The European Cancer Information System (ECIS) web application

Computing and disseminating European statistics on cancer burden

Giorgia Randi, Fabrizio Zaro, Raquel N. Carvalho, Carmen Martos, Nadya Dimitrova, Tadeusz Dyba, Francesco Giusti, Luciana Neamtiu, Emanuele Crocetti, Roisin Rooney, Davor Aslanovski, Stefano Adriani, Antonino Brunetto, Silvio Grispo, Massimiliano Gusmini, Nicholas Nicholson, Enrico Ben, Manola Bettio

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Acknowledgments

The data of population-based cancer registries form the basis for the estimation of the cancer burden and its trends over time and are crucial in the planning and evaluation of cancer control programmes.

Grateful acknowledgement is given to the European cancer registries for contributing to the initiatives and studies included in ECIS.
The European Cancer Information System and the ECIS web application

Cancer is the second most common cause of death in the EU¹, claiming many lives and exerting an enormous toll both on our health systems and on our economy. In order to tackle these challenges more effectively and to profit from EU-added value, the European Commission has proposed and initiated a number of actions, including those that transcend the traditional boundaries of health systems and move into policy areas such as education, environment, taxation, research, and social and external affairs². However, actual effectiveness of any such measure cannot be assessed without the availability of accurate and comparable data on cancer that can be translated into reliable incidence, prevalence, survival and mortality statistics. For this purpose, the Joint Research Centre (JRC), acting as the scientific service to the European Commission and in close collaboration with the Commission’s Directorate-General for Health and Food Safety (DG SANTE) as well as with major European stakeholders in the field, has started developing a comprehensive cancer information system for Europe.

In 2012, the two Directorate-Generals (DG SANTE and JRC) have first entered into a formal collaboration with the aim of supporting the European Network of Cancer Registries (ENCR). In order to ensure the continued administrative functioning of the network, the ENCR secretariat was transferred to the JRC. On the scientific side, the JRC has been supporting the ENCR in the harmonisation of data and registration processes. This collaboration has also included the development of specific infrastructural elements of a European Cancer Information System (ECIS). Building upon existing experience, competence, and cooperation of cancer registries with membership in the ENCR, and in collaboration with other stakeholders in the cancer information domain, DG SANTE and JRC have been developing ECIS with the following aims:
- to monitor the burden of cancer and its trends over time across Europe and its geographical regions;
- to assess the magnitude of the cancer burden and its likely future evolution;
- to illustrate the effects of health policy interventions;
- to establish a reference base for cancer epidemiological research;
- to provide information for further research on possible underlying causes of cancer as well as best practices for prevention, treatment, and control; and
- to provide information and educational resources to the general public to explain the variations observed in different populations.

A key component of this integrated and comprehensive system is the so-called ECIS web application. This web-based module, conceived and developed by the JRC and launched in February 2018, was designed to provide information on and to visualise the cancer burden indicators. The ECIS web application displays three different types of information: historical incidence and mortality indicators

at registry level; national incidence and mortality estimates; and national survival estimates. It permits the exploration of geographical patterns and temporal trends of incidence, mortality, and survival based on data submitted by approx. 150 European population-based cancer registries for the major cancer sites. This enables researchers to assess the magnitude and monitor the cancer burden and its changing trends over time. The ECIS web application also helps to illustrate the effects of health policy interventions aimed at reducing the cancer burden.
Cancer Registration in Europe and the European Network of Cancer Registries (ENCR)

Cancer registration in Europe\(^3\) comprises some 200 population-based cancer registries, residing in most European countries. These registries provide information on cancer cases with varying degrees of geographical coverage, ranging from national to regional and local coverage. There are also notable differences between registries in terms of data quality and comprehensiveness of reporting.

The ENCR\(^4\) was established in 1990, within the framework of the European Commission’s Europe Against Cancer programme. It promotes collaboration between cancer registries, defines data collection standards and supports the registries as the providers of the information necessary to quantify and monitor the burden of cancer in Europe. The ENCR currently comprises 178 individual registries across Europe (including non-EU countries). Figure 1 shows the tapestry of general cancer registries (i.e. those that collect data on all cancer sites and on patients of all ages) with ENCR membership.

![Figure 1. General cancer registries in Europe with ENCR membership](image)

The European Commission’s Joint Research Centre hosts the secretariat of the ENCR and coordinates its underlying activities.

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3. Defined according to the UN definition: [http://unstats.un.org/unsd/methods/m49/m49regin.htm#europe](http://unstats.un.org/unsd/methods/m49/m49regin.htm#europe), with the addition of Cyprus.
Cancer burden indicators in the ECIS web application

The ECIS web application displays three different types of indicators reporting on the cancer burden in Europe (Figure 2) that are based on the results of three European studies and projects:

- historical data on incidence and mortality, displayed at cancer-registry level and derived from the ENCR-JRC project ‘Cancer Incidence and Mortality in Europe’; 
- national-level survival estimates, derived from the latest published edition of the EUROCARE study (currently EUROCARE-5);
- 2018 incidence and mortality estimates, at national level, developed by the International Agency for Research on Cancer (IARC) in collaboration with International Association of Cancer Registries, the JRC, and the ENCR.

Figure 2. The homepage of the ECIS web application

All the cancer indicators displayed in the ECIS web application are based on incidence data submitted

by the European population-based cancer registries participating in the corresponding projects/studies (Figure 3). The mortality data come either from the EUROSTAT and WHO or are provided by the European cancer registries. The population data come from EUROSTAT, WHO, and UN, or they are provided by the European cancer registries. The cancer burden indicators reported in ECIS are the results of data analysis at cancer-registry level (incidence and mortality historical data) or at country level (survival estimates and 2018 estimates of incidence and mortality).

The database feeding the ECIS application is dynamic and updated as new data become available. The ECIS web application has been developed and is maintained by the JRC and can be accessed here: https://ecis.jrc.ec.europa.eu/.

Figure 3. Data sources and data flow feeding the database of the ECIS web application

*Incidence and mortality estimates for 2018 – the IARC-IACR-ENCR-JRC collaboration*

The ECIS web application presents national estimates of incidence and mortality for the major cancer types in 40 European countries for the year 2018. These estimates are the outcome of an exercise led by the International Agency for Research on Cancer (IARC) in collaboration with the JRC, the ENCR, and the International Association of Cancer Registries (IACR). They are based on the historical data on incidence and mortality provided by European population-based cancer registries.
The 2018 incidence estimates for 40 European countries are based on the data from European cancer registries participating in IARC’s *Cancer Incidence in Five Continents* vol. XI as well as from the NORDCAN database and other published reports. The mortality data was extracted from the WHO mortality database.

The 2018 incidence and mortality estimates are shown both for the whole Europe and for the four geographic European areas:

- **CENTRAL AND EASTERN EUROPE**: Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Poland, Romania, Russian Federation, Slovakia, and Ukraine;
- **NORTHERN EUROPE**: Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and United Kingdom;
- **SOUTHERN EUROPE**: Albania, Bosnia Herzegovina, Croatia, Cyprus, Greece, Italy, FYR Macedonia, Malta, Montenegro, Portugal, Serbia, Slovenia, and Spain;
- **WESTERN EUROPE**: Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland;

Other European areas considered are the EU28 countries and the EU28 plus the four European Free Trade Association (EFTA) countries (Iceland, Liechtenstein, Norway and Switzerland).

**Historical incidence and mortality – the ENCR-JRC Project ‘Cancer incidence and mortality in Europe’**

The ENCR-JRC project on cancer incidence and mortality aims to compute and disseminate indicators for assessing and monitoring the burden of cancer in Europe and its trends over time. These indicators can be explored by cancer site, sex, age group, calendar period and geographical area of the registries.

In 2015, the first call for data was sent to all European population-based registries. As of September 2018, a total of 149 registries from 34 European countries have responded and were included in the ENCR-JRC project. The data submitted by cancer registries on all ages and all cancer sites are included in the ECIS web application.

The outputs of the project are produced in collaboration with cancer registries and their representative body – the ENCR Steering Committee.

**Survival estimates – the EUROCARE project**

EUROCARE (EUROpean CAncer REgistry-based study on survival and care of cancer patients) is the widest collaborative research project on cancer survival in Europe. The aims of the study are to provide...

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an updated description of cancer-survival time trends and differences across European countries; to measure cancer prevalence; and to study patterns of care of cancer patients.

The ECIS reports the results of the EUROCARE’s study latest published edition, currently EUROCARE-5. This edition includes data on more than 21 million cancer diagnoses provided by 99 cancer registries in 26 European countries.

The survival estimates in EUROCARE are also provided for the four European regions defined as follows:
- NORTHERN EUROPE: Denmark, Finland, Iceland, Norway, and Sweden;
- UK AND IRELAND: Ireland; UK (England, Northern Ireland, Scotland, and Wales);
- CENTRAL EUROPE: Austria, Belgium, France, Germany, Switzerland, and the Netherlands;
- SOUTHERN EUROPE: Croatia, Italy, Malta, Portugal, Slovenia, and Spain;
- EASTERN EUROPE: Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Poland, and Slovakia.

Work in progress for ECIS

The ECIS web application is continuously updated with new features and data as soon as they are ready for publication. Additional features currently under development address the following areas: i) dissemination of data on paediatric and rare cancers; ii) historical national estimates of cancer incidence in countries without a national registry; iii) cancer factsheets summarising information from different projects in ECIS by cancer site.
Getting started with the ECIS web application

The ECIS data explorer

The core of the ECIS web application, its data explorer, is divided into three areas, reporting separately on national estimates of cancer incidence and mortality for the most recent year, on incidence and mortality indicators over time (historical data until the most recent available year) at registry level, and on national survival estimates. All the possible analyses (Table 1) can be displayed in the ECIS through maps, charts, and tables, according to the indicator (incidence, mortality, survival) and the scenario selected (analyses specific for registry/country and cancer site, analyses by cancer, analyses by registry/country).

Selecting the data to be displayed

Filter menu for selections
The maps, tables, and charts displaying the ECIS analyses can be modified by selecting different filters in the top menu, including: country/registry, cancer site, sex, age at diagnosis/death, year of diagnosis/death, and type of indicator (incidence, mortality, population, survival). The filter menu is adjusted to each study/project depending on the corresponding available selections as in this example:

Indicator selection
The ‘Indicator’ field allows the user to focus on the indicator(s) of interest:
**Country/Registry selection**

The ‘Country/Registry’ field enables the selection of the country or registry for the desired analysis. For historical data, one or more registries can be selected – if more than one are selected, the analyses will display a comparison between different registries. In the ‘Current selection’ box, the user can unselect either individual registries or countries.

Selecting the ‘By registry’ or ‘By country’ option enables the user to toggle between different sets of analyses (Table 1).

![Country/Registry selection](image)

**Sex selection**

The ‘Sex’ field enables the user to choose between ‘Male’, ‘Female’, or ‘Both sexes’. In the latter case, analyses can be displayed separately for males and females or for both sexes combined.

![Sex selection](image)
**Cancer site selection**
The ‘Cancer’ filter depends on the country/registry and sex combination. When more than one tumour site are selected, analyses can be displayed separately by cancer or grouped (all cancers combined). Selecting the ‘By cancer’ option on the menu enables the user to toggle between different sets of analyses (Table 1).

![Cancer Site Selection]

**Age selection**
The ‘Age’ filter depends on the data availability following the registry/registries selection. The age at diagnosis is displayed in five-year intervals, with the exception of the last age bracket, which includes all ages over 85. The user can select the age interval to be considered for analysis.

![Age Selection]
**Year selection**

The ‘Year’ field depends on the data availability following the registry/registries selection. The user can select the range of years to be considered for analysis; when several years are selected, analyses can be displayed separately for each year or grouped (all years together).

![Year selection screenshot](image)

**Exploring, grouping, and exporting the displayed data**

**Help information**

Dedicated help windows are available to guide the user understand the meaning of and to interpret the maps, charts, and tables. The small icon on the right side of each element opens a window with the corresponding help text.

![Help information button](image)

**Specific settings**

The ‘Specific settings’ icon allows the user to select different map/chart/table parameters, including: grouping of cancer sites, sexes, or years when multiple selections are performed, the selection of the displayed statistic; the length of age-groups; the logarithmic scale; and the reference area.

![Specific settings icon](image)
**Visualisation type**
Data can be visualised in map, chart, or tabular form by clicking on the appropriate icon:

![Visualisation icons](image)

**Download**
Maps and charts can be downloaded as PDF, PNG, and JPEG files; tables are downloadable in CSV, PNG, and JPEG file formats.

![Download icons](image)
## Description of the ECIS analyses

The following pages give a description of each ECIS analysis (Table 1), reporting on how to read it and detailing the specific settings available to the user.

<table>
<thead>
<tr>
<th>Analyses</th>
<th>Incidence and mortality estimates 2018</th>
<th>Incidence and mortality historical data</th>
<th>Survival estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age-specific</td>
<td>p. 25</td>
<td>p. 26</td>
<td></td>
</tr>
<tr>
<td>Time trends by age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time trends by period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time trends by cohort – year of diagnosis/year of birth/age at diagnosis</td>
<td></td>
<td></td>
<td>p. 28-30</td>
</tr>
<tr>
<td>By year – summary</td>
<td></td>
<td></td>
<td>p. 31</td>
</tr>
<tr>
<td>By age and follow-up interval</td>
<td></td>
<td></td>
<td>p. 41</td>
</tr>
<tr>
<td>By follow-up interval – summary</td>
<td></td>
<td></td>
<td>p. 42</td>
</tr>
<tr>
<td>Population pyramid</td>
<td></td>
<td></td>
<td>p. 32</td>
</tr>
<tr>
<td>Population by year</td>
<td></td>
<td></td>
<td>p. 33</td>
</tr>
<tr>
<td>By registry/country</td>
<td>p. 18</td>
<td>p. 34</td>
<td>p. 43</td>
</tr>
<tr>
<td>By country – comparison with EU28/EU28+EFTA/Europe</td>
<td>p. 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By registry/country – summary</td>
<td></td>
<td></td>
<td>p. 35</td>
</tr>
<tr>
<td>By country and follow-up interval</td>
<td></td>
<td></td>
<td>p. 44</td>
</tr>
<tr>
<td>Population by registry</td>
<td></td>
<td></td>
<td>p. 36</td>
</tr>
<tr>
<td>By cancer</td>
<td>p. 21</td>
<td></td>
<td>p. 37</td>
</tr>
<tr>
<td>By cancer – percentage distribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By cancer – comparison with EU28/EU28+EFTA/Europe</td>
<td>p. 22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By cancer – summary</td>
<td>p. 24</td>
<td>p. 38</td>
<td></td>
</tr>
<tr>
<td>Age-specific by cancer</td>
<td></td>
<td>p. 39</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Analyses available in the ECIS data explorer
ANALYSIS DESCRIPTION
This type of map displays data on estimated incidence and/or mortality rates by country for the selected cancer site and sex. It shows quintiles of the incidence/mortality statistics, visualised as different shades of colour (as explained in the legend).

In this example the map shows the estimated age-standardised incidence of all sites (except non-melanoma skin cancers) in the countries belonging to the EU28 and EFTA, for both sexes together.

SPECIFIC OPTIONS
The user can select the statistic to be visualised: incidence or mortality rates standardised with world standard population, old, or new European standard population.

The same data can also be visualised in bar-chart or table format.
Incidence and mortality estimates - by country

ANALYSIS DESCRIPTION
For the selected cancer site and sex, this chart plots the relative change, by country and European region, of the estimated incidence or mortality rates as compared to the rates of the reference European area. Countries are ordered by decreasing value of the relative change (expressed in percentages and measured along the horizontal axis) for the selected statistic: those with higher rates being above the reference geographic area, those with lower rates being below the reference geographic area. In this example, the chart compares the estimated rates of all sites (except non-melanoma skin cancers) of EU28 + EFTA countries with the corresponding rate of EU28, for both sexes together.

SPECIFIC OPTIONS
The user can select the statistic to be visualised: incidence or mortality rates standardised with world standard population, old, or new European standard population.
The user can select the reference geographic area to be either the EU28, EU28 plus EFTA countries, or the whole Europe.
The same data can also be visualised in table format.
## ANALYSIS DESCRIPTION

This table presents data on estimated cancer incidence or mortality by country and European region, for the selected cancer site and sex. The displayed statistics are the number of cases or deaths, crude rates, and age-standardised rates (ASR) with world standard population, old, or new European standard population.

In this example the table shows the estimated incidence statistics of all cancer sites (except non-melanoma skin cancers), by country, for both sexes together, for the EU28 and EFTA.

### SPECIFIC OPTIONS

The user can select the list of countries to be included in the table by selecting the geographic area: EU28, EU28 + EFTA, or Europe. The table can be sorted according to each column field in ascending or descending order by clicking on corresponding arrows.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of cases</th>
<th>Crude rate</th>
<th>ASR (European old)</th>
<th>ASR (European new)</th>
<th>ASR (world)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>423 18</td>
<td>481 5</td>
<td>609 9</td>
<td>638 0</td>
<td>329 6</td>
</tr>
<tr>
<td>Belgium</td>
<td>720 68</td>
<td>626 9</td>
<td>658 0</td>
<td>638 0</td>
<td>329 6</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>357 78</td>
<td>480 0</td>
<td>447 6</td>
<td>325 7</td>
<td>254 8</td>
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<tr>
<td>Croatia</td>
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<td>579 6</td>
<td>538 0</td>
<td>325 7</td>
<td>254 8</td>
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<tr>
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<td>386 2</td>
<td>466 2</td>
<td>341 3</td>
<td>262 7</td>
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<tr>
<td>Czech Republic</td>
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<td>580 5</td>
<td>582 5</td>
<td>410 1</td>
<td>304 3</td>
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<tr>
<td>Denmark</td>
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<td>861 5</td>
<td>457 7</td>
<td>333 6</td>
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<tr>
<td>Estonia</td>
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<td>573 5</td>
<td>566 0</td>
<td>316 8</td>
<td>279 7</td>
</tr>
<tr>
<td>Finland</td>
<td>313 33</td>
<td>565 3</td>
<td>533 9</td>
<td>333 7</td>
<td>296 2</td>
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<td>632 4</td>
<td>410 7</td>
<td>323 6</td>
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<tr>
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<td>645 8</td>
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<td>546 6</td>
<td>342 7</td>
<td>273 6</td>
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<tr>
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<td>687 4</td>
<td>684 8</td>
<td>415 2</td>
<td>330 4</td>
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<td>Iceland</td>
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<td>316 3</td>
<td>249 5</td>
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<tr>
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<td>300 3</td>
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<td>296 8</td>
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<td>269 6</td>
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<td>United Kingdom</td>
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<td>826 3</td>
<td>423 2</td>
<td>299 4</td>
</tr>
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<td>EU28</td>
<td>399 166</td>
<td>599 6</td>
<td>599 0</td>
<td>390 0</td>
<td>293 0</td>
</tr>
<tr>
<td>EU28+EFTA</td>
<td>201 012</td>
<td>581 1</td>
<td>582 9</td>
<td>391 1</td>
<td>263 8</td>
</tr>
</tbody>
</table>
ANALYSIS DESCRIPTION
This chart plots data on estimated incidence and/or mortality rates by cancer site for the selected country/region and sex. The cancer sites are ordered by decreasing value of the statistic displayed; if both incidence and mortality are selected, the sorting is done according to incidence. The cancer sites are listed along the vertical axis and the incidence/mortality rates (per 100,000) are measured along the horizontal axis. In this example the chart shows the estimated age-standardised incidence rates (new European standard population) of EU28 by cancer, for both sexes together.

SPECIFIC OPTIONS
The user can select the statistic to be visualised: incidence or mortality rates standardised with world standard population, old, or new European standard population. This data can also be visualised in table format.
**ANALYSIS DESCRIPTION**
This chart reports the percentage distribution of cancers for the selected country/region and sex, in terms of the number of new cases (incidence) or deaths (mortality).
In this example the chart shows the estimated percentage frequency distribution of cancer sites in the EU28, for both sexes together.

**SPECIFIC OPTIONS**
This data can also be visualised in table format.
ANALYSIS DESCRIPTION
This chart plots the relative change of the estimated incidence or mortality rates for the selected country/region and sex, as compared to the rates of the reference European area, by cancer site. Cancer sites are ordered by decreasing value of the relative change (expressed in percentages and measured along the horizontal axis) for the selected statistic: those with rates higher than the corresponding ones of the reference geographic area have positive relative change, while those with rates lower than the reference geographic area have negative relative change. In this example the chart compares the estimated rates for Western Europe with those of the EU28, for both sexes together.

SPECIFIC OPTIONS
The user can select the statistic to be visualised: incidence or mortality rates standardised with world standard population, old, or new European standard population. The user can select the reference geographic area choosing between EU28, EU28 plus EFTA countries, or Europe. This data can also be visualised in table format.
## ANALYSIS DESCRIPTION

The table presents data on estimated cancer incidence or mortality by cancer site, for the selected country/region and sex. The displayed statistics are number of cases or deaths, crude rates, and age-adjusted rates (world standard population, old, or new European standard population).

In this example, the table shows incidence estimates in Western European countries by cancer site, for both sexes together and all ages.

## SPECIFIC OPTIONS

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
ANALYSIS DESCRIPTION
The chart shows age-specific incidence and/or mortality rates observed in each age group, by registry, cancer sites (separately or grouped), year of diagnosis/death (separately or for a time interval), and sex (males and females separately or together). The incidence/mortality age-specific rates (expressed per 100,000) are measured along the vertical axis and the age groups appear on the horizontal axis.
In this example, the incidence and mortality age-specific rates for colon cancer are shown separately for males and females in the period 2004-9, for age groups ranging from 50-54 to 70-74 years.

SPECIFIC OPTIONS
If more than one sex, cancer site, or year are selected, the user can visualise incidence and/or mortality rates grouping together the two sexes, cancer sites, or the years selected.
The age-specific rates can be displayed in the standard or in the logarithmic scale. This data can also be visualised in table format.
**ANALYSIS DESCRIPTION**

The chart shows the trends in age-specific incidence and/or mortality rates over a period of time, separately in each age group (and sex) for selected cancer site(s). The incidence/mortality age-specific rate (expressed per 100,000) is measured along the vertical axis and the year at diagnosis/death appears on the horizontal axis. The lines in the chart show the time patterns of age-specific rates by year of diagnosis/death.

In this example, the age-specific incidence rates for all cancer sites (excluding non-melanoma skin cancers) for both sexes together are reported for the period 2001-13, separately for the age groups 30-44, 45-59, 60-74, and 75+ years.

**SPECIFIC OPTIONS**

If more than one sex or cancer site are selected, the user can visualise incidence and/or mortality rates grouping together the two sexes or cancer sites.

The span of the age groups can be modified choosing between 5, 10, 15, and 30 years.

The age-specific rates can be displayed in the standard or in the logarithmic scale. This data can also be visualised in table format.
ANALYSIS DESCRIPTION
This chart reports incidence and/or mortality trends over the selected time period of diagnosis/death, by sex and cancer site. The incidence/mortality rates (expressed per 100,000) are measured along the vertical axis and the years at diagnosis/death appear on the horizontal axis.

In the example above, age-standardised incidence and mortality rates (old European standard population) computed separately for men and women in the age interval 0-84 years are plotted for the period 1990-2014, for all sites (except non-melanoma skin cancers).

SPECIFIC OPTIONS
If more than one sex or cancer site are selected, the user can visualise incidence and/or mortality statistics grouping together the two sexes and cancer sites.

The user can select the statistic to be visualised: number of new cases/deaths; crude or age-standardised rates (ASR), for world standard population, old, or new European standard population; or cumulative risks.

The incidence and mortality statistics can be displayed in the standard or in the logarithmic scale.

This data can also be visualised in table format.
ANALYSIS DESCRIPTION

One approach to summarising time trends by cohort is to look at the patterns by year of birth. In this chart, age-specific rates stratified by age group at diagnosis/death are plotted against year of birth (cohorts in five-year intervals). The incidence/mortality age-specific rates (expressed per 100,000) are measured along the vertical axis and the years of birth appear on the horizontal axis.

In the example above, the five-year age-specific incidence rates (from 50-54 to 70-74 years of age at diagnosis) of all sites (excluding non-melanoma skin cancers) are plotted against the years of birth, ranging from 1908-12 to 1958-62, for men.

SPECIFIC OPTIONS

The user can toggle between the ‘By cohort – year of birth’, ‘By cohort – year of diagnosis’, and ‘By cohort – age at diagnosis’ views.

The incidence and mortality age-specific rates can be displayed in the standard or in the logarithmic scale.

This data can also be visualised in table format.
ANALYSIS DESCRIPTION

Another approach to summarising time trends by cohort is to look at the patterns according to the year when the disease was diagnosed or death occurred.

In this chart, age-specific rates stratified by age group at diagnosis or death (five-year groups) are plotted against time of diagnosis or death (five-year intervals). The incidence or mortality age-specific rates (expressed per 100,000) are measured along the vertical axis and the years at diagnosis/death appear on the horizontal axis.

In the example above, the age-specific rates (age at diagnosis in five-year intervals, from 50-54 to 70-74 years) for all cancer sites (excluding non-melanoma skin cancers) are plotted by five-year intervals of diagnosis, corresponding to intervals from 1978-82 to 2008-12, for men.

SPECIFIC OPTIONS

The user can toggle between the ‘By cohort – year of diagnosis’, ‘By cohort – year of birth’, and ‘By cohort – age at diagnosis’ views.

The incidence and mortality age-specific rates can be displayed in the standard or in the logarithmic scale.

This data can also be visualised in table format.

Incidence and mortality historical data
A third approach to summarising time trends by cohort is to look at the patterns by the age at diagnosis or death. In this type of chart, age-specific rates stratified by year of birth (cohorts in five-year intervals) are plotted against the age group of diagnosis or death (five-year groups). The incidence or mortality age-specific rates (expressed per 100,000) are measured along the vertical axis and age-groups at diagnosis/death appear on the horizontal axis.

In the example above, the five-year age-specific rates are plotted by age at diagnosis (from 50-54 to 70-74 years), for the different cohorts of men born in the five-year intervals from 1908-12 to 1958-62.

The user can toggle between the ‘By cohort – age at diagnosis’, ‘By cohort – year of birth’, and ‘By cohort – year of diagnosis’ views.

The incidence and mortality age-specific rates can be displayed in the standard or in the logarithmic scale.

This data can also be visualised in table format.
ANALYSIS DESCRIPTION
The table presents data on cancer incidence or mortality by year in the selected time period. Output statistics are: the number of new cases, crude and age-adjusted rates (world standard population, old, or new European standard population), and cumulative risk. In this example, the table reports incidence statistics for all cancers (excluding non-melanoma skin cancers) in the period 2005-13 for all ages.

SPECIFIC OPTIONS
The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
ANALYSIS DESCRIPTION
This chart plots population data by sex and age group for the selected registry and year(s). If more than one year is selected, the mean population for the period is displayed. The age groups appear on the vertical axis, and the number of residents (expressed in thousands) are measured along the horizontal axis.
In this example, the chart shows the mean population for years 2010-13 by sex and age group in the geographic area covered by the registry.

SPECIFIC OPTIONS
This data can also be visualised in table format.
### ANALYSIS DESCRIPTION

This table reports the population data by sex, year, and age group for the selected registry. In this example, the table shows the population by year (2005-13), sex, and age group in the geographic area covered by the registry.

### SPECIFIC OPTIONS

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
ANALYSIS DESCRIPTION
This chart plots incidence and/or mortality statistics by registry for the selected cancer site, sex, age interval, and time period. Registries are ordered by decreasing value of the visualised statistic. If both incidence and mortality are selected, the sorting is done according to incidence. The registries are listed on the vertical axis and the incidence/mortality rates (expressed per 100,000) are measured along the horizontal axis.

This example shows the age-standardised (European new standard population) incidence rates of all cancer sites (excluding non-melanoma skin cancers) for registries providing data in the time period 2010-13, for both sexes together, for cases diagnosed at ages 50-74.

SPECIFIC OPTIONS
The user can select the statistic to be visualised: number of new cases/deaths, crude or age-standardised rates (world standard population, old, or new European standard population), or cumulative risks. This data can also be visualised in table format.
### Analysis Description

The table presents data on cancer incidence or mortality for the selected cancer site by registry. It includes the following statistics: number of new cases or deaths, crude and age-adjusted rates (world standard population, old, or new European standard population), and cumulative risk.

This example shows the incidence statistics by cancer registry of all cancer sites (excluding non-melanoma skin cancers) in the time period 2010-13, for both sexes together, for cases diagnosed at ages 50-74.

### Specific Options

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
### ANALYSIS DESCRIPTION

The table presents the population data by registry, sex, and age group. If more than one year is selected, the mean population for the period is displayed.

In this example, the table shows the population by registry, sex, and age group for the period 2004-10.

### SPECIFIC OPTIONS

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
ANALYSIS DESCRIPTION
This chart plots incidence and/or mortality statistics by cancer site for the selected registry, sex, age interval, and time period. The cancer sites are ordered by decreasing value of the visualised statistic. If both incidence and mortality are selected, the sorting is done according to incidence. The cancer sites appear on the vertical axis and the incidence/mortality statistic are measured along the horizontal axis. In this example, the incidence and mortality rates (expressed by 100,000) standardised using the old European standard population are shown, for both sexes, for the period 2010-13, with age at diagnosis/death in the interval 50-74 years.

SPECIFIC OPTIONS
The user can select the statistic to be visualised: number of new cases/deaths, crude or age-standardised rates (world standard population, old, or new European standard population), or cumulative risks. This data can also be visualised in table format.
## Incidence and mortality historical data - by cancer

<table>
<thead>
<tr>
<th>Registry, Both sexes, All ages, 2004 to 2010</th>
</tr>
</thead>
</table>

### ANALYSIS DESCRIPTION
The table presents data on cancer incidence or mortality for the selected registry by cancer site. It includes the following statistics: number of new cases or deaths, crude and age-adjusted rates (world standard population, old, or new European standard population), and cumulative risk.

In this example, the table describes the incidence for both sexes together, for cases of all ages diagnosed in the period 2004-10.

### SPECIFIC OPTIONS
The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
The table presents data on cancer incidence or mortality by cancer site and age group for the selected registry, sex, age interval, and time period. It includes the following statistics: number of new cases or deaths, crude and age-adjusted rates (world standard population, old, or new European standard population), and cumulative risk.

In this example, the table shows incidence statistics by cancer for both sexes, diagnosed in the period 2004-10, with age at diagnosis in the interval 50-74 years of age.

**ANALYSIS DESCRIPTION**

**SPECIFIC OPTIONS**

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
ANALYSIS DESCRIPTION
The chart shows the five-year observed or relative survival (%) for adult (aged 15 and over) patients diagnosed with the selected cancer in 2000-7 according to the age at diagnosis in the selected country. The 5-year observed or relative survival figures (expressed in percentage) are measured along the vertical axis and the age at diagnosis appears on the horizontal axis. Each line in the chart represents one country and one cancer site. This example shows the 5-year relative survival for breast cancer in two different European regions according to age at diagnosis.

SPECIFIC OPTIONS
If more than one sex is selected, the user can visualise survival for both sexes together. The user can select the statistic to be visualised choosing between observed and relative survival. This data can also be visualised in table format.
ANALYSIS DESCRIPTION
The chart shows the age-specific and age-standardised observed and relative survival at different follow-up intervals for adult (aged 15 and over) patients diagnosed with the selected cancer in 2000-7 in the selected countries or European areas. European average figures are population-weighted averages of the country-specific relative survival estimates. The relative survival (expressed in percentage) is measured along the vertical axis the follow-up intervals appear on the horizontal axis. Each line in the chart represents a specific age group/cancer site/country.

This example shows (for each age group) the relative survival of women diagnosed with lung cancer after one to five years after diagnosis.

SPECIFIC OPTIONS
If more than one sex is selected, the user can visualise survival grouping men and women together.
The user can visualise the age-specific survival of an age group or the survival standardised by age using the International Cancer Survival Standards (ICSS).
The user can select the statistic to be visualised choosing observed or relative survival.
This data can also be visualised in table format.
DESCRIPTION

The table shows the number of adult (aged 15 and over) patients diagnosed with the selected cancer in 2000-7 in the selected country and the observed and relative survival at one, three, and five years after diagnosis. The number of cases and the survival are expressed by age groups at diagnosis and for all adult ages together. The observed and relative survival estimates for all adults are age-standardised. Age standardisation is achieved with cancer-specific weightings obtained from the International Cancer Survival Standards (ICSS). This example shows the observed and relative survival of women diagnosed with lung cancer after one, three, and five years after diagnosis.

OPTIONS

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
ANALYSIS DESCRIPTION

The chart shows the relative survival at five years after diagnosis for adult (aged 15 and over) patients diagnosed with the selected cancer in 2000-7 by country. Each blue bar corresponds to the survival estimate of each European country, while orange and orange-bordered bars refer respectively to Europe as a whole and to five European areas (Northern Europe, UK and Ireland, Central Europe, Southern Europe and Eastern Europe). Relative survival for Europe is computed as the weighted average of country-specific survival estimates. All relative survival estimates refer to all adult ages and are age-standardised. Age standardisation is made with the direct method using cancer-specific weightings obtained from the International Cancer Survival Standards (ICSS). The survival estimate of all sites, except non-melanoma skin cancers, is also cancer-site, case-mix standardised.

This example shows age-standardised five-year relative survival of patients diagnosed with cancer in all sites by European regions and country.

SPECIFIC OPTIONS

The user can select the statistic to be visualised: age-standardised five-year observed or relative survival.

This data can also be visualised in table format.
### Survival estimates - by country

#### Age-standardised relative survival by country and follow-up interval

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of cases</th>
<th>One-year relative survival</th>
<th>Five-year relative survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>255141</td>
<td>75.87 (75.7 - 76.94)</td>
<td>65.1 (64.84 - 65.36)</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>229328</td>
<td>78.9 (78.73 - 79.06)</td>
<td>69.44 (69.17 - 69.72)</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>200023</td>
<td>78.17 (77.94 - 78.41)</td>
<td>67.66 (67.39 - 67.93)</td>
</tr>
<tr>
<td>CENTRAL EUROPE</td>
<td>1069364</td>
<td>75.08 (74.92 - 75.24)</td>
<td>65.08 (64.76 - 65.40)</td>
</tr>
<tr>
<td>Croatia</td>
<td>121341</td>
<td>72.66 (72.49 - 72.93)</td>
<td>60.86 (60.58 - 61.15)</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>321846</td>
<td>76.49 (76.24 - 76.73)</td>
<td>65.69 (65.41 - 65.97)</td>
</tr>
<tr>
<td>Denmark</td>
<td>210879</td>
<td>79.84 (79.59 - 79.98)</td>
<td>69.02 (68.68 - 69.35)</td>
</tr>
<tr>
<td>EASTERN EUROPE</td>
<td>956166</td>
<td>69.08 (68.85 - 69.31)</td>
<td>56.93 (56.69 - 57.17)</td>
</tr>
<tr>
<td>Estonia</td>
<td>42162</td>
<td>69.89 (69.41 - 70.37)</td>
<td>52.93 (52.46 - 53.35)</td>
</tr>
<tr>
<td>EUROPEAN AVERAGE</td>
<td>7478976</td>
<td>72.53 (72.46 - 72.60)</td>
<td>65.15 (64.86 - 65.45)</td>
</tr>
<tr>
<td>Finland</td>
<td>170141</td>
<td>70.86 (70.65 - 71.05)</td>
<td>61.36 (60.97 - 61.76)</td>
</tr>
<tr>
<td>France</td>
<td>170161</td>
<td>77.73 (77.54 - 77.92)</td>
<td>58.62 (58.34 - 58.90)</td>
</tr>
<tr>
<td>Germany</td>
<td>644447</td>
<td>76.71 (76.56 - 76.82)</td>
<td>69.09 (68.89 - 69.30)</td>
</tr>
<tr>
<td>Iceland</td>
<td>73169</td>
<td>70.31 (69.93 - 70.69)</td>
<td>63.22 (62.95 - 63.50)</td>
</tr>
<tr>
<td>Ireland</td>
<td>1101210</td>
<td>70.73 (70.40 - 71.05)</td>
<td>59.59 (59.32 - 60.00)</td>
</tr>
<tr>
<td>Italy</td>
<td>778617</td>
<td>74.87 (74.77 - 74.97)</td>
<td>56.77 (56.46 - 57.09)</td>
</tr>
<tr>
<td>Latvia</td>
<td>80108</td>
<td>80.69 (80.51 - 80.87)</td>
<td>61.80 (61.42 - 62.19)</td>
</tr>
<tr>
<td>Liechtenstein</td>
<td>90173</td>
<td>69.78 (69.51 - 69.95)</td>
<td>59.06 (58.78 - 60.00)</td>
</tr>
<tr>
<td>Malta</td>
<td>10642</td>
<td>70.64 (70.31 - 70.97)</td>
<td>52.93 (52.46 - 53.40)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>572138</td>
<td>72.62 (72.20 - 72.96)</td>
<td>54.57 (54.14 - 55.02)</td>
</tr>
<tr>
<td>NORTHERN EUROPE</td>
<td>880002</td>
<td>76.66 (76.49 - 76.83)</td>
<td>63.63 (63.34 - 63.93)</td>
</tr>
<tr>
<td>Norway</td>
<td>167641</td>
<td>79.67 (79.49 - 79.85)</td>
<td>58.57 (58.28 - 58.88)</td>
</tr>
<tr>
<td>Poland</td>
<td>130555</td>
<td>81.74 (81.47 - 82.00)</td>
<td>54.59 (54.24 - 54.94)</td>
</tr>
<tr>
<td>Portugal</td>
<td>172001</td>
<td>74.95 (74.75 - 75.15)</td>
<td>66.39 (66.05 - 66.74)</td>
</tr>
<tr>
<td>Romania</td>
<td>6110382</td>
<td>80.41 (79.95 - 80.87)</td>
<td>54.79 (54.51 - 55.08)</td>
</tr>
<tr>
<td>Slovakia</td>
<td>673888</td>
<td>67.49 (67.37 - 67.61)</td>
<td>52.25 (52.06 - 52.45)</td>
</tr>
<tr>
<td>SOUTHERN EUROPE</td>
<td>1293363</td>
<td>70.21 (69.93 - 70.49)</td>
<td>54.28 (54.06 - 54.51)</td>
</tr>
<tr>
<td>Spain</td>
<td>141041</td>
<td>74.48 (74.40 - 74.55)</td>
<td>52.82 (52.62 - 52.92)</td>
</tr>
<tr>
<td>Sweden</td>
<td>329312</td>
<td>81.74 (81.09 - 81.38)</td>
<td>44.75 (44.33 - 45.17)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>28892</td>
<td>78.34 (78.08 - 78.59)</td>
<td>59.18 (58.73 - 59.64)</td>
</tr>
<tr>
<td>UK and Ireland</td>
<td>2201141</td>
<td>67.94 (67.68 - 68.21)</td>
<td>50.96 (50.58 - 51.34)</td>
</tr>
<tr>
<td>UK, England</td>
<td>1623249</td>
<td>80.14 (79.85 - 80.43)</td>
<td>50.26 (49.87 - 50.65)</td>
</tr>
<tr>
<td>UK, Northern Ireland</td>
<td>53044</td>
<td>82.46 (82.27 - 82.65)</td>
<td>51.91 (51.53 - 52.29)</td>
</tr>
<tr>
<td>UK, Scotland</td>
<td>206153</td>
<td>50.36 (49.86 - 50.86)</td>
<td>46.52 (46.03 - 46.93)</td>
</tr>
<tr>
<td>UK, Wales</td>
<td>121001</td>
<td>67.27 (66.97 - 67.57)</td>
<td>40.94 (40.64 - 41.25)</td>
</tr>
</tbody>
</table>

#### ANALYSIS DESCRIPTION

The table shows the number of adult patients (aged 15 and over) diagnosed with the selected cancer in 2000-7, and the age-standardised relative survival at one and five years after diagnosis by European country and area (Northern Europe, UK and Ireland, Central Europe, Southern Europe, Eastern Europe, and Europe as a whole). Relative survival for Europe is computed as the weighted average of country-specific survival estimates. The relative survival estimates refer to all adult ages and they are age-standardised. Age standardisation is made with the direct method using cancer-specific weightings obtained from the International Cancer Survival Standards (ICSS). The survival estimates of all sites except non-melanoma skin cancers are also cancer-site, case-mix standardised.

#### SPECIFIC OPTIONS

The table can be sorted according to each column field in ascending or descending order by clicking on the corresponding arrows.
**GLOSSARY**

**Adjustment** A summarising procedure applied to a statistical measure in which the effects of differences in composition of the populations being compared have been minimised by statistical methods.

**Age-specific rate** An age-specific rate is the incidence or mortality rate for a specified age group, in which the numerator and denominator refer to the same age group; it is expressed as the number of new cancer cases or deaths per 100,000 population at risk. Five-year age categories are normally used (highest group 85+).

**ASR (age-standardised rate)** The ASR is a weighted mean of the age-specific rates where the weights are taken from the population distribution of a standard population; the ASR is expressed per 100,000. Comparison of rates referring to different time periods or different geographical areas is only possible after considering the differences in the age structure of the underlying populations. The age-standardisation allows the comparison of the rates that are arithmetically adjusted to have the same age structure of the standard population. The standard population used in the ECIS are the following old European Standard Population, new European Standard Population, and World Standard Population.

**Crude rate** The crude rate is the ratio of the number of new cases or deaths in a specified population and time period to the size of the population at risk during the same time period. Incidence and mortality rate are usually presented as an annual rate per 100,000 persons at risk.

**Cumulative risk** Cumulative incidence/mortality is the probability or risk of individuals getting/dying from the disease over a specified age-span. Cumulative risk is expressed as the number of cases/deaths per 1000 person-years that are expected to occur in a given population between the specified age limits (e.g. between birth and the age 84 years) if the cancer rates were as those observed in the specified time period in the absence of competing causes. Like the age-standardised rate, cumulative risk permits comparing between populations of different age structures.

**Incidence** Incidence is the number of new cases arising in a given period in a specified population. This information is collected routinely by cancer registries. It can be expressed as an absolute number of cases per year or as a rate per 100,000 persons per year (see age-specific rate and rate above). The rate provides an approximation of the average risk of developing a cancer in a population for the time period of reference.
**Mortality** Mortality is the number of deaths occurring in a given period in a specified population. It can be expressed as an absolute number of deaths per year or as a rate per 100,000 persons per year.

**Population at risk** The part of a population which is susceptible to develop a specific cancer. It is defined on the basis of demographic data, such as place of residence, sex, age group, etc. Years of risk duration are counted in person-years.

**Relative change** The relative change compares two age-standardised rates (ASR): the rate of the selected country with the rate of the selected reference (Europe or EU28). The formula is: \((\text{ASR}_{\text{country}} - \text{ASR}_{\text{reference}}) / \text{ASR}_{\text{reference}}\). For example, a relative change of +5% indicates that the country rate is 5% higher than the selected reference rate. Similarly, a relative change of -10% indicates that the country rate is 10% lower than the selected reference rate.

**Relative survival** The relative survival is a standard indicator for comparing cancer survival in population-based studies when the underlying cause of death is unknown. Relative survival is the ratio of the observed survival of patients to the expected survival in a comparable group in the general population for the same region, age, sex and calendar year. It can be interpreted as the survival probability of cancer patients in the absence of other causes of death, which can vary widely between countries. In the EUROCARE-5 study the expected survival was estimated by the Ederer II method from the lifetables of all causes mortality by age, sex, cancer registry and calendar year. Relative survival of patients diagnosed in 2000-2007 and followed up to 2008 was estimated using the classic cohort approach. Relative survival was standardised by age using the International Cancer Survival Standards (ICSS). The mean European relative survival was estimated by weighting country-specific relative survival by the country population.

**Survival or Observed survival** It is the probability to survive after a given time from diagnosis (1, 3, or 5-year), regardless from the cause of death. Observed survival probability is influenced by mortality due to cancer and to other causes of death. In international comparisons of cancer survival the effect of causes other than cancer, which can vary widely by countries, is removed by using relative survival.

References:
Europe Direct is a service to help you find answers to your questions about the European Union
Free phone number (*): 00 800 6 7 8 9 10 11
(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

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