## 3 Results

### 3.0 Overview of incident cancer cases and cancer deaths

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

- **Women**
  - Breast 30.0%
  - Colon and rectum 11.5%
  - Lung 9.4%
  - Malignant melanoma of the skin 4.7%
  - Uterus 4.7%
  - Pancreas 3.9%
  - Non-Hodgkin lymphoma 3.6%
  - Ovaries 3.3%
  - Stomach 2.4%
  - Kidney 2.4%
  - Leukaemia 2.3%
  - Bladder 2.0%
  - Oral cavity and pharynx 1.9%
  - Cervix 1.9%
  - Thyroid gland 1.8%
  - Central nervous system 1.8%
  - Liver 1.2%
  - Multiple myeloma 1.2%
  - Gallbladder and biliary tract 1.2%
  - Soft tissue without mesothelioma 0.9%
  - Oesophagus 0.8%
  - Anus 0.7%
  - Small intestine 0.5%
  - Hodgkin lymphoma 0.5%

- **Men**
  - Breast 17.7%
  - Lung 15.8%
  - Colon and rectum 10.8%
  - Pancreas 8.7%
  - Ovaries 5.1%
  - Leukaemia 3.5%
  - Stomach 3.5%
  - Non-Hodgkin lymphoma 3.1%
  - Liver 2.6%
  - Uterus 2.5%
  - Central nervous system 2.5%
  - Gallbladder and biliary tract 1.9%
  - Kidney 1.8%
  - Multiple myeloma 1.8%
  - Bladder 1.8%
  - Cervix 1.5%
  - Oral cavity and pharynx 1.4%
  - Oesophagus 1.3%
  - Malignant melanoma of the skin 1.1%
  - Vulva 0.9%
  - Soft tissue without mesothelioma 0.9%
  - Thyroid gland 0.4%
  - Small intestine 0.3%
  - Anus 0.3%
  - Mesothelioma 0.3%

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

- **Women**
  - Breast 17.7%
  - Lung 15.8%
  - Colon and rectum 10.8%
  - Pancreas 8.7%
  - Ovaries 5.1%
  - Leukaemia 3.5%
  - Stomach 3.5%
  - Non-Hodgkin lymphoma 3.1%
  - Liver 2.6%
  - Uterus 2.5%
  - Central nervous system 2.5%
  - Gallbladder and biliary tract 1.9%
  - Kidney 1.8%
  - Multiple myeloma 1.8%
  - Bladder 1.8%
  - Cervix 1.5%
  - Oral cavity and pharynx 1.4%
  - Oesophagus 1.3%
  - Malignant melanoma of the skin 1.1%
  - Vulva 0.9%
  - Soft tissue without mesothelioma 0.9%
  - Thyroid gland 0.4%
  - Small intestine 0.3%
  - Anus 0.3%
  - Mesothelioma 0.3%

- **Men**
  - Breast 17.7%
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  - Stomach 3.5%
  - Non-Hodgkin lymphoma 3.1%
  - Liver 2.6%
  - Uterus 2.5%
  - Central nervous system 2.5%
  - Gallbladder and biliary tract 1.9%
  - Kidney 1.8%
  - Multiple myeloma 1.8%
  - Bladder 1.8%
  - Cervix 1.5%
  - Oral cavity and pharynx 1.4%
  - Oesophagus 1.3%
  - Malignant melanoma of the skin 1.1%
  - Vulva 0.9%
  - Soft tissue without mesothelioma 0.9%
  - Thyroid gland 0.4%
  - Small intestine 0.3%
  - Anus 0.3%
  - Mesothelioma 0.3%
<table>
<thead>
<tr>
<th>Cancer site</th>
<th>No. of incident cases</th>
<th>Incidence rate</th>
<th>No. of deaths</th>
<th>Mortality rate</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>ICD-10</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Oral cavity and pharynx</td>
<td>C00–C14</td>
<td>4,490</td>
<td>9,820</td>
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<tr>
<td>Oesophagus</td>
<td>C15</td>
<td>1,840</td>
<td>5,710</td>
<td>2.4</td>
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<tr>
<td>Stomach</td>
<td>C16</td>
<td>5,560</td>
<td>9,200</td>
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<td>Small intestine</td>
<td>C17</td>
<td>1,160</td>
<td>1,520</td>
<td>1.7</td>
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<tr>
<td>Colon and rectum</td>
<td>C18–C20</td>
<td>26,710</td>
<td>33,920</td>
<td>32.7</td>
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<tr>
<td>Anus</td>
<td>C21</td>
<td>1,530</td>
<td>800</td>
<td>2.4</td>
</tr>
<tr>
<td>Liver</td>
<td>C22</td>
<td>2,820</td>
<td>6,690</td>
<td>3.5</td>
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<tr>
<td>Gallbladder and biliary tract</td>
<td>C23, C24</td>
<td>2,700</td>
<td>2,380</td>
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<tr>
<td>Pancreas</td>
<td>C25</td>
<td>9,160</td>
<td>9,860</td>
<td>10.8</td>
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<td>Nasal cavity, nasal sinuses and middle ear</td>
<td>C30, C31</td>
<td>460</td>
<td>660</td>
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<tr>
<td>Larynx</td>
<td>C32</td>
<td>540</td>
<td>2,770</td>
<td>0.8</td>
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<tr>
<td>Lung</td>
<td>C33, C34</td>
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<td>35,290</td>
<td>31.5</td>
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<td>360</td>
<td>500</td>
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<td>Malignant melanoma of the skin</td>
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<td>10,880</td>
<td>12,010</td>
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<tr>
<td>Non-melanoma skin cancer</td>
<td>C44</td>
<td>94,200</td>
<td>105,230</td>
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<tr>
<td>Mesothelioma</td>
<td>C45</td>
<td>340</td>
<td>1,290</td>
<td>0.4</td>
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<tr>
<td>Soft tissue without mesothelioma</td>
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<td>2,160</td>
<td>2,140</td>
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<tr>
<td>Breast</td>
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<td>69,900</td>
<td>720</td>
<td>112.6</td>
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<tr>
<td>Vulva</td>
<td>C51</td>
<td>3,270</td>
<td>4,44</td>
<td>4.4</td>
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<tr>
<td>Vagina</td>
<td>C52</td>
<td>470</td>
<td>0.6</td>
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<td>Cervix</td>
<td>C53</td>
<td>4,320</td>
<td>8.6</td>
<td>1,612</td>
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<tr>
<td>Uterus</td>
<td>C54, C55</td>
<td>10,860</td>
<td>15.9</td>
<td>2,631</td>
</tr>
<tr>
<td>Ovaries</td>
<td>C56</td>
<td>7,300</td>
<td>10.7</td>
<td>5,326</td>
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<tr>
<td>Penis</td>
<td>C60</td>
<td>1,010</td>
<td>1.5</td>
<td>217</td>
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<tr>
<td>Prostate</td>
<td>C61</td>
<td>65,200</td>
<td>99.1</td>
<td>14,963</td>
</tr>
<tr>
<td>Testis</td>
<td>C62</td>
<td>4,160</td>
<td>10.4</td>
<td>178</td>
</tr>
<tr>
<td>Kidney</td>
<td>C64</td>
<td>5,480</td>
<td>9,350</td>
<td>7.6</td>
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<tr>
<td>Renal pelvis and ureter</td>
<td>C65, C66</td>
<td>790</td>
<td>1,310</td>
<td>0.9</td>
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<tr>
<td>Bladder</td>
<td>C67</td>
<td>4,770</td>
<td>13,500</td>
<td>5.5</td>
</tr>
<tr>
<td>Eye</td>
<td>C69</td>
<td>230</td>
<td>290</td>
<td>0.4</td>
</tr>
<tr>
<td>Central nervous system</td>
<td>C70–C72</td>
<td>3,130</td>
<td>4,100</td>
<td>5.4</td>
</tr>
<tr>
<td>Thyroid gland</td>
<td>C73</td>
<td>4,270</td>
<td>1,930</td>
<td>9.1</td>
</tr>
<tr>
<td>Without specification of site</td>
<td>C80</td>
<td>5,020</td>
<td>4,700</td>
<td>5.5</td>
</tr>
<tr>
<td>Hodgkin lymphoma</td>
<td>C81</td>
<td>1,100</td>
<td>1,440</td>
<td>2.5</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>C82–C88</td>
<td>8,280</td>
<td>10,190</td>
<td>11.4</td>
</tr>
<tr>
<td>Multiple myeloma</td>
<td>C90</td>
<td>2,810</td>
<td>3,540</td>
<td>3.5</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>C91–C95</td>
<td>5,310</td>
<td>6,870</td>
<td>7.6</td>
</tr>
<tr>
<td>Other cancer sites</td>
<td>2,750</td>
<td>2,310</td>
<td>3.8</td>
<td>3.8</td>
</tr>
<tr>
<td>All cancers</td>
<td>C00–C97</td>
<td>326,920</td>
<td>370,390</td>
<td>465.2</td>
</tr>
<tr>
<td>All cancers</td>
<td>C00–C97 w/o C44</td>
<td>232,720</td>
<td>265,170</td>
<td>342.9</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

Epidemiology

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

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

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

| Table 3.1.1 | Overview of key epidemiological parameters for Germany, ICD-10 C00–C97 without C44 |
|---|---|---|---|
| Incidence | 2017 | 2018 | Prediction for 2022 |
| | Women | Men | Women | Men | Women | Men |
| Incident cases | 236,000 | 265,200 | 232,700 | 265,200 | 235,900 | 274,300 |
| Crude incidence rate | 563.5 | 650.5 | 554.1 | 648.2 | 557.8 | 664.9 |
| Age-standardised incidence rate | 348.9 | 427.2 | 342.9 | 422.3 | 340.3 | 417.0 |
| Median age at diagnosis | 69 | 70 | 69 | 70 | 69 | 70 |
| Mortality | 2017 | 2018 | 2019 |
| | Women | Men | Women | Men | Women | Men |
| Deaths | 104,077 | 122,603 | 104,791 | 124,274 | 105,682 | 124,560 |
| Crude mortality rate | 248.5 | 300.7 | 249.5 | 303.8 | 251.1 | 303.8 |
| Age-standardised mortality rate | 123.0 | 181.4 | 122.3 | 180.7 | 121.3 | 177.1 |
| Median age at death | 76 | 75 | 77 | 75 | 77 | 75 |
| Prevalence and survival rates | 5 years | 10 years | 25 years |
| | Women | Men | Women | Men | Women | Men |
| Prevalence | 779,300 | 796,700 | 1,356,900 | 1,344,700 | 2,311,600 | 2,129,300 |
| Absolute survival rate (2017–2018) | 59 | 51 | 48 | 39 | 59 | 51 |
| Relative survival rate (2017–2018) | 66 | 61 | 61 | 57 |

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

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

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

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

**Risk factors and early detection**

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

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

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

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

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

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

In addition to preventable risk factors, genetic causes can also increase the risk of developing cancer. Certain hereditary genetic alterations have been clearly identified as the cause of certain types of tumours, such as breast and ovarian cancer or...
colorectal cancer. In the course of tumour genome sequencing, more and more hereditary mutations are being found that can significantly increase the risk of developing certain tumours.

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

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

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

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

1 including in situ tumours and neoplasms of uncertain or unknown behavior (D09.9, D41.4)
2 malignant forms only (C67)
Figure 3.1.1a
Age-standardised incidence and mortality rates by sex, ICD-10 C00–C97 without C44, Germany 1999–2018/2019, projection (incidence) through 2022
per 100,000 (old European Standard)

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

Figure 3.1.2
Age-specific incidence rates by sex, ICD-10 C00–C97 without C44, Germany 2017–2018
per 100,000
Table 3.1.2
Cancer incidence and mortality risks in Germany by age and sex, ICD-10 C00–C97 without C44, database 2018

| Age          | Women aged | | | | | | Men aged | | | |
|--------------|------------|---|---|---|---|---|---|---|---|---|---|---|---|
|              | in the next 10 years | ever | in the next 10 years | ever | in the next 10 years | ever | lifetime risk | ever |
| 35 years     | 2.2 % (1 in 45) | 41.8 % (1 in 2) | 0.3 % (1 in 330) | 19.9 % (1 in 5) |
| 45 years     | 4.8 % (1 in 21) | 40.6 % (1 in 2) | 0.9 % (1 in 110) | 19.7 % (1 in 5) |
| 55 years     | 8.2 % (1 in 12) | 38.0 % (1 in 3) | 2.5 % (1 in 40) | 19.1 % (1 in 5) |
| 65 years     | 12.8 % (1 in 8) | 33.4 % (1 in 3) | 4.9 % (1 in 21) | 17.5 % (1 in 6) |
| 75 years     | 16.2 % (1 in 6) | 25.7 % (1 in 4) | 7.8 % (1 in 13) | 14.4 % (1 in 7) |
| Lifetime risk| 42.3 % (1 in 2) | 19.8 % (1 in 5) |

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

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

Figure 3.1.5
Relative 5-year survival by UICC stage and sex, ICD-10 C00–C97 without C44, Germany 2016–2018
Not included because UICC stages are site-specific.
Figure 3.1.6
Age-standardised incidence and mortality rates in German federal states by sex, ICD-10 C00–C97 without C44, 2017–2018
per 100,000 (old European Standard)

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

1 Data for C00 to C97
2 No data available