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 tumours 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*

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>ICD-10</th>
<th>No. of incident cases</th>
<th>Incidence rate¹</th>
<th>No. of deaths</th>
<th>Mortality rate¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>All cancers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other cancer sites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple myeloma</td>
<td>C90</td>
<td>3,010</td>
<td>3,700</td>
<td>3.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>C91 – C95</td>
<td>5,640</td>
<td>7,920</td>
<td>8.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Other cancer sites</td>
<td></td>
<td>2,450</td>
<td>2,220</td>
<td>3.4</td>
<td>3.5</td>
</tr>
<tr>
<td>All cancers²</td>
<td></td>
<td>327,890</td>
<td>374,150</td>
<td>460.9</td>
<td>563.6</td>
</tr>
<tr>
<td>All cancers²</td>
<td></td>
<td>231,400</td>
<td>261,850</td>
<td>337.4</td>
<td>406.0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Incident cases</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Incident cases</td>
<td>244,000</td>
<td>279,700</td>
</tr>
<tr>
<td>Crude incidence rate</td>
<td>579.7</td>
<td>682.1</td>
</tr>
<tr>
<td>Age-standardised incidence rate</td>
<td>356.5</td>
<td>437.6</td>
</tr>
<tr>
<td>Median age at diagnosis</td>
<td>69</td>
<td>70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mortality</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths</td>
<td>105,682</td>
<td>124,560</td>
<td>104,949</td>
</tr>
<tr>
<td>Crude mortality rate</td>
<td>251.0</td>
<td>303.8</td>
<td>249.1</td>
</tr>
<tr>
<td>Age-standardised mortality rate</td>
<td>121.3</td>
<td>177.1</td>
<td>118.7</td>
</tr>
<tr>
<td>Median age at death</td>
<td>77</td>
<td>75</td>
<td>77</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevalence and survival rates</th>
<th>5 years</th>
<th>10 years</th>
<th>25 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence</td>
<td>801,700</td>
<td>835,000</td>
<td>1,384,600</td>
</tr>
<tr>
<td>Absolute survival rate (2019 – 2020)</td>
<td>58</td>
<td>52</td>
<td>47</td>
</tr>
<tr>
<td>Relative survival rate (2019 – 2020)</td>
<td>66</td>
<td>62</td>
<td>61</td>
</tr>
</tbody>
</table>

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
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 pre-cancerous 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

<table>
<thead>
<tr>
<th>Women aged</th>
<th>Risk of developing cancer</th>
<th>Mortality risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in the next 10 years</td>
<td>ever</td>
</tr>
<tr>
<td>35 years</td>
<td>2.3 % (1 in 43)</td>
<td>44.1 % (1 in 2)</td>
</tr>
<tr>
<td>45 years</td>
<td>4.9 % (1 in 20)</td>
<td>42.9 % (1 in 2)</td>
</tr>
<tr>
<td>55 years</td>
<td>8.5 % (1 in 12)</td>
<td>40.3 % (1 in 2)</td>
</tr>
<tr>
<td>65 years</td>
<td>13.5 % (1 in 7)</td>
<td>35.7 % (1 in 3)</td>
</tr>
<tr>
<td>75 years</td>
<td>17.5 % (1 in 6)</td>
<td>27.8 % (1 in 4)</td>
</tr>
<tr>
<td>Lifetime risk</td>
<td>44.5 % (1 in 2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Men aged</th>
<th>in the next 10 years</th>
<th>ever</th>
<th>in the next 10 years</th>
<th>ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 years</td>
<td>1.2 % (1 in 85)</td>
<td>52.3 % (1 in 2)</td>
<td>0.2 % (1 in 480)</td>
<td>25.0 % (1 in 4)</td>
</tr>
<tr>
<td>45 years</td>
<td>3.3 % (1 in 30)</td>
<td>52.2 % (1 in 2)</td>
<td>0.9 % (1 in 110)</td>
<td>25.1 % (1 in 4)</td>
</tr>
<tr>
<td>55 years</td>
<td>10.0 % (1 in 10)</td>
<td>51.8 % (1 in 2)</td>
<td>3.2 % (1 in 31)</td>
<td>25.0 % (1 in 4)</td>
</tr>
<tr>
<td>65 years</td>
<td>21.3 % (1 in 5)</td>
<td>49.6 % (1 in 2)</td>
<td>7.4 % (1 in 14)</td>
<td>24.0 % (1 in 4)</td>
</tr>
<tr>
<td>75 years</td>
<td>29.2 % (1 in 3)</td>
<td>42.3 % (1 in 2)</td>
<td>12.0 % (1 in 8)</td>
<td>20.8 % (1 in 5)</td>
</tr>
<tr>
<td>Lifetime risk</td>
<td>52.1 % (1 in 2)</td>
<td></td>
<td>24.8 % (1 in 4)</td>
<td></td>
</tr>
</tbody>
</table>

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**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)

#### Women
- Hamburg
- Schleswig-Holstein
- North Rhine-Westphalia
- Saarland
- Lower Saxony
- Saxony-Anhalt
- Berlin
- Bremen
- Hesse
- Germany
- Baden-Württemberg
- Rhineland-Palatinate
- Brandenburg
- Saxony
- Meckl. West Pom.
- Bavaria
- Thuringia

#### Men
- Saxony-Anhalt
- Saarland
- Saxony
- Meckl. West Pom.
- Hamburg
- Schleswig-Holstein
- Brandenburg
- North Rhine-Westphalia
- Lower Saxony
- Bremen
- Germany
- Baden-Württemberg
- Rhineland-Palatinate
- Thuringia
- Hesse
- Bavaria

### 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)

#### Women
- Denmark
- Netherlands
- USA
- Belgium
- England
- Finland
- Germany
- Czech Republic
- Sweden
- Switzerland
- Austria
- Poland

#### Men
- Denmark
- Belgium
- Czech Republic
- USA
- Netherlands
- Switzerland
- Germany
- England
- Finland
- Sweden
- Austria
- Poland

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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