1 in 350)
Lifetime risk			0.8 %	(1 in 130)			0.6 %	(1 in 160)

Figure 3.26.3
Distribution of histological types of malignant brain tumours (C71) in Germany according to WHO-classification (2016), by sex, DCO cases excluded, 2019 – 2020



¹ incl. 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 2019 – 2020

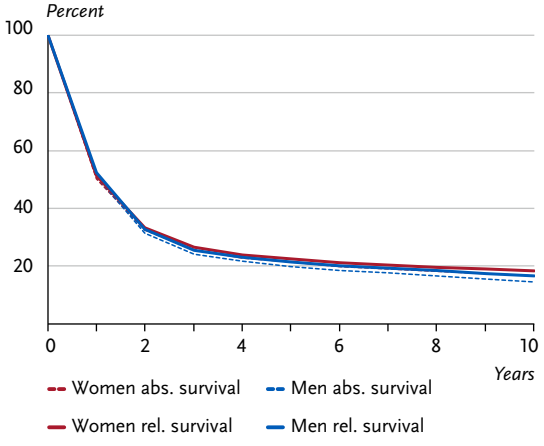


Figure 3.26.5
Relative 5-year survival by histology and sex, ICD-10 C71, Germany 2019 – 2020

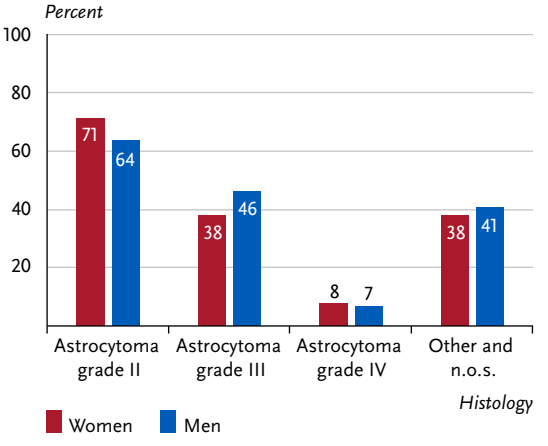


Figure 3.26.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C70 – C72, 2019 – 2020
per 100,000 (old European Standard)

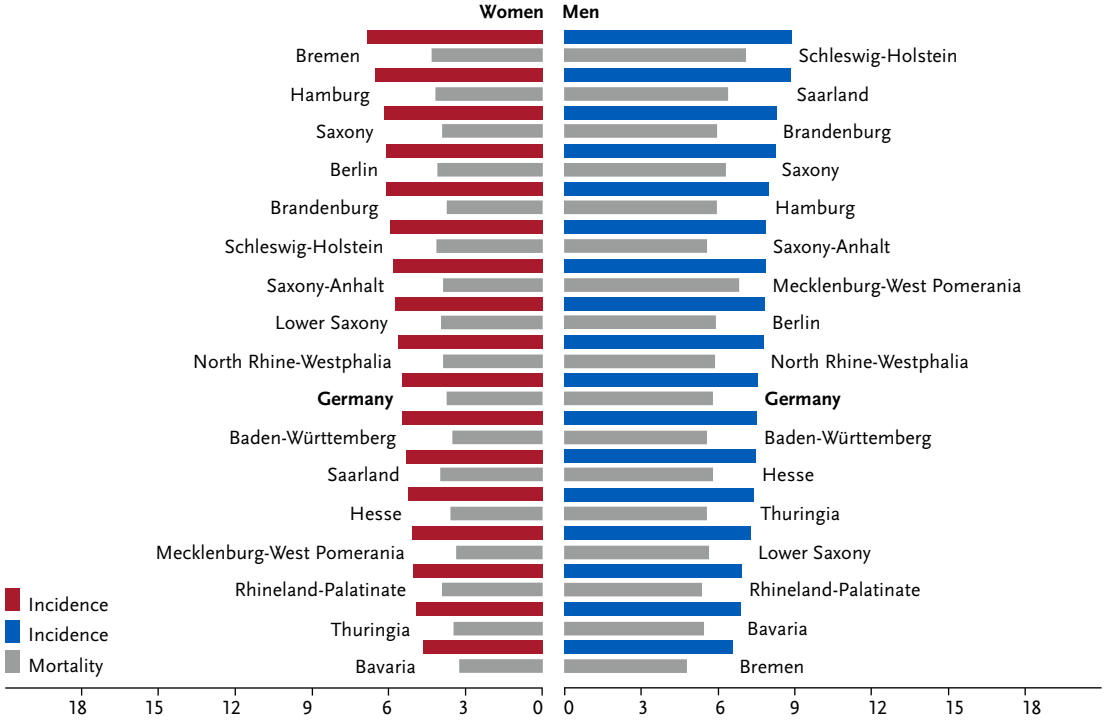
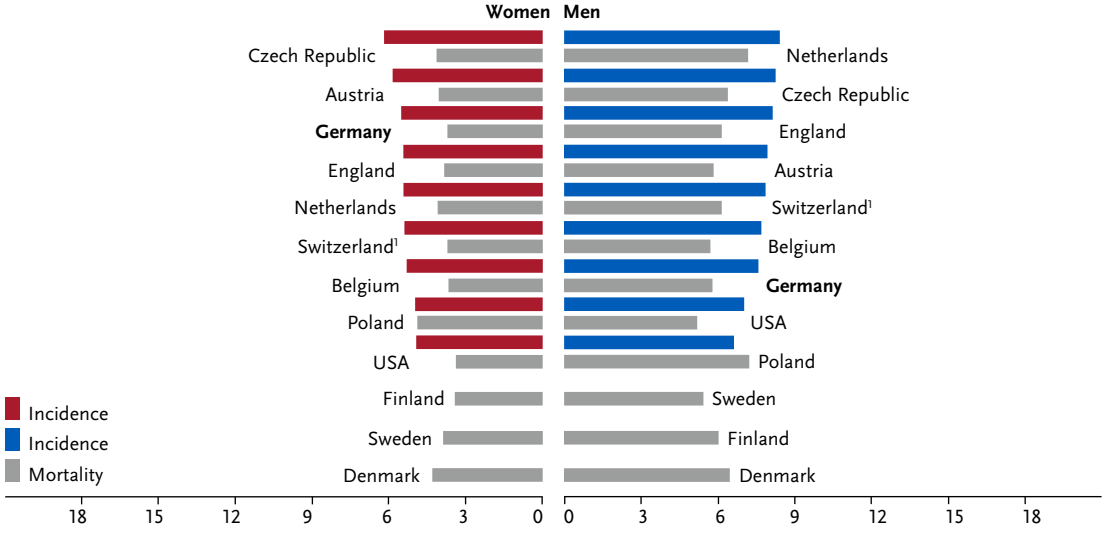


Figure 3.26.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C70 – C72, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.27 Thyroid gland

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	4,240	1,880	3,980	1,780		
Crude incidence rate [1]	10.1	4.6	9.5	4.3		
Age-standardised incidence rate [1, 2]	9.1	3.9	8.6	3.6		
Median age at diagnosis	51	55	51	55		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	426	311	396	295	397	313
Crude mortality rate [1]	1.0	0.8	0.9	0.7	0.9	0.8
Age-standardised mortality rate [1, 2]	0.4	0.5	0.4	0.4	0.4	0.4
Median age at death	80	73	80	74	81	74
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	20,000	8,200	39,400	15,500	78,300	27,400
Absolute survival rate (2019 – 2020) [3]	91 (78 – 96)	83 (79 – 87)	86 (73 – 91)	73 (69 – 77)		
Relative survival rate (2019 – 2020) [3]	94 (81 – 99)	88 (84 – 92)	94 (80 – 99)	86 (80 – 90)		

[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 3,980 women and 1,780 men were diagnosed with thyroid cancer in 2020. The median age at diagnosis was 51 for women and 55 for men, which was relatively low compared to other types of cancer.

In the period from 1999 to 2020, 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 the increased use of imaging diagnostics with improved examination methods. Similar trends can be observed worldwide in thyroid carcinoma.

Mortality rates in Germany have fallen for both sexes. Overall, thyroid cancer has a favourable prognosis: the relative 5-year survival rates are 94 % for women and 88 % for men. Only the rarer anaplastic carcinomas have an unfavourable prognosis. The majority of thyroid carcinomas are detected at an early stage (UICC I) (84 % in women, 68 % in men).

Risk factors

Ionising radiation is an important risk factor for thyroid cancer. In childhood, the thyroid gland is particularly sensitive to radiation. Possible sources of external radiation exposure include applications of radiation as cancer therapy where the thyroid gland is in the radiation field. Internal exposure through the intake of radioactive iodine, such as after nuclear disasters like the Chernobyl reactor accident, also increases the risk. Other environmental risks or dietary or lifestyle-related factors have not yet been proven with certainty. There are indications that obesity is a risk factor for the most common (papillary) thyroid carcinoma.

Many patients have a history of iodine deficiency and benign thyroid diseases, such as goitre and larger adenomas, which increase the risk of thyroid cancer, especially if they occur at a young age. In general, women are affected by thyroid cancer much more frequently than men, but the cause is still unclear.

A clearly proven risk factor is family history: thyroid cancer in a first-degree relative or various hereditary syndromes such as multiple endocrine neoplasia type 2 (MEN 2) increase the risk.

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

Figure 3.27.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C73, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

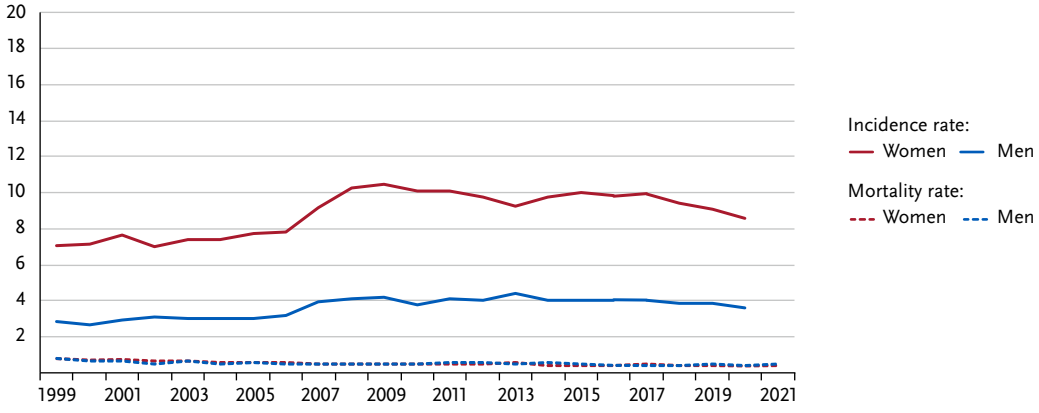


Figure 3.27.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C73, Germany 1999 – 2020/2021

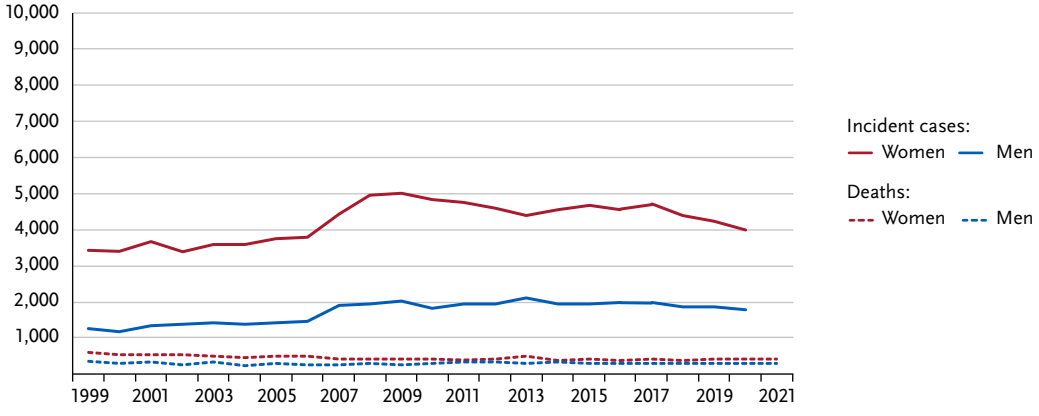


Figure 3.27.2
Age-specific incidence rates by sex, ICD-10 C73, Germany 2019 – 2020
per 100,000

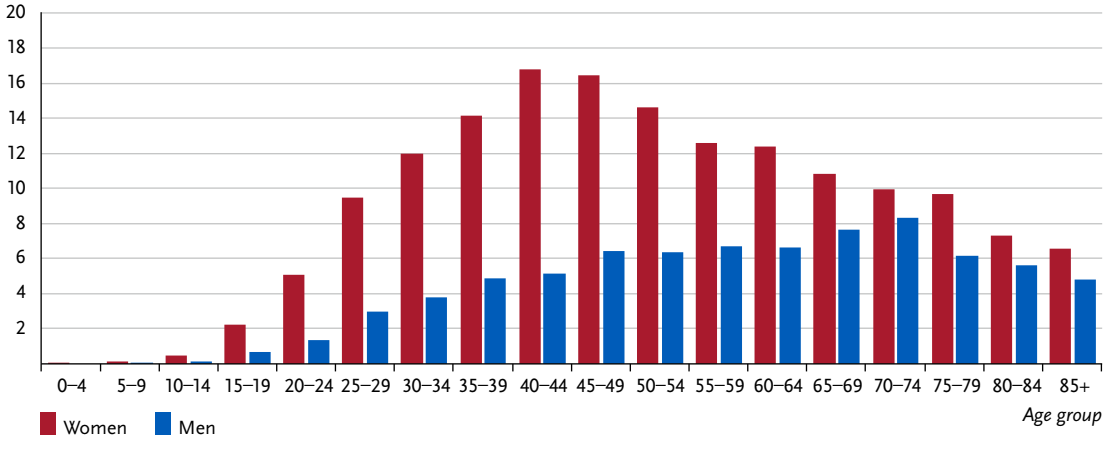


Table 3.27.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C73, database 2019

	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 940)	0.7 %	(1 in 140)	< 0.1 %	(1 in 497,100)	0.1 %	(1 in 1,200)
35 years	0.2 %	(1 in 620)	0.6 %	(1 in 160)	< 0.1 %	(1 in 239,600)	0.1 %	(1 in 1,200)
45 years	0.2 %	(1 in 630)	0.5 %	(1 in 210)	< 0.1 %	(1 in 49,600)	0.1 %	(1 in 1,200)
55 years	0.1 %	(1 in 800)	0.3 %	(1 in 310)	< 0.1 %	(1 in 12,700)	0.1 %	(1 in 1,200)
65 years	0.1 %	(1 in 910)	0.2 %	(1 in 490)	< 0.1 %	(1 in 5,700)	0.1 %	(1 in 1,200)
75 years	0.1 %	(1 in 1,300)	0.1 %	(1 in 920)	< 0.1 %	(1 in 2,900)	0.1 %	(1 in 1,400)
Lifetime risk			0.8 %	(1 in 130)			0.1 %	(1 in 1,200)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
25 years	< 0.1 %	(1 in 3,100)	0.3 %	(1 in 310)	< 0.1 %	(1 in 182,800)	0.1 %	(1 in 1,700)
35 years	0.1 %	(1 in 1,900)	0.3 %	(1 in 350)	< 0.1 %	(1 in 151,100)	0.1 %	(1 in 1,700)
45 years	0.1 %	(1 in 1,600)	0.2 %	(1 in 420)	< 0.1 %	(1 in 34,400)	0.1 %	(1 in 1,700)
55 years	0.1 %	(1 in 1,500)	0.2 %	(1 in 550)	< 0.1 %	(1 in 9,900)	0.1 %	(1 in 1,700)
65 years	0.1 %	(1 in 1,400)	0.1 %	(1 in 810)	< 0.1 %	(1 in 5,300)	0.1 %	(1 in 1,900)
75 years	0.0 %	(1 in 2,000)	0.1 %	(1 in 1,500)	< 0.1 %	(1 in 3,700)	0.0 %	(1 in 2,300)
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 2019 – 2020
(top: incl. missing data and DCO cases; bottom: valid values only)

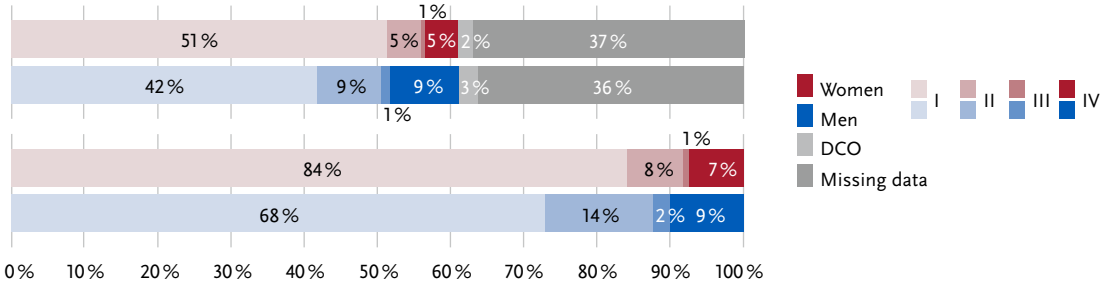


Figure 3.27.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C73, Germany 2019 – 2020

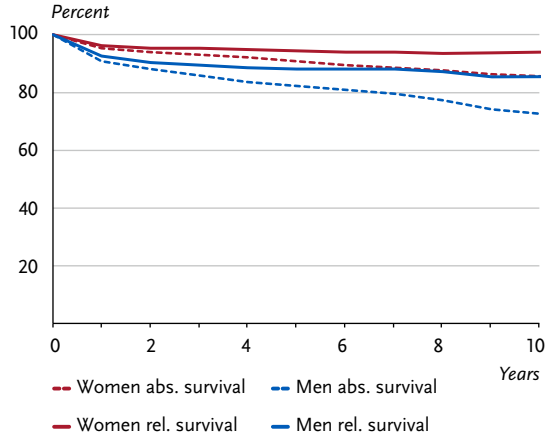


Figure 3.27.5
Relative 5-year survival by UICC stage (7th and 8th edition TNM) and sex, ICD-10 C73, Germany 2019 – 2020

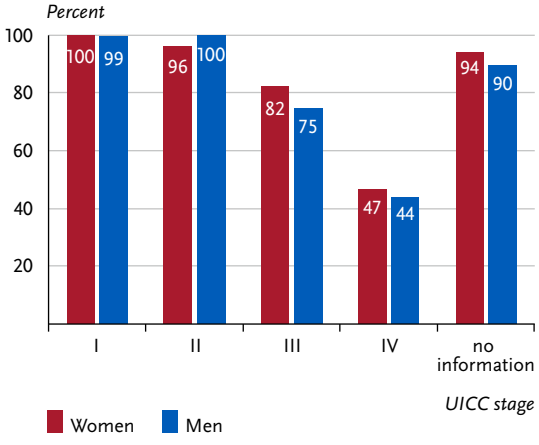


Figure 3.27.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C73, 2019 – 2020
per 100,000 (old European Standard)

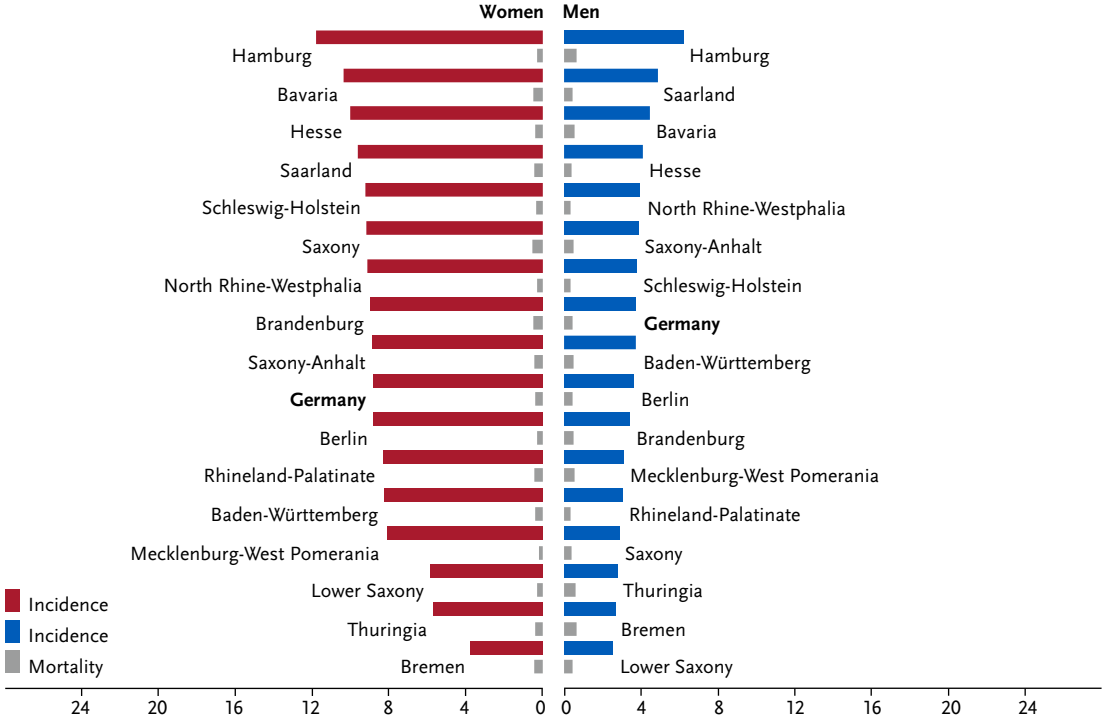
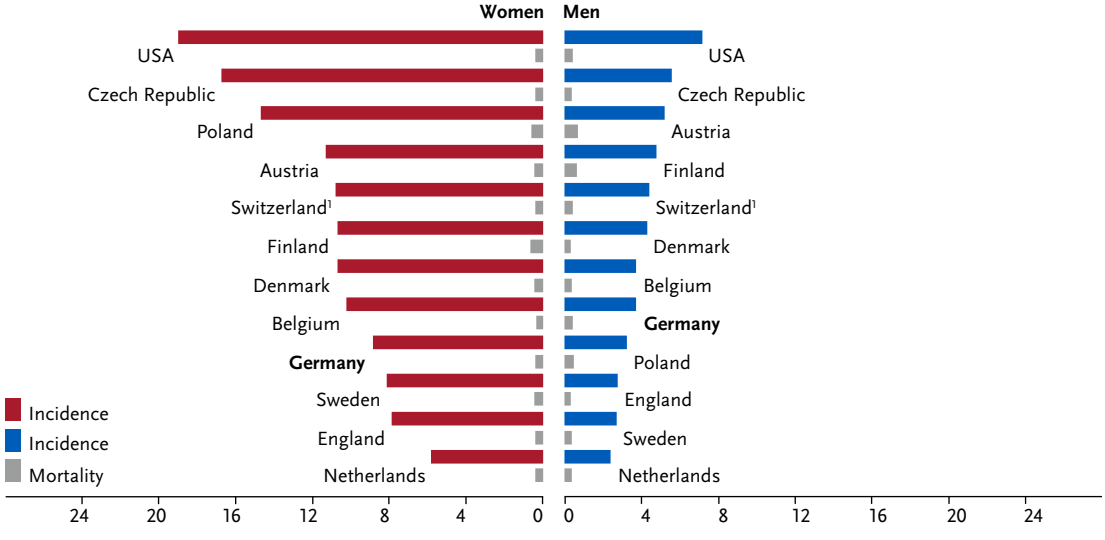


Figure 3.27.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C73, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.28 Hodgkin lymphoma

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	1,120	1,460	990	1,460		
Crude incidence rate [1]	2.7	3.6	2.3	3.6		
Age-standardised incidence rate [1, 2]	2.6	3.2	2.3	3.3		
Median age at diagnosis	43	50	43	48		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	127	207	132	185	131	185
Crude mortality rate [1]	0.3	0.5	0.3	0.5	0.3	0.5
Age-standardised mortality rate [1, 2]	0.1	0.3	0.1	0.3	0.1	0.3
Median age at death	79	73	78	75	80	73
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	4,400	6,100	8,200	11,000	17,200	21,200
Absolute survival rate (2019 – 2020) [3]	83 (81 – 86)	82 (80 – 86)	78 (70 – 82)	73 (70 – 77)		
Relative survival rate (2019 – 2020) [3]	87 (84 – 88)	87 (85 – 92)	84 (77 – 87)	82 (79 – 88)		

[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 known as 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 990 women and 1,460 men in Germany in 2020, relatively many of them in young and middle adulthood. Between the ages of 15 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 or absolute number of new cases of Hodgkin's disease have risen slightly since the mid-2000s, while recently, with just over 300 deaths per year, significantly fewer people are dying from Hodgkin's disease than at the end of the 1990s. The prognosis is correspondingly favourable, with a relative survival of around 87% five years after diagnosis and 83% after ten years. Due to the often chronic recurrence of the disease, the long-term prognosis is also influenced by the side effects of the therapy (including secondary tumours).

Risk factors

The risk factors for Hodgkin lymphoma have only been partially clarified to date. Congenital diseases of the immune system or acquired immunodeficiencies, for example due to HIV infection, can increase the risk of Hodgkin lymphoma.

Epstein-Barr viruses (EBV), the pathogens that cause Pfeiffer's glandular fever (infectious mononucleosis), can play a causal role in the development of individual Hodgkin lymphomas – although the overall risk is low. Lifestyle-related risk factors or environmental risks are probably also involved, but the associations here are complex and therefore not clearly understood. Long-term cigarette consumption may increase the risk.

Children and siblings of those affected have a slightly increased risk of developing Hodgkin's disease themselves. However, the exact correlations are not yet fully understood.

Overall, for many patients, no clear cause can be found for the development of Hodgkin lymphoma. It is likely that 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 – 2020/2021
per 100,000 (old European Standard)

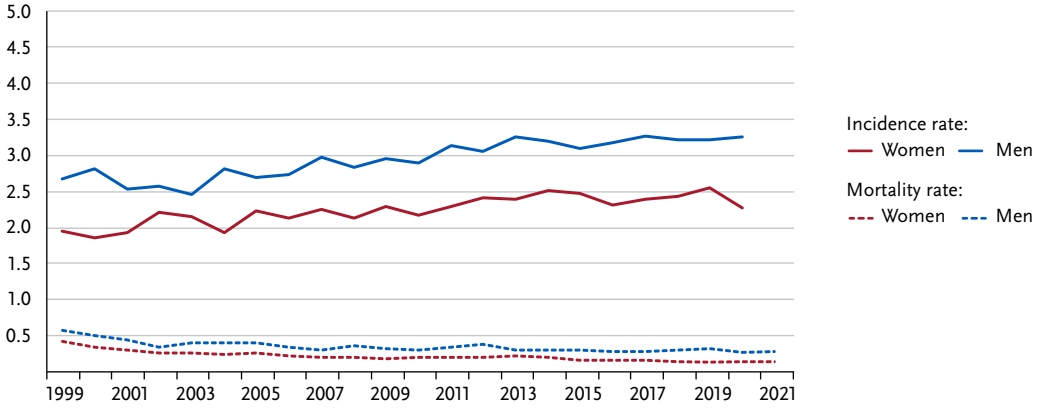


Figure 3.28.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C81, Germany 1999 – 2020/2021

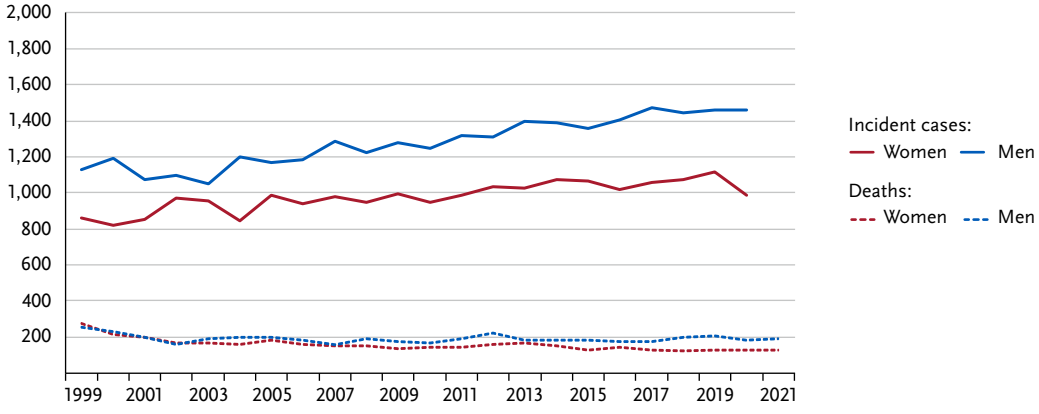


Figure 3.28.2
Age-specific incidence rates by sex, ICD-10 C81, Germany 2019 – 2020
per 100,000

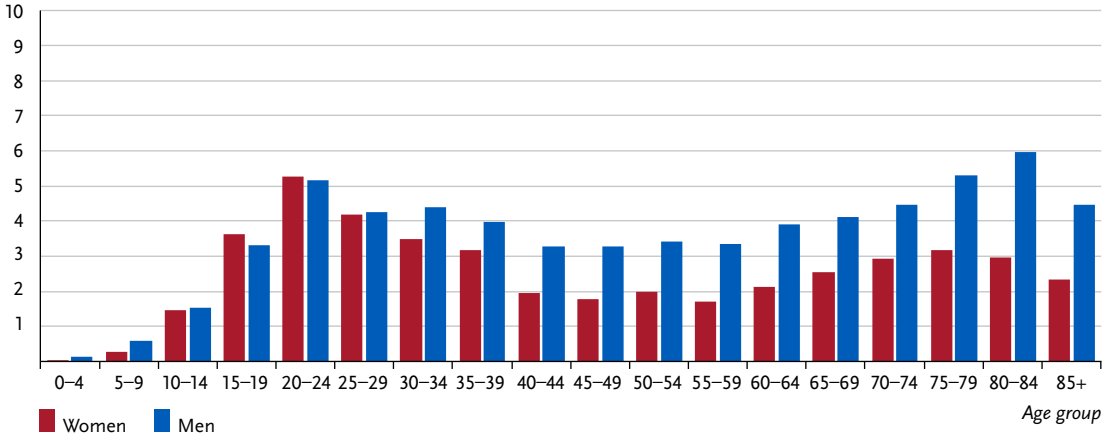


Table 3.28.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C81, database 2019

	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 2,400)	0.2 %	(1 in 480)	< 0.1 %	(1 in 434,200)	< 0.1 %	(1 in 4,200)
25 years	< 0.1 %	(1 in 2,400)	0.2 %	(1 in 600)	< 0.1 %	(1 in 435,400)	< 0.1 %	(1 in 4,200)
35 years	< 0.1 %	(1 in 3,400)	0.1 %	(1 in 800)	< 0.1 %	(1 in 466,500)	< 0.1 %	(1 in 4,300)
45 years	< 0.1 %	(1 in 4,900)	0.1 %	(1 in 1,000)	< 0.1 %	(1 in 98,000)	< 0.1 %	(1 in 4,300)
55 years	< 0.1 %	(1 in 5,000)	0.1 %	(1 in 1,300)	< 0.1 %	(1 in 56,600)	< 0.1 %	(1 in 4,400)
Lifetime risk			0.2 %	(1 in 440)			< 0.1 %	(1 in 4,200)
Men aged	**in the next 10 years**		**ever**		**in the next 10 years**		**ever**	
15 years	< 0.1 %	(1 in 2,600)	0.3 %	(1 in 380)	< 0.1 %	(1 in 128,100)	< 0.1 %	(1 in 2,400)
25 years	< 0.1 %	(1 in 2,300)	0.2 %	(1 in 450)	< 0.1 %	(1 in 101,100)	< 0.1 %	(1 in 2,500)
35 years	< 0.1 %	(1 in 2,900)	0.2 %	(1 in 560)	< 0.1 %	(1 in 84,500)	< 0.1 %	(1 in 2,500)
45 years	< 0.1 %	(1 in 2,800)	0.1 %	(1 in 680)	< 0.1 %	(1 in 43,700)	< 0.1 %	(1 in 2,600)
55 years	< 0.1 %	(1 in 2,800)	0.1 %	(1 in 870)	< 0.1 %	(1 in 18,800)	< 0.1 %	(1 in 2,600)
Lifetime risk			0.3 %	(1 in 360)			< 0.1 %	(1 in 2,400)

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 2019 – 2020

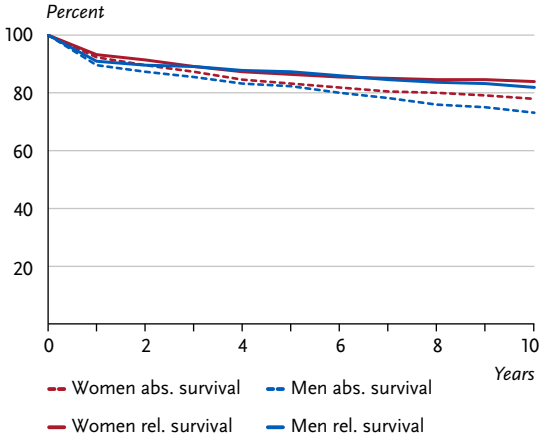


Figure 3.28.5
Relative 5-year survival by age at diagnosis and sex, ICD-10 C81, Germany 2019 – 2020

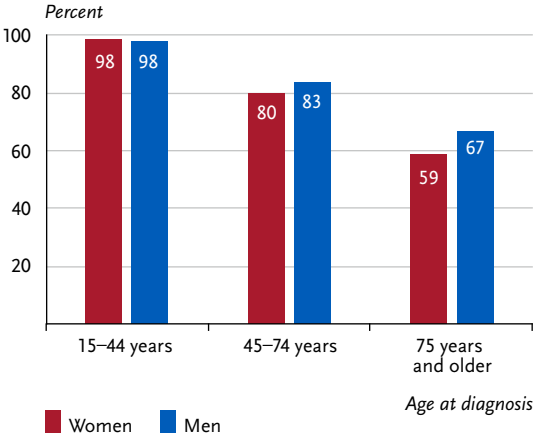


Figure 3.28.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C81, 2019 – 2020
per 100,000 (old European Standard)

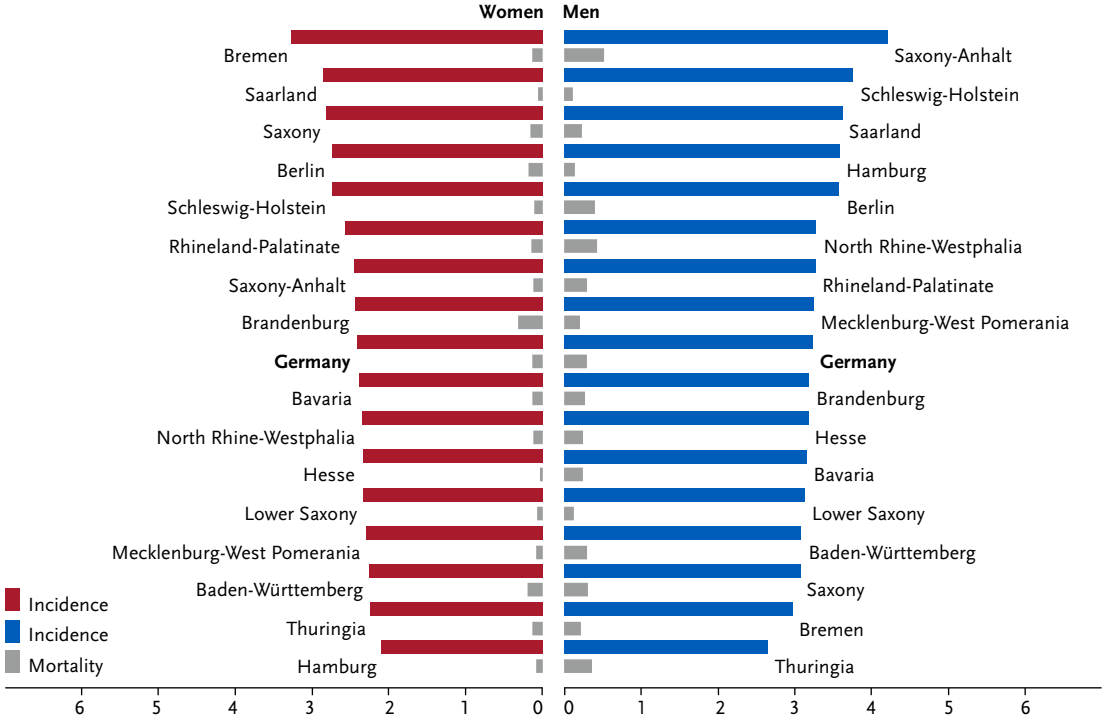
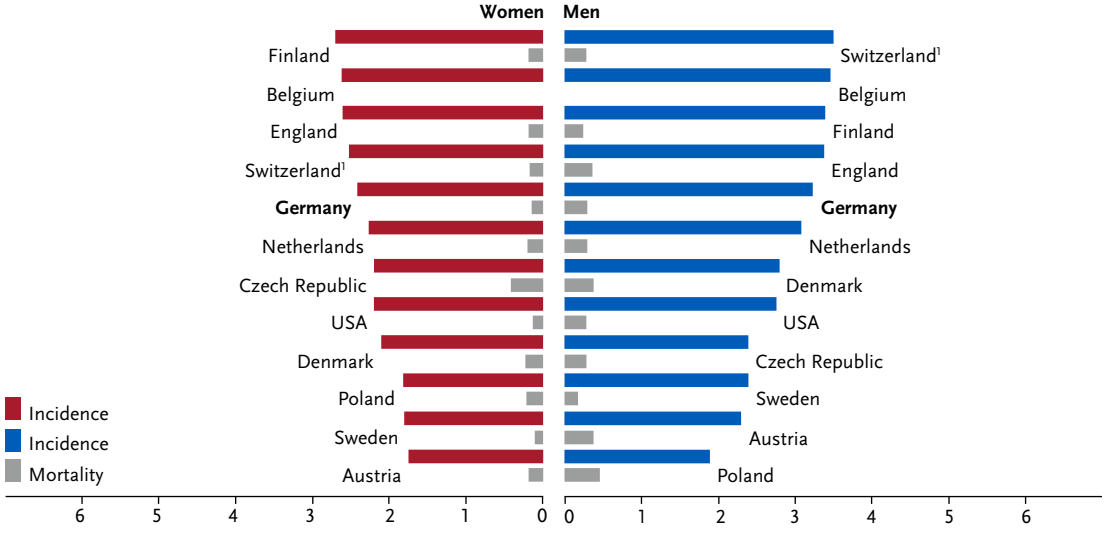


Figure 3.28.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C81, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019

3.29 Non-Hodgkin lymphoma

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	8,490	10,500	8,230	10,090		
Crude incidence rate [1]	20.2	25.6	19.5	24.6		
Age-standardised incidence rate [1, 2]	11.4	16.8	11.0	15.9		
Median age at diagnosis	73	70	73	71		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	3,145	3,885	3,180	4,012	3,189	4,046
Crude mortality rate [1]	7.4	9.6	7.6	9.8	7.6	9.8
Age-standardised mortality rate [1, 2]	3.0	5.3	2.9	5.4	3.0	5.2
Median age at death	80	78	80	78	81	78
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	30,000	35,400	50,700	58,100	80,200	89,800
Absolute survival rate (2019 – 2020) [3]	63 (60 – 70)	60 (57 – 64)	51 (47 – 55)	45 (42 – 50)		
Relative survival rate (2019 – 2020) [3]	72 (69 – 82)	71 (68 – 76)	68 (62 – 76)	64 (61 – 71)		

[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 depending on the cell type and their clinical and molecular characteristics. In 2020, about 18,320 people in Germany were diagnosed with non-Hodgkin lymphoma. The disease is primarily a disease of older age. On average, affected women were 73 years old and men 71 years old at the time of diagnosis.

The increased age-standardised incidence rates are to be seen against the background of changed diagnostic criteria, as chronic lymphocytic leukaemias are now often classified as low-grade 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 more or less constant since then. The average prognosis of non-Hodgkin lymphoma is rather good overall, with relative 5-year survival rates of 72 % for women and 71 % for men, although these figures 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, the 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.

Occupational exposure to benzene and 1,3-butadiene can promote the development of individual non-Hodgkin lymphomas. Other environmental toxins and lifestyle factors are also being discussed as triggers for lymphomas. If lymphomas have already occurred frequently in a family, the risk of lymphoma may be slightly increased for relatives. The exact correlations are still unclear.

Overall, for many patients no clear cause can be found for the development of lymphoma. It is likely that 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 – 2020/2021
per 100,000 (old European Standard)

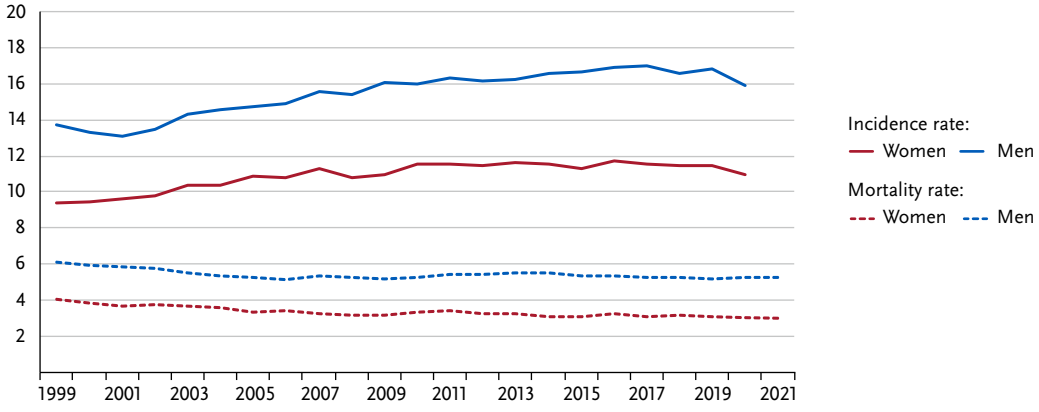


Figure 3.29.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C82 – C88, Germany 1999 – 2020/2021

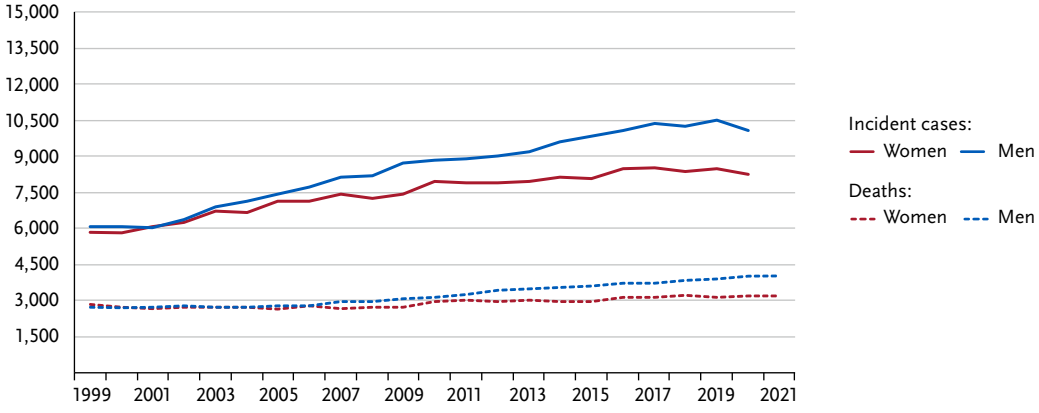


Figure 3.29.2
Age-specific incidence rates by sex, ICD-10 C82 – C88, Germany 2019 – 2020
per 100,000

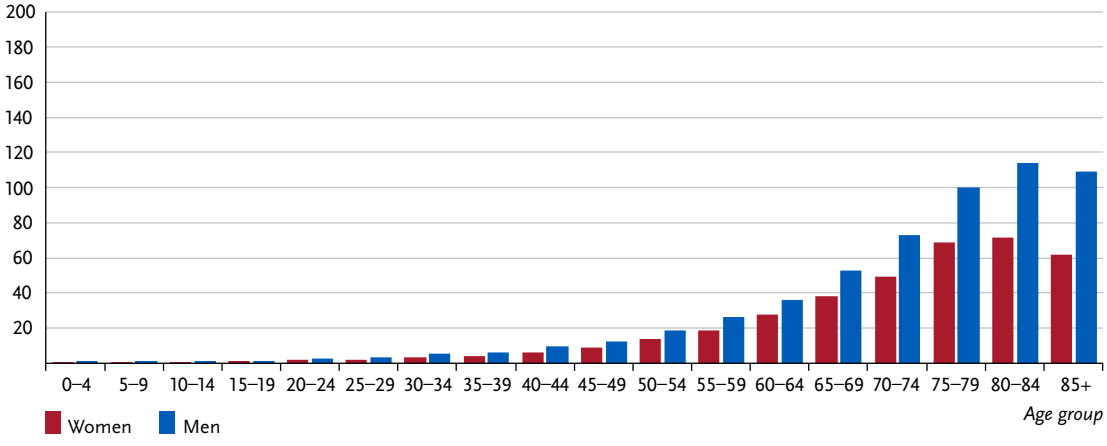


Table 3.29.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C82 – C88, database 2019

	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 1,900)	1.5 %	(1 in 66)	< 0.1 %	(1 in 22,900)	0.6 %	(1 in 160)
45 years	0.1 %	(1 in 870)	1.5 %	(1 in 68)	< 0.1 %	(1 in 7,300)	0.6 %	(1 in 160)
55 years	0.2 %	(1 in 420)	1.4 %	(1 in 72)	< 0.1 %	(1 in 2,700)	0.6 %	(1 in 160)
65 years	0.4 %	(1 in 240)	1.2 %	(1 in 82)	0.1 %	(1 in 820)	0.6 %	(1 in 160)
75 years	0.6 %	(1 in 170)	0.9 %	(1 in 110)	0.3 %	(1 in 340)	0.6 %	(1 in 180)
Lifetime risk			1.6 %	(1 in 64)			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 1,200)	1.9 %	(1 in 52)	< 0.1 %	(1 in 19,200)	0.8 %	(1 in 130)
45 years	0.2 %	(1 in 640)	1.9 %	(1 in 54)	< 0.1 %	(1 in 4,700)	0.8 %	(1 in 130)
55 years	0.3 %	(1 in 320)	1.8 %	(1 in 57)	0.1 %	(1 in 1,400)	0.8 %	(1 in 120)
65 years	0.6 %	(1 in 170)	1.6 %	(1 in 63)	0.2 %	(1 in 510)	0.8 %	(1 in 120)
75 years	0.8 %	(1 in 120)	1.2 %	(1 in 80)	0.4 %	(1 in 230)	0.8 %	(1 in 130)
Lifetime risk			2.0 %	(1 in 51)			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 2019 – 2020

	C82 [1]	C83.1 [2]	C83.3 [3]	C88.4 [4]	Other
Women	20 %	4 %	33 %	6 %	37 %
Men	16 %	7 %	33 %	5 %	39 %

[1] Follicular lymphoma
[2] Mantle cell lymphoma
[3] Diffuse large B-cell lymphoma
[4] Extranodal marginal zone B-cell lymphoma

Figure 3.29.4
Absolute and relative survival rates up to 10 years after diagnosis, by sex, ICD-10 C82 – C88, Germany 2019 – 2020

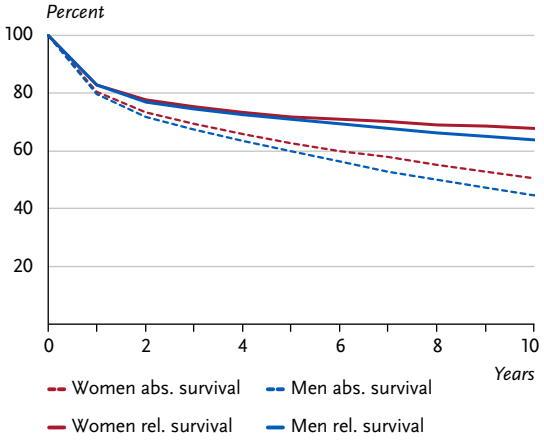


Figure 3.29.5
Relative 5-year survival by type of non-Hodgkin lymphoma (ICD-10) and sex, ICD-10 C82 – C88, Germany 2019 – 2020

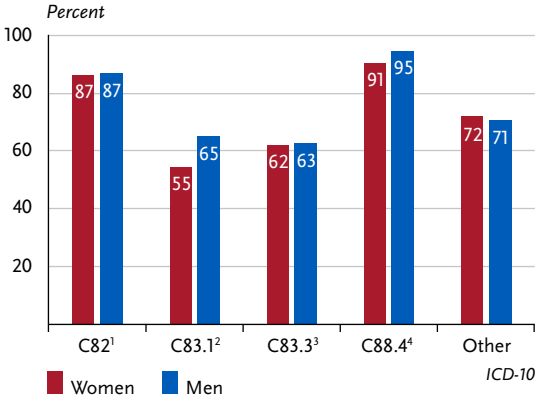
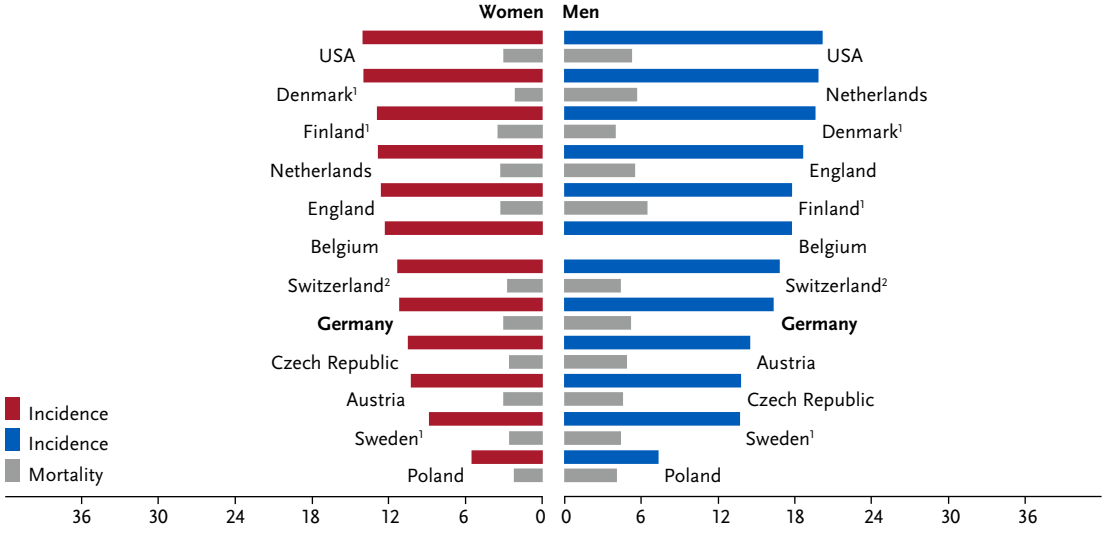


Figure 3.29.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C82 – C88, 2019 – 2020
per 100,000 (old European Standard)

Figure 3.29.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C82 – C88, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Denmark, Sweden, Finland: data incl. C96, w/o. C88
[2] Switzerland: incidence data for 2015 – 2019

3.30 Multiple myeloma

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	3,210	4,030	3,010	3,700		
Crude incidence rate [1]	7.6	9.8	7.1	9.0		
Age-standardised incidence rate [1, 2]	3.9	6.1	3.7	5.5		
Median age at diagnosis	75	72	74	72		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	1,884	2,116	1,881	2,213	1,836	2,208
Crude mortality rate [1]	4.5	5.2	4.5	5.4	4.4	5.4
Age-standardised mortality rate [1, 2]	1.8	2.8	1.8	2.9	1.8	2.9
Median age at death	79	77	80	77	80	78
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	9,900	12,700	15,000	18,800	19,800	24,100
Absolute survival rate (2019 – 2020) [3]	50 (45 – 60)	46 (36 – 55)	29 (19 – 42)	26 (11 – 33)		
Relative survival rate (2019 – 2020) [3]	58 (52 – 68)	56 (42 – 66)	38 (25 – 56)	38 (16 – 50)		

[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 outside the bone marrow (extramedullary plasmocytoma).

In 2020, the disease was newly diagnosed in about 3,010 women and 3,700 men in Germany. The risk of developing the disease increases significantly with age; cases before the age of 45 are extremely rare. After age standardisation, the incidence and mortality rates for women and men have remained almost constant since around 2005.

The prognosis is rather unfavourable with relative 5-year survival rates of 58% for women and 56% for men. Normally, a permanent cure is not to be expected. However, the disease can be asymptomatic for a relatively long time and temporary remissions under therapy are possible.

Risk factors

Multiple myeloma occurs more frequently in old age and more often in men than in women. The cause of the disease is unknown. Among other things, chronic infections, obesity, immunosuppression, environmental toxins and ionising radiation are discussed as risk factors. In cases of intensive occupational exposure to benzene, multiple myeloma is recognised as an occupational disease under certain conditions.

A certain genetic predisposition is indicated by a higher risk for first-degree relatives of myeloma patients and different disease rates in different population groups. In the USA, for example, people of African descent fall ill more frequently than people of Caucasian descent.

Monoclonal gammopathy of undetermined significance (MGUS) is considered a precursor to multiple myeloma. The risk of MGUS developing into multiple myeloma is estimated at around 1% per year.

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

Figure 3.30.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C90, Germany 1999 – 2020/2021
per 100,000 (old European Standard)

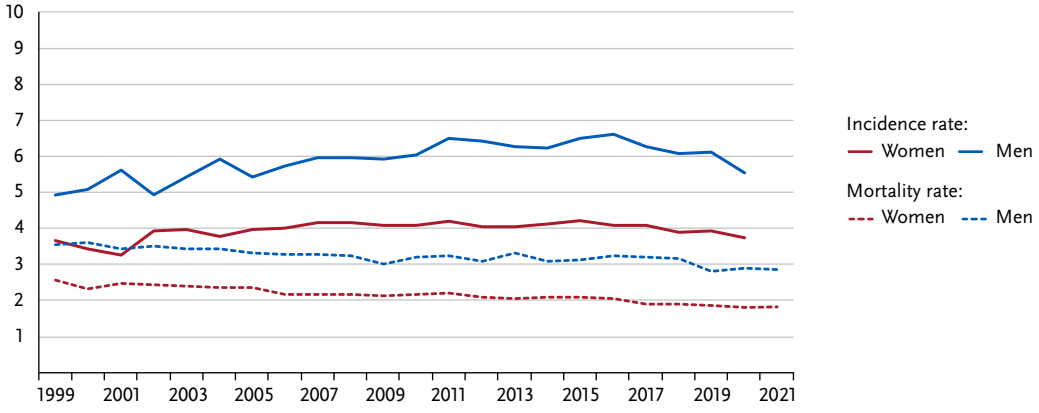


Figure 3.30.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C90, Germany 1999 – 2020/2021

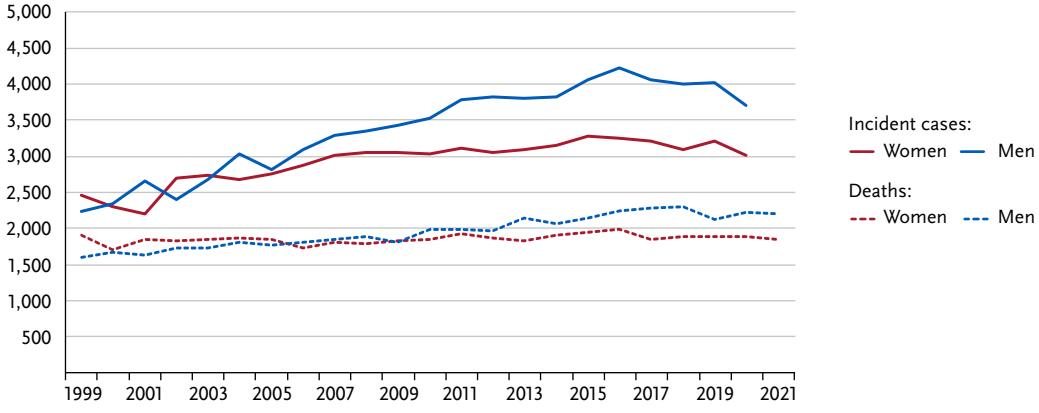


Figure 3.30.2
Age-specific incidence rates by sex, ICD-10 C90, Germany 2019 – 2020
per 100,000

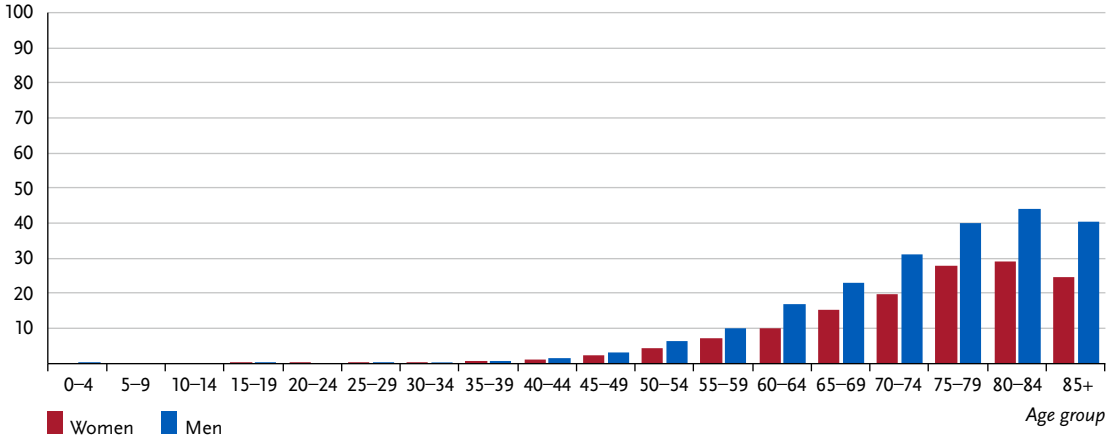


Table 3.30.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C90, database 2019

	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 1,100)	0.5 %	(1 in 200)	< 0.1 %	(1 in 205,600)	0.4 %	(1 in 270)
45 years	< 0.1 %	(1 in 3,200)	0.5 %	(1 in 200)	< 0.1 %	(1 in 16,300)	0.4 %	(1 in 270)
55 years	0.1 %	(1 in 1,300)	0.5 %	(1 in 210)	< 0.1 %	(1 in 3,900)	0.4 %	(1 in 270)
65 years	0.2 %	(1 in 640)	0.4 %	(1 in 230)	0.1 %	(1 in 1,200)	0.4 %	(1 in 280)
75 years	0.2 %	(1 in 460)	0.3 %	(1 in 310)	0.2 %	(1 in 540)	0.3 %	(1 in 320)
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 9,200)	0.6 %	(1 in 170)	< 0.1 %	(1 in 50,500)	0.4 %	(1 in 230)
45 years	< 0.1 %	(1 in 2,900)	0.6 %	(1 in 170)	< 0.1 %	(1 in 10,300)	0.4 %	(1 in 230)
55 years	0.1 %	(1 in 1,200)	0.6 %	(1 in 180)	< 0.1 %	(1 in 2,400)	0.4 %	(1 in 230)
65 years	0.2 %	(1 in 580)	0.5 %	(1 in 200)	0.1 %	(1 in 860)	0.4 %	(1 in 230)
75 years	0.3 %	(1 in 390)	0.4 %	(1 in 270)	0.2 %	(1 in 410)	0.4 %	(1 in 250)
Lifetime risk			0.6 %	(1 in 170)			0.4 %	(1 in 240)

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 2019 – 2020

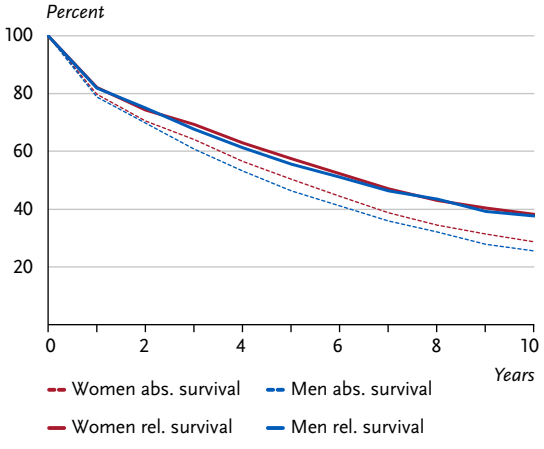


Figure 3.30.5
Relative 5-year survival by age at diagnosis and sex, ICD-10 C90, Germany 2019 – 2020

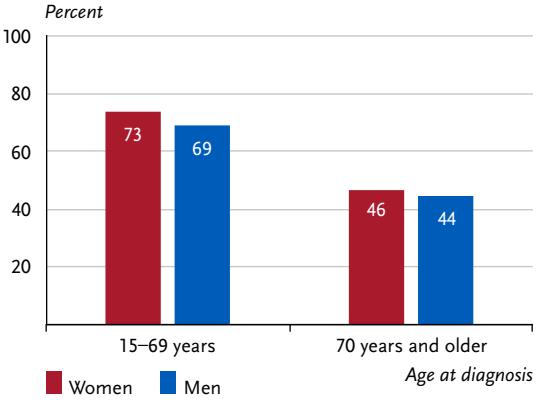


Figure 3.30.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C90, 2019 – 2020
per 100,000 (old European Standard)

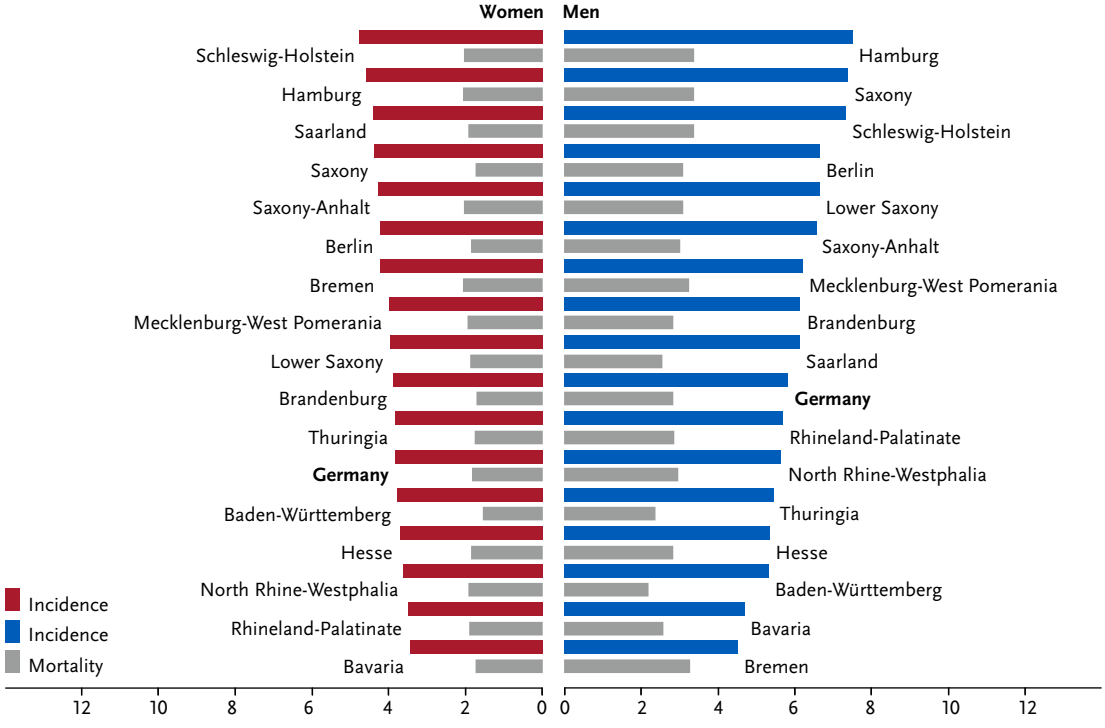
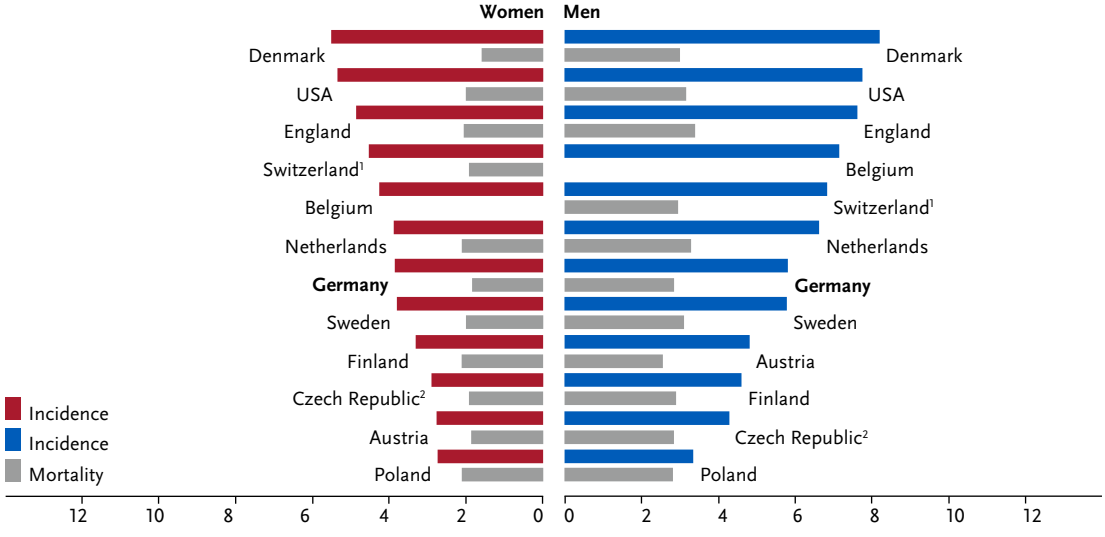


Figure 3.30.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C90, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019
[2] Czech Republic: incidence estimates by ENCR

3.31 Leukaemia

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

Incidence		2019		2020		
	Women	Men	Women	Men		
Incident cases	5,800	8,110	5,640	7,920		
Crude incidence rate [1]	13.8	19.8	13.4	19.3		
Age-standardised incidence rate [1, 2]	8.2	13.2	8.0	12.9		
Median age at diagnosis	74	71	73	71		
Mortality		**2019**		**2020**		**2021**
	Women	Men	Women	Men	Women	Men
Deaths	3,670	4,590	3,573	4,784	3,530	4,674
Crude mortality rate [1]	8.7	11.2	8.5	11.7	8.4	11.4
Age-standardised mortality rate [1, 2]	3.7	6.3	3.5	6.4	3.5	6.2
Median age at death	80	78	80	78	81	78
Prevalence and survival rates		**5 years**		**10 years**		**25 years**
	Women	Men	Women	Men	Women	Men
Prevalence	17,200	23,900	30,000	40,300	48,300	62,600
Absolute survival rate (2019 – 2020) [3]	49 (39 – 53)	51 (43 – 54)	37 (23 – 41)	35 (31 – 38)		
Relative survival rate (2019 – 2020) [3]	56 (45 – 62)	60 (51 – 65)	50 (31 – 56)	51 (44 – 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 2020, about 13,570 people in Germany were diagnosed with leukaemia, of whom 4% were under the age of 15. Among children and adolescents, the risk of developing leukaemia decreases with increasing age. In adulthood, this trend is reversed, with a higher incidence rate in men compared to women. One in 90 women and one in 64 men will develop leukaemia in the course of their lives. At around 38%, chronic lymphocytic leukaemia (CLL) is the most common form.

Between 1999 and 2020, the age-standardised incidence rates remained relatively stable, while the age-standardised mortality rates declined continuously.

The prognosis for people with leukaemia depends on the form of the disease and the age of diagnosis: Children have by far the best survival prospects, while in adults the acute forms continue to have a rather poor prognosis. The relative 10-year survival rate is around 50% for women and men. 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.

Known risk factors for acute leukaemia include ionising radiation and cytostatic drugs. Occupational exposure to benzene and 1,3-butadiene can also contribute to the development of leukaemia. Some rare genetic changes can increase the risk of acute leukaemia, including trisomy of chromosome 21.

With the exception of the human T-lymphotropic virus (HTLV), which is extremely rare in Europe, viruses have not yet been confirmed as a risk factor for leukaemia. A number of other risk factors are currently being discussed as causes of leukaemia. In addition to environmental influences, these include lifestyle factors such as smoking or obesity.

However, a causal relation has not yet been fully established. Overall, for many patients no clear cause can be found for the development of leukaemia.

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 – 2020/2021
per 100,000 (old European Standard)

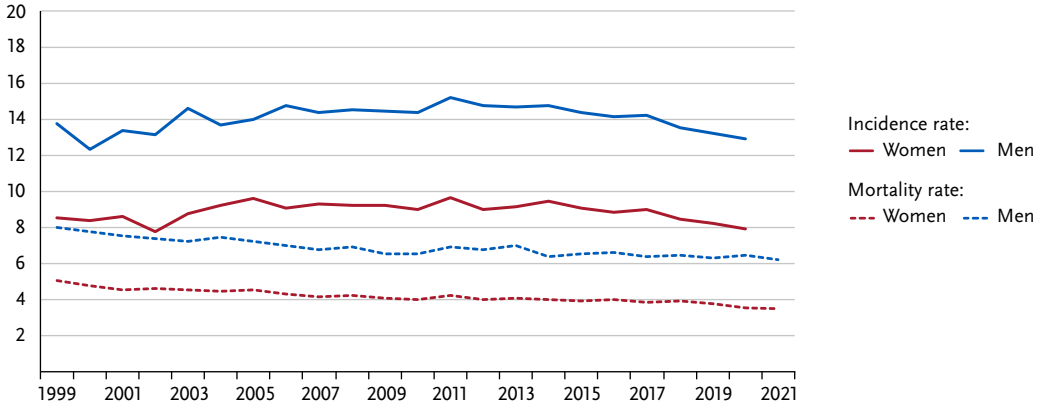


Figure 3.31.1b
Absolute numbers of incident cases and deaths by sex, ICD-10 C91 – C95, Germany 1999 – 2020/2021

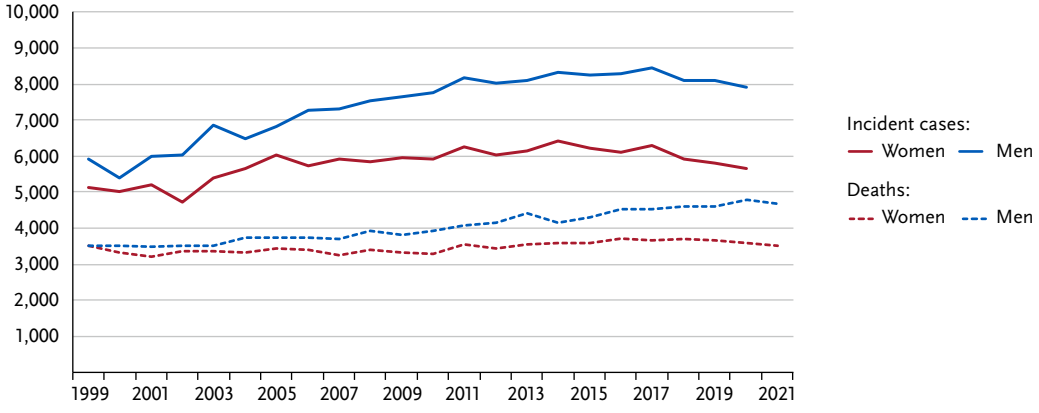


Figure 3.31.2
Age-specific incidence rates by sex, ICD-10 C91 – C95, Germany 2019 – 2020
per 100,000

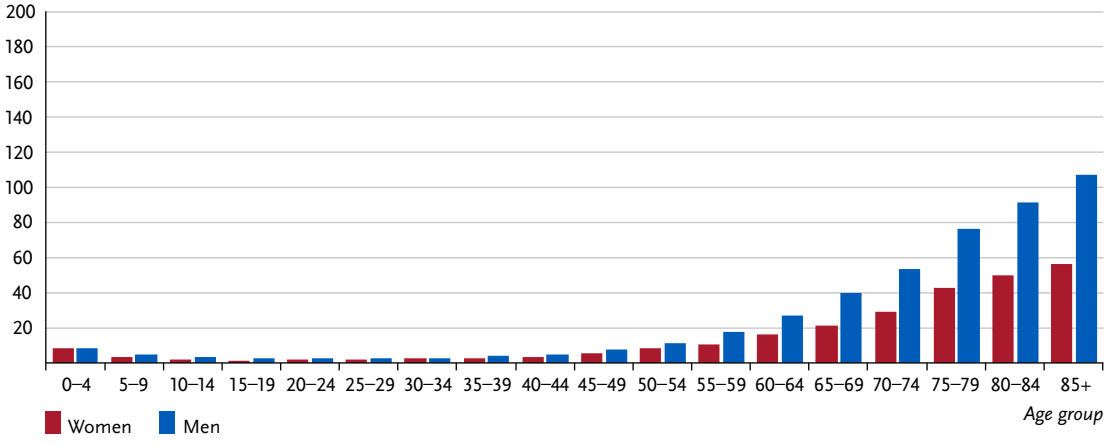


Table 3.31.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C91 – C95, database 2019

	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 3,100)	1.0 %	(1 in 99)	< 0.1 %	(1 in 11,100)	0.7 %	(1 in 140)
45 years	0.1 %	(1 in 1,400)	1.0 %	(1 in 100)	< 0.1 %	(1 in 6,100)	0.7 %	(1 in 140)
55 years	0.1 %	(1 in 770)	0.9 %	(1 in 110)	< 0.1 %	(1 in 2,300)	0.7 %	(1 in 140)
65 years	0.2 %	(1 in 400)	0.8 %	(1 in 120)	0.1 %	(1 in 740)	0.7 %	(1 in 140)
75 years	0.4 %	(1 in 250)	0.7 %	(1 in 150)	0.3 %	(1 in 300)	0.6 %	(1 in 160)
Lifetime risk			1.1 %	(1 in 90)			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)	1.5 %	(1 in 69)	< 0.1 %	(1 in 9,800)	0.9 %	(1 in 110)
45 years	0.1 %	(1 in 1,000)	1.4 %	(1 in 70)	< 0.1 %	(1 in 4,200)	0.9 %	(1 in 110)
55 years	0.2 %	(1 in 450)	1.4 %	(1 in 72)	0.1 %	(1 in 1,300)	0.9 %	(1 in 110)
65 years	0.4 %	(1 in 230)	1.3 %	(1 in 78)	0.2 %	(1 in 440)	1.0 %	(1 in 110)
75 years	0.7 %	(1 in 150)	1.1 %	(1 in 95)	0.5 %	(1 in 200)	0.9 %	(1 in 110)
Lifetime risk			1.6 %	(1 in 64)			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 2019 – 2020

	ALL[1]	CLL[2]	AML[3]	CML[4]	Others[5]
Women	6 %	36 %	27 %	8 %	23 %
Men	5 %	40 %	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 2019 – 2020

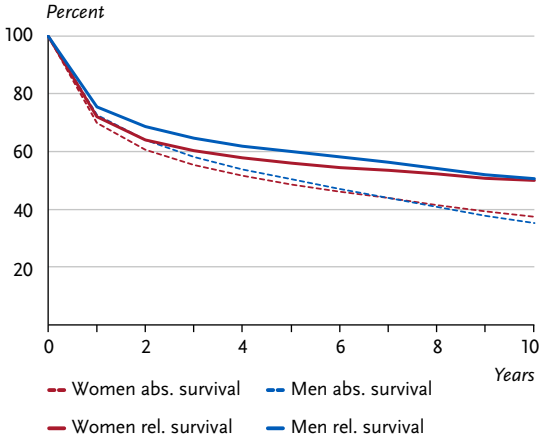


Figure 3.31.5
Relative 5-year survival by type of leukaemia and sex, ICD-10 C91 – C95, Germany 2019 – 2020

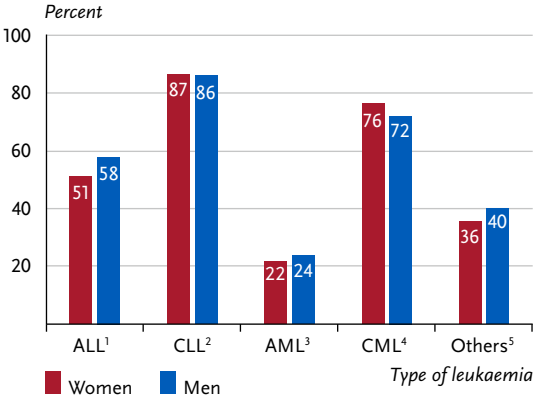


Figure 3.31.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C91 – C95, 2019 – 2020
per 100,000 (old European Standard)

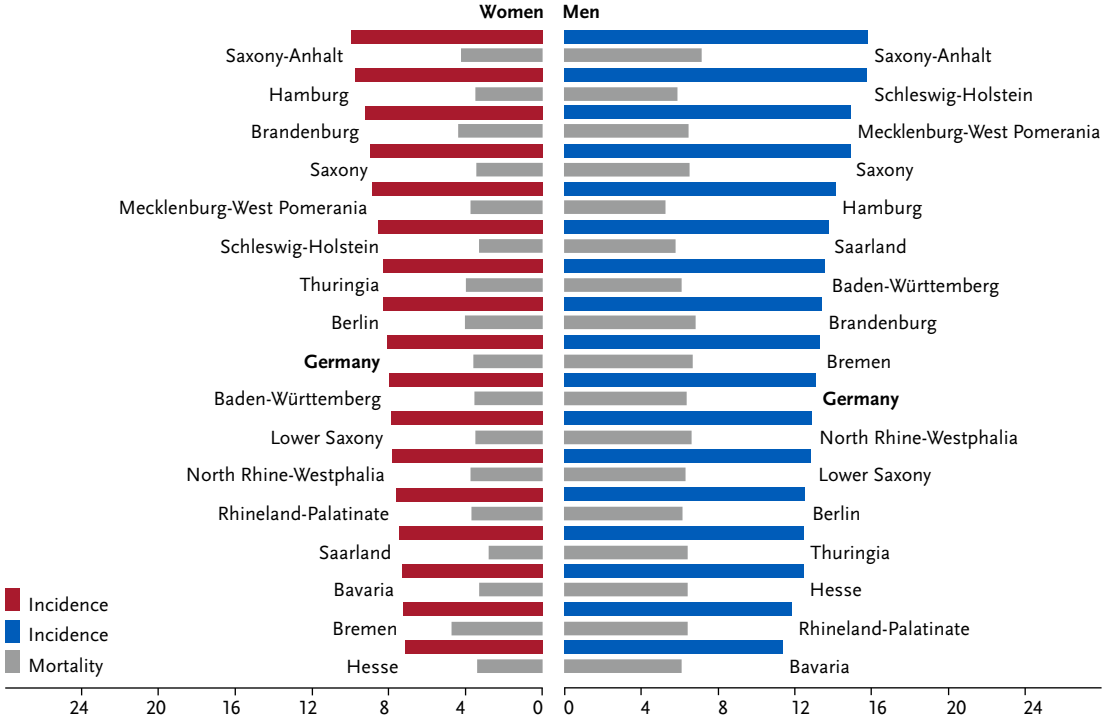
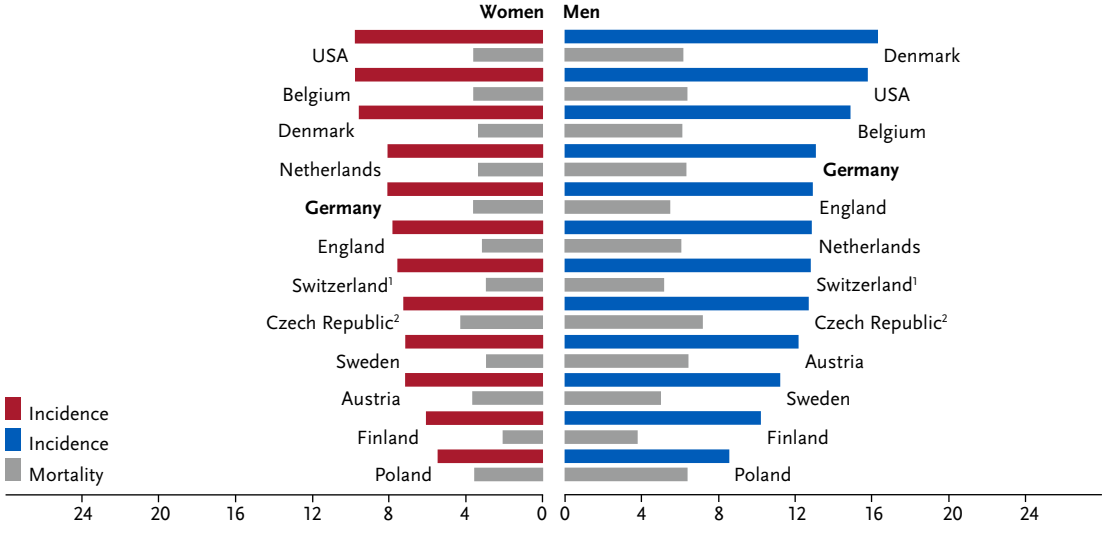


Figure 3.31.7
International comparison of age-standardised incidence and mortality rates by sex, ICD-10 C91 – C95, 2019 – 2020 or latest available year (details and sources, see appendix)
per 100,000 (old European Standard)



[1] Switzerland: incidence data for 2015 – 2019
[2] Czech Republic: incidence estimates by ENCR

4 Cancer in children

The German Paediatric Cancer Registry (DKKR), Department of Childhood Epidemiology, has been based at the Institute of Medical Biometry, Epidemiology and Informatics at the University Medical Centre of the Johannes Gutenberg University Mainz since the beginning of its work in 1980. Close cooperation with the Society for Paediatric Oncology and Haematology (GPOH) and its member clinics was envisaged in the conception of the DKKR. As a result, the registry has a characteristic that is not readily transferable to adult oncology. A comprehensive epidemiological cancer registry was created, covering the whole of Germany with high data quality and a completeness rate of over 95% (since around 1987). The DKKR thus meets the international requirements for an epidemiological cancer registry. A further characteristic

Figure 4.1
Most frequent tumour sites as percent of all incident cancer cases in children under 18 years (determined for the period 2012 – 2021)

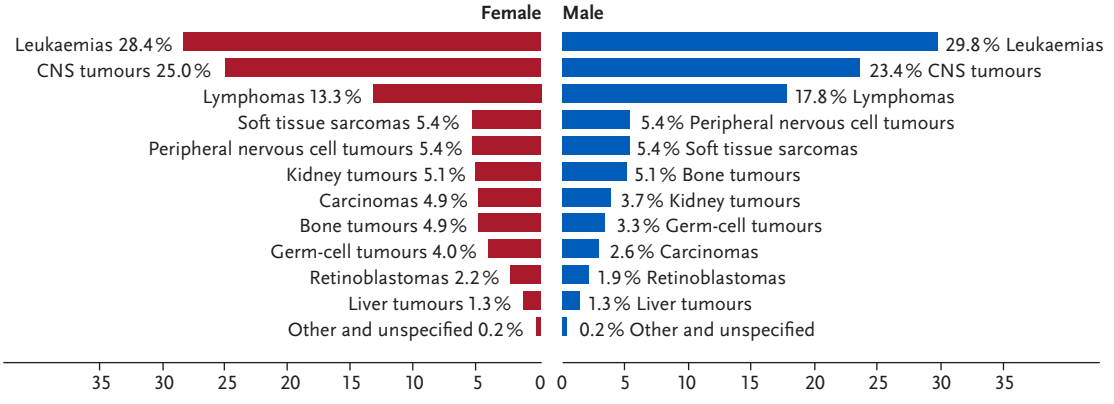


Table 4.1
Incidence* and survival rates for the most frequent diagnoses in childhood (under 18 years), by sex**

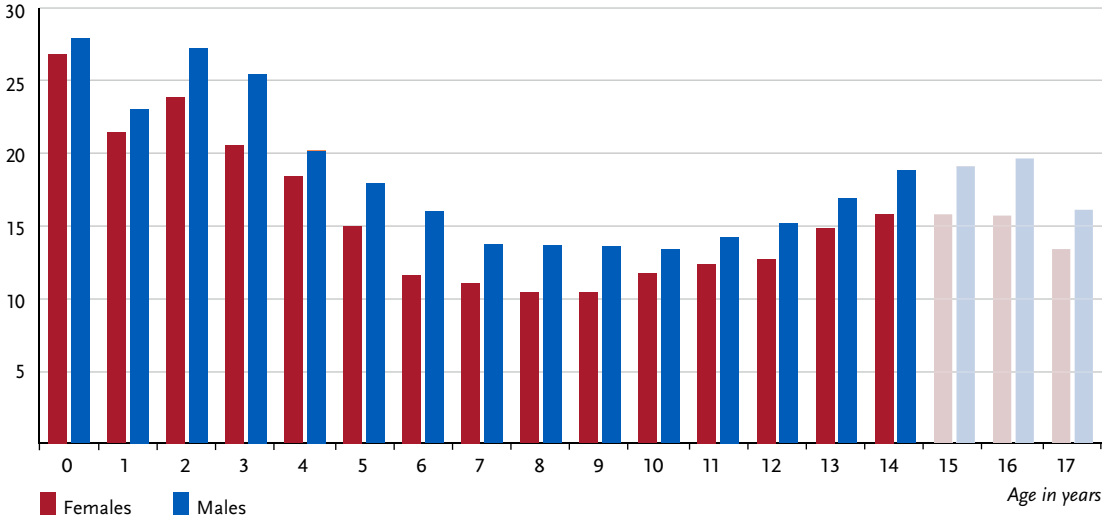
	Incidence*		Survival rate in %**					
			after 5 years		after 10 years		after 15 years	
Cancer sites	females	males	females	males	females	males	females	males
Lymphoid leukaemias	3.5	4.4	93	92	92	91	91	90
Acute myeloid leukaemias	0.7	0.8	78	77	77	77	76	76
Hodgkin lymphomas	1.1	1.2	98	99	97	98	97	97
Non-Hodgkin lymphomas	0.4	1.1	90	92	89	92	87	90
Astrocytomas	1.8	1.9	86	84	85	83	83	82
Intracranial and intraspinal embryonal tumours	0.6	0.9	68	68	63	62	61	59
Neuroblastomas and ganglioneuroblastomas	1.0	1.2	85	79	83	76	83	75
Retinoblastomas	0.4	0.4	98	99	98	99	98	99
Nephroblastomas	0.9	0.8	94	94	93	94	93	93
Osteosarcomas	0.4	0.4	78	74	76	66	74	66
Ewing sarcoma and related bone sarcomas	0.3	0.5	71	69	67	66	64	65
Rhabdomyosarcomas	0.4	0.6	74	74	73	72	72	72
Germ-cell tumours	0.6	0.6	97	93	96	93	95	92
All malignancies	16.1	18.9	88	87	86	85	85	84

* cases per 100,000 children under age 18, age-standardised, standard: Segi world population, diagnosis years 2012 – 2021
** for children diagnosed between 2011 and 2020, 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

of the DKKR is the realisation of active, indefinite long-term follow-up, which continues well into adulthood. Thus, the registry also provides the basis for research into late effects, secondary tumours and generally for studies with long-term survivors.

Since 1980, the register population has included children who were diagnosed with a malignant disease or a histologically benign brain tumour before their 15th birthday and who belonged to the German resident population at the time of diagnosis. Since around 1987, it can be assumed that the survey has been largely complete. Since 1991, diseases in the new federal states have also been recorded. Since 2009, the DKKR has recorded all children and adolescents up to the age of 18 (= diagnosed before their 18th birthday) based on the "Directive of the Joint Federal Committee on Quality Assurance Measures for the Inpatient Care of Children and Adolescents

Figure 4.2
Incidence rate by age and sex, all childhood malignancies
Number of caces per 100,000 by age group, determined for the period 2012 – 2021



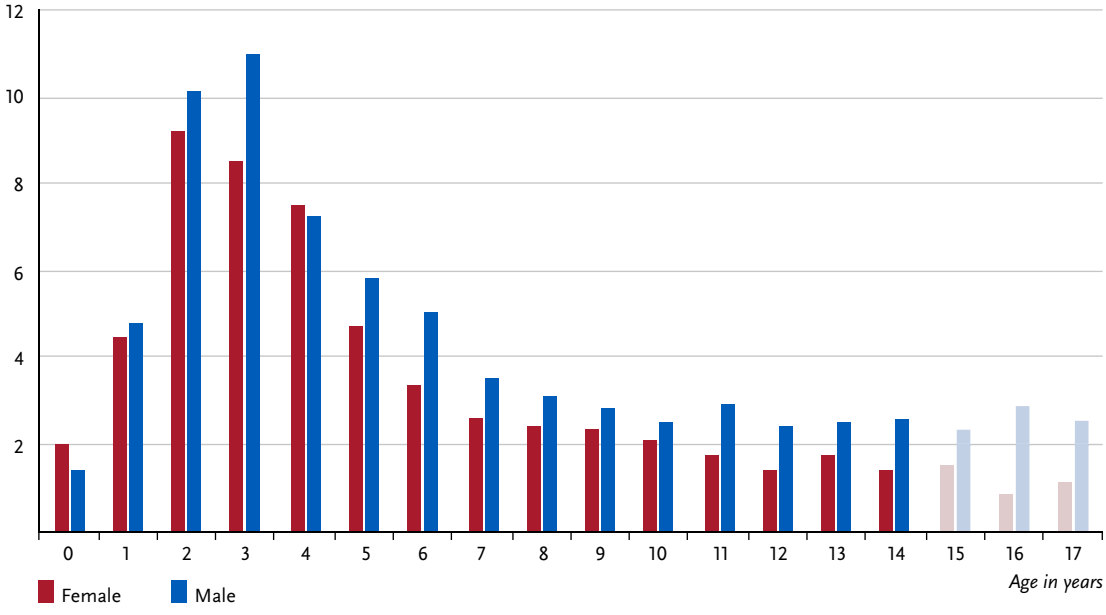
Suspected underreporting among adolescents 15 years and older.

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**

		Number of incident cases		Incidence rate*		Survival rate** in %					
						after 5 years		after 10 years		after 15 years	
Cancer sites	ICD-10	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
Leukaemia	C91–C95	2,638	3,502	4.3	5.3	90.8	90.0	90.0	88.8	89.3	88.0
Central nervous system	C70–C72	1,453	1,818	2.3	2.7	70.6	69.5	66.9	64.5	64.8	62.2
Hodgkin lymphoma	C81	782	904	1.1	1.2	97.7	98.8	97.4	98.2	97.2	97.3
Soft tissue without mesothelioma	C46–C49	764	759	1.3	1.2	81.2	76.8	78.3	73.9	77.5	72.9
Lung	C33–C34	36	41	0.1	0.1	67.9	80.3	67.9	76.9	67.9	74.1
Prostate	C61	0	10	0.0	0.0						
Breast	C50	2	2	0.0	0.0						
Colon and rectum	C18–C21	202	117	0.3	0.2	99.3	88.3				

* cases per 100,000 persons under the age of 18, age-standardised according to the Segi world population, 2012 – 2021
** for children diagnosed between 2011 and 2020
♀ 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 2012 – 2021



Suspected underreporting among adolescents 15 years and older.

with Haemato-oncological Diseases". Some diagnostic groups in older adolescents are also treated outside the paediatric and adolescent oncology clinics; these are slightly under-recorded at the DKKR. The data currently available is based on a total of approximately 74,000 cases.

Incidence of childhood cancer

In Germany, there are about 2,250 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 of 16.1 per 100,000 children for girls and 18.9 per 100,000 children in this age group for boys. The probability of a newborn child suffering a malignant disease within the first 18 years of life is 0.3%. Thus, about one in 330 children will be diagnosed with a malignant cancer by their 18th birthday. Within the first 30 years after initial diagnosis, at least one further cancer (secondary neoplasia) was reported in 1,739 patients.

In a European comparison, Germany's incidence rates are around mid-table. The most important reasons for differences in incidence rates are generally differences in data collection and random effects in countries with a very small database, e.g. where there is no nationwide coverage.

Diagnostic spectrum

In general, the diagnostic spectrum for children is completely different to that for adults. The most appropriate classification of entities for children therefore also focuses on morphology. The largest diagnostic groups are leukaemias (28 to 30%), tumours of the central nervous system (CNS; 23 to 25%) and lymphomas (13 to 18%), especially Hodgkin lymphomas. Embryonal tumours (neuroblastomas, retinoblastomas, nephroblastomas, medulloblastomas, embryonal rhabdomyosarcomas or germ cell tumours) are also common in childhood, but almost never observed in adulthood. Carcinomas, on the other hand, are extremely rare (about 3 to 5% of malignant diseases). The median age at diagnosis for children and adolescents under 18 years of age is seven years and seven months. Boys are 1.2 times more likely to develop the disease than girls.

Analogous to the usual recording and presentation in adulthood according to the ICD (predominantly localisation-based), the fourth most common diagnostic group after leukaemias, lymphomas and malignant CNS tumours is "tumours in soft tissue without mesotheliomas", which includes a range of different morphologies. By contrast, the organs most frequently affected in adulthood – lung, prostate, breast and colon – are extremely 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 in the colon reported in childhood are predominantly appendix carcinoids, while lung tumours are mostly lung carcinoids.

Probability of survival

The proportion of children under the age of 18 with cancer among all cancer patients is less than 1%. However, malignant neoplasms are the second most common cause of death in children. Fortunately, survival rates have improved considerably over the last 40 years thanks to significantly more sophisticated diagnostics and the use of multimodal therapy concepts. While the probability of still being alive five years after diagnosis was 67% for children diagnosed in the early 1980s, this figure is now 88% for girls and 87% for boys in the registry population diagnosed between 2011 and 2020. Survival probabilities vary relatively widely depending on the entity.

Due to the encouraging increase in long-term survivors, the long-term observation of former paediatric cancer patients is increasingly coming into focus. The DKKR represents an ideal database for conducting studies with long-term survivors. As can be seen from the above figures, it is already possible to make statements on the long-term probability of survival (after 15 years or more) or to estimate the risk of a second neoplasm occurring after childhood cancer. Questions about the occurrence of other late effects, such as possible effects of the therapy on fertility, offspring or cardiovascular late effects are examples of further research possibilities. Of the more than 60,000 patients currently known to the registry to be alive, about 47,000 have been under observation for at least five years. The majority of these former patients are now 18 years or older.

Leukaemias

Leukaemia accounts for almost a third of all cancers in patients under the age of 18. The most common single diagnosis overall is lymphocytic leukaemia (LL) at 21.9%. It is almost twice as common in the under-five-year-olds as in the other age groups. 4.1% of all childhood malignancies are acute myeloid leukaemia (AML). AML is most common in the under-two-year-olds. The probability of survival for AML is significantly lower than for LL.

In the case of leukaemia, a slight, steady upward trend was observed until the early 2000s, which was also observed in Europe as a whole. Since then, incidence rates have remained largely constant.

The causes of childhood leukaemia are still largely unclear today. Environmental factors have long been suspected of causing childhood leukaemia. In the meantime, it has been shown for most environmental factors (ionising radiation in the low-dose range as well as non-ionising radiation or pesticides) that the proportion of cases caused by them is rather low, even if a weak connection with the occurrence of childhood leukaemia cannot be ruled out. A number of indications have now increasingly led to hypotheses that attribute a central role to infectious agents and the immune system in the development of childhood leukaemias. Genetic causes are increasingly being investigated and discussed for all childhood neoplasms.

Lymphomas

The most common lymphomas are non-Hodgkin lymphoma (NHL) including Burkitt's lymphoma (6.2% overall) and Hodgkin's disease (7.4%). Survival rates for Hodgkin's disease are among the highest in paediatric oncology (97% after 15 years). Unfortunately, the risk of secondary neoplasia after Hodgkin's disease is also particularly high, with a particular risk of breast cancer in young women.

The incidence rate for lymphomas is 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 has been observed than in those under 15 years of age.

There is an increased risk of developing NHL in children with congenital or acquired immunodeficiency and after immunosuppressive therapy.

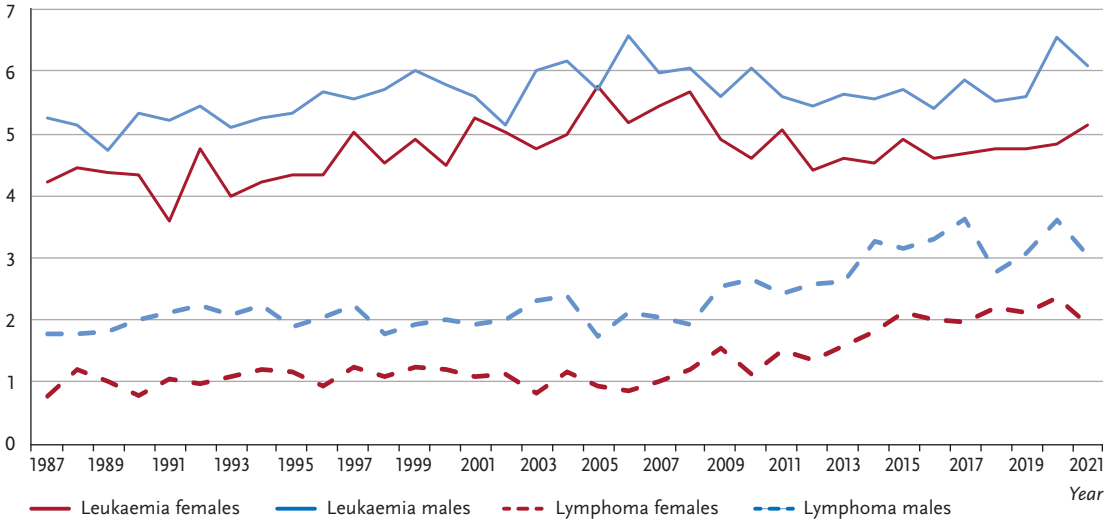
CNS tumours

The most common individual diagnoses of CNS tumours are astrocytomas (10.4% in total), intracranial and intraspinal embryonal tumours (3.9%) and ependymomas (1.5%). The increase in the incidence of CNS tumours 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 suspected. For example, a number of epidemiological studies have looked at the possible influence of ionising radiation, electromagnetic fields or pesticides as well as genetic aspects, but no consistent correlations have yet been found.

Other common malignant diseases

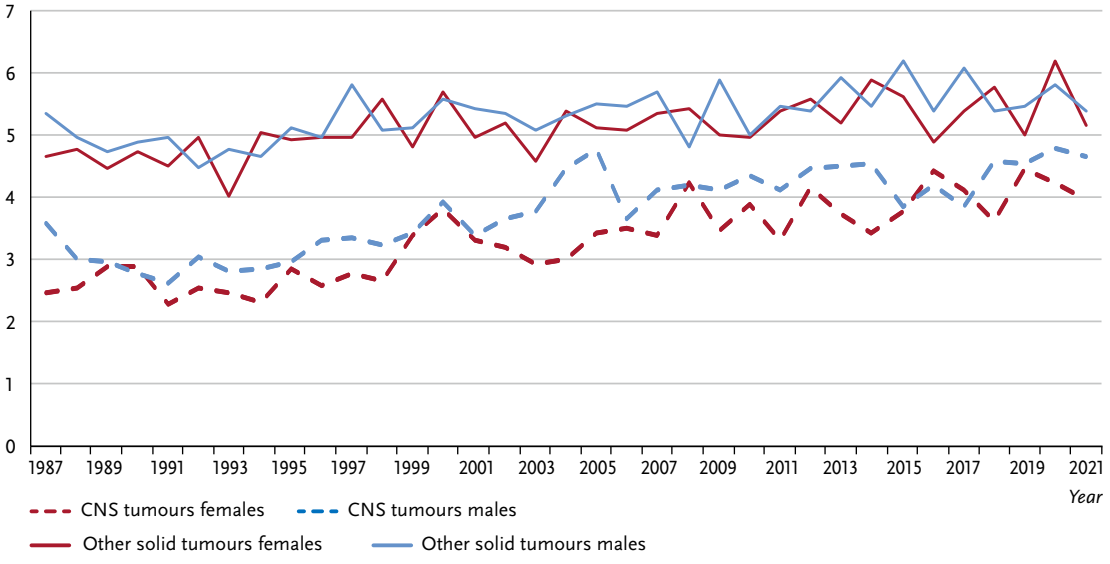
Other common malignant diseases in childhood are neuroblastoma (nerve cell tumour), nephroblastoma (kidney tumour), germ cell tumours, bone tumours and rhabdomyosarcoma (tumour of the skeletal muscles). The prognosis for children suffering from a nephroblastoma or germ cell tumour is significantly more favourable than for other tumours. Leukaemias and CNS tumours are particularly common secondary neoplasms after cancer in childhood and adolescence, as are skin tumours, thyroid carcinomas and breast cancer in young women.

Figure 4.4
Trends in incidence of childhood leukaemia and lymphoma (under 15 years until 2008, under 18 years from 2009), by sex, 1987 – 2021
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 – 2021
Number of cases per 100,000 (age-standardised according to Segi), including eastern Germany since 1991



There is no real trend in incidence rates for solid tumours outside the CNS. Over the years, individual additional diagnoses have been assessed as malignant and recorded. The recording of certain solid tumours in older children, some of which are not treated in paediatric and adolescent oncology, such as gynaecological and urological carcinomas and skin tumours, has been and continues to be slowly improved. Overall, this has led to a slight increase in the number of reported cases.

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5 Appendix

5.1 Centre for Cancer Registry Data at the Robert Koch Institute

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

With the amendment of the BKRG by the "Act on the Consolidation of Cancer Registry Data" (Gesetz zur Zusammenführung von Krebsregisterdaten) in August 2021, the tasks of the ZfKD were expanded. Since the end of 2022, essential data from the nationwide clinical cancer registration has also been regularly transmitted to the ZfKD.

The range of tasks of the Centre for Cancer Registry Data includes:

- Consolidation and verification of the population-based data submitted by the cancer registries of the federal states for uniformity and completeness of case finding
- Creation of a standardised nationwide dataset from the data submitted by the state cancer registries and checked by the ZfKD
- Further development of methods and standards for uniform data collection and data transmission as well as for analysing the data together with the state cancer registries
- Regular analysis and publication of the annual nationwide cancer incidence and mortality, the stage distribution at diagnosis of the respective cancer, as well as other indicators, in particular on prevalence and the risk of developing and dying of cancer. Further analyses of cancer incidence, such as cancer care and the course of the disease, are planned in the future, also using other data sources
- Cross-national determination of regional differences and temporal trends
- Provision of the data set for scientific research purposes upon request
- Publication of a report on the incidence and development of cancer in Germany in consultation with the state cancer registries *(Cancer in Germany)* every two years
- Preparation of a summarised report on cancer incidence in Germany every five years, the first edition will be published in 2026
- Expansion of the information offered on the web, including provision of interactive analysis tools
- Participation in scientific committees, European and international organisations related to cancer registration and cancer epidemiology (including active participation in working groups of the National Cancer Plan, in the GEKID, in the §65c platform, membership in the International Association of Cancer Registries)

The work of the Centre for Cancer Registry Data is supported by an Advisory Board and a Scientific Committee with an office at the RKI. Upon request, the data available at the ZfKD can also be made available to third parties for scientific research purposes.

Further information on the application process and the Centre for Cancer Registry Data can be found online at www.krebsdaten.de/english.

Contact person at the Centre for Cancer Registry Data (see also address section 5.4):

Dr Klaus Kraywinkel (section head)
Dr Benjamin Barnes (deputy section head)

5.2 Association of Population-based Cancer Registries in Germany

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

The GEKID works closely with the Federal Ministry of Health in the area of cancer control, in particular within the framework of the National Cancer Plan, and the Centre for Cancer Registry Data at the Robert Koch Institute. In addition, the GEKID is active in various expert committees, in particular in the working groups for determining the standardised data set for cancer registration in Germany.

One of the Association's primary tasks is to achieve a high degree of methodological uniformity in cancer registration through content standards in the face of differing state regulations. Good comparability of cancer registry results can only be guaranteed through nationwide co-operation. To this end, the GEKID published *The Manual of Population-based Cancer Registration* back in 2008. Ten years later in 2018, this was updated together with the Association of German Tumour Centres (ADT) and supplemented with components of clinical cancer registration. The manual is available on the GEKID website.

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

The GEKID has set itself the following tasks in its statutes:

- to be the point of contact for national and international co-operation partners as well as for the interested public
- to inform the (professional) public about the status of cancer registration in Germany and to communicate the objectives of cancer registration
- to contribute to achieving and ensuring the completeness of the individual cancer registries through joint information activities
- define content standards as a basis for the comparability of population-based cancer registries
- coordinate cross-registry tasks and maintain contact with clinical tumour documentation
- initiate joint research activities
- to promote the scientific utilisation of population-based cancer registries and
- to use the data for quality assurance in oncological care

Important results of GEKID activities in recent years are as follows:

- Further development of the GEKID's various interactive cancer atlases on current cancer incidence, cancer mortality and survival in the federal states and at district and city level, which can be viewed on the GEKID homepage.
- Participation in further development of the oncological basic data set (oDBS) for reporting to a registry as well as definitions for cross-registry data exchange and for data delivery to the Centre for Cancer Registry Data
- Evaluation and publication of results on cancer epidemiology and survival

Further information on GEKID can be obtained via the Internet at www.gekid.de or via the respective regional member registries (see address section 5.4).

Contact of the Association of Population-based Cancer Registries in Germany (see also address section 5.4):

Prof Dr Alexander Katalinic
1st Chairman, Schleswig-Holstein Cancer Registry
Dr Alice Nennecke
2nd Chairwoman, Hamburg Cancer Registry
Hiltraud Kajüter
3rd Chairwoman, Cancer Registry
North Rhine-Westphalia

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

The Cancer Information Service "KID" was founded in 1986 as a telephone contact point to provide personal information to patients, their relatives and the interested public regarding cancer. Today, doctors answer – up-to-date and scientifically sound – between 23,000 and 33,000 individual enquiries from people seeking advice every year on the phone, by email and in consultation hours in Heidelberg and Dresden. Representatives from professional groups involved in the care of cancer patients also contact the Cancer Information Service. The information is tailored to the needs of the various target groups:

- Patients and their relatives are particularly interested in detailed information on diagnosis and treatment options, living with the disease and information on further points of contact in the healthcare system. For interested members of the public, questions about risk factors, cancer prevention and early detection or current cancer research take centre stage. The comprehensive range of services offered by the Cancer Information Service strengthens the health literacy of the individual and creates the basis for a dialogue on an equal footing with the treating doctors, so that an informed, participatory decision can be made by those affected.
- Professionals working in the field of cancer receive up-to-date information based on the best available scientific evidence quickly, reliably and competently by telephone and e-mail. The clear presentation of research results and the customised compilation of relevant sources generate a direct benefit for professionals in patient care.

Via its website www.krebsinformationsdienst.de, the Cancer Information Service provides up-to-date information about cancer, addresses and contacts, further link tips and information material. Around 5.5 million visitors used this service in 2022. In social networks such as Facebook, Instagram, YouTube and LinkedIn, the service provides the latest news and invites discussion. For healthcare professionals, the website provides relevant information from medical research and links to further scientific sources. Newsletters for medical professionals and especially for psycho-oncologists convey current topics on cancer.

The Cancer Information Service is provided by the German Cancer Research Centre Heidelberg (DKFZ), the largest biomedical 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). The service therefore provides information independently, free of conflicts of interest and free of charge. As a National Reference Centre for Cancer Information, the Cancer Information Service works to high quality standards. Through its evaluation research, the Service provides feedback on how cancer patients and their relatives experience health care in Germany.

Further information on the mission and working methods of the Cancer Information Service can be found at www.krebsinformationsdienst.de/wirueberuns.php.

Cancer Information Service KID
Telephone: 0800/420 30 40, free of charge,
daily from 8 a.m. to 8 p.m.
E-mail: krebsinformationsdienst@dkfz.de,
(reply within two working days)
Internet: www.krebsinformationsdienst.de and
www.facebook.com/krebsinformationsdienst

krebsinformationsdienst.med
Telephone: 0800/430 40 50, free of charge,
Monday to Friday from 8 a.m. to 8 p.m.
E-mail: kid.med@dkfz.de,
(reply within two working days)
Internet: www.krebsinformationsdienst.de/fachkreise

Contact person of the Cancer Information Service KID (see also address section 5.4):

Dr Susanne Weg-Remers,
Head of the Cancer Information Service (KID)
Dr Andrea Penzkofer,
Head of the Knowledge Management working group at KID

5.4 Sources for international comparisons of cancer incidence and mortality

For the years 2019 – 2020, if not otherwise stated. Access period: May to September 2023

Netherlands: Netherlands Cancer Registry
https://nkr-cijfers.iknl.nl/

Sweden, Finland, Denmark: NORDCAN (Association of the Nordic Cancer Registries)
https://nordcan.iarc.fr/en

Poland: Polish National Cancer Registry
https://onkologia.org.pl/en/report

Czech Republic: SVOD Web Portal
https://www.svod.cz/

Switzerland: National Agency for Cancer Registration (NACR)
Incidence data for 2015 – 2019
https://www.nkrs.ch/de/downloads?cat=33

Belgium: Belgian Cancer Registry
http://kankerregister.org/Annual%20Tables

USA: The Surveillance, Epidemiology, and End Results (SEER) Program (National Cancer Institute)
Inzidenz (SEER 22-Register): https://seer.cancer.gov/canques/incidence.html
Mortalität (USA-weit): https://seer.cancer.gov/canques/mortality.html

England: NHS Digital: Cancer Registration Statistics, England 2020
https://www.cancerdata.nhs.uk/incidence_and_mortality

Austria: Austrian Cancer Registry (at Statistik Austria)
https://www.statistik.at/statistiken/bevoelkerung-und-soziales/gesundheit/krebserkrankungen

5.5 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 (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

Landesinstitut **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

Klinisch-epidemiologisches Krebsregister **Brandenburg-Berlin** gGmbH
(Clinical-Epidemiological Cancer Registry Brandenburg-Berlin gGmbH)
Koordinierungsstelle (Coordination Office)
Dreifertstraße 12
03044 Cottbus
Telephone: 0355/49 493-100 Telefax: 0355/49 493-109
E-Mail: info@kkrbb.de
Internet: www.kkrbb.de

Bremer Krebsregister (Bremen Cancer Registry) Auswertungsstelle (Analysis Unit)
Leibniz-Institut für Präventionsforschung und Epidemiologie – BIPS GmbH
(Leibniz Institute for Prevention Research and Epidemiology)
Achterstraße 30
28359 Bremen
Telephone: 0421/21 85 69 61 Telefax: 0421/21 85 68 21
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

(R) = Registerstelle (Registry Unit) (V) = Vertrauensstelle (Confidentiality Unit)

Freie und Hansestadt Hamburg
Behörde für Wissenschaft, Forschung, Gleichstellung und Bezirke
(Ministry of Science, Research, Equality and Districts)
Hamburgisches Krebsregister (Hamburg Cancer Registry)
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: 0611/32 59-14 56 Telefax: 0611/32 759-14 56
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

Krebsregister **Mecklenburg-Vorpommern** (Mecklenburg-West Pomerania Cancer Registry)
Zentralstelle der Krebsregistrierung (ZKR) (Central Cancer Registration Office)
Ellernholzstraße 1–2
17487 Greifswald
Telephone: 03834/86-22711
E-Mail: zentralstelle@krebsregister-mv.de
Internet: www.kkr-mv.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)
Sutelstraße 2
30659 Hannover
Telephone: 0511/4 50 5-0 Telefax: 0511/4 50 51 32
E-Mail: vertrauensstelle.ekn@nlga.niedersachsen.de
Internet: www.krebsregister-niedersachsen.de

Landeskrebsregister **Nordrhein-Westfalen** gGmbH (North Rhine-Westphalia Cancer Registry)
Gesundheitscampus 10
44801 Bochum
Telephone: 0234/5 45 09-111 Telefax: 0234/5 45 09-499
E-Mail: info@krebsregister.nrw.de
Internet: www.krebsregister.nrw.de

Krebsregister **Rheinland-Pfalz** gGmbH (Rhineland-Palatinate Cancer Registry)
Große Bleiche 46
55116 Mainz
Zentrale: 06131/9 71 75-0
E-Mail: info@krebsregister-rlp.de
Internet: www.krebsregister-rlp.de

Krebsregister **Saarland** (Saarland Cancer Registry)
Ministerium für Arbeit, Soziales, Frauen und Gesundheit (Ministry of Social Affairs, Health, Women and Family)
Neugeländstraße 9
66117 Saarbrücken
Telephone: 0681/5 01 58 05 (R) 0681/5 01 45 38 (V)
Telefax: 0681/5 01 59 98
E-Mail: krebsregister@soziales.saarland.de
Internet: https://krebsregister.saarland.de

Klinisch-epidemiologisches Krebsregister **Sachsen** gGmbH
(Clinical-Epidemiological Cancer Registry Saxony gGmbH)
Gemeinsame Geschäftsstelle bei der Sächsischen Landesärztekammer
(Joint Office at the State Chamber of Physicians of Saxony)
Schützenhöhe 16
01099 Dresden
Telephone: 0351/8 26 73 76 Telefax: 0351/8 26 73 12
E-Mail: geschaeftsstelle@krebsregister-sachsen.de
Internet: www.krebsregister-sachsen.de

Klinisches Krebsregister **Sachsen-Anhalt** gGmbH (Clinical Cancer Registry Saxony-Anhalt gGmbH)
Doctor-Eisenbart-Ring 2
39120 Magdeburg
Telephone: 0391/60 74 53 40
E-Mail: mail@kkr-lsa.de
Internet: www.kkr-lsa.de

Krebsregister **Schleswig-Holstein** (Schleswig-Holstein Cancer Registry)
Registerstelle (Registry Unit)
Institut für Krebsepidemiologie e.V.
Ratzeburger Allee 160, Haus V50
23538 Lübeck
Telephone: 0451/50 05 21 01 Telefax: 0451/50 05 21 04
E-Mail: rs@krebsregister-sh.de
Internet: www.krebsregister-sh.de

Vertrauensstelle des Krebsregisters (Confidentiality Unit of the Schleswig-Holstein Cancer Registry)
bei der Ärztekammer Schleswig-Holstein (at the Schleswig-Holstein Medical Association)
Bismarckallee 8 – 12
23795 Bad Segeberg
Telephone: 04551/80 38 52
E-Mail: vs@krebsregister-sh.de

Zentrales klinisches Krebsregister **Thüringen** gGmbH (Central Clinical Cancer Registry Thuringia gGmbH)
Camburger Straße 74
07743 Jena
Telephone: 03641/2 42 36 10
E-Mail: info@zkkr-thueringen.de
Internet: www.krebsregister-thueringen.de

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)
(Institute for Medical Biostatistics, Epidemiology and Informatics)
Rhabanusstraße 3, Turm A
55118 Mainz
Telephone: 06131/17 31 11
E-Mail: info@kinderkrebsregister.de
Internet: www.kinderkrebsregister.de

(R) = Registerstelle (Registry Unit) (V) = Vertrauensstelle (Confidentiality Unit)

Krebsinformationsdienst (KID) (Cancer Information Service)
Deutsches Krebsforschungszentrum (German Cancer Research Center)
Im Neuenheimer Feld 280
69120 Heidelberg

Telephone: 06221/42 28 90 (secretariat)
E-Mail: krebsinformationsdienst@dkfz.de
Internet: www.krebsinformationsdienst.de

Further Contacts

Zentrum für Krebsregisterdaten im Robert Koch-Institut
(German Centre for Cancer Registry Data at the Robert Koch Institute)
General-Pape-Straße 62 – 66
12101 Berlin

Telephone: 030/1 87 54 31 37
E-Mail: krebsdaten@rki.de
Internet: www.krebsdaten.de

Bundesministerium für Gesundheit (Federal Ministry of Health)
53107 Bonn
Referat 311

Telephone: 0228/9 94 41 31 81
E-Mail: 311@bmg.bund.de

Referat 324

Telephone: 0228/9 94 41 31 08
E-Mail: 324@bmg.bund.de
Internet: www.bundesgesundheitsministerium.de

5.6 Publications with participation/with results of the German population-based cancer registries 2019 – 2023

Abele M, Grabner L, Blessing T, et al. (2023) *Epidemiology and Characteristics of Gastric Carcinoma in Childhood – An Analysis of Data from Population-Based and Clinical Cancer Registries*. Cancers 15 (1): 317. doi: 10.3390/cancers15010317

Alfaar AS, Saad A, Wiedemann P, et al. (2022) *The epidemiology of uveal melanoma in Germany: a nationwide report of incidence and survival between 2009 and 2015*. Graefes Arch Clin Exp Ophthalmol 260: 1723 – 1731. doi: 10.1007/s00417-021-05317-7

Alfaar AS, Suckert CN, Rehak M, et al. (2022) *The epidemiology of adults' eyelid malignancies in Germany between 2009 and 2015; An analysis of 42,710 patients' data*. Eur J Ophthalmol 33 (2): 1186 – 1199. Doi: 10.1177/11206721221125018

Arndt V, Dahm S, Kraywinkel K (2021) *Krebsprävalenz in Deutschland 2017*. Onkologe 27 (8): 717 – 723. doi: 10.1007/s00761-021-00988-7

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 (2023) Factsheet *Epidemiologie metastasierter Tumoren in Deutschland, 2015 – 2019: Inzidenz und 5-Jahres-Überleben*. Die Onkologie 29 (3): 177 – 181. doi: 10.1007/s00761-022-01295-5

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

Becker C, Graf N, Grabow D, et al. (2020) *Early deaths from childhood cancer in Germany 1980 – 2016*. Cancer Epidemiol 65:101669. doi: 10.1016/j.canep.2020.101669

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