



## Cancer incidence and mortality patterns in Europe: Estimates for 40 countries in 2012

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Cancer  
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**Abstract** *Introduction:* Cancer incidence and mortality estimates for 25 cancers are presented for the 40 countries in the four United Nations-defined areas of Europe and for the European Union (EU-27) for 2012.

*Methods:* We used statistical models to estimate national incidence and mortality rates in 2012 from recently-published data, predicting incidence and mortality rates for the year 2012 from recent trends, wherever possible. The estimated rates in 2012 were applied to the corresponding population estimates to obtain the estimated numbers of new cancer cases and deaths in Europe in 2012.

*Results:* There were an estimated 3.45 million new cases of cancer (excluding non-melanoma skin cancer) and 1.75 million deaths from cancer in Europe in 2012. The most common cancer sites were cancers of the female breast (464,000 cases), followed by colorectal (447,000), prostate (417,000) and lung (410,000). These four cancers represent half of the overall burden of cancer in Europe. The most common causes of death from cancer were cancers of the lung (353,000 deaths), colorectal (215,000), breast (131,000) and stomach (107,000). In the European Union, the estimated numbers of new cases of cancer were approximately 1.4 million

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in males and 1.2 million in females, and around 707,000 men and 555,000 women died from cancer in the same year.

**Conclusion:** These up-to-date estimates of the cancer burden in Europe alongside the description of the varying distribution of common cancers at both the regional and country level provide a basis for establishing priorities to cancer control actions in Europe. The important role of cancer registries in disease surveillance and in planning and evaluating national cancer plans is becoming increasingly recognised, but needs to be further advocated. The estimates and software tools for further analysis (EUCAN 2012) are available online as part of the European Cancer Observatory (ECO) (<http://eco.iarc.fr>).

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## 1. Introduction

Up-to-date cancer incidence and mortality data in Europe are a key resource in both planning and assessing the impact of cancer control programmes at the country and regional level. Europe carries a significant load of the global burden, with one quarter of the global burden of cancer observed in Europe in 2008 despite a total population that comprises one-ninth of the world's population.<sup>1,2</sup> The International Agency for Research on Cancer (IARC), through its programmes of collaboration with population-based cancer registries in Europe, members of the European Network of Cancer Registries (ENCR, <http://www.enrcr.com.fr/>) has provided estimates of cancer burden at the European and European Union (EU) member state level over the last 25 years.<sup>3–8</sup>

In this paper, we provide estimates of the incidence of, and the mortality from cancer for 25 sites in 40 European countries in 2012, using the most recently available data. The reported estimates are based on the latest incidence data provided by the ENCR member registries, the World Health Organisation (WHO) mortality database<sup>9</sup> and UN population estimates.<sup>2</sup> The results are also presented for four areas as defined by the UN (Eastern, Northern, Southern and Western Europe),<sup>2</sup> and the European Union 27 Member States (EU-27). The complete set of estimates is available through the European Cancer Observatory (ECO) website (<http://eco.iarc.fr>).<sup>10</sup>

## 2. Data sources and methods

Cancer incidence and mortality for 2012 by sex and 16 age groups (0–4, 5–9, . . . , 70–74, 75 and over) are estimated for each of the 39 European countries defined by the United Nations<sup>2</sup> and Cyprus. Results are presented for the following cancer sites as defined by the 10th edition of the International Classification of Diseases (ICD-10)<sup>11</sup>: lip, oral cavity and pharynx (ICD-10 C00–14), oesophagus (C15), stomach (C16), colorectal (including anus C18–21), liver (C22), gallbladder (C23–24), pancreas (C25), larynx (C32), lung (including trachea, C33–34), melanoma of skin (C43), female breast (C50), cervix uteri (C53), corpus uteri (C54), ovary (C56), prostate (C61), kidney (including renal pelvis and ureter, C64–66), bladder (C67), brain and central

nervous system (C70–72), thyroid (C73), Hodgkin lymphoma (C81), non-Hodgkin lymphoma (C82–85, C96), multiple myeloma (C88 + C90), leukaemia (C91–95) and all cancers combined, excluding non-melanoma skin cancer (C00–96, except C44). This last category was calculated by summing the estimated counts for each individual cancer site, and the corresponding estimate of the residual category “other and unspecified cancers”. No attempt was made to estimate incidence and mortality from non-melanoma skin cancer given the non-systematic registration of these cases in most cancer registries.

### 2.1. Development of the estimates

The methods used to estimate country-specific incidence and mortality rates for 2012 are based on previous work,<sup>8</sup> and involve projections of the most recent national rates available prior to 2012. For countries with fifteen or more years of recent incidence or mortality data available, corresponding rates for 2012 were predicted using the NORDPRED program based on age-period-cohort modelling<sup>12</sup> separately for each cancer site and sex. When the available information was for less than 15 years, or when data up to 2010 were available, a programme developed at IARC (DEPPRED) based on the simple time-linear prediction models of Dyba and Hakulinen<sup>13</sup> was used to make the short-term predictions. To reduce the prospect of erroneous predictions as a result of inherently large random variation due to small numbers (rare cancers, small populations), cancer-, sex-specific prediction models were fitted only when at least 50 cancer cases or cancer deaths (all ages) were recorded per year for DEPPRED, and when at least 100 cancer cases or deaths (all ages) were recorded per 5-year period for NORDPRED. For the sex and cancer combinations where these criteria were not satisfied, the rates for 2012 were derived from the annual average rates recorded in the most recent 5-year period available. For countries where no historical national incidence or mortality data existed, the most recent disease rates available were used as proxy for 2012. For France, we used the published estimates of national incidence rates for 2011.<sup>14</sup> Since no data were available for Montenegro, incidence and mortality rates were estimated as the simple average of the rates (age-, sex- and site-specific) of those of Bosnia Herzegovina and Serbia.

Table 1  
Data availability and method of estimation.

Country	Mortality	Incidence
Albania	1995–2004 <sup>a</sup> > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from cancer registries of Bulgaria and central Serbia)
Austria	1990–2009 > 2012 (NORDPRED)	National incidence 1990–2009 > 2012 (NORDPRED)
Belarus	2008–2009 = 2012 <sup>b</sup>	National incidence 1978–2007 > 2012 (NORDPRED)
Belgium	2005–2006 = 2012	National incidence 2008–2009 = 2012
Bosnia Herzegovina	Bosnia Herzegovina 2009 and Herzegovina	Republika Srpska 2004–2005 = 2012
Bulgaria	1990–2009 > 2012 (NORDPRED)	National incidence 1994–2008 > 2012 (NORDPRED)
Croatia	1990–2009 > 2012 (NORDPRED)	National incidence 1988–2007 > 2012 (NORDPRED)
Cyprus	2008–2009 = 2012	National incidence 2006–2007 = 2012
Czech Republic	1990–2009 > 2012 (NORDPRED)	National incidence 1989–2008 > 2012 (NORDPRED)
Denmark	1987–2006 > 2012 (NORDPRED)	National incidence 1990–2009 > 2012 (NORDPRED)
Estonia	1990–2009 > 2012 (NORDPRED)	National incidence 1988–2007 > 2012 (NORDPRED)
Finland	1990–2009 > 2012 (NORDPRED)	National incidence 1990–2009 > 2012 (NORDPRED)
France	2001–2009 > 2012 (DEPPRED)	National incidence 2011 (estimated) = 2012
Germany	1990–2009 > 2012 (NORDPRED)	Local incidence from 9 pooled German cancer registries 2000–2008 > 2012 (DEPPRED) and applied to 2012 population
Greece	1990–2009 > 2012 (NORDPRED)	Estimated mortality → incidence (I:M ratio from cancer registries of Bulgaria, Cyprus and central Serbia)
Hungary	1990–2009 > 2012 (NORDPRED)	Estimated mortality → incidence (I:M ratio from cancer registries of Austria, Croatia, Slovakia, Slovenia and central Serbia)
Iceland	1990–2009 > 2012 (NORDPRED)	National incidence 1990–2009 > 2012 (NORDPRED)
Ireland	1990–2009 > 2012 (NORDPRED)	National incidence 1994–2007 > 2012 (NORDPRED)
Italy	2000–2009 > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from 17 Italian cancer registries).
Latvia	2001–2010 > 2012 (DEPPRED)	National incidence 1988–2007 > 2012 (NORDPRED)
Lithuania	2001–2010 > 2012 (DEPPRED)	National incidence 1988–2007 > 2012 (NORDPRED)
Luxembourg	1990–2009 > 2012 (NORDPRED)	Estimated mortality → incidence (I:M ratio from 11 French and 9 German cancer registries)
FYR Macedonia	2004–2010 <sup>a</sup> > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from cancer registries of Bulgaria and central Serbia)
Malta	1990–2009 > 2012 (NORDPRED)	National incidence 2000–2009 > 2012 (DEPPRED)
Moldova	2001–2010 > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from Ukrainian cancer registry)
Montenegro	Simple mean of Bosnia and Serbia rates	
Norway	1990–2009 > 2012 (NORDPRED)	National incidence 1990–2009 > 2012 (NORDPRED)
Poland	2001–2010 > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from 3 Polish cancer registries).
Portugal	2000–2009 > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from 2 Portuguese and 12 Spanish cancer registries)
Romania	2001–2010 > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from cancer registries of Bulgaria, Slovakia and Romania, Cluj county)
Russian Federation	2000–2009 > 2012 (DEPPRED)	National incidence 1994–2008 > 2012 (NORDPRED)
Serbia	2001–2010 > 2012 (DEPPRED)	Estimated mortality → incidence (I:M ratio from cancer registries of Croatia, Slovenia and central Serbia)
Slovakia	1990–2009 > 2012 (NORDPRED)	National incidence 1988–2007 > 2012 (NORDPRED)

Table 1 (continued)

Country	Mortality	Incidence
Slovenia	1990–2009 > 2012 (NORDPRED)	National incidence 1989–2008 > 2012 (NORDPRED)
Spain	1990–2009 > 2012 (NORDPRED)	Estimated mortality → incidence (I:M ratio from 12 Spanish cancer registries)
Sweden	1990–2009 > 2012 (NORDPRED)	National incidence 1990–2009 > 2012 (NORDPRED)
Switzerland	2000–2007 <sup>c</sup> >2012 (DEPPRED)	Local incidence from 7 pooled Swiss cancer registries 1988–2007 > 2012 (NORDPRED) and applied to 2012 population
The Netherlands	1990–2009 > 2012 (NORDPRED)	National incidence 1989–2008 > 2012 (NORDPRED)
Ukraine	2009 = 2012 <sup>c</sup>	National incidence 2009 = 2012
United Kingdom	1990–2009 > 2012 (NORDPRED)	National incidence 1993–2007 > 2012 (NORDPRED)

“>” projected to.

“→” converted to incidence.

“=” applied to.

<sup>a</sup> Corrected for under-reporting. Missing sites: mean average of the estimated mortality rates for Bulgaria and Serbia.

<sup>b</sup> Main category (ICD special list) only. Other category partitioned using mortality data from Ukrainian cancer registry.

<sup>c</sup> Main category (ICD-10 special list) only. Other category partitioned using mortality data from local (Switzerland) or national (Ukraine) cancer registries.

Random fluctuations in the predicted age-specific incidence and mortality rates were smoothed using a loess function by country, sex and cancer site. The derived age-, sex- and site-specific rates were age-standardised (ASRs per 100,000 person-years) using the European standard population.<sup>15</sup> The number of cancer cases and deaths in 2012 was computed for each country and cancer site by multiplying the predicted 2012 age- and sex-specific incidence and mortality rates by the corresponding 2012 population estimates from the UN Population Division (the 2010 revision).<sup>2</sup> The data sources available for the estimation of the 2012 rates, and the methods applied in the incidence and mortality estimations are summarised in Table 1.

## 2.2. Mortality

For 38 European countries, cancer mortality data from 1990 to 2010 and corresponding population figures were available through the WHO mortality database.<sup>9</sup> For Bosnia Herzegovina, the data were extracted from the federal cancer registry.<sup>16</sup> For Albania and Macedonia, vital registration is known to be incomplete during the period under study<sup>9</sup>; the source data were therefore corrected using the estimated percentage of under-reporting estimated by the WHO. The changes in the use of ICD in 2000 in France and in 1995 in Switzerland resulted in discontinuity in trends<sup>17,18</sup> and thus the French and Swiss mortality estimates are derived using short-term predictions based on the period from 2000 using DEPPRED (Table 1). For Italy and Portugal, mortality data were missing for one or more calendar years in the period 2004–2006, and the nearest available data (generally that of the previous or subsequent year) were replicated to replace the missing values.

There are large variations in the accuracy of death certificates related to cancer of the uterus, with many deaths recorded as “uterus cancer, not otherwise specified” (ICD-10 C55). By default, the cancer deaths coded as “uterus unspecified category” were reallocated to either cervix uteri or corpus uteri cancer according to the observed age-specific proportions of each when the all age proportion of uterine cancer deaths coded to the unspecified category was considered to be low (<25% of the total).<sup>19</sup> For the other countries (Austria, Belgium, France, Germany, Ireland, Italy, Portugal, Slovenia, Sweden and Switzerland) we estimated the all-age proportions of deaths from cervix and corpus uteri cancers using the recorded incidence in local or national cancer registries around 2000 and the corresponding 5-year relative survival probabilities extracted from the EURO CARE 4 study.<sup>20</sup> The total number of cancer deaths from uterine cancers (ICD-10 C53–55) estimated in 2012 were then partitioned into cervix and corpus uteri cancers using the proportions obtained from the survival analysis, and then further stratified by age using age-specific death counts of the two sites extracted from the WHO mortality database. Finally, for the countries with large proportion (more than 25%) of unspecified uterine cancers and no incidence and survival data (Albania, FYR Macedonia, Greece and Luxembourg) we used pooled incidence and survival data from Belgium and France to reallocate the uterine cancer deaths in Luxembourg and a pool from Malta, Slovenia and Portugal was used for the other listed countries. In addition, for Belarus and the Ukraine, the deaths from “corpus uteri and uterus, not otherwise specified” (ICD-10 C54–55) were first partitioned into two components using proportions from the Ukrainian National Cancer Registry mortality data

Table 2  
Cancer- and sex-specific comparisons of estimated cancer cases in Finland 2012.

Site	Finnish cancer registry	International Agency for Research on Cancer (IARC)
<b>Male</b>		
Prostate	5093	5366
Lung, trachea	1700	1682
Colorectum	1580	1551
Bladder <sup>a</sup>	710	869
Non-Hodgkin lymphoma	672	641
Melanoma of the skin	667	670
Pancreas	579	555
Kidney	485	477
Brain, central nervous system <sup>b</sup>	409	242
Stomach	373	368
Leukaemia	359	374
Liver	381	407
Oesophagus	190	194
Multiple myeloma	177	199
Testis	149	144
Larynx	107	104
All sites but non-melanoma skin cancers	15,009	15,204
<b>Female</b>		
Breast	4707	4477
Colorectum	1371	1345
Corpus uteri	873	860
Lung, trachea	797	812
Brain, central nervous system <sup>b</sup>	603	188
Non-Hodgkin lymphoma	580	567
Melanoma of the skin	562	538
Pancreas	594	596
Ovary	447	457
Kidney	405	405
Thyroid gland	303	291
Stomach	272	273
Leukaemia	258	279
Bladder <sup>a</sup>	197	224
Liver	215	213
Cervix uteri	140	143
Gallbladder	144	151
Multiple myeloma	143	159
All sites but non-melanoma skin cancers	13,859	13,224

Finnish Cancer Registry. Cancer in Finland 2008 and 2009. Cancer Society of Finland Publication No. 84, Helsinki 2011.

<sup>a</sup> IARC estimates include non-malignant tumours.

<sup>b</sup> Finnish estimates include benign tumours.

for 2009.<sup>21</sup> The category “uterus cancer, not otherwise specified” was then distributed into the cervix and corpus uteri categories using the age-specific proportions from the same source.

For Belarus, Switzerland and Ukraine, national mortality data for several cancer sites selected for this study were not available. Thus for cancers of the gallbladder, testis, kidney, thyroid as well as Hodgkin lymphoma, the mortality rates from the Ukrainian National Cancer Registry<sup>21</sup> were applied to the national population estimates in Belarus and the Ukraine in 2012, whereas for Switzerland, the rates from the regional Swiss mortality statistics 2004–2008<sup>22</sup> were applied to the corresponding population data.

As noted above, projections of national mortality rates were carried out only when a minimum threshold in the number of deaths was recorded per year for a given sex and cancer combination. Otherwise, the mortality rates from the most recent 5-year period were applied to the 2012 population.

### 2.3. Incidence

Recent regional and national (up to 2009) incidence data were extracted from EUREG, part of the ECO website<sup>10</sup> as well as from the NORDCAN database of the Association of Nordic Cancer Registries.<sup>23</sup> National and regional incidence data for other countries were

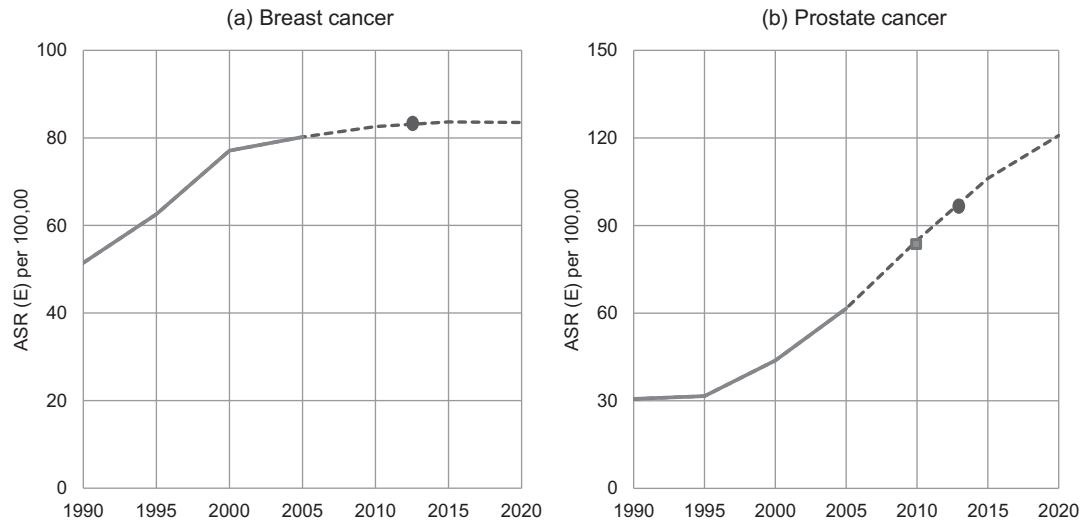


Fig. 1. Prediction of incidence rates for female breast (a) and prostate (b) cancers in Croatia (1993–2007) and predicted incidence (2008–2022) using NORDPRED (circle points). The predicted incidence rate for female breast cancer for the period 2008–2017 (mid period 2012, circle point) was used, while for prostate cancer, only the first predicted period 2008–2012 (mid period 2010, square point) was considered.

extracted from the Cancer Incidence in Five Continents series<sup>24,25</sup> and national incidence data for 2009 in Bosnia Herzegovina and Ukraine were extracted from published reports.<sup>16,21</sup> The methods to estimate the national sex- and age-specific incidence rates in 2012 are

summarised in Table 1 and fall into one of the following categories, listed in order of priority:

1. Estimates based on national and local incidence data (27 countries, Table 1).

Table 3

Estimated numbers of new cancer cases and deaths from cancer (thousands), age-standardised rates (ASRs) (per 100,000) by sex and cancer site in Europe in 2012.

	Incidence						Mortality					
	Both sexes		Male		Female		Both sexes		Male		Female	
	Cases	ASR (E)	Cases	ASR (E)	Cases	ASR (E)	Deaths	ASR (E)	Deaths	ASR (E)	Deaths	ASR (E)
Oral cavity and pharynx	99.6	11.0	73.9	18.2	25.8	4.9	43.7	4.7	34.2	8.4	9.4	1.6
Oesophagus	45.9	4.7	35.1	8.4	10.8	1.8	39.5	3.9	30.3	7.1	9.2	1.4
Stomach	139.6	13.7	84.2	19.5	55.4	9.3	107.3	10.3	63.6	14.6	43.7	7.0
Colon and rectum	446.8	43.5	241.6	55.7	205.2	34.7	214.7	19.5	113.2	25.2	101.5	15.4
Liver	63.4	6.2	42.8	10.0	20.6	3.3	62.1	5.9	39.9	9.1	22.2	3.4
Gallbladder	29.7	2.7	11.9	2.7	17.9	2.8	20.9	1.9	7.9	1.8	13.0	2.0
Pancreas	103.8	10.1	51.9	12.1	51.8	8.3	104.5	9.9	52.6	12.2	51.9	8.1
Larynx	39.9	4.4	36	8.8	3.9	0.8	19.8	2.1	18.1	4.3	1.7	0.3
Lung	409.9	41.9	290.7	68.3	119.2	21.6	353.5	35.2	254.4	59.1	99.0	17.2
Melanoma of skin	100.3	11.1	47.2	11.4	53.1	11.0	22.2	2.3	12.1	2.8	10.1	1.8
Breast					463.8	94.2					131.2	23.1
Cervix uteri					58.3	13.4					24.4	4.9
Corpus uteri					98.9	19.3					23.7	3.9
Ovary					65.5	13.1					42.7	7.6
Prostate			416.7	96.0					92.2	19.3		
Testis			21.5	5.8					1.6	0.4		
Kidney	115.2	12.1	71.7	17.2	43.4	8.1	49.0	4.7	31.3	7.2	17.7	2.8
Bladder	151.2	14.4	118.3	26.9	32.9	5.3	52.4	4.5	39.5	8.5	12.9	1.8
Brain, nervous system	57.1	6.6	30.7	7.8	26.4	5.6	45.0	4.9	24.6	6.0	20.4	4.0
Thyroid	52.9	6.3	12.3	3.1	40.7	9.3	6.3	0.6	2.1	0.5	4.3	0.7
Hodgkin lymphoma	17.6	2.3	9.3	2.5	8.3	2.1	4.6	0.5	2.6	0.6	2.0	0.4
Non-Hodgkin lymphoma	93.4	9.8	49.5	11.9	43.9	8.0	37.9	3.5	20.3	4.6	17.5	2.7
Multiple myeloma	38.9	3.8	20.5	4.7	18.4	3.1	24.3	2.2	12.2	2.7	12.1	1.8
Leukaemia	82.3	8.8	46.4	11.3	35.9	6.9	53.8	5.1	29.5	6.7	24.3	3.9
All sites but non-melanoma skin cancers	3439.6	355.7	1829.1	429.9	1610.5	306.3	1754.6	168.0	975.9	222.6	778.6	128.8

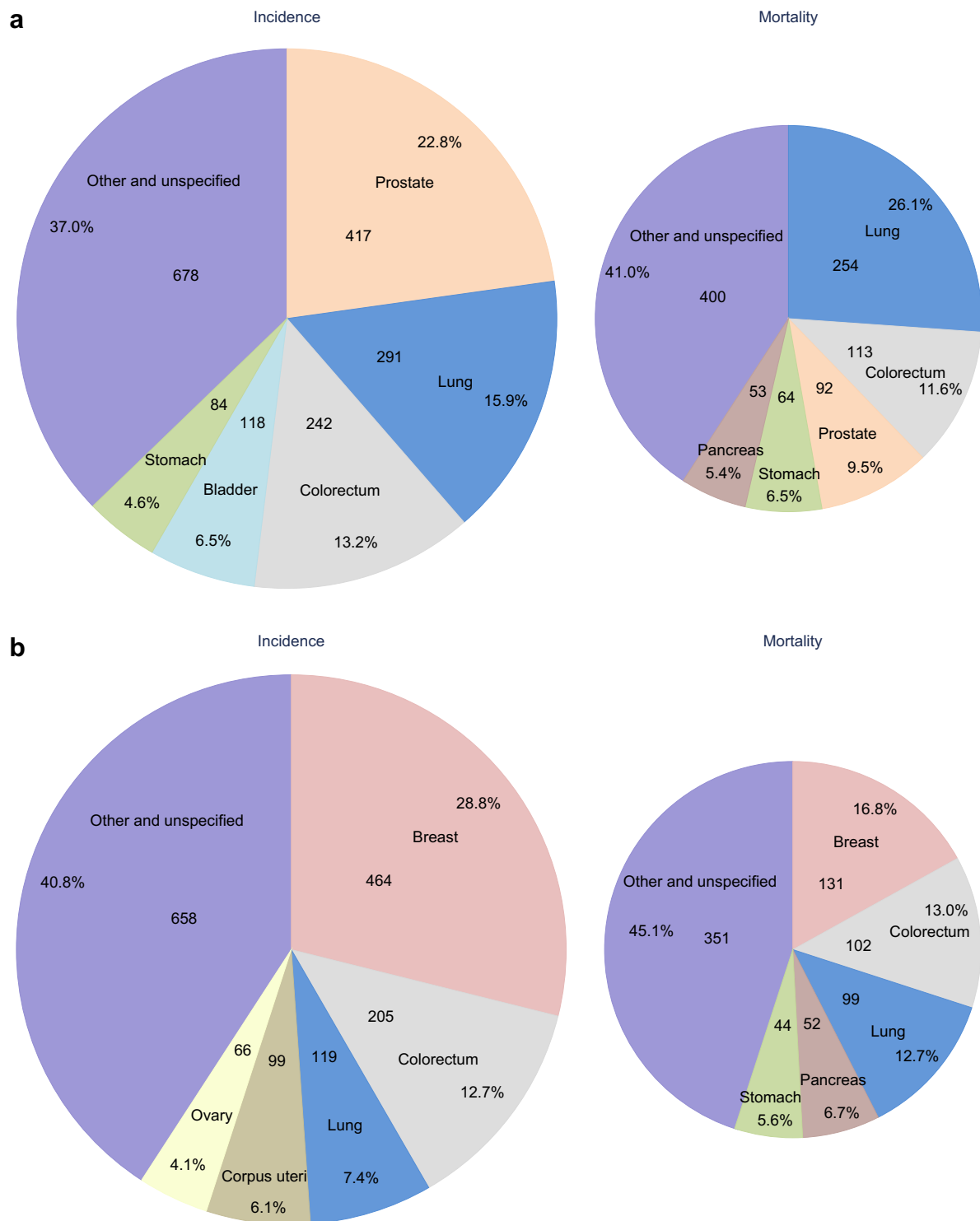


Fig. 2. Distribution of the expected cases and deaths for the 5 most common cancers in Europe 2012 in males (a) and females (b). For each sex, the area of the segment of the pie chart reflects the proportion of the total number of cases or deaths.

1A. When historical national data and sufficient numbers of recorded cases were available, incidence rates were projected to 2012 using either the NORDPRED or DEPPRED methods. This method for predicting incidence in 2012 was used in 20 countries, and validated for Finland by comparing our estimates to those

computed by the Finnish Cancer Registry for the same year.<sup>26</sup> The close agreement between the two sets of estimates is shown in Table 2.

1B. When historical regional incidence data covering at least 30% of a country and sufficient numbers of recorded cases were available (Germany and Switzerland), local

Table 4  
Most common leading types of cancer in terms of new cases (i) and deaths (m) in each of the European countries in 2012.

	First				Second				Third				
	Males		Females		Males		Females		Males		Females		
	i	m	i	m	i	m	i	m	i	m	i	m	
Europe	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Lung	Lung	Lung
EU-27	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Colorectum	Lung	Prostate	Prostate	Lung	Colorectum
Albania	Lung	Lung	Breast	Lung	Stomach	Stomach	Lung	Breast	Prostate	Prostate	Stomach	Stomach	Stomach
Austria	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Lung	Colorectum	Prostate	Lung	Colorectum	Colorectum
Belarus	Lung	Lung	Breast	Breast	Prostate	Stomach	Colorectum	Colorectum	Colorectum	Colorectum	Colorectum	Corpus uteri	Stomach
Belgium	Prostate	Lung	Breast	Breast	Lung	Prostate	Colorectum	Colorectum	Colorectum	Colorectum	Colorectum	Lung	Lung
Bosnia Herzegovina	Lung	Lung	Breast	Breast	Prostate	Colorectum	Colorectum	Lung	Colorectum	Prostate	Lung	Colorectum	Colorectum
Bulgaria	Lung	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Prostate	Corpus uteri	Lung	Lung
Croatia	Lung	Lung	Breast	Breast	Prostate	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Lung	Lung	Lung
Cyprus	Prostate	Lung	Breast	Breast	Colorectum	Prostate	Colorectum	Colorectum	Lung	Colorectum	Thyroid	Lung	Lung
Czech Republic	Prostate	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Lung	Lung	Prostate	Lung	Colorectum	Colorectum
Denmark	Prostate	Lung	Breast	Lung	Colorectum	Prostate	Colorectum	Breast	Lung	Colorectum	Lung	Lung	Colorectum
Estonia	Prostate	Lung	Breast	Colorectum	Lung	Prostate	Colorectum	Breast	Colorectum	Colorectum	Colorectum	Corpus uteri	Lung
Finland	Prostate	Lung	Breast	Breast	Lung	Prostate	Colorectum	Lung	Colorectum	Colorectum	Corpus uteri	Colorectum	Colorectum
France	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Lung	Colorectum	Prostate	Colorectum	Colorectum	Colorectum
Germany	Prostate	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Lung	Lung	Prostate	Lung	Colorectum	Colorectum
Greece	Lung	Lung	Breast	Breast	Prostate	Prostate	Colorectum	Colorectum	Bladder	Colorectum	Lung	Lung	Lung
Hungary	Lung	Lung	Breast	Lung	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Oral cavity, pharynx	Lung	Breast	Breast
Iceland	Prostate	Lung	Breast	Lung	Lung	Prostate	Lung	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Colorectum
Ireland	Prostate	Lung	Breast	Lung	Colorectum	Colorectum	Colorectum	Breast	Lung	Prostate	Lung	Colorectum	Colorectum
Italy	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Colorectum	Prostate	Prostate	Lung	Lung	Lung
Latvia	Prostate	Lung	Breast	Breast	Lung	Prostate	Colorectum	Colorectum	Colorectum	Colorectum	Corpus uteri	Ovary	Ovary
Lithuania	Prostate	Lung	Breast	Breast	Lung	Prostate	Colorectum	Colorectum	Colorectum	Colorectum	Cervix uteri	Ovary	Ovary
Luxembourg	Prostate	Lung	Breast	Lung	Colorectum	Colorectum	Colorectum	Breast	Lung	Prostate	Corpus uteri	Colorectum	Colorectum
FYR Macedonia	Lung	Lung	Breast	Breast	Prostate	Stomach	Colorectum	Corpus uteri	Colorectum	Colorectum	Colorectum	Lung	Lung
Malta	Prostate	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Lung	Prostate	Corpus uteri	Ovary	Ovary
Moldova	Lung	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Stomach	Cervix uteri	Cervix uteri	Cervix uteri
Montenegro	Lung	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Lung	Prostate	Prostate	Lung	Colorectum	Colorectum
Norway	Prostate	Lung	Breast	Lung	Colorectum	Prostate	Colorectum	Colorectum	Lung	Colorectum	Lung	Breast	Breast
Poland	Lung	Lung	Breast	Lung	Colorectum	Colorectum	Colorectum	Breast	Prostate	Prostate	Lung	Colorectum	Colorectum
Portugal	Prostate	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Lung	Prostate	Corpus uteri	Stomach	Stomach
Romania	Lung	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Stomach	Cervix uteri	Lung	Lung
Russian Federation	Lung	Lung	Breast	Breast	Prostate	Stomach	Colorectum	Colorectum	Colorectum	Colorectum	Colorectum	Colorectum	Stomach
Serbia	Lung	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Lung	Prostate	Prostate	Lung	Colorectum	Colorectum
Slovakia	Colorectum	Lung	Breast	Breast	Prostate	Colorectum	Colorectum	Colorectum	Lung	Oral cavity, pharynx	Corpus uteri	Lung	Lung
Slovenia	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Lung	Lung	Lung
Spain	Prostate	Lung	Breast	Breast	Lung	Colorectum	Colorectum	Colorectum	Colorectum	Prostate	Corpus uteri	Lung	Lung
Sweden	Prostate	Prostate	Breast	Lung	Colorectum	Lung	Colorectum	Breast	Lung	Colorectum	Lung	Colorectum	Colorectum
Switzerland	Prostate	Lung	Breast	Breast	Colorectum	Prostate	Colorectum	Breast	Lung	Colorectum	Lung	Colorectum	Colorectum
The Netherlands	Prostate	Lung	Breast	Lung	Colorectum	Colorectum	Colorectum	Breast	Lung	Prostate	Lung	Colorectum	Colorectum
Ukraine	Lung	Lung	Breast	Breast	Colorectum	Colorectum	Colorectum	Colorectum	Stomach	Stomach	Corpus uteri	Stomach	Stomach
United Kingdom	Prostate	Lung	Breast	Lung	Colorectum	Prostate	Lung	Breast	Lung	Colorectum	Colorectum	Colorectum	Colorectum

incidence rates were projected to 2012 using either NORDPRED or DEPPRED and applied to the 2012 national population. In the absence of such data, the local incidence rates from the most recent available 5-year period were applied to the 2012 national population.

For female breast and prostate cancers, the projection method 1A or 1B could potentially yield unreasonably high values if, for example mammographic screening programmes or PSA testing commenced, respectively, in the calendar period serving as the basis for the estimates. For both cancers, a careful examination of the observed and predicted trends in rates was performed. When the predicted incidence rate for 2012 yielded what was considered by the authors an unrealistically high value, the incidence rate from the most recent 5-year period was applied to the 2012 population (Fig. 1). Such an adjustment was applied in Austria and Denmark for female breast cancer and in Austria, Belarus, Croatia, Czech Republic, Ireland, Lithuania, Slovakia and the United Kingdom for prostate cancer.

1C. When national incidence rates were available only for a short period of time, the incidence rates for the most recent period available were applied to the 2012 population (five countries, including national estimates for France<sup>14</sup>).

1. Estimates based on local incidence data and national mortality data (12 countries, Table 1).

National incidence ( $I_N$ ) was estimated by applying a set of sex-, site- and age-specific incidence to corresponding mortality ratios ( $I_R/M_R$ ) obtained from the aggregation of local registries' incidence data, to the corresponding national mortality estimate for 2012 ( $M_N$ ):

$$I_N = M_N * I_R/M_R \tag{1}$$

Before aggregation, each registry dataset was weighted according to the square root of its population to take into account the relative size of the population covered. In practice, the  $I_R/M_R$  ratios were obtained from a



Table 5

Estimated numbers of new cancer cases and deaths from cancer (thousands), age-standardised rates (ASRs) (per 100,000) by sex and cancer site in the European Union (EU-27) in 2012.

	Incidence						Mortality					
	Both sexes		Male		Female		Both sexes		Male		Female	
	Cases	ASR (E)	Cases	ASR (E)	Cases	ASR (E)	Deaths	ASR (E)	Deaths	ASR (E)	Deaths	ASR (E)
Oral cavity and pharynx	73.0	11.6	53.4	18.3	19.6	5.5	28.2	4.3	21.5	7.2	6.7	1.7
Oesophagus	34.5	5.0	26.0	8.4	8.5	2.0	29.6	4.1	22.2	7.0	7.4	1.7
Stomach	80.6	10.7	49.9	15.2	30.7	7.1	57.7	7.3	34.9	10.4	22.8	4.9
Colon and rectum	342.1	46.3	191.6	59.0	150.5	36.1	150.0	18.4	81.8	23.8	68.2	14.2
Liver	51.3	7.0	35.6	11.1	15.8	3.6	48.0	6.2	31.6	9.6	16.4	3.5
Gallbladder	23.5	3.0	9.6	2.8	13.9	3.1	16.0	2.0	6.1	1.8	9.8	2.1
Pancreas	78.7	10.5	39.1	12.2	39.6	9.0	77.9	10.1	38.9	11.9	39.1	8.5
Larynx	28.0	4.4	24.9	8.3	3.1	0.9	12.0	1.8	10.8	3.4	1.3	0.3
Lung	309.6	44.1	211.4	66.3	98.2	26.1	264.8	36.5	183.4	56.4	81.4	20.6
Melanoma of skin	82.1	13.0	39.6	13.2	42.5	13.1	15.7	2.2	8.8	2.8	6.9	1.7
Breast					364.4	108.8					90.6	22.4
Cervix uteri					33.4	11.3					13.0	3.7
Corpus uteri					64.3	17.9					14.7	3.3
Ovary					44.1	12.6					29.8	7.4
Prostate			359.9	110.8					71.0	18.9		
Testis			18.0	7.2					0.9	0.3		
Kidney	84.4	12.4	53.8	17.4	30.6	8.0	34.7	4.5	22.3	6.7	12.4	2.7
Bladder	123.1	16.3	96.4	29.1	26.7	6.1	40.3	4.7	29.9	8.4	10.3	2.0
Brain, nervous system	42.5	6.9	23.1	8.1	19.4	5.9	32.6	4.9	18.0	6.0	14.5	4.0
Thyroid	36.9	6.5	9.6	3.5	27.3	9.3	3.6	0.4	1.4	0.4	2.2	0.5
Hodgkin lymphoma	12.3	2.3	6.7	2.6	5.6	2.1	2.7	0.4	1.5	0.5	1.1	0.3
Non-Hodgkin lymphoma	78.8	11.6	42.2	13.8	36.5	9.6	30.4	3.8	16.4	4.9	14.0	3.0
Multiple myeloma	33.4	4.5	17.9	5.5	15.5	3.7	20.3	2.5	10.4	3.0	9.9	2.1
Leukaemia	62.2	9.2	35.9	11.8	26.3	7.1	41.1	5.2	22.9	6.8	18.2	4.0
All sites but non-melanoma skin cancers	2634.6	382.0	1434.3	452.9	1200.3	330.1	1262.4	164.6	707.5	211.8	554.9	128.4

Poisson regression model, including terms for sex and age. Depending on the accuracy and availability of local data, one of two variants of the method was used, as specified below:

2A. Country-specific models were fitted for three countries (Italy, Poland and Spain) with several local cancer registries in operation: the  $I_R/M_R$  ratios were obtained from the most recent country-specific data (generally a 5-year period centred on year 2005), under the assumption that the  $I_R/M_R$  ratios will be reasonably constant in recent years. This assumption is likely to be violated for female breast and prostate cancers, particularly following the introduction of screening programmes, which may have resulted in marked fluctuation in the ratios of recorded cases to deaths. For these two cancer sites we used the most recent incidence rates from the cancer registries used in the model (generally the year 2007) as a proxy for the 2012 national incidence rate. To achieve a greater stability in the incidence to mortality ratios where the country-specific local data were sparse, additional incidence and mortality data from local cancer registries in neighbouring countries within the same area were included prior to modelling.

2B. Regional models were fitted when no incidence data were available or when they were considered to

be lacking sufficient quality (nine countries). The  $I_R/M_R$  ratios were obtained by the aggregation of cancer registry data in neighbouring countries. Specifically for Luxembourg, we applied the age-specific incidence rates (2007–2009) recorded by the national pathological registry<sup>27</sup> to the national 2012 population where zero cancer deaths were recorded for a particular combination of sex and cancer type. We applied the same redistribution procedure of the number of cancer deaths coded as “uterus unspecified” described above to the local mortality used in the models in methods 2A and 2B.

### 3. Results

Table 3 and Fig. 2 summarise the estimated numbers of new cancer cases and cancer deaths in Europe in 2012 (in thousands), by type of cancer. There were just over 3.4 million new cases of cancer (excluding non-melanoma skin cancers) in Europe in 2012, 53% (1.8 million) occurring in men and 47% (1.6 million) in women. The most common cancer sites were breast cancer (464,000 cases, 13.5% of all cancer cases), followed by colorectal cancer (447,000, 13.0%), prostate cancer (417,000, 12.1%) and lung cancer (410,000, 11.9%). These four cancers represented half (50.5%) of the estimated overall

Table 6a  
Estimated age-standardised rates (ASRs) (European standard) of cancer incidence by sex, cancer site and country, 2012.

	Oral cavity and pharynx		Oesophagus		Stomach		Colon and rectum		Liver		Gallbladder		Pancreas		Larynx		Lung		Melanoma		Breast	Cervix
	C00–14		C15		C16		C18–21		C22		C23–24		C25		C32		C33–34		C43		C50	C53
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	F	F
Europe	18.2	4.9	8.3	1.8	19.5	9.3	55.7	34.6	10.0	3.3	2.7	2.8	12.1	8.3	8.8	0.8	68.3	21.6	11.4	11.0	94.2	13.4
EU-27	18.3	5.5	8.4	2.0	15.2	7.1	59.0	36.1	11.1	3.6	2.9	3.1	12.2	9.0	8.3	0.9	66.3	26.1	13.2	13.1	108.8	11.3
Central and Eastern Europe	20.6	3.8	7.9	1.1	29.7	12.9	51.1	31.5	6.9	2.9	2.4	2.8	12.8	7.4	10.9	0.6	77.3	14.8	6.1	6.0	63.4	19.2
Belarus	24.9	2.3	9.6	0.6	42.1	17.2	45.6	29.9	4.8	1.8	1.9	1.9	10.4	5.1	12.3	0.3	81.7	8.7	4.8	5.9	60.5	15.8
Bulgaria	15.1	3.7	4.1	0.6	21.4	10.4	58.7	36.4	9.2	3.5	2.7	2.8	15.1	8.8	14.0	0.7	73.1	12.4	5.2	4.0	76.3	28.5
Czech Republic	18.0	6.1	8.0	1.4	15.5	7.8	81.1	40.5	9.5	3.9	5.3	7.3	17.8	12.0	7.9	0.7	75.0	25.9	19.1	15.3	95.5	16.3
Hungary	39.8	9.5	9.6	1.3	20.3	9.7	86.7	44.6	8.0	2.2	4.2	4.5	16.7	11.1	16.6	1.9	109.3	46.5	10.6	8.1	72.3	20.5
Moldova	22.8	3.0	4.9	0.3	26.4	9.2	52.0	32.9	17.7	7.8	0.7	1.2	14.0	9.7	15.5	0.6	61.3	11.9	3.4	3.0	52.9	24.1
Poland	19.0	4.6	5.7	1.2	19.7	7.4	55.5	28.9	5.4	3.0	3.1	5.6	12.7	8.2	11.7	1.3	89.6	31.1	6.0	5.3	69.9	15.3
Romania	29.6	3.3	5.9	0.7	23.7	8.5	50.3	29.2	13.1	4.5	2.2	2.3	14.9	8.7	14.1	0.5	83.3	15.8	4.7	4.4	66.2	34.9
Russian Federation	17.9	3.5	9.2	1.4	35.8	15.6	44.6	31.5	6.3	2.8	2.0	2.0	11.7	6.8	9.5	0.4	74.3	9.8	5.0	5.7	60.7	17.7
Slovakia	30.3	4.8	9.0	1.2	21.0	9.8	92.2	43.6	10.0	3.7	5.3	6.8	17.1	11.7	9.6	0.7	70.0	20.5	14.9	12.1	78.1	19.4
Ukraine	22.0	3.0	7.6	0.7	32.1	12.9	43.6	28.1	4.3	1.9	1.7	1.8	12.0	5.9	11.5	0.4	66.9	8.7	5.0	5.6	54.0	19.2
Northern Europe	13.4	5.8	12.1	4.2	11.2	5.5	55.1	37.8	6.7	2.8	1.2	1.7	10.9	8.9	4.8	0.8	52.3	34.9	19.1	19.4	120.8	9.9
Denmark	18.0	8.3	8.3	3.5	12.3	4.5	69.2	53.4	6.4	2.0	3.1	3.2	14.0	11.7	6.1	1.3	62.5	54.9	22.0	26.6	142.8	12.0
Estonia	15.1	4.2	6.5	0.9	28.7	14.9	53.1	33.8	4.9	2.4	2.5	1.9	14.7	7.2	7.9	0.4	70.7	13.5	8.9	10.7	69.0	23.3
Finland	9.9	5.6	5.4	1.8	10.2	5.9	42.5	29.2	11.1	4.2	2.8	2.9	15.1	11.8	2.9	0.3	45.4	17.9	19.9	14.5	121.0	4.9
Iceland	8.9	5.9	10.1	2.4	9.6	5.6	44.5	41.7	3.4	2.0	1.8	2.0	7.7	7.7	2.2	0.0	47.6	43.0	12.3	17.8	130.7	8.8
Ireland	11.9	4.9	12.5	5.1	13.4	6.7	65.1	41.3	6.7	3.3	2.5	3.5	11.3	9.2	6.7	1.3	54.9	40.4	17.7	18.6	122.4	15.1
Latvia	14.8	2.6	10.1	1.5	33.7	12.6	45.5	30.0	8.4	2.7	1.6	1.8	15.4	9.3	11.9	0.6	83.9	11.7	7.6	7.9	69.8	20.7
Lithuania	19.1	3.3	10.7	1.2	33.5	11.8	47.4	28.1	6.9	2.1	2.7	2.0	15.4	7.9	11.2	0.4	80.8	10.4	7.4	6.8	65.2	31.6
Norway	10.8	6.8	5.8	1.7	8.7	5.7	65.0	53.8	4.1	2.0	2.5	2.4	12.1	10.0	3.4	0.6	52.3	38.1	26.6	24.8	98.4	11.3
Sweden	9.5	5.7	5.2	1.6	7.4	4.1	48.9	39.4	5.0	2.3	2.0	3.0	7.4	6.5	2.4	0.5	28.8	27.5	24.1	24.1	108.2	8.6
United Kingdom	13.9	6.0	15.0	5.4	10.0	4.8	55.6	36.7	6.8	2.9	0.5	1.1	10.4	8.8	4.8	0.9	53.3	38.5	18.6	19.6	129.2	7.9
Southern Europe	13.6	4.0	4.6	0.8	17.6	8.8	58.7	35.2	13.9	4.4	3.3	3.1	11.3	8.1	10.2	0.8	69.0	18.3	10.1	10.0	96.8	10.0
Albania	9.3	5.3	2.6	1.1	36.2	22.2	12.7	11.2	7.7	4.4	0.5	0.5	9.3	4.7	6.5	2.7	54.0	24.5	1.5	1.1	69.4	6.2
Bosnia Herzegovina	9.4	3.7	2.5	0.9	14.9	8.5	30.0	19.0	8.3	5.4	3.1	3.5	7.0	4.1	11.2	1.5	65.1	15.5	2.7	2.3	49.1	16.2
Croatia	20.2	5.1	7.7	1.0	21.8	9.5	66.7	36.7	12.2	3.2	4.5	5.2	13.2	8.0	13.3	1.1	85.4	22.3	12.0	11.9	83.0	12.1
Cyprus	4.2	1.3	2.2	0.8	11.4	4.8	41.6	33.2	6.4	2.8	2.1	2.4	7.4	5.4	4.1	0.5	38.1	10.7	4.4	4.6	104.3	5.2
Greece	5.5	1.8	2.3	0.3	11.1	5.4	24.9	17.2	8.3	2.9	2.6	1.8	10.6	6.9	6.5	0.4	74.7	13.2	3.8	2.6	58.6	6.2
Italy	9.8	4.0	3.1	0.8	16.5	8.8	61.2	39.9	16.3	5.6	3.5	3.5	11.2	9.1	9.0	0.7	58.8	19.2	13.5	13.6	118.0	7.7
FYR Macedonia	7.0	2.4	1.7	0.3	34.8	15.4	41.1	29.9	8.5	3.9	1.5	2.0	17.0	6.5	12.9	0.9	101.6	19.2	7.2	6.0	101.4	15.6
Malta	14.9	5.3	5.5	1.5	17.0	8.1	60.1	37.6	5.1	1.7	3.4	1.7	15.6	10.2	7.9	1.4	58.0	11.0	6.6	8.4	116.2	4.6
Montenegro	14.4	5.3	4.1	1.1	17.0	9.5	49.8	28.9	9.9	5.2	3.1	3.9	10.3	7.4	12.7	1.4	85.5	25.9	7.3	4.7	75.9	23.0
Portugal	27.5	4.6	8.5	0.7	26.7	12.8	61.4	33.9	11.9	2.5	4.4	1.9	9.7	5.5	13.0	0.4	49.1	11.7	7.5	8.8	85.6	10.8
Serbia	18.8	5.2	5.7	1.2	17.1	8.1	62.1	33.2	9.6	4.0	2.8	3.8	12.3	8.6	14.1	1.4	99.2	32.9	11.2	7.4	92.3	28.3
Slovenia	20.6	5.2	5.4	1.0	23.3	9.6	74.5	40.1	12.5	3.1	5.6	6.7	14.2	11.7	7.2	0.7	78.9	24.8	21.2	20.5	88.4	11.8
Spain	16.8	4.2	6.4	1.0	16.4	7.5	65.6	35.3	14.2	3.7	3.0	2.5	11.5	7.6	11.0	0.9	76.8	15.7	8.3	9.0	84.9	9.1

(continued on next page)

Table 6a (continued)

	Oral cavity and pharynx		Oesophagus		Stomach		Colon and rectum		Liver		Gallbladder		Pancreas		Larynx		Lung		Melanoma		Breast	Cervix	
	C00–14		C15		C16		C18–21		C22		C23–24		C25		C32		C33–34		C43		C50	C53	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	F	F	
Western Europe	21.5	6.8	9.8	2.3	13.4	6.3	58.6	36.9	11.8	3.3	3.1	3.0	12.3	9.5	6.8	1.0	64.2	28.1	15.4	15.8	126.8	8.7	
Austria	16.5	5.5	7.2	1.1	13.9	7.4	51.3	29.3	12.1	4.2	2.6	2.8	14.5	10.6	5.0	0.8	54.2	27.8	13.1	12.4	90.7	7.0	
Belgium	21.9	7.0	10.8	2.9	12.2	5.7	67.5	43.4	6.7	2.4	2.3	2.1	9.6	7.2	9.4	1.5	83.2	27.6	11.9	18.2	147.5	10.2	
France	23.1	7.6	8.7	2.5	10.5	4.2	53.8	36.9	16.6	3.6	2.7	2.3	11.7	8.7	7.8	1.3	74.5	27.9	13.1	13.1	136.6	8.0	
Germany	23.1	6.4	9.9	2.0	16.2	8.0	59.7	34.8	10.6	3.5	3.4	3.7	13.2	10.5	6.5	0.7	57.3	25.4	15.3	14.8	122.0	9.7	
Luxembourg	16.4	6.5	9.0	2.5	14.7	7.2	62.5	33.6	15.9	5.5	0.8	0.9	11.2	8.5	5.2	0.9	59.7	26.9	15.0	13.9	118.2	7.1	
The Netherlands	12.6	7.0	14.9	4.2	11.6	5.8	71.6	50.5	3.3	1.2	3.2	2.3	10.8	8.0	5.8	1.1	66.1	44.5	22.5	26.5	131.3	8.0	
Switzerland	18.0	6.6	9.0	2.8	7.5	5.1	54.2	35.0	12.7	3.0	2.8	2.9	10.7	9.3	4.5	0.6	52.0	29.7	26.8	25.4	111.3	4.2	
	Corpus	Ovary	Prostate	Testis	Kidney		Bladder		Brain		Thyroid		Hodgkin	NHL		Multiple myeloma	Leukaemia	All sites					
	C54	C56	C61	C62	C64–66		C67		C70–72		C73		C81	C82–85,C96		C88 + C90	C91–95	C00–96/C44					
	F	F	M	M	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Europe	19.3	13.1	96.0	5.8	17.2	8.1	26.9	5.3	7.8	5.6	3.1	9.3	2.5	2.1	11.9	8.0	4.7	3.1	11.3	6.9	429.9	306.3	
EU-27	17.9	12.6	110.8	7.2	17.4	8.0	29.1	6.1	8.1	5.9	3.5	9.3	2.6	2.1	13.8	9.6	5.5	3.7	11.8	7.1	452.9	330.1	
Central and Eastern Europe	21.4	14.8	48.3	3.2	17.0	8.2	22.4	4.0	7.0	5.3	2.2	9.0	2.1	1.9	6.3	4.7	2.3	1.9	9.7	6.1	371.3	259.1	
Belarus	23.2	14.0	53.5	2.7	21.2	10.4	21.2	2.8	5.4	4.8	4.1	16.3	2.5	2.7	6.0	3.7	2.7	2.5	13.5	8.2	391.0	250.6	
Bulgaria	24.3	17.9	37.1	6.0	13.5	5.7	28.0	6.5	10.5	7.7	1.1	5.7	2.2	1.9	6.6	4.9	2.7	2.3	8.3	5.6	367.0	290.5	
Czech Republic	25.4	15.1	110.3	8.7	34.9	15.0	28.9	8.3	7.3	6.1	3.7	13.8	2.6	1.8	10.6	8.5	3.7	2.5	9.7	6.1	503.4	356.8	
Hungary	10.5	14.1	56.6	11.1	19.4	6.7	34.3	10.5	5.8	4.3	2.9	8.8	1.6	1.4	8.8	7.0	2.2	1.6	11.2	7.0	500.3	319.4	
Moldova	17.1	9.7	30.4	2.1	8.6	4.2	17.6	3.4	5.7	4.0	2.2	8.3	2.0	1.1	6.5	5.0	1.2	1.7	6.0	4.1	323.2	229.8	
Poland	23.4	18.1	55.3	4.6	15.4	8.1	30.3	6.4	10.7	9.4	1.8	6.2	2.2	1.5	6.2	5.6	3.1	2.9	9.8	5.4	389.7	283.6	
Romania	11.6	13.6	37.9	3.0	11.2	4.9	27.4	4.1	8.3	6.0	1.2	5.3	1.2	1.6	7.2	5.5	2.9	2.2	9.3	5.7	381.6	253.7	
Russian Federation	22.0	14.5	46.6	1.8	17.2	8.7	18.0	2.8	5.7	4.3	2.2	9.9	2.0	1.9	5.7	4.3	1.9	1.6	9.5	6.4	352.1	249.6	
Slovakia	26.8	15.4	78.3	9.4	24.7	11.9	28.2	5.9	10.3	7.5	2.4	7.2	2.0	2.3	10.1	9.0	4.8	4.4	14.8	8.1	488.9	327.8	
Ukraine	22.4	13.6	31.1	2.6	14.8	6.8	18.9	2.5	6.2	4.5	2.2	8.2	2.5	2.4	4.9	3.3	1.6	1.4	9.0	5.4	325.6	228.2	
Northern Europe	20.0	14.9	127.7	7.4	15.7	8.1	19.3	5.6	8.5	6.1	2.1	6.7	2.8	2.0	16.1	11.4	6.2	4.0	12.1	7.4	434.0	363.3	
Denmark	19.2	14.3	138.4	12.5	14.0	6.6	35.2	10.7	8.8	6.3	2.3	4.8	2.5	2.2	16.2	11.5	4.5	3.5	10.1	6.5	515.0	454.4	
Estonia	20.2	15.8	145.4	3.5	24.9	10.6	21.8	4.3	7.8	4.4	2.2	7.3	2.4	1.6	9.9	5.0	5.2	3.0	12.9	8.2	471.4	275.1	
Finland	20.1	11.5	145.2	5.8	13.7	9.1	23.4	4.3	7.7	5.2	3.1	9.5	2.7	2.4	18.6	13.1	5.4	3.3	11.3	7.3	423.3	323.8	
Iceland	16.8	8.5	159.9	7.1	17.8	8.4	28.0	8.9	7.8	7.2	3.5	14.4	1.1	1.8	15.8	9.9	6.5	3.0	11.4	5.3	442.2	381.5	
Ireland	15.6	15.6	168.7	9.1	15.7	8.7	20.5	7.5	9.0	5.9	1.9	4.7	2.9	2.5	17.2	12.9	7.0	5.2	17.0	8.2	499.6	382.4	
Latvia	23.2	18.9	127.2	4.8	23.3	10.0	26.5	5.9	11.2	9.2	3.1	8.8	2.1	1.7	7.9	5.4	3.1	2.4	11.4	7.4	472.7	280.5	
Lithuania	24.5	16.2	93.8	2.0	29.4	11.8	23.7	6.8	8.3	8.0	4.7	24.2	2.1	1.9	10.2	7.2	4.9	4.0	13.3	9.3	454.1	302.6	
Norway	24.0	13.3	193.2	12.7	17.9	8.5	33.5	9.8	11.0	9.1	3.0	7.2	3.1	1.9	17.4	12.5	8.8	5.5	12.4	7.7	535.7	383.8	
Sweden	19.7	10.3	175.2	7.2	11.2	6.4	25.7	7.1	10.8	13.1	1.8	5.4	2.0	1.5	13.8	10.2	5.3	3.6	10.4	7.8	427.8	340.3	
United Kingdom	19.7	16.0	111.1	7.1	15.7	8.0	14.8	4.5	8.0	4.8	1.9	5.7	3.0	2.1	16.8	12.0	6.5	4.1	12.4	7.3	415.8	370.5	

Southern Europe	18.0	12.0	88.3	6.0	15.8	6.3	33.1	5.8	8.5	6.0	4.5	10.8	2.7	2.2	13.5	8.9	4.9	3.5	11.4	7.0	428.7	297.4
Albania	14.9	4.2	24.8	4.4	10.9	5.3	22.9	7.3	15.4	10.7	1.2	2.6	1.9	0.6	1.3	0.8	0.3	0.6	6.9	5.7	262.9	234.4
Bosnia Herzegovina	13.3	10.4	32.7	3.0	8.8	5.1	18.0	3.8	8.1	6.1	0.9	2.7	1.2	1.6	3.2	2.5	1.2	0.7	4.3	3.3	254.0	195.6
Croatia	17.7	13.8	72.8	8.9	20.1	8.8	27.8	7.9	12.2	9.4	4.7	17.6	3.6	3.1	10.4	8.9	4.0	3.4	10.2	6.2	462.4	316.9
Cyprus	15.4	9.4	85.9	4.2	5.5	2.7	35.7	3.8	5.4	4.6	3.8	16.7	2.0	1.5	10.8	9.1	4.5	3.2	15.9	9.7	322.3	270.3
Greece	10.0	11.2	34.2	2.6	9.4	3.8	26.7	4.1	10.1	7.7	0.7	3.1	2.7	2.4	3.4	2.2	3.4	2.4	14.3	9.0	289.0	192.0
Italy	19.2	13.3	100.9	8.8	18.4	6.8	32.3	5.9	7.4	5.0	8.0	18.7	3.0	2.1	18.0	11.4	6.4	4.8	12.1	7.4	447.8	341.6
FYR Macedonia	39.4	14.8	43.7	4.5	5.3	4.4	31.6	4.0	13.8	6.6	1.3	2.7	2.0	1.1	5.2	2.1	1.2	0.8	8.2	4.3	377.1	299.4
Malta	21.8	16.2	78.4	7.0	15.0	7.5	39.8	9.7	7.3	4.6	2.9	10.7	1.8	2.7	9.6	8.6	4.3	2.4	11.7	7.0	396.7	314.4
Montenegro	20.5	14.9	48.6	4.3	11.5	6.4	22.9	6.5	11.8	8.2	0.3	3.9	2.2	1.5	6.4	4.2	2.2	1.4	8.4	5.8	354.9	283.1
Portugal	18.0	8.2	95.1	5.9	10.2	4.0	33.4	5.4	8.1	6.2	2.2	6.4	2.7	2.7	16.4	10.6	3.9	2.8	9.8	6.8	429.7	263.0
Serbia	24.5	16.4	55.7	5.6	13.8	6.4	25.1	7.1	13.2	9.8	1.3	4.0	2.8	2.4	9.2	7.1	3.0	2.1	10.7	6.9	417.2	330.3
Slovenia	20.8	13.8	124.9	10.6	20.9	9.8	28.1	6.5	8.3	5.3	3.6	13.3	2.2	1.5	11.9	9.4	6.0	3.6	10.3	7.0	514.0	339.1
Spain	16.3	10.3	96.8	3.4	15.7	6.4	39.0	5.5	7.7	5.3	2.7	4.8	2.6	2.2	12.1	8.0	4.3	2.8	10.7	6.3	449.9	264.5
Western Europe	16.5	10.4	140.0	9.0	18.9	9.1	30.1	6.6	7.6	5.4	3.8	10.3	2.7	2.3	15.0	10.7	6.5	4.1	12.4	7.6	492.3	356.5
Austria	14.7	10.2	110.0	8.5	15.7	7.6	29.5	7.6	6.1	5.5	7.0	17.6	2.1	1.6	11.9	8.5	4.6	3.2	11.3	7.6	423.9	304.0
Belgium	18.9	11.0	134.6	5.9	16.9	7.9	47.6	9.4	7.7	5.7	4.0	10.2	3.3	2.3	16.6	12.0	6.6	4.3	13.4	8.0	525.1	388.0
France	15.2	10.7	187.5	7.8	19.6	8.1	22.8	3.3	7.6	5.2	5.0	14.7	2.8	2.8	16.5	10.7	8.3	5.3	14.0	7.9	550.7	369.8
Germany	16.9	10.2	114.1	10.0	19.9	10.5	34.7	8.3	7.8	5.5	3.1	7.6	2.5	2.1	13.5	10.2	5.4	3.5	12.1	7.4	463.2	344.5
Luxembourg	35.3	10.5	118.3	8.0	17.3	6.4	23.5	6.5	9.3	4.1	5.7	16.6	1.1	2.7	12.5	10.5	3.1	4.2	11.1	7.9	451.6	358.6
The Netherlands	17.7	9.2	124.5	8.9	16.4	8.6	20.8	5.8	7.3	4.8	1.7	4.2	2.8	2.1	17.5	12.8	6.6	4.0	10.1	7.4	474.2	394.1
Switzerland	18.0	11.1	158.7	12.0	13.5	5.0	31.3	8.3	7.2	5.5	3.5	8.5	3.3	2.4	16.3	12.7	6.5	4.0	12.8	8.0	484.6	335.2

Countries for which no data were available are in italics.

burden of cancer in Europe in 2012. The most common primary sites in men were prostate (22.8% of the total), lung (291,000, 15.9%), colorectal (242,000, 13.2%) and bladder (118,000, 6.5%). In women, breast cancer was by far the most frequently diagnosed neoplasm (28.8% of the total), followed by colorectal (205,000, 12.7%), lung (119,000, 7.4%) and corpus uteri (99,000, 6.1%) cancers. The estimated total number of cancer deaths in Europe in 2012 was 1.75 million, of which 56% (976,000) were in men and 44% (779,000) in women. Lung cancer, with an estimated 353,000 deaths (one fifth of the total) was the most frequent cause of death from cancer in Europe in 2012, followed by colorectal cancer (almost 215,000 deaths, 12.2%), breast cancer (131,000, 7.5%) and stomach cancer (107,000, 6.1%). Lung cancer continued to be the most common cause of death from cancer in men (254,000, 26.1%) followed by colorectal (113,000, 11.6%) and prostate (92,000, 9.5%) cancers. Breast cancer was the leading cause of death in women (131,000, 16.8%), followed by colorectal (102,000, 13.0%) and lung (almost 100,000 deaths, 12.7%) cancers.

Table 4 shows the numbers of new cases and deaths for three most common leading types of cancer in each of the European countries in 2012.

Table 5 shows the estimated numbers of cases and deaths by site of cancer and sex (in thousands) for the 27 countries of the European Union (EU-27). The EU-27 accounted for an estimated 2.6 million new cases (76% of the European total) and 1.26 million deaths (72%) in 2012. The most common forms of cancers were breast cancer (364,000 cases, 13.8% of all cancer cases), followed by prostate cancer (360,000, 13.7%), colorectal cancer (342,000, 13.0%) and lung cancer (310,000, 11.8%). These four cancers represented 52% of the overall burden of cancer in the EU-27 in 2012. Lung cancer, with an estimated 265,000 deaths (21.0% of total) was by far the most common cause of death from cancer, followed by colorectal cancer (150,000 deaths, 11.9%), breast cancer (91,000, 7.2%) and pancreatic cancer (78,000, 6.2%).

Tables 6a and 6b show the estimates of incidence and mortality rates by sex and site, for all 40 countries. Tables 7a and 7b portray the estimated numbers of cases and deaths for the same categories. A brief description of the patterns for the four most common cancers in Europe follows.

### 3.1. Overall patterns

After adjusting for differing population age structures, overall incidence rates in both sexes were highest in Northern and Western European countries, in men in France (550 per 100,000) and in women in Denmark (454) (Figs. 3a, b and 4a). For both male and female, the lowest all-cancer incidence rates were to be found in the Balkan Peninsula with rates almost half in Bosnia Herz-

Table 6b

Estimated age-standardised rates (ASRs) (European standard) of cancer mortality by sex, cancer site and country, 2012.

	Oral cavity and pharynx		Oesophagus		Stomach		Colon and rectum		Liver		Gallbladder		Pancreas		Larynx		Lung		Melanoma		Breast	Cervix
	C00–14		C15		C16		C18–21		C22		C23–24		C25		C32		C33–34		C43		C50	C53
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	F	F
Europe	8.4	1.6	7.1	1.4	14.6	7.0	25.2	15.4	9.1	3.4	1.8	2.0	12.2	8.1	4.3	0.3	59.1	17.2	2.8	1.8	23.1	4.9
European Union (EU)-27	7.2	1.7	7.0	1.7	10.4	4.9	23.8	14.2	9.6	3.5	1.8	2.1	11.9	8.5	3.4	0.3	56.4	20.6	2.8	1.7	22.4	3.7
Central and Eastern Europe	12.8	1.7	7.1	0.9	24.8	10.4	31.0	17.7	7.8	3.3	1.9	2.2	13.0	7.3	7.0	0.3	69.3	12.0	2.7	1.9	23.2	8.0
Belarus	16.0	1.0	8.7	0.4	36.0	13.7	26.4	15.4	4.5	1.4	1.1	0.9	11.3	4.8	8.7	0.1	72.8	5.4	2.5	2.1	19.5	6.0
Bulgaria	9.8	2.7	3.5	0.4	17.9	8.0	32.3	18.2	11.6	5.2	1.5	1.6	13.1	7.1	9.4	0.4	67.6	11.3	2.4	1.4	24.1	8.8
Czech Republic	9.3	2.1	6.3	1.0	10.6	5.2	35.4	15.8	7.1	3.0	4.2	5.6	15.5	11.2	3.5	0.3	59.3	19.1	3.2	1.7	19.2	4.4
Hungary	23.1	3.7	8.6	1.1	16.1	7.5	46.3	22.5	7.5	2.4	3.4	3.7	16.2	10.7	8.6	0.8	96.4	37.7	3.4	1.9	23.4	6.9
Moldova	15.3	1.4	4.1	0.3	21.7	7.5	32.4	18.4	20.0	8.6	0.7	1.1	13.3	8.2	10.1	0.4	52.3	9.1	1.9	1.1	25.7	10.3
Poland	9.6	1.8	5.5	1.0	16.8	6.0	31.8	15.9	5.5	3.1	2.5	4.5	12.3	8.0	6.5	0.7	82.9	25.3	3.5	2.3	19.7	7.4
Romania	17.9	1.6	5.4	0.7	19.2	6.9	27.5	14.7	16.0	6.2	1.7	1.6	13.5	7.6	8.6	0.4	71.4	13.6	1.7	1.2	21.6	14.2
Russian Federation	11.6	1.6	8.4	1.1	30.6	12.9	30.6	19.2	7.9	3.3	1.7	1.6	13.2	7.5	6.6	0.2	68.7	8.3	2.7	1.9	24.2	7.8
Slovakia	19.8	2.3	8.2	1.0	14.6	6.9	42.0	18.8	8.4	3.5	4.1	5.0	14.7	11.5	5.9	0.3	59.1	13.0	3.9	2.4	19.1	6.9
Ukraine	14.6	1.3	6.2	0.4	26.4	10.3	27.8	15.7	4.5	2.1	1.3	1.5	11.2	4.9	7.6	0.2	56.5	6.6	2.5	1.8	25.1	7.8
Northern Europe	4.5	1.6	10.9	3.6	7.4	3.7	21.3	14.4	6.1	2.8	0.9	1.3	10.8	8.6	1.9	0.3	45.4	28.7	3.7	2.2	23.7	2.9
Denmark	7.2	2.7	9.8	2.9	6.0	3.0	26.9	20.3	6.4	1.6	1.4	1.6	12.6	9.2	2.5	0.5	53.9	42.3	3.6	2.5	28.0	2.6
Estonia	7.9	1.3	7.3	0.4	18.3	8.9	27.5	12.5	6.0	2.5	1.7	1.9	14.2	8.5	4.3	0.2	59.7	10.5	4.1	2.4	15.1	6.1
Finland	3.2	1.4	4.4	1.5	7.4	4.3	16.2	10.8	7.9	3.5	2.0	2.5	13.6	10.7	0.9	0.1	39.6	14.2	4.1	1.6	19.7	1.4
Iceland	1.8	0.7	7.1	1.4	4.9	4.4	14.9	9.6	4.1	2.4	1.1	0.4	8.7	6.7	0.0	0.0	41.6	35.0	4.0	3.3	20.7	0.7
Ireland	4.3	1.5	10.6	4.2	8.8	4.4	25.4	14.1	5.8	3.7	0.6	1.0	11.0	8.4	2.7	0.3	45.9	27.6	3.8	2.1	27.4	4.2
Latvia	10.6	1.6	9.8	1.0	24.0	9.8	27.8	15.9	6.5	2.6	1.5	1.5	15.6	8.3	7.6	0.2	73.4	7.9	3.1	2.7	24.5	8.2
Lithuania	15.5	1.7	10.4	1.0	24.8	9.2	30.8	15.9	6.7	2.4	1.5	1.5	14.8	7.2	9.6	0.3	69.6	6.8	3.5	1.9	23.4	9.8
Norway	2.6	1.2	4.9	1.3	5.1	3.9	23.2	19.4	3.3	2.0	0.6	0.4	11.1	9.4	1.2	0.1	41.0	27.9	7.0	3.5	18.3	3.1
Sweden	3.1	1.5	4.7	1.4	5.7	2.8	19.6	15.4	5.7	2.7	2.5	3.5	11.0	10.5	0.7	0.1	26.4	24.1	5.1	3.1	19.5	2.6
United Kingdom	4.0	1.6	13.2	4.7	6.6	3.1	20.6	13.7	6.1	3.0	0.6	0.8	10.0	8.2	1.6	0.3	46.7	32.4	3.2	2.1	24.8	2.4
Southern Europe	5.7	1.4	4.1	0.7	12.9	6.2	24.5	13.8	11.5	4.1	2.3	2.3	11.1	7.7	4.3	0.3	59.1	14.6	2.3	1.4	21.5	3.2
Albania	5.0	2.9	2.9	1.1	31.0	18.8	7.1	5.9	10.8	6.5	0.5	0.6	9.8	5.1	4.3	1.7	50.7	23.3	0.9	0.6	21.8	2.4
Bosnia Herzegovina	2.5	1.0	3.0	1.0	13.4	7.3	19.8	11.7	12.6	7.3	3.1	2.7	10.3	5.8	6.7	1.1	65.6	14.0	1.5	0.8	16.9	3.6
Croatia	12.6	1.3	7.0	0.9	17.6	7.4	41.7	20.3	10.6	3.8	3.6	4.1	13.3	8.6	7.2	0.5	80.2	18.7	4.2	2.7	24.5	4.3
Cyprus	1.4	0.2	1.8	0.5	7.5	4.6	13.6	8.4	5.5	2.3	0.9	1.2	9.5	5.3	2.9	0.2	36.8	8.6	1.7	0.6	21.4	2.5
Greece	2.8	0.8	2.2	0.3	9.6	4.6	14.9	9.9	10.8	4.0	2.1	1.5	10.8	7.1	4.1	0.3	67.7	11.8	1.6	0.9	21.0	2.5
Italy	4.5	1.4	3.0	0.7	12.0	6.1	21.3	13.6	12.8	4.5	2.9	2.9	11.3	8.5	3.3	0.3	52.4	15.6	2.6	1.4	22.9	2.1
FYR Macedonia	4.0	1.3	1.5	0.3	30.3	13.3	23.6	16.7	11.1	5.7	0.9	1.9	17.5	6.6	8.0	0.6	91.6	17.5	3.8	2.4	36.3	7.0
Malta	5.9	1.5	3.9	0.7	9.3	2.5	23.2	16.4	5.8	2.1	1.2	0.6	11.7	9.0	2.3	0.0	45.0	7.8	1.8	0.3	26.0	1.2
Montenegro	6.6	1.7	4.8	1.0	15.3	7.6	30.1	17.1	12.7	7.0	3.1	3.4	12.4	8.8	7.6	1.0	82.3	23.4	2.2	1.3	27.6	7.4
Portugal	10.0	1.4	7.3	0.7	19.5	8.9	30.1	14.9	9.5	2.5	2.3	1.3	9.8	5.6	5.4	0.2	39.4	9.1	1.6	1.2	18.4	4.9
Serbia	10.2	2.0	5.4	1.1	14.0	6.3	34.3	17.2	9.8	4.4	2.4	3.1	12.6	9.1	7.7	0.7	88.4	27.3	4.0	2.0	31.5	10.3
Slovenia	9.8	1.6	5.1	0.8	16.2	6.5	36.1	17.8	10.2	3.1	4.1	4.9	13.5	11.1	3.3	0.2	63.6	20.7	4.5	4.3	23.4	4.1
Spain	5.8	1.3	5.2	0.7	10.8	4.9	27.3	13.5	10.3	3.3	1.5	1.5	10.2	6.6	4.3	0.3	60.0	11.3	1.8	1.2	16.7	2.7

	6.9	1.7	7.4	1.8	7.9	4.0	21.2	13.4	9.9	3.2	1.4	1.6	12.2	9.0	2.2	0.3	52.7	21.3	2.9	1.8	23.5	2.4
Austria	6.2	1.7	5.6	0.8	8.3	4.8	21.3	11.8	10.8	4.0	1.5	1.7	13.3	9.7	1.9	0.3	43.6	20.1	4.1	1.9	21.3	2.8
Belgium	7.0	1.6	7.6	2.1	7.8	3.5	23.8	15.3	6.4	2.9	1.0	1.0	10.8	7.9	3.5	0.3	78.0	19.1	2.3	1.7	29.5	2.7
France	8.1	1.7	7.6	1.6	6.7	2.7	20.6	12.9	14.6	3.6	1.1	1.0	12.0	8.0	2.5	0.3	58.7	18.4	2.7	1.6	23.7	2.6
Germany	6.9	1.8	6.6	1.7	8.8	4.8	20.7	13.1	8.1	3.2	1.7	2.0	12.7	9.8	2.0	0.3	47.0	21.1	2.5	1.6	22.7	2.4
Luxembourg	2.5	0.9	6.7	1.3	6.4	3.4	22.0	14.4	14.4	5.9	0.0	0.0	10.8	8.7	1.8	0.0	50.3	21.4	2.3	1.3	19.9	3.6
The Netherlands	3.8	1.6	12.6	3.6	7.6	4.2	25.5	17.8	4.0	1.8	1.4	1.5	11.6	9.3	1.5	0.4	59.6	35.6	4.5	3.4	26.0	2.1
Switzerland	6.0	1.8	6.6	1.6	5.1	3.1	20.3	10.1	10.0	2.7	1.4	1.9	9.6	8.5	1.9	0.3	38.1	22.6	4.9	2.4	19.8	1.6
	Corpus	Ovary	Prostate	Testis	Kidney		Bladder		Brain		Thyroid		Hodgkin		NHL		Multiple myeloma		Leukaemia		All sites	
	C54	C56	C61	C62	C64–66		C67		C70–72		C73		C81		C82–85, C96		C88 + C90		C91–95		C00–96/C44	
	F	F	M	M	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Europe	3.9	7.6	19.3	0.4	7.2	2.8	8.5	1.8	6.0	4.0	0.5	0.7	0.6	0.4	4.6	2.7	2.7	1.8	6.7	3.9	222.5	128.8
EU-27	3.3	7.4	18.9	0.3	6.7	2.7	8.4	2.0	6.0	4.0	0.4	0.5	0.5	0.3	4.9	3.0	3.0	2.1	6.7	4.0	211.8	128.4
Central and Eastern Europe	4.9	8.3	18.9	0.6	8.4	3.0	9.7	1.4	6.0	4.1	0.6	0.9	0.9	0.5	3.6	2.1	1.7	1.3	6.2	3.7	253.8	130.6
Belarus	5.3	7.5	20.7	0.9	9.6	3.4	7.8	0.8	5.3	3.3	0.5	0.7	1.2	0.6	3.6	2.0	2.2	1.8	8.7	4.7	268.9	111.9
Bulgaria	5.5	8.0	17.2	1.0	7.2	2.5	9.3	1.7	8.4	5.4	0.5	0.4	1.0	0.4	4.2	2.9	1.2	0.9	4.9	3.4	231.7	126.3
Czech Republic	4.0	9.0	20.5	0.5	10.9	4.7	8.3	2.5	5.7	4.0	0.5	0.5	0.4	0.2	4.4	2.7	2.4	2.0	6.7	4.3	241.3	142.4
Hungary	2.3	8.1	17.9	1.0	8.0	2.6	9.9	2.9	4.5	3.1	0.6	0.6	0.4	0.2	4.6	2.9	1.7	1.2	7.8	4.6	306.3	163.6
Moldova	4.1	5.6	15.6	0.6	4.6	1.7	8.6	1.3	4.8	3.2	0.5	0.6	1.0	0.5	4.2	2.7	1.1	0.9	3.9	2.9	231.9	123.4
Poland	4.5	10.2	20.8	0.6	8.5	3.4	12.8	2.1	7.6	5.8	0.4	0.6	0.6	0.4	4.2	2.6	2.8	2.2	7.3	4.1	264.9	146.5
Romania	2.4	7.0	16.3	0.5	5.2	1.9	10.0	1.6	7.7	5.2	0.5	0.7	0.5	0.4	3.5	2.2	1.5	1.1	5.9	3.5	252.9	126.7
Russian Federation	5.2	8.1	19.9	0.6	9.0	3.2	9.2	1.2	5.5	3.8	0.8	1.3	1.0	0.6	3.5	2.0	1.5	1.2	5.7	3.6	258.2	130.5
Slovakia	5.4	8.0	22.3	0.6	9.1	4.1	7.6	1.8	7.3	4.9	0.4	0.5	0.7	0.3	4.3	2.7	2.1	2.0	7.3	4.3	261.4	137.5
Ukraine	5.8	7.9	15.7	0.6	7.9	2.5	9.0	0.8	5.2	3.3	0.5	0.7	1.1	0.8	3.0	1.6	1.1	0.7	6.1	3.5	228.1	115.9
Northern Europe	3.5	8.7	25.2	0.2	6.3	3.0	7.4	2.5	6.3	4.0	0.4	0.4	0.4	0.3	5.3	3.4	3.6	2.3	6.2	3.7	195.9	141.9
Denmark	3.7	9.5	33.7	0.4	6.1	2.9	9.8	3.8	6.6	4.7	0.4	0.4	0.5	0.2	4.7	3.7	3.8	2.0	6.5	4.3	222.3	167.6
Estonia	2.9	7.5	32.8	0.4	9.0	3.5	9.5	1.3	7.2	5.3	0.4	0.8	0.5	0.2	2.5	1.7	3.1	2.1	8.7	4.4	243.4	109.0
Finland	3.5	7.2	21.1	0.1	4.9	2.8	5.3	1.2	5.1	3.8	0.4	0.4	0.4	0.2	5.5	3.8	3.8	2.4	5.4	2.8	163.5	109.2
Iceland	2.0	5.3	26.8	0.0	7.2	3.1	8.0	1.1	6.5	5.4	1.1	0.6	0.0	0.4	4.3	1.7	3.2	2.1	5.9	2.4	161.1	121.4
Ireland	3.7	10.2	22.1	0.2	6.5	3.0	5.6	2.1	6.9	4.6	0.4	0.3	0.5	0.3	5.8	3.8	3.9	2.4	7.1	3.8	193.1	145.6
Latvia	7.1	12.4	30.2	0.5	10.9	4.6	13.2	1.5	8.0	5.7	0.4	0.9	0.8	0.7	5.0	3.4	2.7	2.0	6.4	4.2	276.5	139.1
Lithuania	4.8	11.9	36.1	0.3	12.6	3.8	11.0	1.6	7.3	5.5	0.6	0.6	0.5	0.3	4.8	2.5	3.2	2.2	8.2	5.1	291.1	129.7
Norway	2.9	9.4	32.0	0.4	6.0	2.0	7.1	2.3	6.5	4.3	0.5	0.5	0.2	0.1	5.3	3.3	4.5	2.8	5.6	3.5	182.0	134.3
Sweden	3.2	8.2	31.6	0.2	5.5	2.8	6.5	2.1	6.4	4.3	0.4	0.5	0.2	0.2	4.5	2.8	3.8	2.6	5.9	3.9	162.0	129.9
United Kingdom	3.3	8.4	22.8	0.2	6.2	3.1	7.3	2.8	6.2	3.7	0.3	0.4	0.5	0.4	5.6	3.6	3.6	2.3	6.2	3.6	196.9	147.5
Southern Europe	3.3	6.4	16.2	0.3	5.5	2.0	9.9	1.8	6.3	4.2	0.4	0.5	0.6	0.4	4.8	2.8	2.8	2.1	7.0	4.1	212.0	118.0
Albania	3.0	2.0	13.4	0.5	5.4	2.6	9.2	2.7	12.3	7.8	0.4	0.4	0.9	0.2	0.9	0.5	0.3	0.4	5.3	4.4	193.4	138.1
Bosnia Herzegovina	3.5	5.9	15.1	0.8	3.4	1.4	7.5	1.9	5.0	3.6	0.2	0.9	0.8	0.3	2.8	1.2	0.7	0.6	2.6	2.2	188.7	104.0
Croatia	4.5	9.3	26.0	0.8	9.7	2.8	9.7	2.0	8.1	5.8	0.5	0.5	0.5	0.3	5.2	3.7	2.1	2.1	6.9	4.4	287.5	143.1
Cyprus	3.1	5.8	17.9	0.3	1.8	1.1	6.7	1.2	4.0	3.0	0.7	0.6	0.4	0.3	4.7	3.1	3.0	1.9	6.7	3.6	148.7	96.2
Greece	2.6	6.2	17.7	0.4	4.7	1.8	9.8	1.6	8.2	5.9	0.4	0.4	1.5	0.9	1.7	1.0	2.2	1.6	9.2	5.3	203.6	107.4
Italy	3.2	6.8	14.1	0.2	5.9	2.1	8.7	1.5	5.8	3.6	0.5	0.5	0.6	0.3	5.7	3.3	3.2	2.4	7.5	4.3	200.1	122.4

(continued on next page)

Table 6b (continued)

	Corpus		Ovary	Prostate	Testis	Kidney		Bladder	Brain		Thyroid	Hodgkin	NHL		Multiple myeloma		Leukaemia		All sites			
	C54	C56	C61	C62	C64-66	C67	C70-72	C73	C81	C82-85,C96	C88 + C90	C91-95	C00-96/C44	M	F	M	F	M	F	M	F	
																						M
FYR Macedonia	8.2	7.6	23.5	0.9	3.0	1.9	12.0	1.7	9.9	5.3	0.3	0.4	0.7	0.5	2.7	1.2	1.1	0.6	6.3	3.3	271.4	153.7
Malta	4.8	10.3	13.6	0.0	6.5	3.0	7.3	8.1	4.8	2.4	0.0	0.2	0.0	0.0	7.4	3.7	2.4	2.1	6.2	2.2	173.4	115.7
Montenegro	4.2	7.7	22.1	0.0	5.0	2.2	9.5	2.8	7.6	5.3	0.0	0.8	0.0	0.0	4.2	2.2	1.6	1.1	5.7	3.9	248.6	151.3
Portugal	3.1	4.4	19.0	0.3	3.3	1.3	8.4	1.6	5.8	4.4	0.5	0.6	0.5	0.3	5.4	3.3	2.4	1.9	5.6	3.8	202.0	103.5
Serbia	4.4	8.6	22.6	0.7	6.1	2.5	8.7	2.3	9.4	6.7	0.4	0.7	0.9	0.6	4.7	3.2	2.4	1.6	8.0	4.8	272.2	164.9
Slovenia	3.9	9.3	32.5	0.5	9.0	3.3	10.8	2.9	7.2	3.7	0.6	0.3	0.5	0.1	6.4	4.0	3.9	2.6	8.1	4.1	259.1	142.8
Spain	2.9	5.3	15.2	0.2	5.0	1.9	12.5	1.9	5.3	3.6	0.3	0.4	0.4	0.3	4.1	2.5	2.6	1.8	5.8	3.3	207.8	99.5
Western Europe	3.0	7.0	18.7	0.3	7.1	2.8	6.6	1.9	5.5	3.6	0.4	0.4	0.4	0.2	5.0	3.0	3.1	2.1	6.7	4.1	201.2	125.5
Austria	3.0	6.9	18.1	0.5	5.6	2.7	5.5	1.8	5.0	3.5	0.5	0.5	0.4	0.1	5.3	3.5	2.9	2.0	7.3	4.4	199.4	126.4
Belgium	3.4	8.1	22.7	0.2	6.1	2.7	9.2	2.2	5.1	3.6	0.4	0.5	0.6	0.3	5.0	3.2	3.2	2.2	7.6	4.5	234.1	132.7
France	3.7	6.4	17.7	0.3	6.9	2.2	8.2	1.6	5.3	3.1	0.4	0.4	0.5	0.3	5.4	3.1	3.2	2.2	7.4	4.2	218.3	118.1
Germany	2.5	7.0	17.8	0.3	7.3	3.2	5.2	1.9	5.6	3.8	0.4	0.4	0.3	0.2	4.6	2.9	3.0	2.0	6.2	4.0	187.1	125.7
Luxembourg	8.1	7.6	18.4	0.0	2.6	0.7	5.7	1.8	7.1	3.5	0.3	0.0	0.0	0.0	4.7	2.6	2.3	2.0	7.4	4.7	184.7	124.8
The Netherlands	3.1	8.2	23.7	0.3	9.0	3.8	7.8	2.8	6.2	4.1	0.3	0.5	0.5	0.3	5.1	3.4	3.2	2.0	6.4	4.1	213.5	153.2
Switzerland	3.3	7.1	21.8	0.4	5.6	2.3	6.0	2.0	5.9	4.0	0.5	0.7	0.4	0.2	4.5	3.3	3.2	2.3	6.3	3.3	174.5	115.1

Countries for which no data were available are in italics.

egovina (254 in men, 195 in women), Albania (263, 234) and Greece (289, 192). Mortality rates reflect the frequency and the fatality of cancer, both high in men in Eastern and Central European countries e.g. Hungary (306). The high all-cancer mortality rate estimated in Danish women (168) is partially driven by the high incidence and mortality rates of breast cancer. The lowest mortality rates in males were estimated for Northern European countries, Finland (163) and Iceland (161), and in females for Southern European countries, Portugal (103) and Spain (99) (Figs. 3c, d and 4b).

3.2. Breast cancer

Breast cancer was the leading cancer site in women in all countries of Europe (Table 4) in 2012. There is a 3-fold variation (49–148 per 100,000) with a clear geographical pattern (Fig. 5). High incidence rates were estimated in Western European countries, notably in Belgium (147), France (137) and The Netherlands (131) and in Northern Europe, particularly in the United Kingdom (129) and in the Nordic countries, Denmark (143), Iceland (131) and Finland (121). In comparison, incidence rates in Eastern European countries such as the Ukraine (54) and Moldova (53) were much lower. The range of mortality rates varies twofold (15–36 per 100,000). Mortality rates were highest in the North (e.g. Belgium, 29 and Denmark, 28) and in the South (e.g. Serbia, 31 and Macedonia, 36). The high mortality rates in the northern countries reflect the high incidence, while in the south there is a high mortality to incidence ratio, a proxy of unfavourable survival (Fig. 5).

3.3. Colorectal cancer

The incidence rates of colorectal cancer are slightly higher in men than in women (Fig. 6a). Elevated rates of incidence were estimated in Central European countries — Slovakia (92 per 100,000), Hungary (87) and Czech Republic (81) in men, and in Norway (54), Denmark (53) and The Netherlands (50) in women. There is up to a fivefold variation in the incidence rates across Europe, with the lowest rates in the Balkan countries of Bosnia Herzegovina (30 in men, 19 in women), Greece (25, 17) and Albania (13, 11). Geographical patterns of mortality partially follow incidence, although mortality is high also in some countries with relatively low incidence rates (Moldova, Russia, Montenegro, Poland and Lithuania) (Fig. 6a and 6b).

3.4. Prostate cancer

Incidence rates of prostate cancer vary by more than 7-fold (25–193 per 100,000) the highest rates were estimated in Northern and Western European countries

Table 7a  
 Estimated number of new cancer cases (hundreds) by sex, cancer site and country, 2012.

	Oral cavity and pharynx C00–14		Oesophagus		Stomach		Colon and rectum		Liver		Gallbladder		Pancreas		Larynx		Lung		Melanoma		Breast	Cervix
	C00–14		C15		C16		C18–21		C22		C23–24		C25		C32		C33–34		C43		C50	C53
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	F	F
Europe	738.6	257.7	350.7	107.8	841.8	554.1	2416.2	2051.8	427.8	206.4	118.8	178.6	519.2	518.5	359.8	39.2	2907.1	1192.1	472.4	531.0	4638.2	583.5
EU-27	533.7	196.5	259.9	85.5	499.3	306.9	1916.2	1505.1	355.6	157.6	96.1	139.4	390.8	395.7	248.5	31.0	2114.0	981.9	395.7	425.0	3644.5	333.5
Central and Eastern Europe	290.3	79.5	110.4	26.1	410.8	285.7	703.2	695.4	94.8	64.8	33.6	65.8	177.7	168.9	153.3	11.7	1069.6	316.5	86.2	118.5	1236.2	338.8
Belarus	10.8	1.6	4.1	0.4	17.7	11.9	18.9	21.2	2.0	1.3	0.8	1.4	4.4	3.7	5.3	0.2	34.2	5.9	2.1	3.6	37.8	9.2
Bulgaria	6.5	2.0	1.8	0.4	9.9	6.7	27.1	22.1	4.2	2.2	1.3	1.8	6.9	5.5	6.0	0.3	32.5	6.9	2.3	2.1	39.3	12.5
Czech Republic	10.7	4.4	4.8	1.1	9.4	6.5	49.8	33.6	5.8	3.4	3.3	6.4	10.9	10.3	4.8	0.5	46.2	20.6	11.5	10.5	68.5	10.2
Hungary	20.6	6.4	5.1	1.0	11.2	8.4	47.5	36.9	4.3	2.0	2.3	4.1	9.1	9.5	8.7	1.2	58.9	34.0	5.7	5.5	50.9	11.8
Moldova	3.7	0.7	0.8	0.1	4.1	2.0	8.0	7.2	2.8	1.7	0.1	0.3	2.2	2.2	2.6	0.1	9.8	2.6	0.5	0.7	11.0	4.8
Poland	37.9	12.2	11.5	3.6	39.4	21.7	110.7	83.7	10.7	9.3	6.2	16.8	25.5	24.6	23.4	3.2	179.1	83.3	11.9	13.9	172.6	35.1
Romania	32.4	4.9	6.6	1.1	27.1	13.6	57.6	45.0	14.9	7.3	2.6	3.7	16.9	13.9	15.4	0.8	93.2	23.3	5.3	5.9	89.8	43.4
Russian Federation	112.7	35.3	57.2	15.4	218.4	165.8	267.5	331.8	38.5	29.6	12.2	21.9	72.1	73.1	60.2	4.0	456.0	102.1	32.1	55.0	575.0	153.4
Slovakia	8.2	1.7	2.4	0.4	5.3	3.7	23.5	16.2	2.6	1.4	1.3	2.6	4.4	4.4	2.6	0.2	18.0	7.3	4.0	4.1	26.4	6.1
Ukraine	46.7	10.5	16.2	2.6	68.3	45.4	92.7	97.8	9.0	6.6	3.6	6.8	25.5	21.8	24.3	1.1	141.8	30.7	10.8	17.1	164.7	52.3
Northern Europe	76.7	39.6	76.0	34.7	71.8	44.5	351.7	298.1	41.9	22.5	7.7	13.9	69.2	72.8	28.9	5.6	333.6	266.3	112.1	120.3	780.2	53.7
Denmark	6.1	3.0	3.0	1.5	4.4	1.9	25.4	23.0	2.3	0.8	1.1	1.4	5.1	5.1	2.1	0.5	23.0	22.6	7.3	8.7	52.2	3.6
Estonia	1.0	0.4	0.4	0.1	2.0	1.7	3.7	4.2	0.3	0.3	0.2	0.3	1.0	0.9	0.5	0.0	4.8	1.5	0.6	1.1	6.6	1.9
Finland	3.4	2.4	1.9	0.9	3.7	2.7	15.5	13.5	4.1	2.1	1.1	1.5	5.6	6.0	1.0	0.1	16.8	8.1	6.7	5.4	44.8	1.4
Iceland	0.2	0.1	0.2	0.1	0.2	0.1	0.8	0.8	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.8	0.8	0.2	0.3	2.3	0.1
Ireland	2.6	1.2	2.8	1.4	3.1	1.8	14.8	10.8	1.5	0.9	0.6	0.9	2.6	2.5	1.5	0.3	12.5	10.3	4.0	4.6	29.0	3.6
Latvia	1.7	0.5	1.1	0.3	3.8	2.6	5.3	6.3	1.0	0.6	0.2	0.4	1.7	2.0	1.3	0.1	9.5	2.4	0.9	1.4	11.5	2.8
Lithuania	3.0	0.8	1.7	0.3	5.4	3.3	7.7	7.9	1.1	0.6	0.4	0.6	2.5	2.3	1.7	0.1	12.8	2.8	1.2	1.6	14.8	6.2
Norway	3.1	2.2	1.7	0.6	2.7	2.1	19.7	19.5	1.2	0.7	0.8	0.8	3.6	3.7	1.0	0.2	15.7	12.8	7.7	7.4	28.9	2.9
Sweden	5.8	3.9	3.4	1.2	5.0	3.1	33.0	30.6	3.2	1.7	1.4	2.3	4.8	4.8	1.5	0.3	19.3	19.6	14.6	14.6	66.2	4.5
United Kingdom	50.0	25.0	59.7	28.3	41.7	25.2	226.0	181.6	27.2	14.7	2.0	5.5	42.1	45.4	18.1	3.9	218.5	185.4	69.0	75.5	524.0	26.6
Southern Europe	126.7	48.7	45.1	11.2	182.9	120.7	599.7	449.5	141.2	64.2	36.0	44.9	115.4	115.1	96.2	9.1	698.7	217.5	92.7	99.6	1007.2	92.8
Albania	1.3	0.8	0.3	0.2	5.0	3.4	1.8	1.7	1.0	0.7	0.1	0.1	1.3	0.7	0.9	0.4	7.3	3.7	0.2	0.2	10.2	0.9
Bosnia Herzegovina	1.9	1.0	0.5	0.2	3.1	2.2	6.2	4.9	1.7	1.4	0.7	0.9	1.5	1.1	2.3	0.4	13.4	3.9	0.5	0.5	11.5	3.6
Croatia	5.2	1.7	2.0	0.4	5.9	3.8	18.0	14.1	3.3	1.4	1.2	2.2	3.5	3.3	3.4	0.4	22.6	7.9	3.1	3.6	26.4	3.3
Cyprus	0.2	0.1	0.1	0.1	0.6	0.3	2.3	2.1	0.4	0.2	0.1	0.2	0.4	0.4	0.2	0.0	2.1	0.7	0.3	0.3	6.0	0.3
Greece	4.0	1.7	1.8	0.4	9.0	5.8	20.7	18.1	7.1	3.5	2.1	2.0	8.3	7.1	4.8	0.4	56.8	12.0	2.6	2.1	49.3	4.2
Italy	38.4	20.0	13.4	4.7	75.5	54.5	265.7	215.4	71.9	35.5	16.7	22.8	49.5	57.4	37.1	3.4	269.3	103.1	48.9	51.2	506.6	29.2
FYR Macedonia	0.7	0.3	0.2	0.0	3.5	1.9	4.2	3.7	0.9	0.5	0.2	0.3	1.7	0.8	1.3	0.1	10.4	2.2	0.8	0.7	11.5	1.7
Malta	0.4	0.2	0.1	0.1	0.4	0.3	1.5	1.2	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.1	1.5	0.3	0.2	0.2	3.1	0.1
Montenegro	0.5	0.2	0.1	0.0	0.5	0.3	1.6	1.1	0.3	0.2	0.1	0.2	0.3	0.3	0.4	0.1	2.7	0.9	0.2	0.2	2.6	0.8
Portugal	16.8	4.0	5.3	0.8	18.3	11.8	42.1	29.2	7.7	2.3	3.0	1.9	6.7	5.6	8.0	0.3	32.1	9.8	4.6	6.4	60.9	7.2
Serbia	9.8	3.3	3.0	0.8	9.3	5.3	33.7	21.4	5.2	2.8	1.5	2.5	6.7	5.8	7.4	0.9	52.8	19.9	5.9	4.3	54.2	15.0
Slovenia	2.5	0.8	0.7	0.2	2.9	1.8	9.3	6.9	1.6	0.6	0.7	1.3	1.8	2.1	0.9	0.1	9.8	3.8	2.5	2.8	12.6	1.4
Spain	45.0	14.7	17.6	3.3	48.7	29.4	192.6	129.8	40.1	15.2	9.5	10.6	33.4	30.3	29.1	2.7	217.8	49.4	22.9	27.2	252.2	25.1

(continued on next page)



Table 7a (continued)

	Oral cavity and pharynx C00–14		Oesophagus		Stomach		Colon and rectum		Liver		Gallbladder		Pancreas		Larynx		Lung		Melanoma		Breast	Cervix
	C00–14		C15		C16		C18–21		C22		C23–24		C25		C32		C33–34		C43		C50	C53
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	F	F
Western Europe	244.9	89.9	119.2	35.9	176.3	103.3	761.6	608.9	149.9	55.0	41.4	54.1	157.0	161.6	81.4	12.8	805.2	391.7	181.5	192.6	1614.6	98.2
Austria	8.2	3.3	3.7	0.8	7.6	5.5	27.9	20.8	6.4	3.1	1.5	2.1	7.8	8.0	2.5	0.4	28.5	17.3	6.6	6.7	52.5	3.6
Belgium	13.8	4.9	7.2	2.5	8.8	5.3	48.0	38.9	4.5	2.0	1.7	2.0	6.7	6.3	6.2	1.0	57.6	20.4	7.6	11.8	103.4	6.4
France	80.7	31.7	32.6	11.6	42.6	22.5	215.2	193.0	65.0	18.3	11.6	13.5	45.5	45.9	28.3	5.2	280.3	120.1	47.2	51.5	542.5	28.6
Germany	120.5	38.4	55.4	14.1	100.8	59.3	365.7	270.1	64.0	28.1	21.8	31.6	79.7	84.8	36.1	4.5	341.6	166.5	85.1	83.7	716.2	50.0
Luxembourg	0.5	0.2	0.3	0.1	0.4	0.3	1.8	1.3	0.5	0.2	0.0	0.0	0.3	0.3	0.1	0.0	1.7	0.9	0.4	0.4	3.6	0.2
The Netherlands	12.8	7.9	15.6	5.3	12.3	7.3	76.0	63.2	3.4	1.4	3.4	2.9	11.4	10.0	6.1	1.3	69.9	49.8	22.0	26.1	139.0	7.5
Switzerland	8.4	3.6	4.4	1.6	3.8	3.1	27.1	21.7	6.2	1.9	1.5	1.9	5.5	6.2	2.1	0.3	25.6	16.8	12.5	12.3	57.5	1.9
	Corpus	Ovary	Prostate	Testis	Kidney		Bladder		Brain		Thyroid		Hodgkin	NHL		Multiple myeloma C88 + C90		Leukaemia		All sites		
	C54	C56	C61	C62	C64–66		C67		C70–72		C73		C81	C82–85, C96		C88 + C90		C91–95		C00–96/C44		
	F	F	M	M	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Europe	989.2	655.4	4167.3	215.3	717.4	434.4	1182.8	329.1	307.2	263.8	122.8	406.5	92.8	83.0	495.3	439.0	204.9	184.4	464.1	358.6	18290.7	16105.3
EU-27	643.3	441.5	3599.4	180.1	537.6	306.3	964.4	266.9	231.3	194.2	96.1	272.5	66.6	56.2	422.4	365.3	179.4	154.8	359.5	262.8	14342.6	12003.2
Central and Eastern Europe	420.3	282.6	654.3	49.1	238.0	165.5	308.7	89.0	98.5	96.9	31.6	159.6	30.2	30.7	87.7	93.3	31.6	39.7	131.7	117.2	5137.8	5230.9
Belarus	14.3	8.4	21.4	1.3	9.3	6.5	8.7	2.1	2.4	2.6	1.9	9.1	1.2	1.4	2.6	2.4	1.2	1.7	5.7	5.0	164.4	159.8
Bulgaria	12.8	9.0	18.2	2.2	5.8	3.0	12.8	3.8	4.4	3.9	0.5	2.6	0.8	0.7	2.8	2.6	1.2	1.2	3.4	2.7	164.8	155.7
Czech Republic	18.9	10.9	68.5	5.0	21.2	12.0	17.7	6.9	4.2	4.2	2.1	8.8	1.5	1.0	6.3	6.4	2.3	2.0	5.7	4.5	307.2	269.1
Hungary	7.9	10.0	31.7	5.7	10.3	5.3	18.7	8.2	3.0	3.0	1.5	5.3	0.8	0.7	4.7	5.2	1.2	1.4	5.9	5.2	269.7	235.0
Moldova	3.5	2.0	4.4	0.4	1.4	0.9	2.7	0.8	1.0	0.8	0.4	1.5	0.3	0.2	1.1	1.1	0.2	0.3	1.0	0.8	50.8	48.1
Poland	59.1	44.6	110.3	9.4	30.5	21.9	61.1	18.5	20.9	23.8	3.5	14.2	4.2	3.1	12.2	14.4	6.1	8.1	18.9	14.1	777.1	745.1
Romania	15.4	18.5	45.3	3.4	12.5	6.9	31.5	6.7	9.2	8.0	1.3	6.6	1.4	1.8	8.0	7.7	3.2	3.2	10.1	7.4	431.5	356.1
Russian Federation	209.7	133.7	268.9	13.3	109.2	83.9	107.9	30.6	37.6	36.1	15.0	86.8	14.0	15.1	36.8	40.4	11.6	15.8	58.7	59.0	2154.2	2429.6
Slovakia	9.3	5.2	19.3	2.8	6.5	4.1	7.2	2.2	2.7	2.5	0.7	2.3	0.6	0.7	2.7	3.1	1.2	1.6	3.8	2.7	126.1	114.3
Ukraine	69.3	40.3	66.4	5.7	31.4	21.0	40.3	9.3	13.2	12.0	4.8	22.4	5.5	5.9	10.5	10.1	3.5	4.3	18.6	15.8	692.0	718.0
Northern Europe	137.6	99.9	814.4	36.3	95.1	58.9	126.8	46.3	47.3	37.6	11.8	37.5	14.5	11.0	97.7	82.4	39.1	31.4	73.0	51.9	2708.0	2535.0
Denmark	7.5	5.4	52.0	3.4	4.9	2.6	13.1	4.7	2.9	2.3	0.7	1.5	0.7	0.6	5.7	4.6	1.7	1.5	3.5	2.4	185.6	175.6
Estonia	2.0	1.6	10.2	0.2	1.7	1.2	1.5	0.6	0.5	0.4	0.2	0.7	0.2	0.1	0.7	0.6	0.3	0.3	0.9	0.9	32.4	28.8
Finland	8.6	4.6	53.7	1.4	4.8	4.1	8.7	2.2	2.4	1.9	1.0	2.9	0.8	0.6	6.4	5.7	2.0	1.6	3.7	2.8	152.0	132.2
Iceland	0.3	0.2	2.7	0.1	0.3	0.2	0.5	0.2	0.1	0.1	0.1	0.2	0.0	0.0	0.3	0.2	0.1	0.1	0.2	0.1	7.6	6.9
Ireland	3.7	3.8	37.9	2.2	3.5	2.2	4.7	2.0	2.0	1.5	0.4	1.1	0.7	0.6	3.9	3.2	1.6	1.3	3.9	2.1	113.0	95.0
Latvia	3.9	3.0	14.8	0.6	2.6	1.9	3.0	1.2	1.2	1.4	0.3	1.3	0.2	0.2	0.9	1.0	0.4	0.5	1.3	1.3	53.9	49.6
Lithuania	5.7	3.7	15.2	0.3	4.7	3.1	3.9	1.8	1.3	1.8	0.8	4.9	0.3	0.3	1.6	1.9	0.8	1.1	2.1	2.2	72.5	72.7
Norway	7.7	4.2	57.9	3.1	5.1	2.8	10.2	3.6	3.0	2.6	0.8	1.9	0.8	0.5	5.0	4.1	2.6	1.9	3.5	2.5	158.6	123.6
Sweden	14.3	6.6	116.0	3.3	6.8	4.4	17.8	5.7	5.8	7.3	1.0	2.9	1.0	0.7	8.8	7.2	3.5	2.8	6.4	5.1	277.4	227.5
United Kingdom	83.8	66.9	454.1	21.6	60.7	36.5	63.5	24.3	28.0	18.6	6.5	20.0	9.8	7.2	64.5	53.9	26.1	20.4	47.6	32.5	1655.0	1623.1
Southern Europe	195.0	128.6	912.7	47.8	153.9	76.2	347.6	80.4	76.9	62.9	38.2	99.3	22.1	18.3	127.2	104.3	50.8	45.9	111.5	81.4	4300.8	3384.6
Albania	2.2	0.6	3.4	0.8	1.5	0.8	3.1	1.1	2.2	1.6	0.2	0.4	0.3	0.1	0.2	0.1	0.0	0.1	1.0	0.9	36.4	35.0

Bosnia Herzegovina	3.2	2.5	6.9	0.6	1.8	1.2	3.7	1.0	1.6	1.4	0.2	0.6	0.2	0.3	0.6	0.6	0.3	0.2	0.8	0.7	52.0	47.1
Croatia	6.0	4.3	20.2	1.9	5.2	3.0	7.5	3.0	3.0	2.9	1.1	4.6	0.8	0.8	2.6	2.8	1.1	1.2	2.6	2.0	122.2	106.7
Cyprus	0.9	0.6	4.8	0.3	0.3	0.2	2.0	0.3	0.3	0.3	0.2	1.0	0.1	0.1	0.6	0.6	0.3	0.2	0.9	0.6	18.1	16.3
Greece	8.7	9.2	32.4	1.6	7.2	3.8	23.0	4.7	7.0	6.3	0.4	2.1	1.8	1.9	2.6	2.1	2.9	2.7	12.5	10.0	233.2	176.5
Italy	84.7	59.1	445.3	26.6	76.8	36.2	146.7	36.1	27.6	21.7	26.5	68.1	9.2	6.7	69.5	56.0	27.8	25.9	49.0	34.7	1921.5	1623.1
FYR Macedonia	4.5	1.7	4.4	0.5	0.6	0.5	3.2	0.5	1.5	0.7	0.1	0.3	0.2	0.1	0.6	0.3	0.1	0.1	0.8	0.5	38.6	34.7
Malta	0.6	0.5	2.0	0.2	0.4	0.2	1.0	0.3	0.2	0.1	0.1	0.3	0.0	0.1	0.2	0.3	0.1	0.1	0.3	0.2	10.1	9.0
Montenegro	0.7	0.5	1.5	0.1	0.4	0.2	0.7	0.2	0.4	0.3	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.3	0.2	11.2	10.0
Portugal	14.9	6.2	66.2	3.0	6.7	3.4	23.4	5.4	4.9	4.4	1.3	4.5	1.5	1.4	10.2	8.3	2.7	2.5	6.2	5.1	284.8	207.0
Serbia	14.4	9.4	31.4	2.9	7.3	4.0	13.7	4.7	6.8	5.9	0.7	2.2	1.4	1.3	4.8	4.2	1.6	1.3	5.6	4.0	223.9	198.3
Slovenia	3.1	1.9	15.7	1.1	2.5	1.5	3.5	1.1	0.9	0.7	0.4	1.6	0.2	0.2	1.4	1.5	0.7	0.6	1.2	1.0	63.4	51.2
Spain	51.2	32.4	278.5	8.2	43.5	21.3	115.8	22.1	20.6	16.6	7.0	13.6	6.2	5.3	33.8	27.5	13.1	11.1	30.3	21.6	1285.5	869.8
Western Europe	236.3	144.2	1785.8	82.2	230.4	133.9	399.7	113.3	84.4	66.5	41.2	110.1	26.0	23.0	182.7	159.0	83.5	67.3	147.9	108.1	6144.2	4954.7
Austria	9.1	6.4	58.3	3.7	8.2	5.0	16.3	5.3	2.9	3.0	3.3	8.7	0.9	0.7	6.2	5.5	2.5	2.3	5.8	4.7	222.7	188.4
Belgium	15.2	8.4	93.9	3.0	11.3	6.3	34.8	8.7	4.7	3.6	2.4	6.1	1.8	1.2	11.1	9.6	4.7	3.6	8.7	5.9	361.0	292.4
France	68.5	45.9	736.1	23.3	73.6	36.6	92.8	18.9	26.7	21.0	16.5	50.6	8.7	8.8	62.8	52.3	32.9	27.4	54.5	37.3	2113.2	1603.6
Germany	112.0	66.7	682.6	40.3	113.5	72.6	216.6	67.5	39.8	31.4	15.7	36.6	10.8	9.4	76.7	69.2	33.1	26.4	62.7	47.7	2704.0	2233.8
Luxembourg	1.2	0.4	3.4	0.2	0.5	0.2	0.7	0.3	0.3	0.1	0.2	0.5	0.0	0.1	0.4	0.3	0.1	0.2	0.3	0.3	13.0	11.8
The Netherlands	20.4	10.3	133.0	7.1	16.8	10.0	22.5	7.5	6.9	4.8	1.6	4.0	2.4	1.8	17.7	14.7	7.0	5.0	9.9	7.8	494.0	440.5
Switzerland	10.0	6.2	78.5	4.5	6.5	3.0	16.0	5.1	3.2	2.6	1.5	3.8	1.4	1.0	7.8	7.3	3.3	2.5	6.0	4.4	236.2	184.3

Countries for which no data were available are in italics.

such as Norway (193) and France (187) and the lowest in Central and Eastern European countries – Republic of Moldova (30) and Albania (25). In comparison with incidence, mortality rates vary much less, from the highest estimated rates in Lithuania (36) or Denmark (34) to the lowest in Malta (14) or Albania (13) (Fig. 7).

### 3.5. Lung cancer

In men, incidence was highest in Central and Eastern European countries – Hungary (109), FYR of Macedonia (102), Serbia (99) and Poland (90) and lowest in the Northern European countries, for example in Finland (45) and Sweden (29). The reverse was seen in women: elevated rates were estimated in Northern Europe (e.g. Denmark (55) and The Netherlands (44)) and low rates in Eastern Europe (e.g. Ukraine and Belarus (9) or Russian Federation (10)). For both sexes combined the highest rates were seen in Hungary and the lowest in Cyprus (Fig. 8). Geographical patterns of mortality are quite similar to those of incidence for both sexes (Table 6b), due to the rapid course of the disease after diagnosis. Lung cancer is the leading cause of cancer death amongst men in all countries except Sweden, and women die from lung cancer more commonly than from breast cancer in a growing number of countries (Table 4).

## 4. Discussion

This timely and comparative situation analysis of the cancer burden in Europe reveals variations in incidence and mortality rates. These reflect variability in the national health system policies (e.g. organised screening for breast, prostate, cervical and colorectal cancers), the varying prevalence – of risk factors between countries and regions, and disparities in human development and the effective delivery of cancer control measures. Strategies to reduce the extent of the disease burden on the continent evidently need to be established locally, to reflect the profile of the observed cancer rates in each European country and in comparison with the pattern in other countries. We estimated 3.45 million new cases and 1.75 million deaths from cancer in Europe in 2012. In combination, cancers of the female breast, colorectal, prostate and lung represent almost half of the overall burden of cancer in Europe. The same diseases are also major causes of cancer death in Europe in 2012, with stomach and pancreatic cancer ranking 4th and 5th respectively, ahead of prostate cancer.

Since the annual statistics published by cancer registries need 2–5 years to be finalised, the short-term predictions are the best alternative to provide up-to-date figures to timely inform cancer control policies. Additional estimations were required where national incidence data were not available, using incidence and

Table 7b  
Estimated number of cancer deaths (hundreds) by sex, cancer site and country, 2012.

	Oral cavity and pharynx C00–14		Oesophagus C15		Stomach C16		Colon and rectum C18–21		Liver C22		Gallbladder C23–24		Pancreas C25		Larynx C32		Lung C33–34		Melanoma C43		Breast C50	Cervix C53
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	F	F
	Europe	342.5	94.1	303.1	91.9	636.1	436.6	1131.6	1015.1	398.9	222.5	78.9	129.8	525.8	518.8	180.7	17.0	2544.4	990.2	120.5	101.5	1311.7
EU-27	214.8	67.0	222.4	73.8	348.8	227.8	818.0	681.8	315.9	164.0	61.3	98.5	388.9	390.6	107.7	12.8	1833.7	814.1	88.1	69.2	905.8	129.8
Central and Eastern Europe	179.7	37.0	98.9	21.4	343.1	239.8	425.5	419.3	108.1	76.1	26.6	52.7	180.5	169.7	97.6	6.3	956.9	263.0	38.5	39.7	487.2	154.4
Belarus	7.1	0.7	3.8	0.3	15.0	9.9	10.8	11.4	1.9	1.0	0.5	0.6	4.8	3.6	3.8	0.1	30.4	3.8	1.1	1.4	12.6	3.7
Bulgaria	4.2	1.6	1.6	0.3	8.3	5.2	15.2	12.1	5.3	3.3	0.7	1.0	6.0	4.5	4.1	0.3	30.2	6.4	1.1	0.8	13.9	4.4
Czech Republic	5.6	1.6	3.9	0.8	6.5	4.5	21.8	14.5	4.4	2.6	2.6	5.0	9.5	9.8	2.1	0.2	36.6	15.7	2.0	1.4	16.2	3.1
Hungary	12.0	2.6	4.5	0.9	8.9	6.8	25.9	20.7	4.1	2.1	1.9	3.5	8.9	9.4	4.5	0.6	52.4	28.3	1.9	1.5	19.1	4.6
Moldova	2.5	0.3	0.7	0.1	3.4	1.6	4.9	4.1	3.1	1.9	0.1	0.2	2.1	1.8	1.7	0.1	8.3	2.0	0.3	0.2	5.5	2.1
Poland	19.2	5.2	11.1	3.1	33.7	18.3	63.7	49.8	11.0	9.6	5.1	13.9	24.6	23.9	13.1	1.8	165.3	68.4	7.0	6.5	53.7	18.6
Romania	19.6	2.4	6.0	1.1	22.2	11.5	32.3	24.5	18.2	10.1	2.0	2.6	15.5	12.4	9.5	0.6	80.2	20.5	1.9	1.8	32.4	19.1
Russian Federation	73.2	17.4	52.1	12.9	185.4	143.1	181.2	217.9	48.5	36.8	10.0	18.4	81.7	82.0	41.2	1.9	418.9	90.0	16.9	19.4	245.4	73.7
Slovakia	5.4	0.8	2.2	0.4	3.7	2.7	10.5	7.4	2.1	1.3	1.0	1.9	3.8	4.4	1.6	0.1	15.1	4.7	1.0	0.9	7.0	2.3
Ukraine	30.9	4.5	13.1	1.6	56.0	36.1	59.3	57.0	9.5	7.3	2.8	5.5	23.8	17.9	16.1	0.6	119.5	23.2	5.4	5.8	81.2	22.7
Northern Europe	26.4	12.5	69.3	31.1	48.8	31.7	141.2	125.7	38.8	24.1	6.3	11.0	69.3	72.9	11.6	2.0	294.2	227.7	22.7	16.6	177.7	19.4
Denmark	2.5	1.1	3.6	1.3	2.2	1.3	10.2	9.8	2.3	0.7	0.5	0.7	4.6	4.2	0.9	0.2	20.0	18.1	1.3	1.0	12.0	1.0
Estonia	0.5	0.2	0.5	0.1	1.3	1.2	2.0	1.8	0.4	0.3	0.1	0.3	1.0	1.1	0.3	0.0	4.1	1.3	0.3	0.3	1.7	0.6
Finland	1.1	0.7	1.6	0.8	2.7	2.1	6.1	5.5	3.0	1.9	0.8	1.3	5.0	5.5	0.3	0.1	14.7	6.6	1.5	0.7	8.6	0.5
Iceland	0.0	0.0	0.1	0.0	0.1	0.1	0.3	0.2	0.1	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.7	0.7	0.1	0.1	0.4	0.0
Ireland	1.0	0.4	2.4	1.2	2.0	1.2	5.9	4.0	1.3	1.0	0.2	0.3	2.5	2.4	0.6	0.1	10.5	7.3	0.9	0.5	7.0	1.0
Latvia	1.2	0.3	1.1	0.2	2.8	2.1	3.3	3.6	0.8	0.6	0.2	0.3	1.8	1.9	0.8	0.1	8.4	1.7	0.3	0.5	4.3	1.4
Lithuania	2.4	0.5	1.6	0.3	4.0	2.7	5.0	4.9	1.1	0.7	0.3	0.5	2.4	2.2	1.5	0.1	11.0	1.9	0.6	0.5	6.1	2.2
Norway	0.8	0.5	1.5	0.5	1.6	1.5	7.3	7.8	1.0	0.8	0.2	0.2	3.4	3.6	0.4	0.0	12.5	9.7	2.1	1.2	6.3	1.0
Sweden	2.0	1.2	3.1	1.2	4.0	2.4	13.9	13.4	3.9	2.3	1.7	2.9	7.6	8.8	0.5	0.1	18.3	18.6	3.4	2.3	14.5	1.9
United Kingdom	15.0	7.6	53.7	25.6	28.2	17.1	87.3	74.7	25.0	15.6	2.4	4.5	41.0	43.1	6.2	1.4	194.0	161.9	12.5	9.5	116.8	9.8
Southern Europe	54.5	18.7	40.9	10.1	138.3	92.5	271.0	209.6	122.0	63.7	26.1	35.8	115.0	112.3	43.9	4.2	612.9	182.7	23.1	17.3	274.5	35.3
Albania	0.7	0.5	0.4	0.2	4.3	2.9	1.0	0.9	1.5	1.0	0.1	0.1	1.3	0.8	0.6	0.3	6.9	3.6	0.1	0.1	3.2	0.3
Bosnia Herzegovina	0.5	0.3	0.7	0.3	2.8	2.0	4.2	3.3	2.7	2.1	0.7	0.7	2.1	1.6	1.4	0.3	13.6	3.7	0.3	0.2	4.3	0.9
Croatia	3.2	0.5	1.8	0.4	4.8	3.1	11.5	8.6	2.8	1.6	1.0	1.7	3.6	3.5	1.9	0.2	21.2	6.7	1.1	1.0	9.2	1.4
Cyprus	0.1	0.0	0.1	0.0	0.4	0.3	0.8	0.6	0.3	0.2	0.1	0.1	0.5	0.3	0.2	0.0	2.0	0.5	0.1	0.0	1.3	0.2
Greece	2.1	0.9	1.7	0.4	8.1	5.2	13.5	11.8	9.2	4.8	1.8	1.7	8.6	7.7	3.3	0.3	53.0	11.4	1.2	0.8	21.4	2.1
Italy	18.6	8.4	13.1	4.4	57.2	41.9	102.5	90.3	60.1	31.9	14.0	19.7	50.7	55.6	15.0	1.5	246.9	88.5	10.7	7.4	128.0	10.2

FYR Macedonia	0.4	0.2	0.2	0.0	3.1	1.7	2.4	2.1	1.1	0.7	0.1	0.2	1.8	0.8	0.8	0.1	9.4	2.1	0.4	0.3	4.3	0.8
Malta	0.2	0.1	0.1	0.0	0.2	0.1	0.6	0.5	0.2	0.1	0.0	0.0	0.3	0.3	0.1	0.0	1.2	0.2	0.1	0.0	0.8	0.0
Montenegro	0.2	0.1	0.2	0.0	0.5	0.3	1.0	0.7	0.4	0.3	0.1	0.1	0.4	0.3	0.2	0.0	2.6	0.9	0.1	0.1	1.0	0.3
Portugal	6.2	1.3	4.7	0.7	13.9	9.0	22.4	15.6	6.6	2.5	1.7	1.4	6.9	5.8	3.5	0.2	26.4	8.0	1.1	1.1	15.7	3.9
Serbia	5.4	1.4	2.9	0.7	7.7	4.3	19.2	12.1	5.4	3.1	1.4	2.1	7.0	6.3	4.1	0.5	47.5	16.9	2.1	1.3	20.4	6.1
Slovenia	1.2	0.3	0.6	0.2	2.0	1.3	4.6	3.5	1.3	0.6	0.5	1.0	1.7	2.1	0.4	0.0	8.0	3.4	0.6	0.7	4.2	0.6
Spain	15.8	4.9	14.6	2.7	33.4	20.5	87.4	59.6	30.5	14.9	4.8	6.9	30.0	27.2	12.4	0.9	174.3	36.9	5.3	4.4	60.8	8.5
Western Europe	81.9	25.9	94.0	29.4	105.9	72.6	294.0	260.6	130.0	58.6	19.9	30.3	160.9	164.0	27.7	4.5	680.4	316.8	36.2	27.8	372.3	34.8
Austria	3.2	1.1	2.9	0.6	4.7	3.9	12.1	9.8	5.9	3.1	0.9	1.4	7.3	7.6	1.0	0.2	23.4	13.2	2.2	1.3	15.1	1.8
Belgium	4.5	1.3	5.2	2.0	5.9	3.8	18.4	16.7	4.6	3.0	0.8	1.1	7.9	8.0	2.4	0.3	56.4	15.4	1.6	1.4	25.2	2.2
France	29.7	7.9	30.0	8.3	28.5	15.7	89.9	81.6	59.3	21.2	4.8	6.5	49.1	46.8	9.7	1.3	229.1	85.3	10.6	7.8	119.3	11.7
Germany	37.7	12.5	39.0	12.7	55.8	41.3	134.6	120.1	50.5	26.7	11.2	17.9	79.0	82.9	12.0	2.1	287.0	147.2	14.7	12.0	168.3	15.7
Luxembourg	0.1	0.0	0.2	0.1	0.2	0.1	0.7	0.6	0.4	0.2	0.0	0.0	0.3	0.3	0.1	0.0	1.5	0.7	0.1	0.0	0.7	0.1
The Netherlands	3.9	2.0	13.4	4.7	8.2	5.7	27.6	24.8	4.3	2.5	1.5	2.0	12.4	12.5	1.6	0.5	63.9	42.2	4.6	3.9	31.6	2.4
Switzerland	2.9	1.1	3.3	1.1	2.6	2.2	10.7	7.2	5.0	1.9	0.7	1.3	4.9	5.9	0.9	0.2	19.1	12.9	2.4	1.4	12.0	0.9
	Corpus	Ovary	Prostate	Testis	Kidney		Bladder		Brain		Thyroid		Hodgkin		NHL		Multiple myeloma		Leukaemia		All sites	
	C54	C56	C61	C62	C64–66		C67		C70–72		C73		C81		C82–85,C96		C88 + C90		C91–95		C00–96/C44	
	F	F	M	M	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Europe	237.2	427.0	922.4	16.1	312.9	176.6	394.9	128.7	245.5	204.3	20.7	42.7	26.2	20.0	203.3	175.3	122.2	120.7	294.9	242.7	9759.2	7786.3
EU-27	146.8	297.6	710.2	9.1	222.8	124.4	299.1	103.4	180.1	145.5	13.6	22.5	15.3	11.4	163.8	140.3	103.9	99.3	229.2	181.9	7075.0	5549.3
Central and Eastern Europe	107.2	168.1	258.6	9.0	117.0	68.5	132.3	35.4	84.7	78.6	8.4	22.8	12.6	9.9	50.7	45.6	23.6	28.8	85.9	78.9	3512.3	2869.6
Belarus	3.6	4.8	8.3	0.4	4.1	2.3	3.2	0.7	2.4	2.0	0.2	0.5	0.5	0.4	1.5	1.4	0.9	1.2	3.6	3.3	112.8	77.5
Bulgaria	3.2	4.4	8.6	0.4	3.2	1.5	4.4	1.2	3.6	2.9	0.2	0.3	0.4	0.2	1.8	1.6	0.5	0.5	2.1	1.9	105.5	75.1
Czech Republic	3.5	7.1	12.7	0.3	6.7	4.3	5.1	2.3	3.4	3.0	0.3	0.4	0.2	0.2	2.7	2.4	1.5	1.8	4.1	3.8	148.0	121.1
Hungary	2.1	6.4	10.3	0.5	4.4	2.4	5.6	2.6	2.4	2.3	0.3	0.5	0.2	0.2	2.5	2.5	0.9	1.1	4.3	4.0	167.6	134.9
Moldova	0.9	1.2	2.2	0.1	0.7	0.4	1.3	0.3	0.8	0.6	0.1	0.1	0.2	0.1	0.7	0.6	0.2	0.2	0.6	0.6	36.4	26.5
Poland	13.1	26.9	42.4	1.2	16.9	10.3	25.8	6.9	15.1	15.2	0.8	1.8	1.3	0.9	8.3	7.4	5.6	6.6	14.6	12.0	530.3	419.3
Romania	3.6	10.2	20.2	0.6	5.9	3.0	11.8	2.9	8.6	7.3	0.5	1.1	0.6	0.6	4.0	3.4	1.8	1.7	6.7	5.0	288.8	193.8
Russian Federation	54.8	79.7	114.8	4.0	56.0	34.2	53.9	14.5	35.6	34.6	4.8	15.4	6.6	5.1	21.7	20.1	9.4	12.4	35.1	36.1	1571.3	1382.2
Slovakia	2.1	2.8	5.3	0.2	2.3	1.6	1.9	0.7	1.9	1.7	0.1	0.2	0.2	0.1	1.1	1.0	0.5	0.8	1.8	1.6	66.5	51.3
Ukraine	20.4	24.5	33.7	1.3	16.7	8.7	19.3	3.3	11.0	9.0	1.1	2.5	2.5	2.2	6.4	5.2	2.4	2.5	12.9	10.7	485.0	387.9
Northern Europe	28.9	65.9	180.4	1.2	40.7	25.6	51.5	23.8	36.1	26.9	2.4	3.9	2.6	2.3	35.1	29.7	24.3	20.6	41.1	31.1	1286.6	1151.7
Denmark	1.7	4.0	13.2	0.1	2.2	1.3	3.8	1.8	2.2	1.8	0.1	0.2	0.2	0.1	1.8	1.7	1.5	1.0	2.4	2.0	82.6	74.1
Estonia	0.4	0.9	2.4	0.0	0.6	0.4	0.7	0.2	0.5	0.6	0.0	0.1	0.0	0.0	0.2	0.2	0.2	0.3	0.6	0.6	17.0	13.7
Finland	1.8	3.3	8.3	0.0	1.8	1.5	2.0	0.7	1.7	1.5	0.2	0.2	0.1	0.1	2.1	2.1	1.4	1.3	2.0	1.4	60.9	53.1
Iceland	0.0	0.1	0.5	0.0	0.1	0.1	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	2.9	2.4

(continued on next page)

Table 7b (continued)

	Corpus		Ovary	Prostate		Testis		Kidney		Bladder		Brain		Thyroid		Hodgkin		NHL		Multiple myeloma C88 + C90		Leukaemia		All sites	
	C54	C56	C61	C62	C64–66		C67	C70–72		C73	C81		C82–85,C96		C88 + C90		C91–95		C00–96/C44						
	F	F	M	M	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Ireland	1.0	2.6	5.2	0.1	1.5	0.8	1.3	0.6	1.6	1.1	0.1	0.1	0.1	0.1	1.3	1.1	0.9	0.7	1.7	1.1	44.4	39.1			
Latvia	1.5	2.2	3.6	0.1	1.3	1.0	1.6	0.4	0.9	1.0	0.0	0.2	0.1	0.1	0.6	0.7	0.3	0.4	0.7	0.9	31.8	27.9			
Lithuania	1.3	3.0	6.1	0.1	2.0	1.1	1.8	0.6	1.2	1.4	0.1	0.2	0.1	0.1	0.8	0.8	0.5	0.6	1.3	1.4	46.9	35.9			
Norway	1.2	3.3	10.5	0.1	1.8	0.8	2.3	1.0	1.8	1.4	0.2	0.2	0.1	0.0	1.6	1.3	1.4	1.1	1.7	1.4	56.5	49.9			
Sweden	2.9	6.1	24.4	0.1	3.9	2.5	4.9	2.0	3.7	2.8	0.3	0.4	0.2	0.1	3.2	2.6	2.7	2.3	4.2	3.3	114.8	105.8			
United Kingdom	17.1	40.4	106.0	0.6	25.5	16.0	33.0	16.4	22.5	15.4	1.4	2.2	1.8	1.6	23.5	19.2	15.3	12.7	26.3	18.9	828.8	749.7			
Southern Europe	45.9	78.2	202.1	2.6	59.0	29.8	116.4	30.0	59.4	48.2	4.6	7.6	6.3	4.4	50.1	41.7	30.9	31.2	76.0	57.8	2274.3	1627.1			
Albania	0.5	0.3	1.8	0.1	0.7	0.4	1.2	0.4	1.7	1.2	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.8	0.7	26.5	21.0			
Bosnia Herzegovina	0.9	1.5	3.4	0.2	0.7	0.4	1.6	0.6	1.0	0.9	0.0	0.2	0.2	0.1	0.6	0.3	0.1	0.2	0.5	0.5	39.7	27.6			
Croatia	1.9	3.2	7.6	0.2	2.6	1.2	2.8	0.9	2.1	2.0	0.1	0.2	0.1	0.1	1.4	1.4	0.6	0.8	1.9	1.7	77.5	55.6			
Cyprus	0.2	0.4	1.0	0.0	0.1	0.1	0.4	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.1	0.4	0.3	8.4	6.3			
Greece	2.8	5.8	18.2	0.3	4.0	2.0	9.2	2.0	6.2	5.4	0.3	0.4	1.2	0.9	1.4	1.1	2.0	1.9	8.4	6.3	171.1	113.7			
Italy	19.6	36.2	78.1	0.8	28.0	14.0	45.5	12.0	22.6	17.4	2.3	3.6	2.6	1.6	26.1	21.6	15.7	16.2	35.3	26.5	949.9	750.4			
FYR Macedonia	1.0	0.9	2.3	0.1	0.3	0.2	1.2	0.2	1.0	0.6	0.0	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.6	0.4	27.6	18.6			
Malta	0.2	0.3	0.3	0.0	0.2	0.1	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.2	0.1	4.5	3.8			
Montenegro	<i>0.2</i>	<i>0.3</i>	<i>0.7</i>	<i>0.0</i>	<i>0.2</i>	<i>0.1</i>	<i>0.3</i>	<i>0.1</i>	<i>0.2</i>	<i>0.2</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.1</i>	<i>0.1</i>	<i>0.1</i>	<i>0.0</i>	<i>0.2</i>	<i>0.2</i>	<i>7.8</i>	<i>5.7</i>			
Portugal	3.0	3.8	15.8	0.2	2.4	1.3	6.6	2.0	3.7	3.5	0.3	0.6	0.3	0.2	3.7	3.1	1.8	1.8	4.0	3.6	143.0	98.1			
Serbia	3.0	5.3	13.8	0.4	3.3	1.8	5.1	1.8	5.0	4.2	0.2	0.5	0.5	0.3	2.5	2.1	1.3	1.1	4.4	3.1	149.7	108.4			
Slovenia	0.7	1.5	4.2	0.1	1.1	0.6	1.4	0.6	0.9	0.6	0.1	0.1	0.1	0.0	0.8	0.8	0.5	0.5	1.0	0.8	32.7	26.0			
Spain	12.1	18.8	54.8	0.4	15.3	7.6	41.0	9.1	14.7	12.0	1.0	1.9	1.2	1.0	12.7	10.7	8.5	8.3	18.3	13.8	635.8	391.8			
Western Europe	55.3	114.8	281.3	3.3	96.4	52.8	94.6	39.5	65.3	50.6	5.3	8.4	4.7	3.5	67.3	58.3	43.4	40.1	91.9	75.0	2686.1	2137.9			
Austria	2.3	5.0	11.1	0.3	3.1	2.2	3.3	1.6	2.5	2.2	0.3	0.4	0.2	0.1	3.0	2.8	1.7	1.7	4.2	3.5	110.4	94.0			
Belgium	3.5	7.3	19.1	0.1	4.6	2.7	7.3	2.5	3.3	2.7	0.3	0.5	0.4	0.2	3.7	3.4	2.4	2.4	5.7	4.6	173.4	124.7			
France	21.5	33.9	86.1	1.0	28.9	12.9	36.5	11.2	19.4	13.5	1.6	2.3	1.8	1.3	23.1	19.7	14.2	13.5	32.0	25.2	901.1	644.6			
Germany	21.3	53.8	125.5	1.5	47.1	28.3	35.4	18.6	31.0	25.6	2.6	3.9	1.6	1.3	29.6	25.3	19.8	18.0	39.8	33.8	1176.1	1000.3			
Luxembourg	0.3	0.3	0.6	0.0	0.1	0.0	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	5.5	4.7			
The Netherlands	4.1	10.2	26.5	0.3	9.6	5.0	8.6	4.0	6.1	4.5	0.3	0.7	0.5	0.3	5.4	4.7	3.5	2.9	6.8	5.5	229.4	196.0			
Switzerland	2.3	4.4	12.5	0.2	2.9	1.6	3.3	1.5	2.7	2.1	0.3	0.5	0.2	0.2	2.4	2.3	1.7	1.7	3.2	2.2	90.2	73.6			

Countries for which no data were available are in italics.

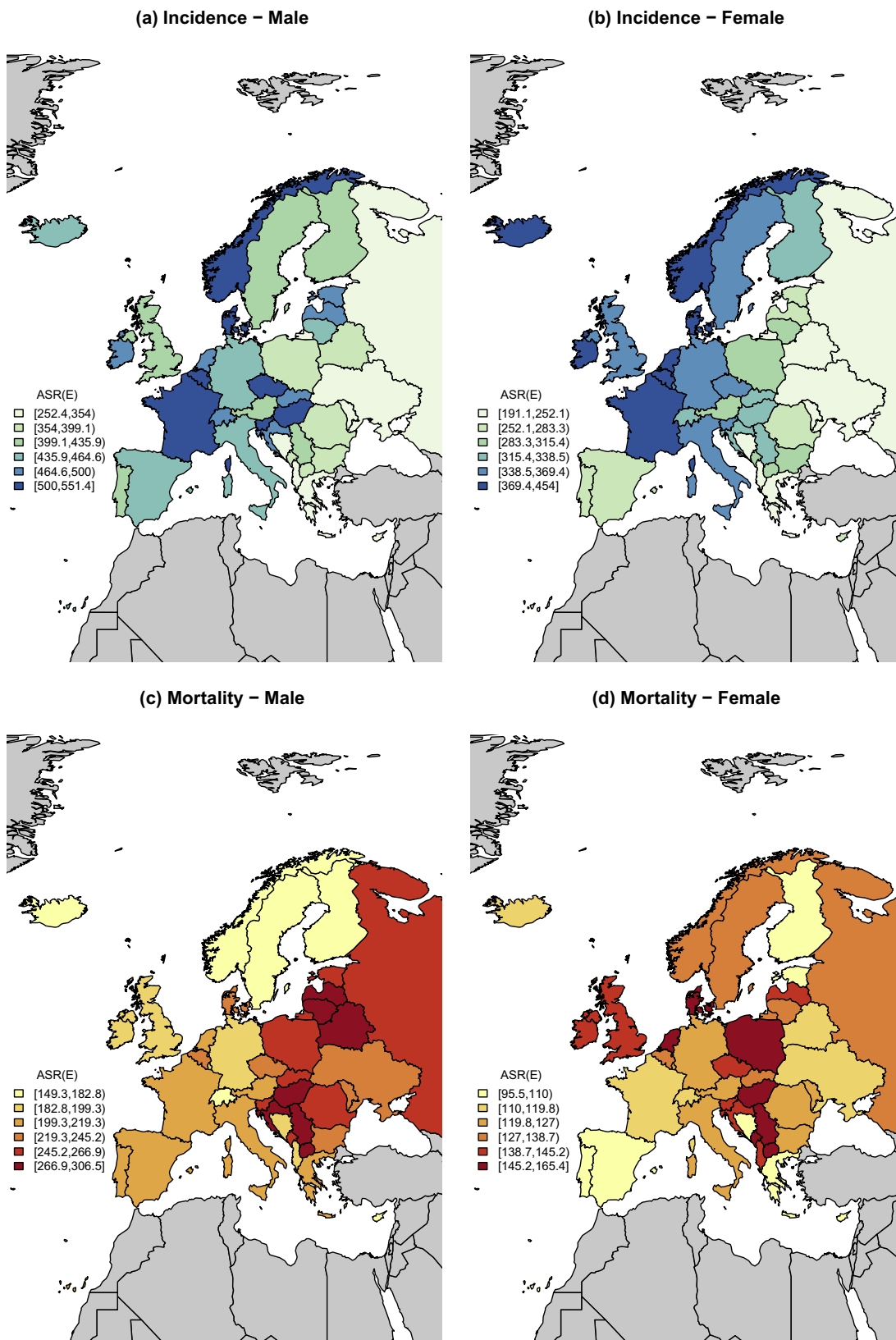


Fig. 3. Age-standardised rates for all cancers excluding non-melanoma skin cancers in Europe 2012.

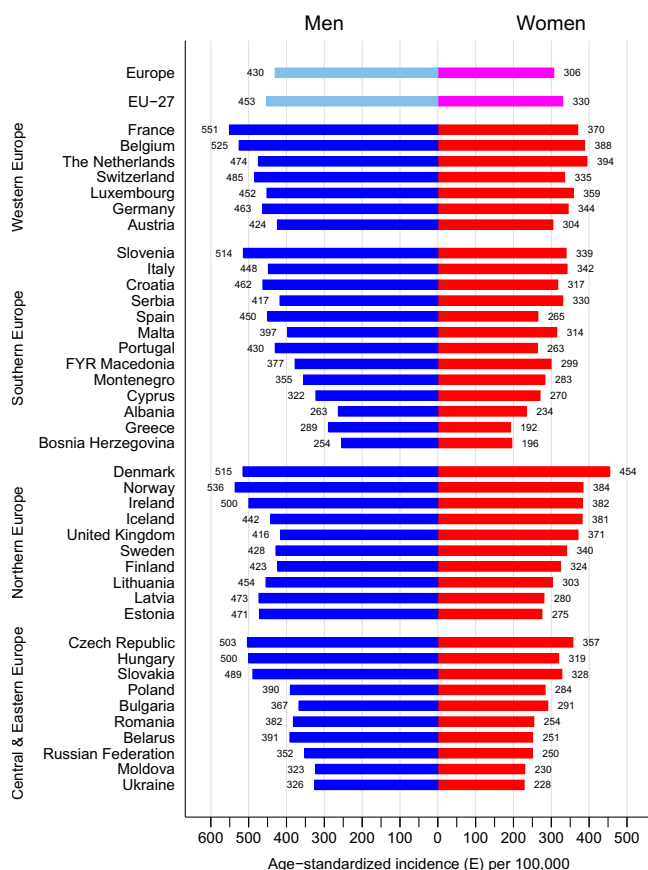


Fig. 4a. Age-standardised incidence rates by sex, area and country in Europe 2012: all cancers excluding non-melanoma skin cancers.

mortality data from local cancer registries. The methodology is consistent with previous studies estimating cancer incidence and mortality in Europe.<sup>7,8</sup> Short term prediction methods have been used to prepare estimates for 2012 from the most recently available data – specifically, national mortality rates for the years 2004–2010, and national incidence rates for 2005–2009, depending on the availability of such data in a given country. Although predictions are based on trends in historical data which may or may not continue into the long-term future, they are likely to be reasonably accurate in the short term or when the disease rates exhibit rather stable trends.

In addition to the incompleteness of mortality data, there is also possible underestimation of the cancer mortality in certain European countries where the number of deaths attributed to ill-defined and unknown causes is relatively large (Table 8). Cancer mortality data are also prone to a lower accuracy (validity) than cancer registry statistics, mainly because of the difficulties in ascertaining and certifying the cause of death. This may have led to an underestimate of the true mortality of cancer at specific sites. Inclusion of metastatic cancers along with primary neoplasms for example amplifies the mortality rates for some sites such as liver, lung and

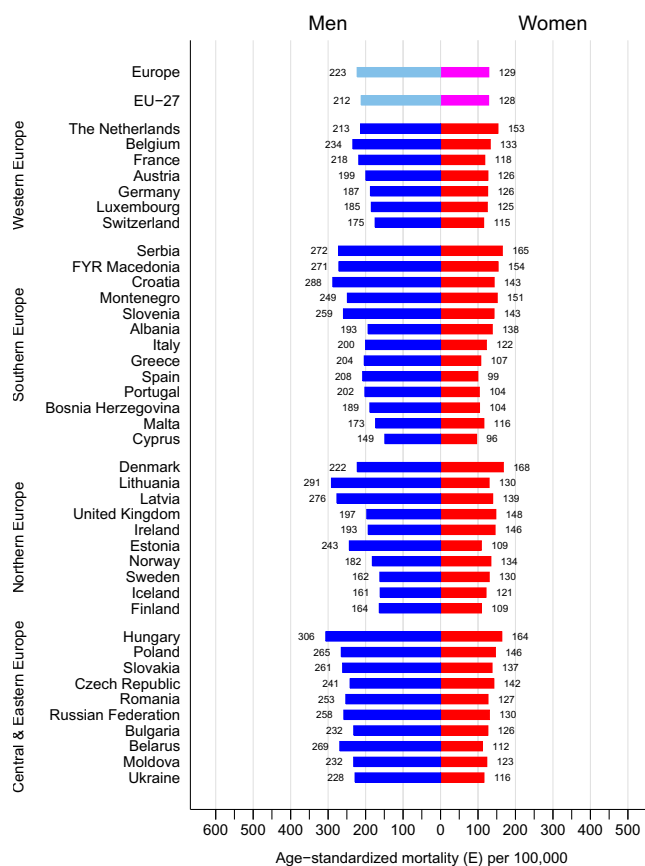


Fig. 4b. Age-standardised mortality rates by sex, area and country in Europe 2012: all cancers excluding non-melanoma skin cancers.

brain. This would inflate the national estimates of mortality and possibly incidence, if the latter relies both on the national mortality statistics and on  $I_R/M_R$  ratios outside the country, as in method 2B. Therefore, some caution must be employed in interpretation of the estimated cancer mortality data. Another attempt to estimate the cancer mortality in the EU-27 for 2012 using a similar methodology was published recently.<sup>28</sup> The overall estimates of 1.28 million cancer deaths (717,000 in men and 566,000 in women) are very close to our estimates of 1.26 million cancer deaths (707,000 in men and 555,000 in women, Table 5).

With respect to incidence, several sources of data have been used in generating the statistics. National incidence rates were provided by 24 European countries (Table 1) representing 50% of the total European population. For Germany and Switzerland, the projection of incidence rates based on aggregated local cancer registries data covering a substantial part of the population (30% and 40% respectively, method 1B) was preferred to the “standard” M:I ratio method and the representativeness of the local registry data is of course unknown. The resulting estimates may slightly overestimate or underestimate the incidence rates if the increasing or decreasing trends observed in local registries do not

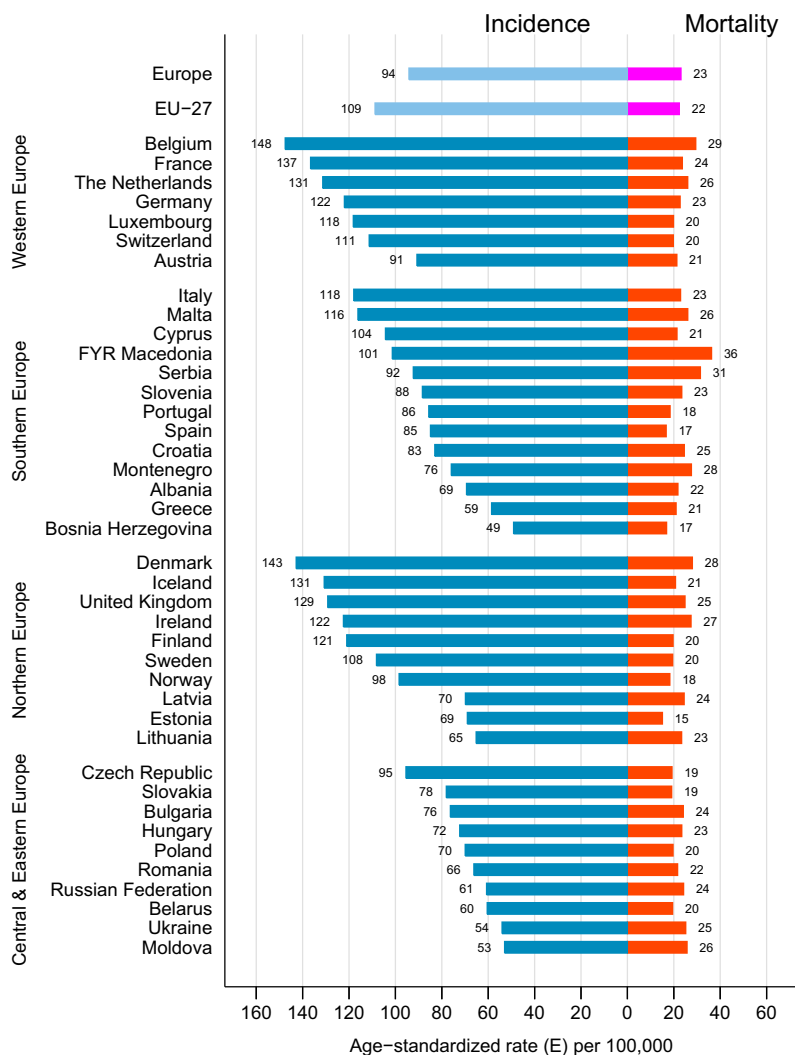


Fig. 5. Age-standardised incidence and mortality rates by area and country in Europe 2012: breast cancer.

apply to the national population. For 12 countries, it was necessary to estimate incidence using the predicted national mortality in 2012 and mortality to incidence ratios (M:I) of aggregated data from either local cancer registries or neighbouring countries (methods 2A and 2B). This practice corrects for any discrepancy between local and national rates of incidence, and is also robust to deficiencies in the quality of mortality data, provided these are similar nationally and locally.<sup>5</sup> Where it is likely that the M:I ratios will be changing rapidly, national incidence rates have been estimated as a mean of the most recent incidence rates obtained from local cancer registries. This method was used for cancers of the breast and prostate, for which screening programmes may have affected the ratio between the recorded new cases and deaths. In the absence of local cancer registry data, M:I ratios from cancer registries in neighbouring countries were used (method 2B). This is evidently not ideal given the national  $M_N$  and the regional  $M_R$  in Eq. (1) are not from the same vital sta-

tistics systems, and the resulting incidence  $I_N$  could be distorted. Finally, the estimates for certain sites are less accurate when one considers the mortality to incidence ratios (M:I) with values greater than 1. This suggests under-reporting of cancer cases by the registry (e.g. pancreatic cancer in elderly patients), and thus a possible underestimate of the burden of cancer in the country. Alternatively, M:I greater than 1 may testify flawed mortality data, if more deaths are attributed to a cancer site because of the minimal medical information available for a patient at the time of the death certification. However, despite the provisos about data quality for some sites, the general patterns of cancer in Europe are clearly established, and with the data presented herein, it is possible to define the priorities to cancer control actions in Europe.

Lung cancer retains its status as the leading cause of cancer death in Europe in 2012. The overwhelming majority of lung cancer is caused by tobacco smoking<sup>29</sup> and tobacco control is clearly a number one priority in



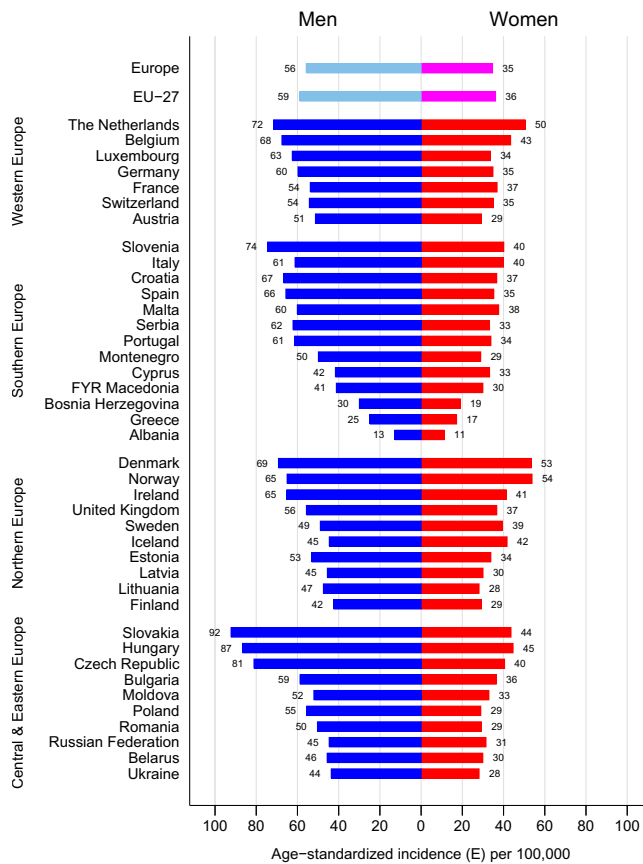


Fig. 6a. Age-standardised incidence rates by sex, area and country in Europe 2012: colorectal cancer.

Europe, not only aimed at men, particularly the male populations of Central and Eastern Europe, but increasingly targeted towards young women. Incidence and mortality rates in men are decreasing in many European countries, particularly in Northern and Western areas where the prevalence of smoking amongst men was first to diminish, while the lung cancer rates in Central and Eastern Europe remain high, but are showing signs of stabilisation or decline.<sup>30</sup> Mortality rates in women, who acquired the smoking habit later than men, are largely on the increase in Europe (e.g. France, Spain) although rates are beginning to stabilise, notably in the high-risk countries of Northern Europe.<sup>30</sup> Primary prevention, through efforts to deter the initiation of smoking and raise cessation rates through higher taxes, regulations on smoking and information to the public should have a major impact on incidence and mortality from lung and other tobacco-related cancers, including oral cavity and pharynx, oesophagus, pancreas, larynx and urinary tract.<sup>31</sup>

Colorectal cancer is the second most common cause of cancer death in both men and women (Table 4). Diets low in fruit, vegetables and unrefined plant food, and high in red meat, processed food and fat have been shown to confer an increased risk of colorectal cancer<sup>32</sup>

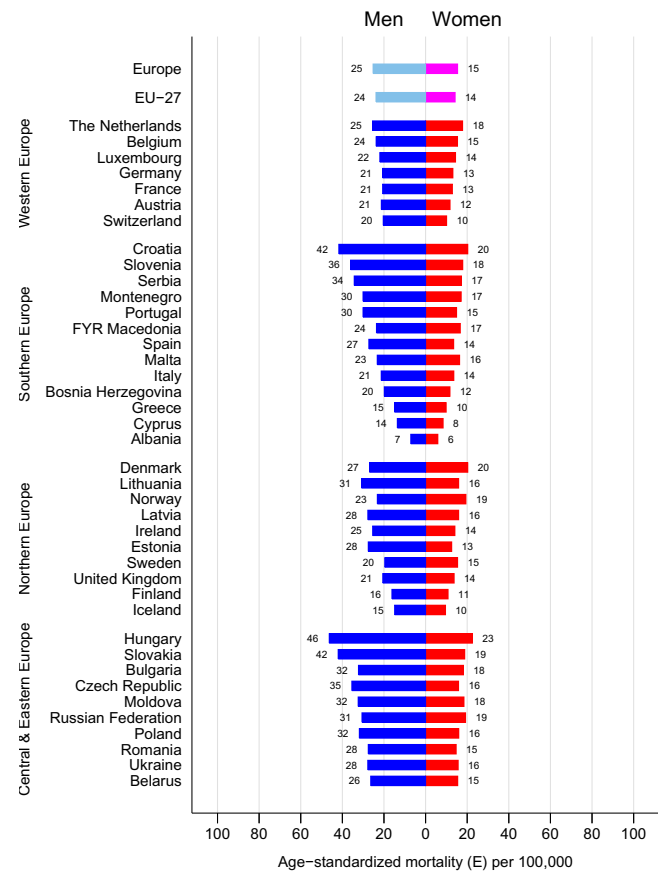


Fig. 6b. Age-standardised mortality rates by sex, area and country in Europe 2012: colorectal cancer.

and there is an evidence base to suggest that maintenance of a healthy diet and avoidance of a sedentary lifestyle and obesity may reduce the risk of colorectal cancer. The European Guidelines For Quality Assurance In Colorectal Cancer Screening And Diagnosis indicate there is good evidence that invitation to screening with FOBT using the guaiac test reduces mortality from colorectal cancer by about 15% in average risk populations of appropriate age, and that there is reasonable evidence that flexible sigmoidoscopy screening reduces incidence and mortality if performed within an organised screening programme with strict monitoring of quality and outcomes.<sup>33</sup> Implementation of organised colorectal screening programmes is resource-dependent but is underway in higher-resource countries, and should remain a high priority as a means of early detection of the disease in Europe.

Breast cancer is the leading cancer site in women in all countries in Europe (Table 4) and it is also the first cause of death from cancer in women in Europe (Fig. 2b). It is likely that the variation observed in breast cancer incidence across European countries (Fig. 5) may be attributable to the variable extent and type of screening activities in operation, a differential in the prevalence and distribution of known risk factors for breast cancer

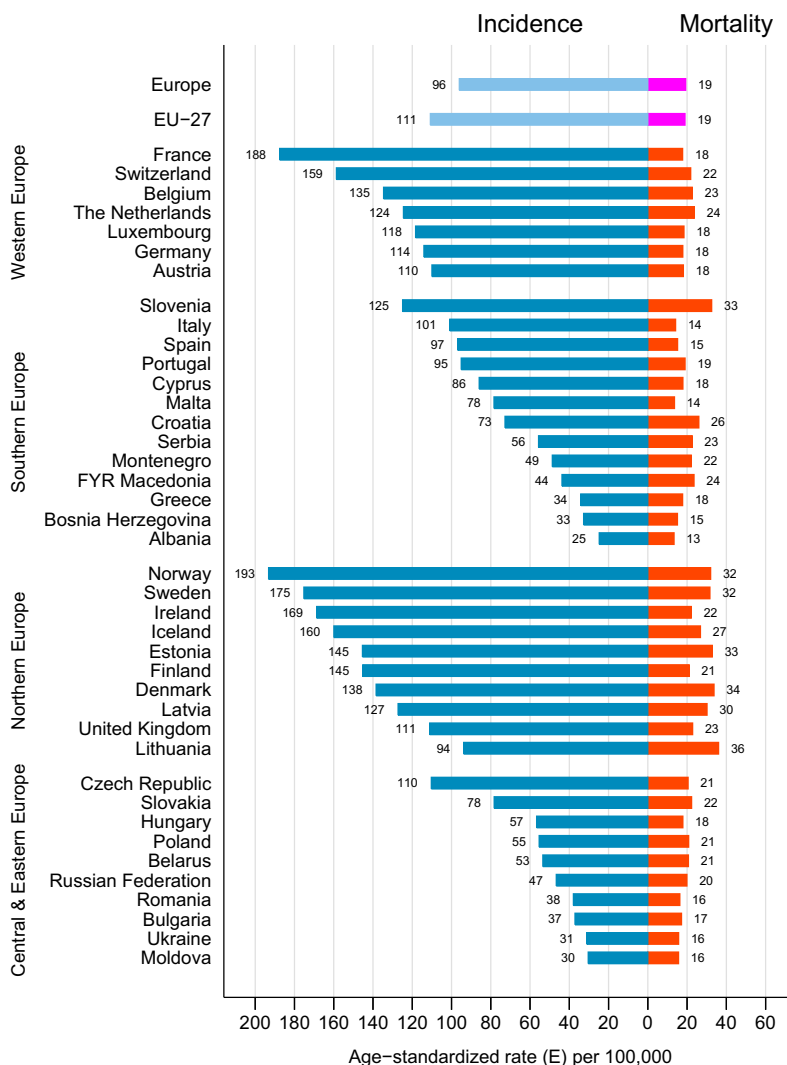


Fig. 7. Age-standardised incidence and mortality rates by area and country in Europe 2012: prostate cancer.

(e.g. parity, age at first birth<sup>34</sup>), as well as possible artefacts in the methods of estimation. Declines in breast cancer mortality rates in most European countries in the 1990s were reported by several studies<sup>35,36</sup> as a consequence of the combined effects of earlier detection (part due to screening, part due to increasing awareness), and a range of improvements in treatment. However, while trend analyses of mortality rates are useful in evaluating overall success in breast cancer control, they are of limited value in quantifying the impact of the introduction of mammographic screening.<sup>37</sup>

Prostate cancer is the third most common cancer diagnosed in Europe today, and it has emerged as the most frequent cancer amongst men in Europe. General increases in prostate cancer incidence have been reported,<sup>38</sup> but in most European countries, particularly in the highest resource countries in Northern and Western Europe, the rising trends in incidence are largely attributable to increased detection of latent disease fol-

lowing the widespread availability of PSA tests in the late-1980s and its subsequent and rapid uptake by urologists and GPs as a screening test. Therefore the geographical variations in prostate cancer incidence rates reported herein largely reflect the prevalence of PSA testing and consequent biopsy, although other factors such as sedentary lifestyle and obesity may be risk factors for invasive disease.<sup>39</sup> With respect to prostate cancer mortality, the rates are a better proxy of risk than incidence, revealing much less between-country variation than incidence (notably in absolute terms), although they may be prone to variations in the quality of reporting of the underlying cause of death.<sup>40</sup> However, decreasing mortality trends have been observed in several European countries after 1996 and the relative impact of the introduction of curative treatment versus early detection by PSA is still subject to much debate.<sup>38</sup>

Although some care should be taken when comparing these estimates by country with those published earlier

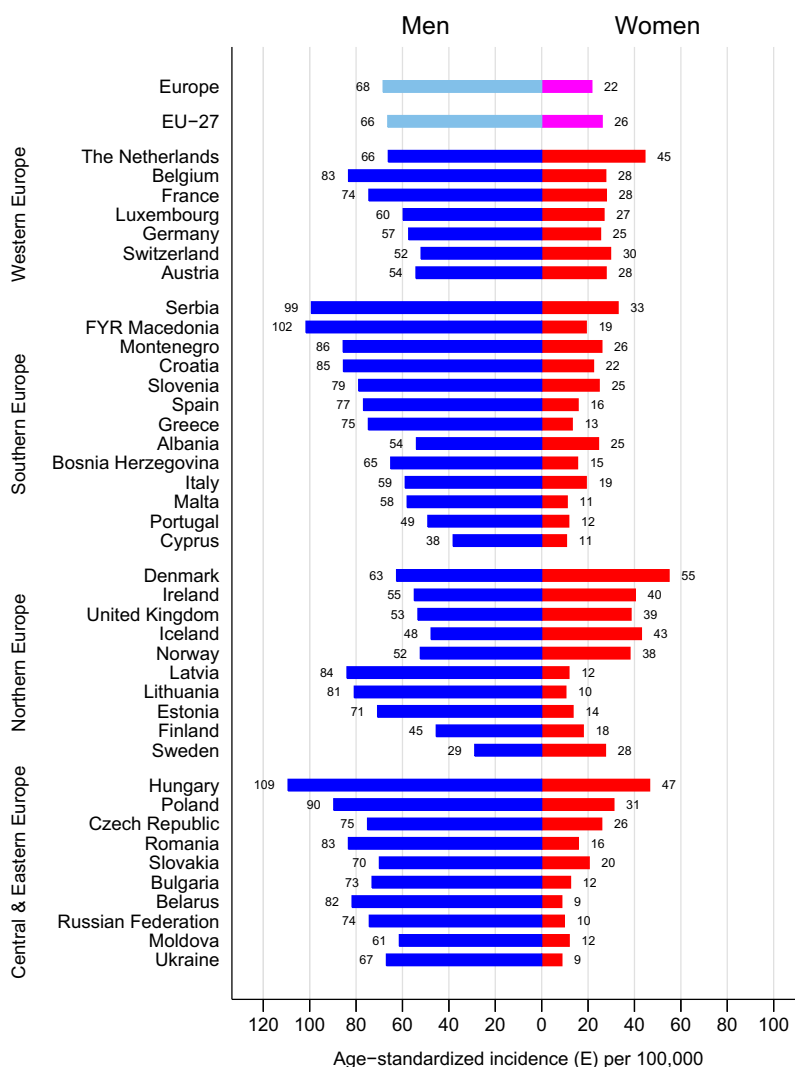


Fig. 8. Age-standardised incidence rates by sex, area and country in Europe 2012: lung cancer.

(part of the observed differences may be the result of changes in the methodology due to extension of data availability as for Germany and Switzerland), some comparison at the European level with our previous estimates for 2008<sup>8</sup> (3.23 million new cases of cancer and 1.72 million deaths from cancer) could be drawn. The 2012 estimates presented herein show a slight increase in the number of new cases of cancer (in particular for breast and prostate cancers) and a similar estimate of the number of deaths from cancer despite the growth and the ageing of the European population in the period. Therefore, the overall risk of getting cancer in Europe seems to be almost stabilised now although at a high level, while the overall risk of dying from cancer in Europe is declining, with directions of change and magnitude varying by country and by the cancer site.<sup>35</sup>

This estimation of cancer incidence in Europe would not be possible without population-based cancer registries functioning in many European countries. The

important role of registries in disease surveillance is increasingly being recognised but should not be taken for granted. Cancer registration in Europe is at present facing an uncertain future as a result of funding constraints, inappropriate implementation of e-Health methodology and also because of attempts to implement legislation which would require patients to provide informed consent to permit registration and/or opt-out from registration.<sup>41</sup> The latter restrictions, although intended to safeguard patient confidentiality, have led to concerns that it would no longer be possible to monitor cancer patterns and trends reliably. The inevitable exclusion of an undetermined fraction of cases would introduce serious biases in the data. If European governments consider the control of cancer burden an important issue for the future of Europe, they must commit themselves to an appropriate level of investment in cancer registries and legislation that would safeguard their ability to collect population-based information.

Table 8

Percentage of ill-defined causes of deaths and ill-defined cancer deaths in European countries, both sexes combined, for the most recent year of information (source World Health Organisation (WHO)) and percentage of unknown and unspecified cancer site in cancer registries included in CI5 Vol. IX.

Country	Mortality		Incidence % of unknown and unspecified cancer site
	% of ill-defined causes of deaths	% of unknown and ill-defined cancer deaths	
Albania	11.8	0.8	
Austria	2.4	2.6	1.2
<i>Belarus</i>	<i>11.4</i>		1.6
Belgium	2.6	3.9	3.1
Bulgaria	3.0	2.3	3.7
Croatia	1.1	3.5	2.3
Czech Republic	1.6	5.0	1.7
Cyprus	6.2	6.5	1.8
Denmark	4.5	5.9	3.2
Estonia	1.8	2.7	2.1
Finland	0.6	2.9	2.5
France	7.1	4.7	2.6
Germany	2.8	4.9	2.0
Greece	7.5	6.5	
Hungary	0.1	2.2	
Iceland	0.8	2.1	2.0
Ireland	0.3	3.7	3.4
Italy	1.6	3.8	1.5
Latvia	6.3	3.5	1.8
Lithuania	1.3	4.0	2.0
Luxembourg	2.8	1.8	
Macedonia	6.5	2.0	
Malta	0.9	4.2	3.7
Republic of Moldova	0.6	3.0	
The Netherlands	3.9	4.0	3.9
Norway	4.9	4.2	2.7
Poland	6.5	5.5	3.4
Portugal	9.4	4.0	1.4
Romania	0.8	2.8	
<i>Russian Federation</i>	<i>4.6</i>		1.2
Serbia	4.4	3.8	1.4
Slovakia	1.4	2.8	1.0
Slovenia	1.3	2.9	0.9
Spain	2.9	4.8	3.1
Sweden	3.6	3.5	3.0
<i>Switzerland</i>	<i>2.9</i>		1.6
United Kingdom	1.8	6.9	4.2
<i>Ukraine</i>	<i>3.1</i>		
Europe	3.8	4.6	2.8

Countries for which data were available according ICD-10 Mortality Tabulation List 1 only are in italics.

### Conflict of interest statement

None declared.

### Acknowledgements

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Cancer Registry, Bremen Cancer Registry, Hamburg Cancer Registry, Lower Saxony Cancer Registry, Mecklenburg – Western Pomerania Cancer Registry, Munich Cancer Registry, Epidemiological Cancer Registry North Rhine-Westphalia, Cancer Registry of Rhineland-Palatinate, Saarland Cancer Registry, Free state of Saxony Cancer Registry, Saxony-Anhalt Cancer Registry, Schleswig-Holstein Cancer Registry, Thüringen Cancer Registry; Gibraltar – Gibraltar Cancer Registry; Iceland – Icelandic Cancer Registry; Ireland – National Cancer Registry Ireland; Italy – Cancer Registry of the Province of Biella, Cancer Registry of Brescia, Cancer Registry of the Campania Region, Integrated Cancer Registry of Catania-Messina-Siracusa-Enna, Catanzaro Tumour Registry, Cancer Registry of Como province, Ferrara Province Cancer Registry, Latina Province Cancer Registry, Lecco Cancer Registry, Liguria Region Tumour Registry, Mesothelioma Registry of the Liguria Region, Cancer Registry of South Lombardy, Macerata Province Tumour Registry, Mantova Cancer Registry, Milano Tumour Registry, Tumour Registry of Modena, North East of Italy Cancer Surveillance Network – Friuli Venezia Giulia, Nuoro Cancer Registry, Palermo Province Cancer Registry (PPCR), Breast Cancer Registry Palermo, Parma Cancer Registry, Ragusa Cancer Registry, Reggio Emilia Province Tumour Registry, Romagna Tumour Registry, Salerno Province Tumour Registry, Sassari Province Tumour Registry, Siracusa Province Cancer Registry, Sondrio Province Tumour Registry, South Tyrol Cancer Registry, Trapani Cancer Registry, Trento Cancer Registry, Piedmont Torino City Tumour Registry, Tuscany Region Tumour Registry, Umbrian Tumour Registry, Varese Tumour Registry, Veneto Tumour Registry; Latvia – Latvian Cancer Registry; Lithuania – Lithuanian Cancer Registry; Malta – Malta National Cancer Registry; The Netherlands – The Netherlands Cancer Registry, Comprehensive Cancer Centre South; Norway – Cancer Registry of Norway; Poland – Cracow City and District Cancer Registry, Kielce Regional Cancer Registry, Lower Silesian Cancer Registry; Portugal – Azores Cancer Registry, Central Region Cancer Registry, North Region Cancer Registry; Romania – Cluj Regional Cancer Registry, Timisoara Regional Cancer Registry; San Marino – San Marino Cancer Registry; Serbia – Central Serbia Cancer Registry; Slovakia – Slovakia National Cancer Registry; Slovenia – Cancer Registry of Republic of Slovenia; Spain – Albacete Cancer Registry, Asturias Cancer Registry, Basque Country Cancer Registry, Cuenca Cancer Registry, Girona Cancer Registry, Granada Cancer Registry, La Rioja Cancer Registry, Murcia Cancer Registry, Navarra Cancer Registry, Tarragona Cancer Registry; Switzerland – Geneva Cancer Registry, Graubünden and Glarus Cancer Registry, Neuchâtel Cancer Registry, St. Gallen-Appenzell Cancer Registry, Ticino Cancer Registry, Vaud Cancer Reg-

istry; United Kingdom – Eastern England, Northern and Yorkshire Cancer Registry, Northern Ireland Cancer Registry, North West Cancer Intelligence Service, Oxford Cancer Intelligence Unit, Scottish Cancer Registry, South West Cancer Registry, Thames Cancer Registry, Trent Cancer Registry, Welsh Cancer Intelligence and Surveillance Unit, West Midlands Cancer Intelligence Unit; Ukraine – National Cancer Registry of Ukraine.

## References

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. GLOBOCAN 2008 v2.0, Cancer incidence and mortality worldwide: IARC CancerBase No. 10 [Internet]. Lyon, France: International Agency for Research on Cancer; 2010. Available from: <http://globocan.iarc.fr> [accessed 12/07/2012].
2. United Nations, Population division. World population prospects, the 2010 revision. Available from: <http://www.un.org/esa/population/unpop.htm> [accessed 12/09/2011].
3. Jensen OM, Estève J, Møller H, Renard H. Cancer in the European Community and its member states. *Eur J Cancer* 1990;**26**:1167–256.
4. Black RJ, Bray F, Ferlay J, Parkin DM. Cancer incidence and mortality in the European Union: cancer registry data and estimates of national incidence for 1990. *Eur J Cancer* 1997;**33**:1075–107.
5. Bray F, Sankila R, Ferlay J, Parkin DM. Estimates of cancer incidence and mortality in Europe in 1995. *Eur J Cancer* 2002;**38**:99–166.
6. Boyle P, Ferlay J. Cancer incidence and mortality in Europe, 2004. *Ann Oncol* 2005;**16**(3):481–8.
7. Ferlay J, Autier P, Boniol M, Heanue M, Colombet M, Boyle P. Cancer incidence and mortality in Europe, 2006. *Ann Oncol* 2007;**16**(3):481–8.
8. Ferlay J, Parkin DM, Steliarova-Foucher E. Estimates of cancer incidence and mortality in Europe in 2008. *Eur J Cancer* 2010;**46**(4):765–81.
9. World Health Organization (WHO) Databank. Geneva, Switzerland: WHO Statistical Information System. Available from: <http://www.who.int/whosis> [accessed July 2012].
10. Steliarova-Foucher E, O'Callaghan M, Ferlay J, Masuyer E, Comber H, Bray F. European cancer observatory: cancer incidence, mortality, prevalence and survival in Europe. Version 1.0 (September 2012) European Network of Cancer Registries, International Agency for Research on Cancer. Available from: <http://eco.iarc.fr> [accessed 14/09/2012].
11. World Health Organization. International statistical classification of diseases and related health problems. Tenth revision, vol. 2. Geneva, Switzerland: WHO; 1993.
12. Nordpred. A software for predicting trends in cancer incidence. Available from: <http://www.kreftregisteret.no/en/Research/Projects/Nordpred/> [accessed 18/11/2011].
13. Dyba T, Hakulinen T. Comparison of different approaches to incidence prediction based on simple interpolation techniques. *Stat Med* 2000;**19**(13):1741–52.
14. Projection de l'incidence et de la mortalité par cancer en France en 2011. Rapport technique. Saint-Maurice: Institut de veille sanitaire; 2011. p. 78. Available from: <http://www.invs.sante.fr>.
15. Doll R, Payne P, Waterhouse J. Cancer incidence in five continents: a technical report. Berlin, Germany: Springer-Verlag (for UICC); 1966.
16. Cancer registry Federation of Bosnia and Herzegovina. Overview of malignant neoplasms 2009. Institute for Public Health of Federation of Bosnia and Herzegovina, 2011.

17. Lutz JM, Pury P, Fioretta G, Raymond L. The impact of coding process on observed cancer mortality trends in Switzerland. *Eur J Cancer Prev* 2004;**13**(1):77–81.
18. Pavillon G, Boileau J, Renaud G, et al. Conséquences des changements de codage des causes médicales de décès sur les données nationales de mortalité en France, à partir de l'année 2000. *Bull Epidemiol Hebd* 2005;**4**:13–6.
19. Loos AH, Bray F, McCarron P, Weiderpass E, Hakama M, Parkin DM. Sheep and goats: separating cervix and corpus uteri from imprecisely coded uterine cancer deaths, for studies of geographical and temporal variations in mortality. *Eur J Cancer* 2004;**40**:2794–803.
20. Sant M, Allemani C, Santaquilani M, Knijn A, Marchesi F, Capocaccia R. EURO CARE-4. Survival of cancer patients diagnosed in 1995–1999. Results and commentary, the EURO CARE Working Group. *Eur J Cancer* 2009;**45**:931–91.
21. Cancer in Ukraine 2009–2010. Bulletin of National Cancer Registry of Ukraine No. 12. Kiev; 2011. Available from: <http://users.iptelecom.net.ua/~ucr/> [accessed 03-07-2012].
22. Swiss Federal Statistical Office. Cause of death statistics<sup>®</sup> FSO – The Statistical Encyclopedia.
23. Engholm G, Ferlay J, Christensen N, et al. NORDCAN: cancer incidence, mortality, prevalence and survival in the nordic countries, version 5.1 (March 2012). Association of the Nordic Cancer Registries. Danish Cancer Society. Available from <http://www.ancr.nu> [accessed 11/06/2012].
24. Ferlay J, Parkin DM, Curado MP, et al. Cancer incidence in five continents, volumes I to IX: IARC CancerBase No. 9 [Internet]. Lyon, France: International Agency for Research on Cancer; 2010. Available from: <http://ci5.iarc.fr>.
25. Curado MP, Edwards B, Shin HR, et al. (Eds.), Cancer incidence in five continents, vol. IX. IARC Scientific Publications No. 160. Lyon: IARC; 2007.
26. Finnish Cancer Registry. Cancer in Finland 2008 and 2009. Cancer Society of Finland Publication No. 84, Helsinki; 2011.
27. Registre Morphologique des Tumeurs au Grand – Duché de Luxembourg. Available from: <http://www.cancer-registry.lu> [accessed 25/06/2012].
28. Malvezzi M, Bertuccio P, Levi F, La Vecchia C, Negri E. European cancer mortality predictions for the year 2012. *Ann Oncol* 2012;**23**(4):1044–52, Epub 2012 Feb 28.
29. International Agency for Research on Cancer (IARC). Monographs on the evaluation of carcinogenic risks to humans, vol 83. Tobacco smoke and involuntary smoking. Lyon, France: IARC; 2004.
30. Bray F, Weiderpass E. Lung cancer mortality trends in 36 European countries: secular trends and birth cohort patterns by sex and region 1970–2007. *Int J Cancer* 2010;**126**(6):1454–66.
31. Soerjomataram I, de Vries E, Pukkala E, Coebergh JW. Excess of cancers in Europe: a study of eleven major cancers amenable to lifestyle change. *Int J Cancer* 2007;**120**(6):1336–43.
32. World Cancer Research Fund. *Food, nutrition and the prevention of cancer: a global perspective*. Washington: World Cancer Research Fund/American Institute for Cancer Research; 1997.
33. Segnan N, Patnick J, von Karsa L, editors. *European guidelines for quality assurance in colorectal cancer screening and diagnosis*. 1st ed. Luxembourg: European Commission, Publications Office of the European Union; 2010.
34. Soerjomataram I, Pukkala E, Brenner H, Coebergh JW. On the avoidability of breast cancer in industrialized societies: older mean age at first birth as an indicator of excess breast cancer risk. *Breast Cancer Res Treat* 2008;**111**(2):297–302, Epub 2007 Oct 12.
35. Héry C, Ferlay J, Boniol M, Autier P. Quantification of changes in breast cancer incidence and mortality since 1990 in 35 countries with Caucasian-majority populations. *Ann Oncol* 2008;**19**(6):1187–94.
36. Karim-Kos HE, de Vries E, Soerjomataram I, Lemmens V, Siesling S, Coebergh JW. Recent trends of cancer in Europe: a combined approach of incidence, survival and mortality for 17 cancer sites since the 1990s. *Eur J Cancer* 2008;**44**(10):1345–89.
37. Moss SM, Nyström L, Jonsson H, et al. The impact of mammographic screening on breast cancer mortality in Europe: a review of trend studies. *J Med Screen* 2012:19.
38. Bray F, Lortet-Tieulent J, Ferlay J, Forman D, Auvinen A. Prostate cancer incidence and mortality trends in 37 European countries: an overview. *Eur J Cancer* 2010;**46**(17):3040–52.
39. Whittemore AS, Kolonel LN, Wu AH, et al. Prostate cancer in relation to diet, physical activity, and body size in blacks, whites, and Asians in the United States and Canada. *J Natl Cancer Inst* 1995;**87**:652–61.
40. Feuer EJ, Merrill RM, Hankey BF. Cancer surveillance series: interpreting trends in prostate cancer – part II: cause of death misclassification and the recent rise and fall in prostate cancer mortality. *J Natl Cancer Inst* 1999;**16**:91(12):1025–32.
41. Hakulinen T, Arbyn M, Brewster DH, et al. Harmonization may be counterproductive – at least for parts of Europe where public health research operates effectively. *Eur J Public Health* 2011;**21**(6):686–7, Epub 2011 Nov 10.