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2009 edition

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1

Introduction

This Atlas describes the mortality of the regions of the Member States of the European Union, Candidate countries (except Turkey) as well as EEA/EFTA countries. We describe the European mortality by age and gender, by main causes of death and by 272 European regions. Levels of mortality indicate general levels of ill health, while causes of death provide useful information for an understanding of these differences in mortality levels. Different risk factors such as biological factors, lifestyle, smoking behaviour, alcohol consumption, and cultural or economic circumstances may cause the different mortality profiles. Differences in mortality across countries and regions indicate potentials for public health interventions in order to eliminate and control avoidable mortality in the future.

This Atlas on mortality is an update of a previous one published by Eurostat in 2002, based on data for the years 1994-1996. The current Atlas is an update to the extent that the number of European countries included has increased considerably and that more recent data are used (2002-2004). The selection of causes of death and the selection of indicators for inclusion in this Atlas have been revised.

Overall mortality trends

Mortality has declined strongly in all European countries over the last century. All countries have experienced similar patterns of change. In the first half of the 20th century the decline in mortality was caused by a sharp decline in infectious diseases, which led to a considerable downturn in mortality at younger ages. However, at the same time cancer and cardiovascular disease were on the rise. In the second half of the 20th century, these diseases became the prominent causes of death. Despite these similar trends across all European countries there are still considerable differences in the level of mortality. In the old EU-15 Member States, life expectancy stagnated between 1950 and 1970, particularly among men, but then took up again for both genders, but more so in men. Since the 1970s, these sharp mortality declines have not occurred in the former socialist economies, giving rise to increasing mortality gaps with market economies.

At the end of the 1980s, during the rapid transition from socialist economies to market economies there was a sharp increase in mortality, decreasing life expectancy even more. As a result the level of mortality in the Central and Eastern European Member States was significantly higher than in the EU-15 countries. After this period of turmoil, mortality trends in the new Member States took a turn for the better. Nevertheless there are still considerable differences in the level of mortality between the new Member States and the EU-15 countries. Moreover, even within the group of EU-15 countries considerable differences exist. For example, the level of male mortality in Sweden is about a third lower than in Portugal, whereas female mortality in France is a third lower than in Denmark. Furthermore, there are significant differences in mortality levels among regions in the same country. These differences can be explained by various lifestyle factors and sometimes differences in the effectiveness of or access to healthcare.

Differences between men and women

One characteristic of mortality in Europe is the marked difference between the genders. Although there is a tendency at present for this gap to narrow in certain Member States, the difference nevertheless warrants separate treatment of female and male mortality. Differences in mortality between the genders are found for most of the causes of death, and the patterns of mortality according to gender and age vary from one Member State to another. Women seem more resilient to cancer and cardiovascular disease and to risk taking behaviour; they smoked less than men (although this converged in the EU-15), suffer less from alcohol related mortality, have less fatal transport accidents and commit far less suicide. However, converging smoking behaviour leads to convergence of historically the main cause of death in the EU, smoking related mortality, and to decreasing gender gaps in mortality.

Causes of death

This Atlas deals with these various categories of causes of death separately in order to highlight specific differences. The Atlas particularly highlights premature mortality in the European Union. This may seem unnecessary as most deaths (80 percent) occur after the age of 65. But most of the deaths before the age of 65 are preventable as will be demonstrated by this Atlas. Although premature mortality affects a smaller number of people, it causes loss of productive life and it is therefore also of economic concern. It affects parents who lose their children, and children who lose their parents, adding many life years with serious difficulties to the lost ones. Levels of premature mortality vary widely across Europe and its link to health and prevention practices make it of particular interest.

Regional analysis

Mortality varying by place and population has always been used to generate hypotheses on causation. More often, it may serve health policy aims pointing to those causes of death that are most likely to be preventable. The Atlas shows that mortality can vary at supranational (i.e. at European level), international (between countries) or supraregional (between regions) levels. The most striking supranational mortality pattern is the difference between the high mortality of the new Central and Eastern European Member States and the lower mortality of the old EU-15. It can even be noted how the German formerly socialist regions often show an intermediate position. The reasons will be discussed in the text. Variance between countries often points to country specific practices or policies. One important cause of sharp international boundaries between causes of death is undoubtedly diagnostic and coding practices. However, if diseases are more specific, such as lung cancer, suicide, transport accidents or cervical cancer at younger ages, such differences may reflect differences in national policies. Regional clusters of similar mortality profiles nearly always point to a common industrial history. Often, mortality is higher in old industrial regions with a traditional heavy industry based on coal and steel that is now in decay. At the opposite, 'healthy' regions may attract healthy and wealthy pensioners enjoying the remains of the day in a beloved region, often coastal regions.

2

Methodology

Data on mortality and population

Sources

All basic data have been taken from Eurostat's free dissemination database. This Atlas does not present all causes of death that are included in the database. The selection of causes of death for this Atlas will be discussed below. Mortality indicators were calculated specifically for this Atlas based on absolute values using the same methodology as that used by Eurostat. Data updates might explain differences between the data available online and the data shown in this publication.

Processing of the data

The data include, for each spatial unit, the population and number of deaths by gender and five-year age groups up to 85 years and over. The data were aggregated over a period of three years (2002, 2003 and 2004) in order to increase the number of deaths, thereby reducing the number of regions with numbers too small for statistical processing.

Aggregation of the data also rules out the effects of yearly fluctuations. An example of such a fluctuation is the excess of mortality due to the heat wave in 2003 that hit several European countries. In most countries this excess was balanced by a decrease in mortality 1 year later.

NUTS

The Nomenclature of Territorial Units for Statistics (NUTS) was established by Eurostat more than 30 years ago in order to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union. The NUTS is a three-level hierarchical classification. The NUTS subdivides each Member State into a whole number of NUTS 1 regions, each of which is in turn subdivided into a whole number of NUTS 2 regions and so on. The present NUTS nomenclature is valid from 1 January 2008 and subdivides the economic territory of the European Union into 97 regions at NUTS 1 level, 271 regions at NUTS 2 level and 1303 regions at NUTS 3 level([1]). This report describes mortality at NUTS 2 level.

Missing data

At the time of data extraction, mortality data were unavailable for certain Belgian regions after 1998, so there are no maps for these regions. Since mortality data were missing for the NUTS 2 regions of Scotland, the figures were used for the next highest geographical level (NUTS 1). Similarly, figures for Denmark (DK), Croatia (HR) and Slovenia (SI) are shown at the national level (NUTS 0). For three countries no data for the period 2002-2004 were available. The next most recent data were used: for the Flemish regions of Belgium and for Italy the figures relate to the period 2000-2002, and for Denmark to 1999-2001. Currently, there are no reliable mortality data available for Turkey.

Overall mortality

The Atlas includes three chapters on overall mortality (all causes of death). The first chapter presents maps of crude death rates and age standardised death rates. Crude death rates largely reflect the effect of demographic age and gender structures on mortality. The standardised death rates give an initial regional comparison of overall death rates after controlling for the age structures of the populations.

Premature and older age mortality

The second chapter on overall mortality shows some indicators of age-specific mortality. Infant mortality describes mortality in the first year of life, and age standardised rates are shown for ages below 65 (an indication for premature mortality) and for ages above 65.

Life expectancies

The last chapter on overall mortality gives information on life expectancies at three different ages: at birth, at age 65 and at age 85. Life expectancies refer to the number of years still to be lived by a person who has reached a certain age, if subjected throughout the rest of his or her life to 'current' mortality conditions.

Causes of death

Causes of death are classified by the 65 causes of the 'European shortlist' of causes of death. This shortlist is based on the International Statistical Classification of Diseases and Related Health Problems (ICD). The list of the selected causes and their equivalent ICD codes are given in annex 2.

The overall procedures for the collection of causes of death data are relatively homogeneous across European countries. However, for as long as mortality statistics have existed, national differences in coding and classification have caused serious difficulties in making international comparisons. Although the ICD attempts to eliminate such differences, application and interpretation of the ICD varies considerably between countries. Almost all countries now use ICD-10. However, not all countries implement the updates to ICD-10([2]). A table showing which country implements which ICD revision and which updates for the period under study is given in annex 3.

Selected causes of death

The causes of death shown in the maps were selected according to various criteria: their relative share in overall mortality, their importance in terms of public health, their potential role in prevention, their coding errors expected to be low, their expected regional diversity, comparability with the previous atlas, etc. Special attention was paid to 'premature' deaths (i.e. deaths below age 65). Causes of death were also grouped for a more specific approach corresponding to a particular aim (e.g. mortality associated with alcoholism). The table on the next page shows the selected causes, the corresponding codes in the Eurostat shortlist, and the share of each cause in overall mortality in the year 2002 for all ages, and for ages below age 65.

Infectious and parasitic diseases were chosen because these causes of death are important indicators of the remaining 'old public health agenda' of now preventable infectious disease mortality. Tuberculosis can also still be part of the old public health agenda in less developed countries, but is re-emerging as a consequence of immigration from tuberculosis-ridden countries, emerging multi-resistance and as a curable consequence of HIV infection as well.

Other causes of death belonging to the old public health agenda are pneumonia and influenza. Influenza is a vaccinable disease, and pneumonia is an emerging health problem among the elderly because of waning immunity. Effective treatment is available however.

Lung cancer in developed countries is a specific marker of past smoking intensities in a population. Lung cancer is a rare disease among non-smokers but frequent among smokers. Therefore, mortality from lung cancer shows the public health need of maintaining and setting up strict anti-tobacco policies.

Trends in gynaecological cancers are targeted by screening and treatment. Breast cancer is a disease vulnerable to screening and mortality is dependent on expensive but partially effective care. Cervical cancer is more vulnerable to screening. Trends in cervical cancer may reflect trends in unsafe sexual behaviour.

Circulatory diseases used to be the most important group of causes of death, but in the fourth stage of the epidemiologic transition of delayed cardiovascular disease, its influence is waning and competition with cancer as the most important cause of death is increasing. Ischaemic heart disease is the most important specific cause of death targetable by prevention and treatment. It is the most powerful indicator of the fourth stage in the epidemiologic transition, the stage of delayed cardiovascular diseases. Trends in cerebrovascular diseases (stroke) are historically dependent on development and partly preventable by adequate control of blood pressure and diabetes. Effective treatment is becoming increasingly important.

An important category of predominantly juvenile mortality, and preventable by policy measures, are the external causes of death. Transport accidents are the most common and suicide and intentional self-harm is a common cause of death among young people.

Mortality indicators used

Statistical indicators

This Atlas uses mostly conventional mortality indicators: Crude Death Rates (CDR), Age Standardised Death Rates (SDR), Infant Mortality Rates (IMR), and Life expectancies. In addition, two less conventional indicators are used, namely the Potential Years of Life Lost (PYLL) and Years of Life Lost (YLL).

Crude Death Rates

The Crude Death Rate (CDR) describes mortality in relation to the total population. Expressed per 100,000 inhabitants, it is calculated as the number of deaths recorded in the population for a given period divided by the population in the same period and then multiplied by 100,000.

$$CDR_t = \theta_t / N_t \times 100{,}000$$, where

$CDR_t =$ crude death rate in year t

$\theta_t =$ number of deaths recorded in the population during year t

$N_t =$ average population in year t

The crude death rate is the 'crude', unadjusted mortality per person year, specified as the midyear population. Thus, the population structure strongly influences this indicator, as age is a major determinant of mortality. All other things being equal, in a relatively 'old' population, there will be more deaths than in a 'young' one because mortality is higher in higher age groups.

Standardised Death Rates

For comparisons, the age effect can be taken into account. The direct method is applied for standardisation by using a standard population. The (Age-) Standardised Death Rate (SDR) is a weighted average of age-specific death rates. The weighting factor is the age distribution of a standard reference population. The standard reference population used is the 'European standard population' as defined by the World Health Organisation (WHO). This standard population is given in annex 1. SDRs are calculated for the age group 0-64 ('premature death'), for ages above 65 and for the total of all ages.

As most causes of death vary significantly with people's age and gender, the use of standardised death rates improves comparability over time and among countries and regions.

	Causes of death	ICD-10 codes	'European shortlist' codes	% of overall mortality in 2002	% of below age 65 overall mortality in 2002
1	**Overall mortality**	**A00-Y89**		**100**	**100**
2	*Infectious and parasitic diseases*	*A00-B99*	*1*	*1.2*	*1.9*
3	of which tuberculosis	A15-A19,B90	2	0.2	0.4
4	of which AIDS (HIV-disease)	B20-B24	4	0.1	0.6
5	*All malignant neoplasms*	*C00-C97*	*7*	*24.8*	*34.6*
6	of which malignant neoplasms of larynx and trachea/ bronchus/lung	C32-C34	15	5.2	8.6
7	of which malignant neoplasms of colon, rectum and anus	C18-C21	11, 12	2.9	3.0
8	of which malignant neoplasms of breast (women only)	C50	17	1.9	3.4
9	of which malignant neoplasms of cervix uteri and other parts of uterus (women only)	C53-C55	18, 19	0.6	1.0
10	of which malignant neoplasms of prostate (men only)	C61	21	1.4	0.5
11	*Diseases of the circulatory system*	*I00-I99*	*33*	*42.0*	*23.6*
12	of which ischaemic heart diseases	I20-I25	34	15.4	10.6
13	of which cerebrovascular diseases	I60-I69	36	11.0	5.1
14	*Pneumonia and influenza*	*J10-J18*	*38, 39*	*2.6*	*1.3*
15	*External causes of injury and poisoning*	*V01-Y89*	*58*	*5.5*	*15.1*
16	of which transport accidents	V01-V99	60	1.2	4.6
17	of which suicide and intentional self-harm	X60-X84	63	1.4	4.8
18	*Alcohol related causes of death*	*C00-C15, F10, K70, K73-K74*	*8, 9, 29, 44*	*3.3*	*8.6*

$$SDR_A = \frac{\sum_x \left({}^A m_x \, {}^S P_x\right)}{\sum_x {}^S P_x}$$, where

SDR_A = age standardised death rate for population in region *A*

${}^A m_x$ = age specific death rate at age *x* last birthday in population in region *A*

${}^S P_x$ = the population exposed to the risk of death at age *x* last birth day in the standard population

$$IMR_t = {}_1\theta_{0,t} / B_t \times 1{,}000$$, where

IMR_t = infant mortality rate in year *t*

${}_1\theta_{0,t}$ = number of deaths between ages *0* and *1* during year *t*

B_t = number of live births during year *t*

Infant Mortality Rates

The infant mortality rate describes mortality during the first year of life. It is the ratio of the number of deaths of children under one year of age during the year to the number of live births in that year. The value is expressed per 1,000 live births. Infant mortality rates for Estonia, France, Greece, Ireland, Italy and Luxembourg are taken from Eurostat's free dissemination database and refer to the year 2000. All other available infant mortality rates have been calculated by the Netherlands Interdisciplinary Demographic Institute (NIDI), based on 2003 data.

Life expectancies

Life expectancies can be calculated for any age. They refer to the mean number of years still to be lived by a person who has reached a certain exact age, if subjected throughout the rest of his or her life to the actual mortality conditions (age-specific probabilities of dying). Life expectancies are calculated using a life table. Examples of such life tables are given in annex 5.

Potential Years of Life Lost

Potential Years of Life Lost (PYLL) is a public health measure showing the importance of loss of life at young, adult and middle ages. PYLL weigh mortality, age at death and the population structure. It is based on the 'fair innings' principle, which states that people dying at younger ages lose more life, and reflects the health problem of the true population, explicitly taking into account the age distribution.

$$PYLL = \frac{\left(\sum_{x=0}^{x=64} \left(65-\left(x+{}_n a_x\right)\right)\cdot {}_n D_{x,c}\right)}{\left(\sum_{x=0}^{x=64} {}_n N_x\right)} \times 100{,}000$$

, where

$x =$ exact age x (at the beginning of the age group)

$n =$ width of the age group

${}_n a_x =$ average person years lived between ages x and $x+n$ for persons dying in the age interval

${}_n D_{x,c} =$ observed number of deaths for cause c, between ages x and $x+n$ during the year

${}_n N_x =$ mid-year population in age interval x to $x+n$

The PYLL represents the total number of years not lived by an individual who died before the age of 65. This indicator gives more importance to the causes of death that occurred at younger ages than to those that occurred at older ages. Deaths occurring to individuals aged 65 or older are not included in the calculation. The PYLL is expressed as a rate per 100,000 inhabitants.

Years of Life Lost

Years of Life Lost (YLL) is the mortality component of the DALY (disability adjusted life years), introduced by the World Bank and the WHO as a description of the 'burden of disease'. YLL ignores morbidity, and therefore only describes 'the burden of mortality'. As in PYLL, YLL weighs mortality, age at death and the population structure, but YLL counts all life years lost. PYLL states that all people should reach age 65, and counts loss of life at young, adult and middle ages. YLL counts mortality at all ages, and weighs death by the residual life expectancy in a standard life table.

Life table

As a standard life table, we use the common life table for all the EU-15 countries, separately for men and women. The reader will find these standard life tables in annex 5.

The use of an appropriate standard is always a difficult choice. Standards cover different purposes, descriptive and proscriptive. As a descriptive standard, the common life table of the EU-27 is an average of the very different mortality patterns of the EU-15 and the new Member States. As a proscriptive, normative standard, the common life table of the EU-27 includes higher mortality countries. We therefore chose the common life table of the EU-15 as the standard. For the EU-15 countries, it reflects deviances from a comparable standard, which serves as the best description. For the other countries, the comparisons with the common EU-15 life table show where the most important gains can be made.

As the mortality profiles of men and women are very different, and at least some of these differences are biological, the Atlas uses the common life table of the EU-15 countries for men and women separately as the most appropriate standards. The YLL, like the PYLL, is expressed as a rate per 100,000 inhabitants.

$$YLL = \frac{\left(\sum_{x=0}^{x=85+} {}_n D_{x,c}\cdot w_x\right)}{\left(\sum_{x=0}^{x=85+} {}_n N_x\right)} \times 100{,}000$$

, where

$x =$ exact age x (at the beginning of the age group)

$n =$ width of the age group

${}_n D_{x,c} =$ observed number of deaths for cause c, between ages x and $x+n$ during the year

${}_n N_x =$ mid-year population in age interval x to $x+n$

$w_x =$ expectation of life at age x for an ideal, model or standard population

Interquintile differences

Comparing the highest and lowest values of death rates or life expectancies across regions may not always be meaningful, as extremes may be outliers caused by random fluctuations due to small numbers or by special populations (specific religious groups for example) or events (such as for example war and heat waves). For this reason, instead of comparing extreme values, this Atlas uses the indicator 'interquintile difference' as a measure for distributions.

For calculating the interquintile difference the 20 percent regions with the highest values and the 20 percent regions with the lowest values are removed. The interquintile difference is the difference between the minimum and maximum values of the remaining regions. Or in other words, it is the difference between the 80th and 20th percentiles.

The maps

All maps divide the mortality data into 5 ranges. These 5 ranges are chosen in such a way that each range holds approximately 20 percent (a quintile) of all regions.

The chapters on specific causes of death all start with maps showing the standardised death rates for men and women. Based on relevancy and interesting features, the SDR maps are followed by maps showing either the PYLL or the YLL or both.

(1) http://ec.eurostat/ramon/nuts/home_regions_en.html
(2) http://circa.europa.eu/Public/irc/dsis/health/library

3

Overall mortality

Crude death rates (not adjusted for age structure) highlight differences in the frequency of deaths across European regions. At the regional level, the rates vary between 390 and 2,444 per 100,000 inhabitants. On average the crude death rate equals 1,032 deaths per 100,000 inhabitants. The number of deaths in each region is strongly correlated to the number of older people in a region simply because mortality is more common among older people than among young people. Almost 80 percent of all deaths in the regions under study occur to people aged 65 years or older. Regions with a high proportion of older people have the highest crude death rates. This is the case, for example, for regions in Sweden, the United Kingdom and Italy. Regions with a low proportion of older people (e.g. Iceland and Ireland) have low crude death rates. However, age structure alone cannot explain the level of the crude death rates of each region. Some regions in Portugal and Romania, for example, have high death rates whereas the share of older people is relatively low.

Six urbanised regions stand out by their low crude death rates: Berkshire, Buckinghamshire and Oxfordshire in the United Kingdom, Comunidad de Madrid in Spain, Stockholm in Sweden and Oslo og Akershus in Norway.

Age standardised death rates

Taking the effect of age into account, the age standardised death rates show geographic differences in the risk of dying. For example, Iceland is a country with a relatively young population: 23 percent are younger than 15 years and 12 percent are 65 years or older. Iceland has a CDR of 630 deaths per 100,000 inhabitants. Italy, on the other hand, has an older population: 12 percent are younger than 15 years and 19 percent are 65 years or older. The CDR in Italy equals 995 deaths per 100,000 inhabitants. This is almost 60 percent higher than in Iceland.

However, the two countries have very similar standardised death rates: 562 and 546 deaths per 100,000 inhabitants respectively. Death rates in Italy are now only 3 percent higher than in Iceland.

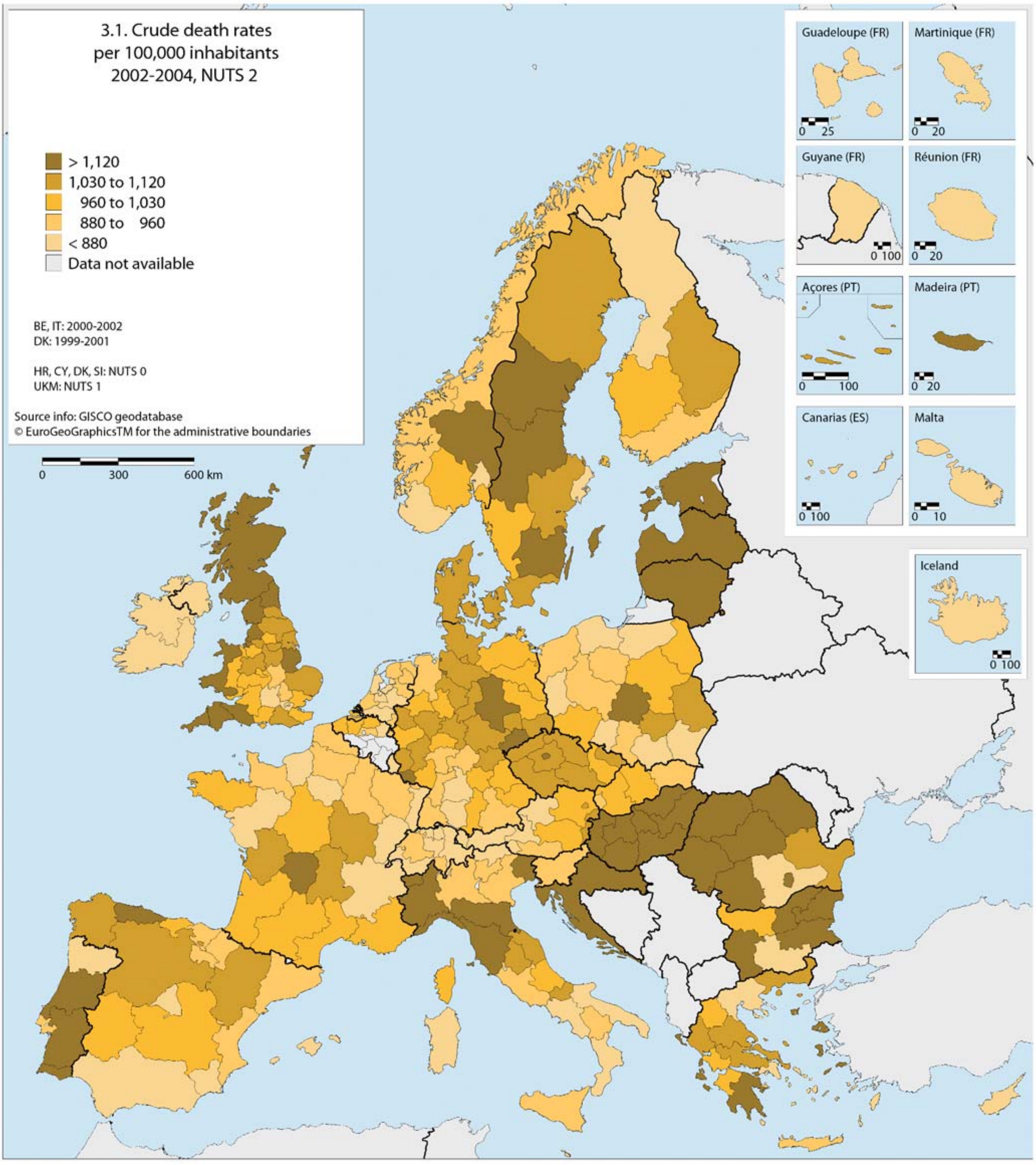
Age standardised death rates (all ages) for men vary between 634 and 2,463 deaths per 100,000 inhabitants. For women these figures are 368 and 1,599 per 100,000 respectively. The difference in these ranges between men and women indicates a marked excess of male mortality.

The maps with age standardised death rates show that the geographical pattern is very different from the maps with crude death rates. Low crude mortality and high standardised mortality imply a younger population. Several Polish regions as well as Irish regions have some of the lowest crude death rates, but some of the highest age standardised death rates. A reversed example can be seen for several regions in Sweden and Greece.

Regions with the highest age standardised death rates are often the most economically disadvantaged regions. This is shown in the maps for countries (Poland, Romania, Portugal) but also for regions within countries. Examples of such regions are Nord - Pas-de-Calais in France, Scotland in the United Kingdom and Andalucía in Spain. These regions are comparatively poor in the context of their own countries and face relatively high unemployment. The new Central and Eastern European Member States show high mortality, explained in part by the social consequences of a very rapid transition from a socialist to a market economy. However, the socioeconomic factor alone does not always explain the level of death rates. Denmark, for example, one of the richest Member States, has relatively high death rates for a Nordic country.

Lifestyle is another important factor influencing levels of mortality. Comparing the maps of men and women reveals some marked differences. Large parts of France, but also of Greece, the southern part of the United Kingdom, Sweden and Finland show relatively high mortality for men compared with women. Large gender mortality gaps often reflect big differences in risk behaviour (e.g. use of alcohol and tobacco) among men and women. Many regions of Southern European countries show remarkably low mortality, especially for women. This is caused by low ischaemic heart disease mortality, often called 'the Mediterranean paradox'. There is little explanation for this phenomenon; dietary factors are most often cited. Another factor that may influence differences in death rates is the effectiveness of and/or access to healthcare.

Male mortality is higher than mortality of women in all EU regions; the degree of excess mortality, however, varies markedly. In Lithuania, Estonia and Latvia male mortality is twice that among women. Regions in Greece, the United Kingdom and Iceland, on the other hand, have relatively low ratios of excess male mortality (27 to 41 percent).


3.1. Crude death rates
per 100,000 inhabitants
2002-2004, NUTS 2
> 1,120
1,030 to 1,120
960 to 1,030
880 to 960
< 880
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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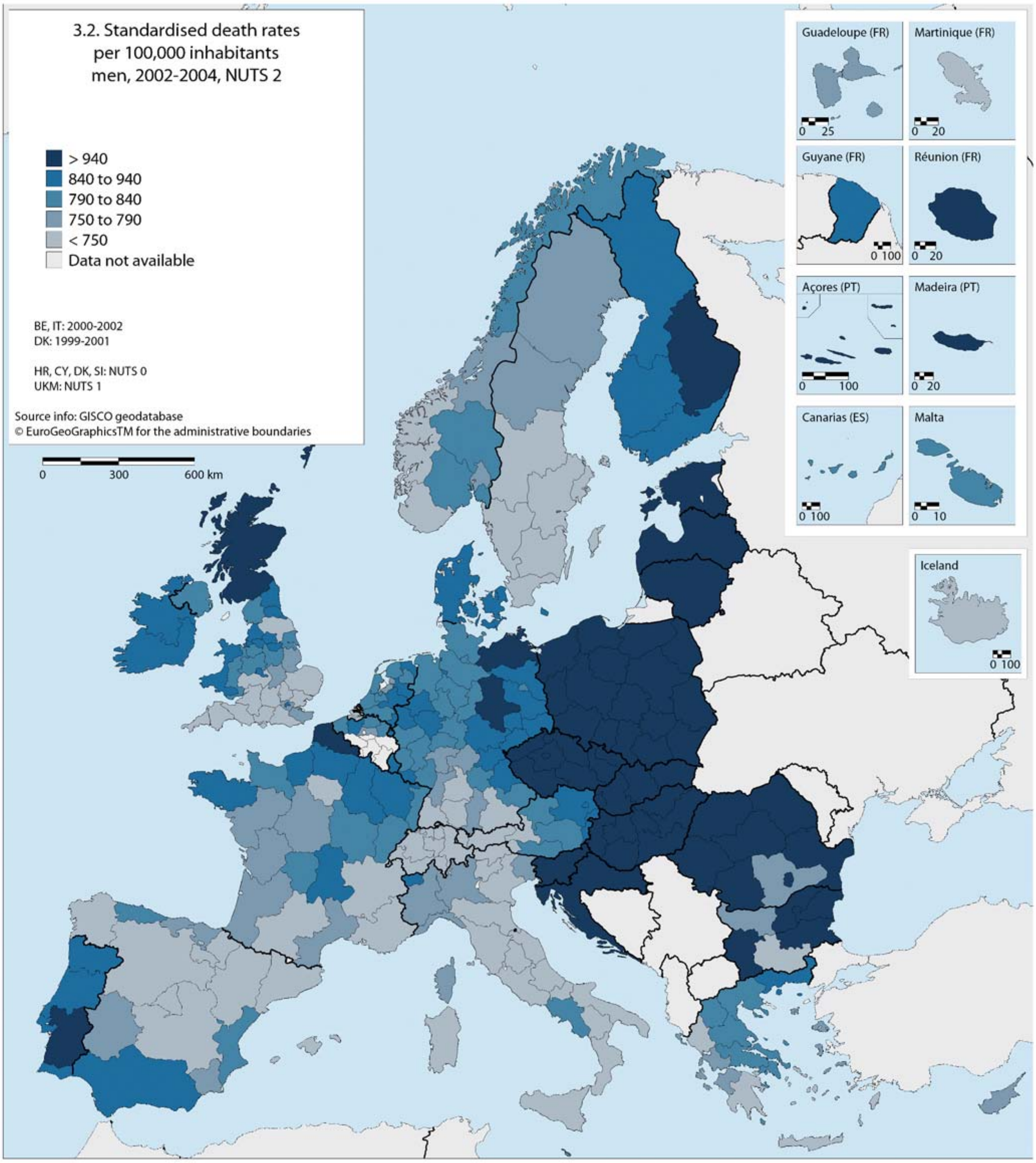
0 300 600 km
Guadeloupe (FR)
Martinique (FR)
Guyane (FR)
Réunion (FR)
Açores (PT)
Madeira (PT)
Canarias (ES)
Malta
Iceland


3.2. Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 940
840 to 940
790 to 840
750 to 790
< 750
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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0
300
600 km
Guadeloupe (FR)
0 25
Martinique (FR)
0 20
Guyane (FR)
0 100
Réunion (FR)
0 20
Açores (PT)
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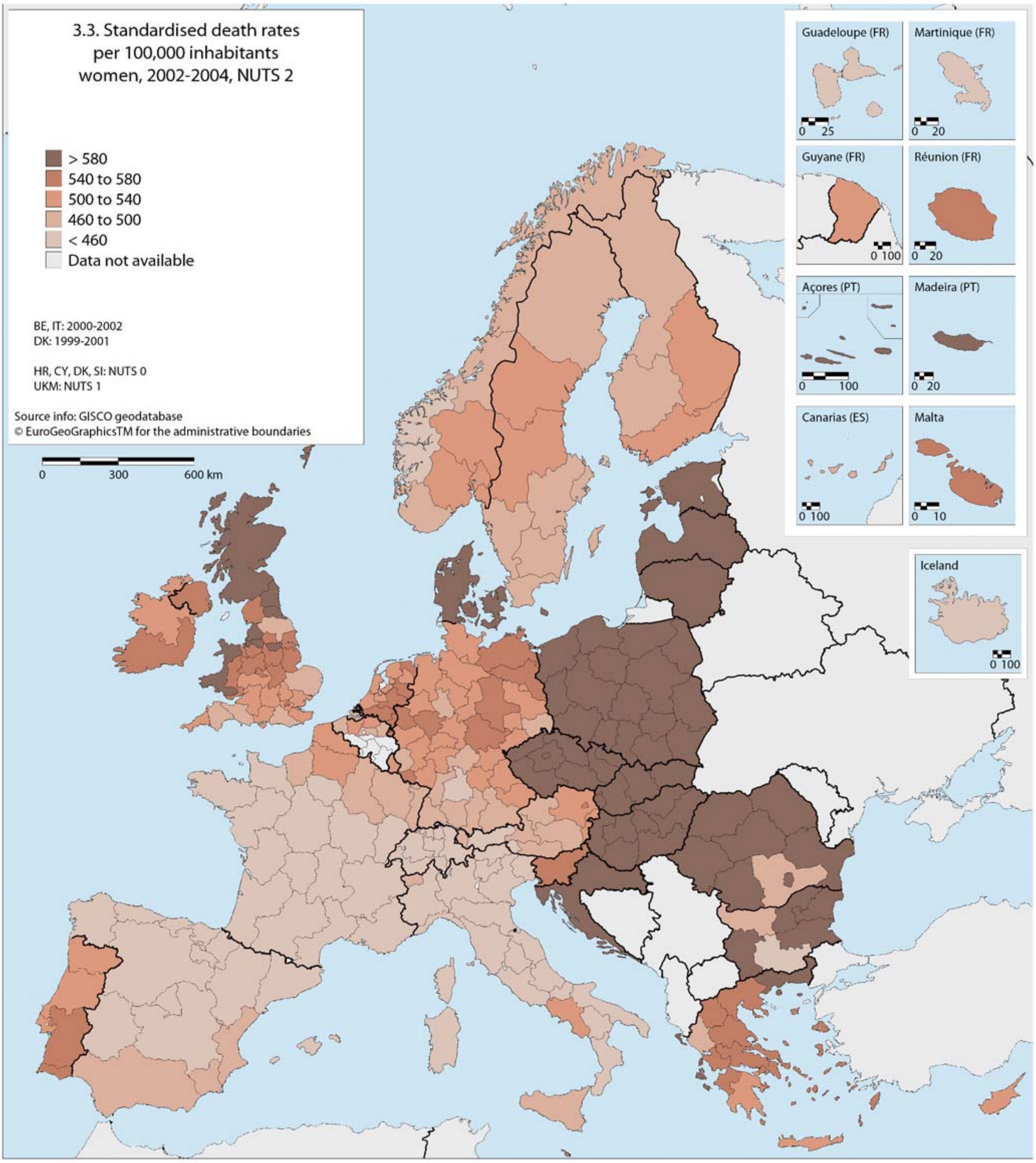
Canarias (ES)
0 100
Malta
0 10
Iceland
0 100


3.3. Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 580
540 to 580
500 to 540
460 to 500
< 460
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Guadeloupe (FR)
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Açores (PT)
Madeira (PT)
Canarias (ES)
Malta
Iceland

4

‘Premature’ and older age mortality

In this chapter the age standardised death rates from the previous chapter are further divided into infant mortality and two large age groups. The first map shows infant mortality rates. Infant mortality is the ratio of children who died before their first birthday and the numbers of live births. The next two maps show the standardised death rates for ages 0 to 64 for men and women respectively, covering 'premature' mortality, and the last two maps show these rates for ages 65 and older.

Infant mortality

Infant mortality rate (IMR) is the number of newborns dying under a year of age divided by the number of live births during the year.

In pre-industrial times infant mortality was very high. The main reasons were difficult childbirth, poor maternal health or nutrition and congenital affections. Few babies survived if the mother was unable to breastfeed the child. Infant mortality rates declined dramatically, in particular between 1850 and 1950, due to improved hygiene and housing. Health care has been very important in further reducing infant mortality to very low levels, particularly good obstetric care. Infant mortality is universally considered a useful indicator of a country's level of health, development and quality of governance.

Infant mortality may vary between countries based on the way they define a live birth. The World Health Organization (WHO) defines a live birth as any born human being who demonstrates independent signs of life, including breathing, voluntary muscle movement, or heartbeat. All EU Member States adopted the WHO definition in the late 1980s or early 1990s. The adoption of the WHO recommendations for defining live and stillbirths has caused abrupt increases in registered infant mortality in many countries. Since that adoption, the comparability of infant mortality rates between EU Member States has likely been improved. Decisions between miscarriage, stillbirth and infant death in very frail or very premature infants or infants with multiple handicaps can remain difficult. The average infant mortality rate now stands at 5.2 deaths per 1,000 life births. The lowest value (2.1) is found in Comunidad Foral de Navarra (Spain) and the highest value (20.1) is found in Nord-Est (Romania).

Premature mortality

In the European Union as a whole premature mortality (below age 65) covers about 20 percent of all deaths. Death rates for men are about twice those for women. Estonia has the highest ratio: male premature mortality is three times as high as that for women. Noord-Brabant in the Netherlands has the lowest ratio: mortality is about 43 percent higher among men than among women. The interquintile difference shows that among men, the 80th percentile has a 69 percent higher mortality than the 20th percentile. Among women, the 80th percentile has a 46 percent higher mortality than the 20th percentile, indicating that the mortality differential among men is substantially higher than among women. Remarkably low male death rates for ages below 65 are found in most regions of Italy and Sweden, but also in parts of the Netherlands, the southern part of the United Kingdom and in Iceland.

High rates are found without exception in the former socialist economies of Poland, Estonia, Lithuania, Latvia, Bulgaria, Romania, the Czech Republic, Slovenia, Slovakia, Hungary and Croatia. Former East Germany occupies a middle position. In Western, Southern and Nordic Europe, premature male mortality is high in France, Portugal and Finland.

This divide can also be seen in premature female mortality. The former socialist countries again have higher rates than Western European countries. The highest and lowest rates are found in the same regions as for men – in Finland and Bulgaria, respectively – and vary between 51 and 327 per 100,000 inhabitants. The lowest rates are found in different regions, however. The regions in Spain and Greece stand out in terms of their low rates. Denmark, Scotland and the former industrial north-east of France have high premature mortality rates among women.

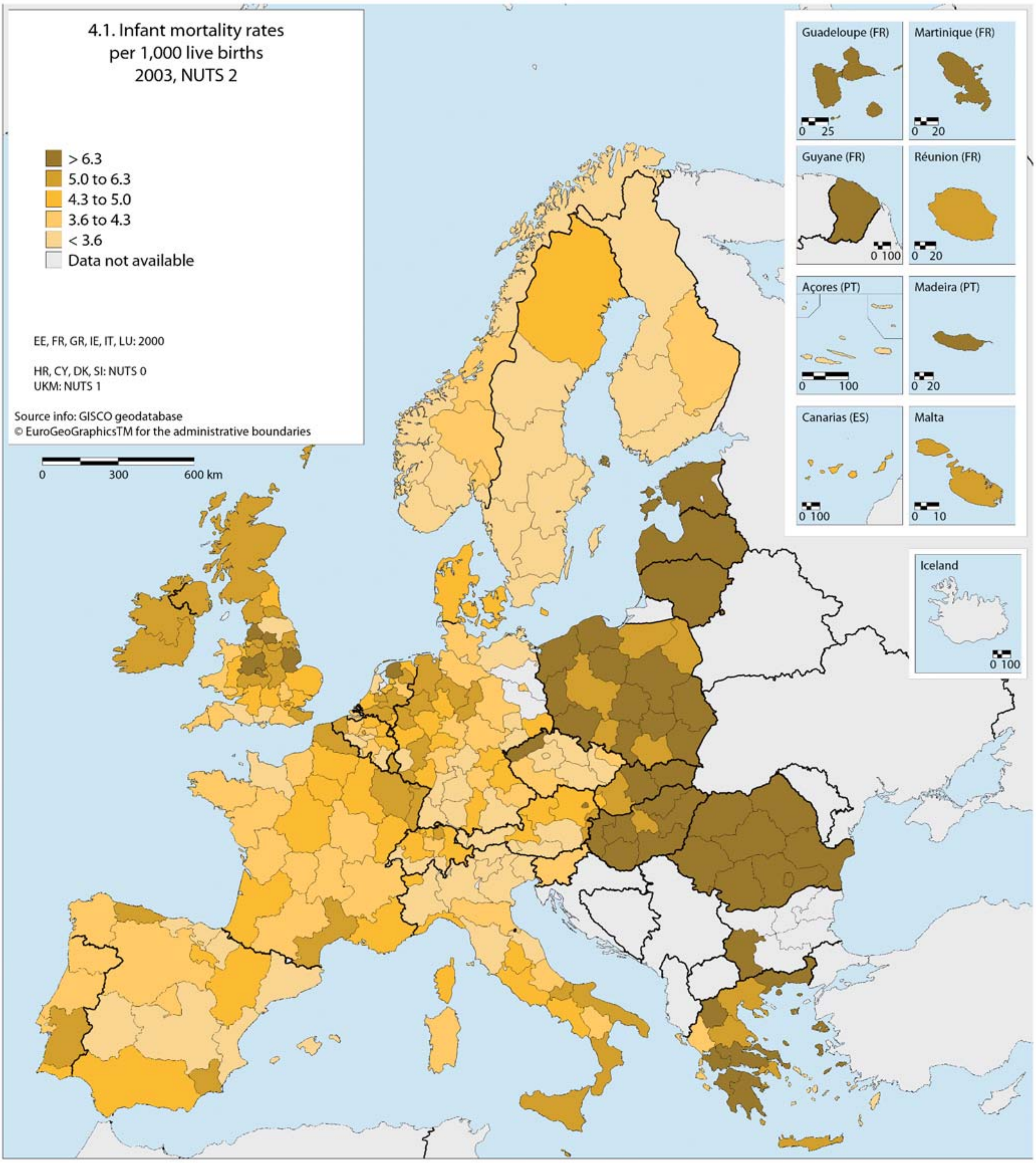
In general premature mortality is strongly linked to behavioural risks. The most common causes of death at ages under 65 among men are ischaemic heart disease, lung cancer, accidents and suicide. The most common causes are more or less the same among women, adding breast cancer as the most important cause of premature death to cancer. But among men these selected causes constitute a far greater proportion (40 percent) of premature mortality than among women (30 percent).

Many deaths before age 65 are related to personal lifestyles such as smoking, risky driving, alcohol consumption, and are therefore avoidable. Premature deaths account for 20 percent of all deaths and have a strong influence on the years of life lost and on life expectancies. Moreover, the fact that behaviour that puts people's health at risk is modifiable makes premature mortality highly suitable for public health interventions.

Older age mortality

The spatial pattern of age standardised mortality for ages 65 and older is very similar to that for all ages for both men and women. Deaths in this highest age group account for almost 80 percent of all deaths in the countries under study.

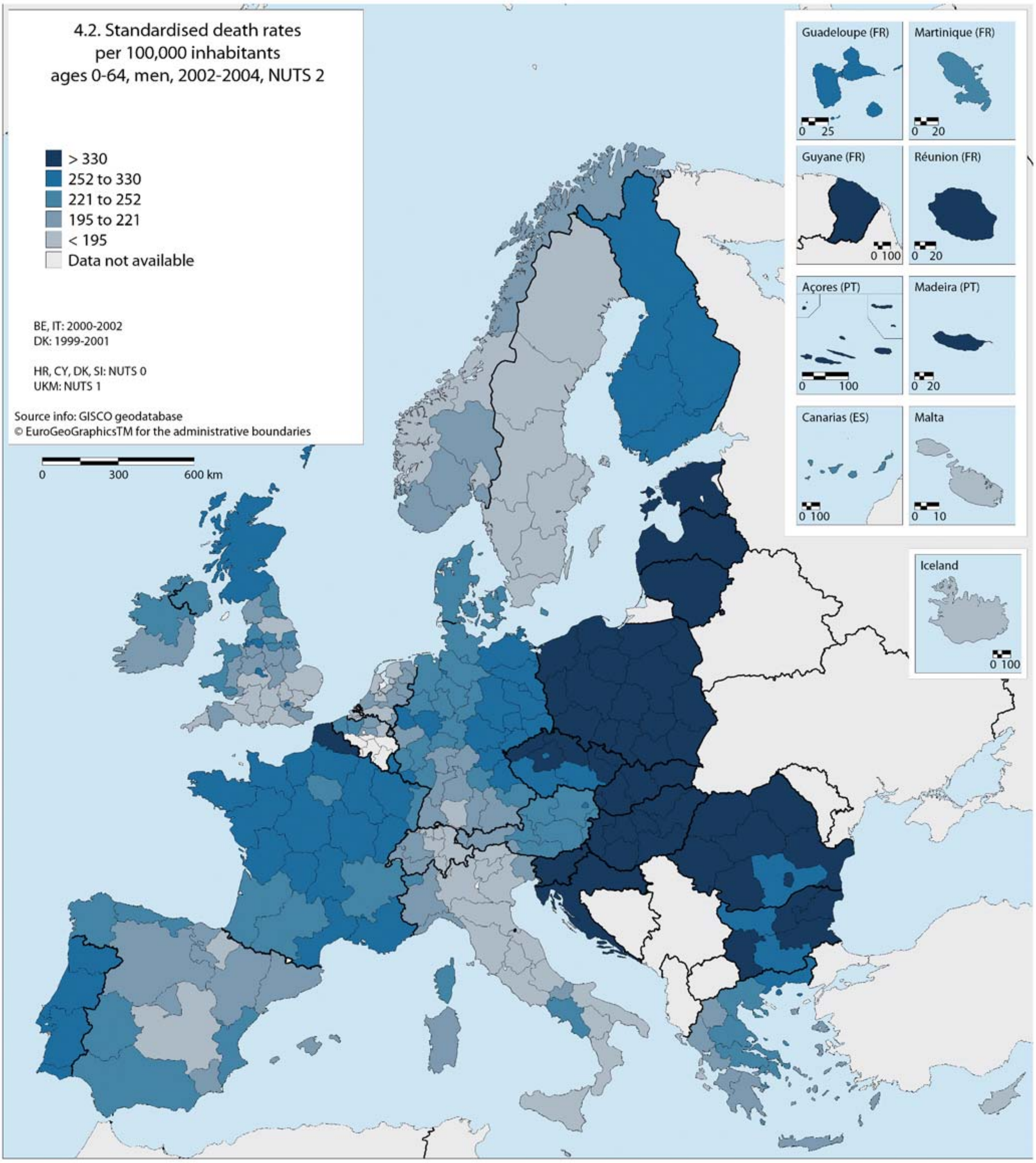
For men, the SDRs for ages 65 and older vary between 427 and 1,611 per 100,000 inhabitants. For women they vary between 287 and 1,226 per 100,000. Differences between men and women are highest in Provincia Autonoma Trento



(Italy) where the level of mortality is about 80 percent higher for men than it is for women. They are lowest in Ionia Nisia (Greece) where this percentage equals 11.

For both men and women old-age mortality is relatively high in all Central and Eastern European Member States, but also in Scotland, Ireland and Portugal. Low rates are found in the northern parts of Spain and large parts of France and Italy.

The next chapters show that the age standardised death rates for ages 65 and over are linked to mortality from diseases of the circulatory system: 47 percent of those who die after the age of 65 die from diseases of the circulatory system. Of those circulatory diseases, ischaemic heart diseases and cerebrovascular diseases are the most common. The Mediterranean region shows low mortality, benefiting from the very low cardiovascular disease rates.


4.2. Standardised death rates
per 100,000 inhabitants
ages 0-64, men, 2002-2004, NUTS 2
> 330
252 to 330
221 to 252
195 to 221
< 195
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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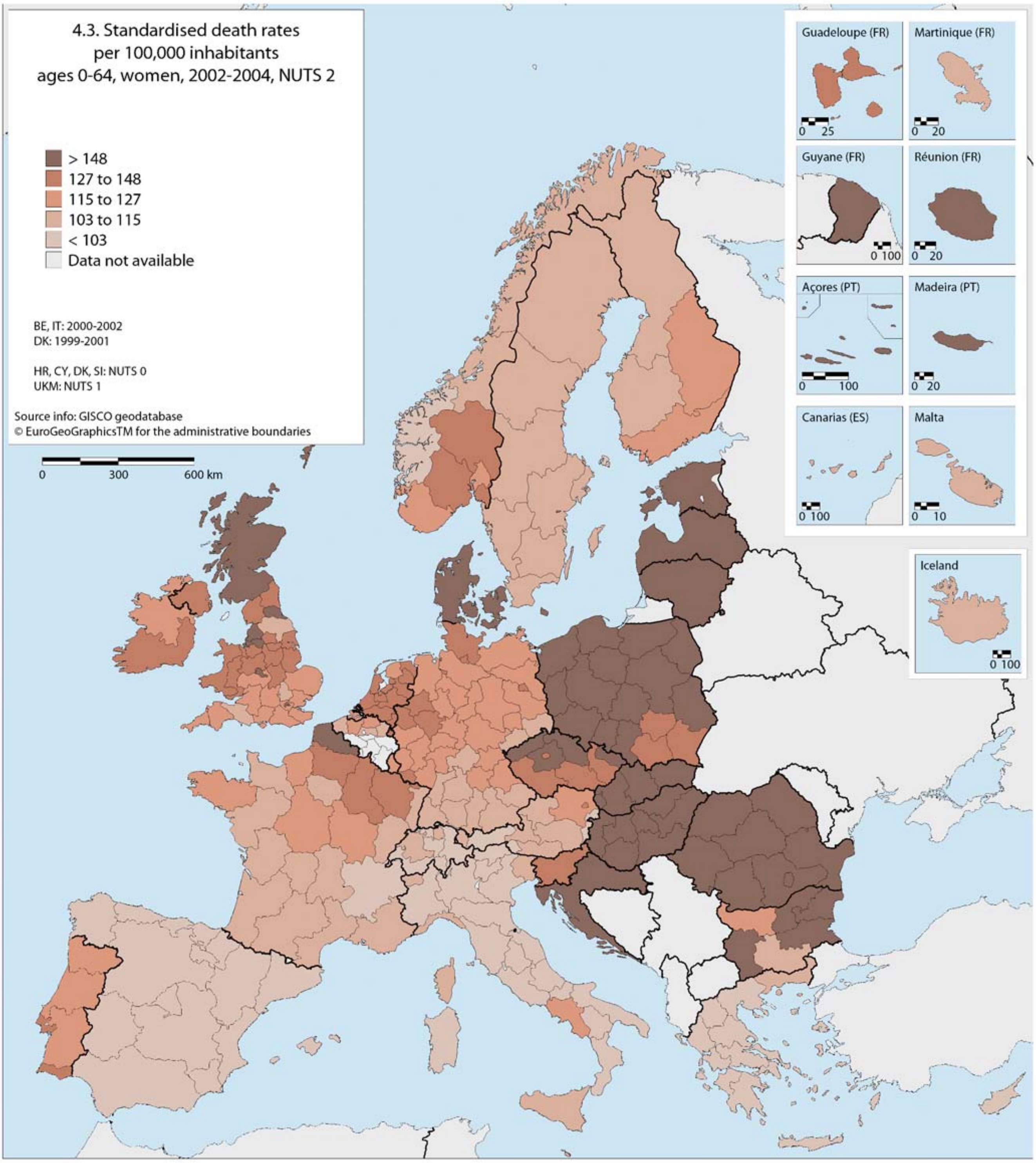
4.3. Standardised death rates
per 100,000 inhabitants
ages 0-64, women, 2002-2004, NUTS 2
> 148
127 to 148
115 to 127
103 to 115
< 103
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Martinique (FR)
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Guyane (FR)
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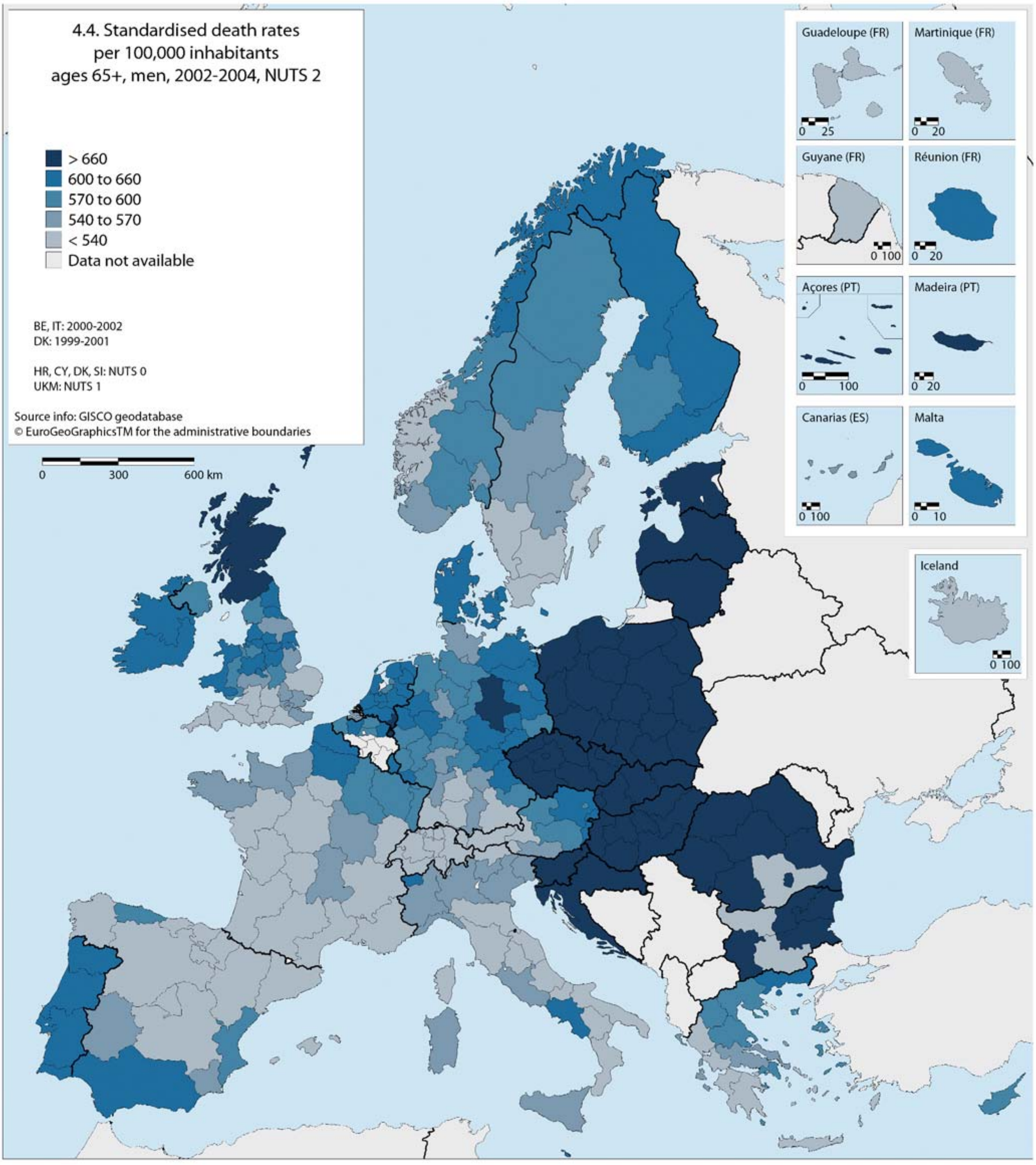
4.4. Standardised death rates
per 100,000 inhabitants
ages 65+, men, 2002-2004, NUTS 2
> 660
600 to 660
570 to 600
540 to 570
< 540
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Martinique (FR)
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Guyane (FR)
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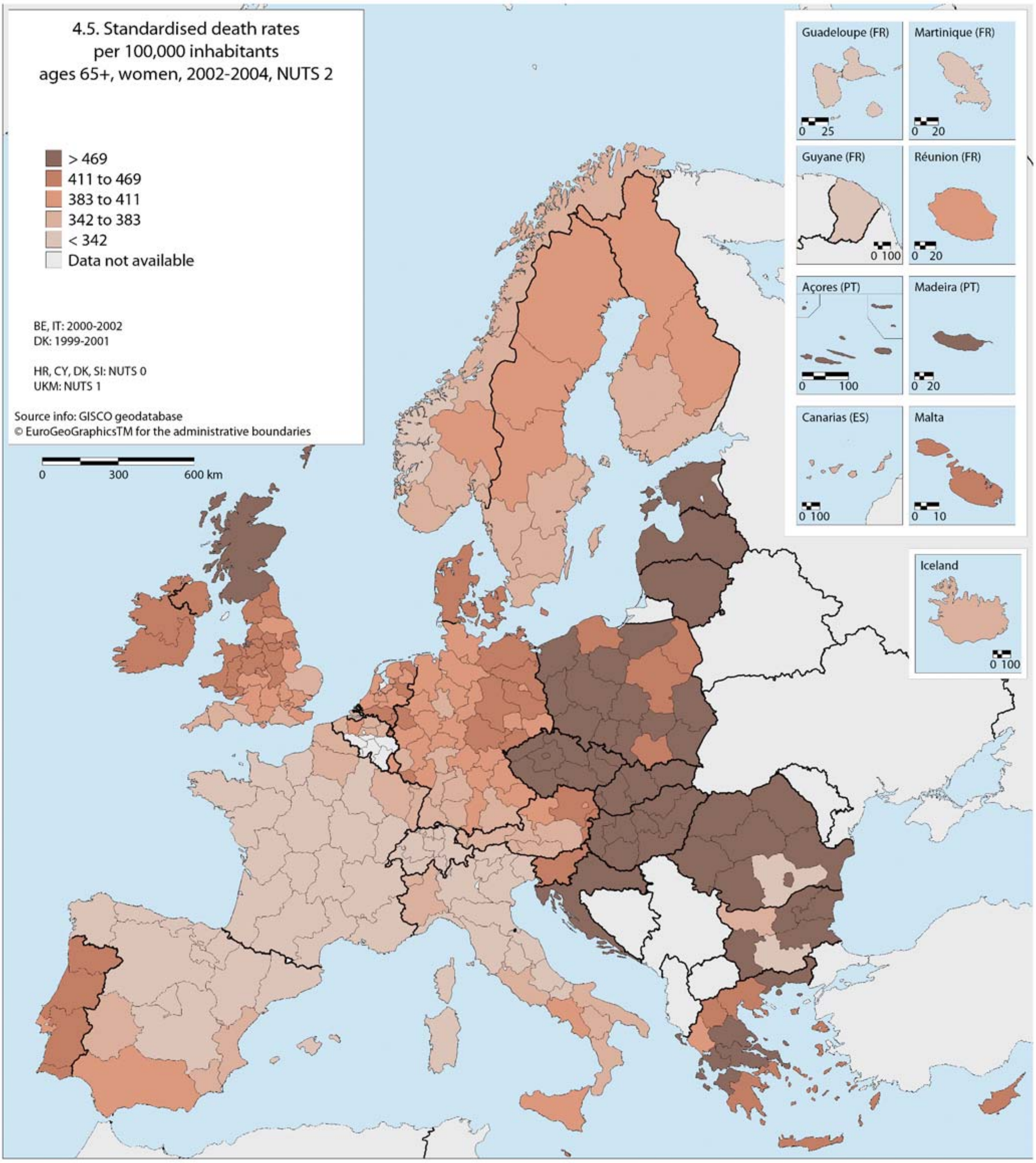
4.5. Standardised death rates
per 100,000 inhabitants
ages 65+, women, 2002-2004, NUTS 2
> 469
411 to 469
383 to 411
342 to 383
< 342
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Martinique (FR)
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Açores (PT)
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Madeira (PT)
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Canarias (ES)
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Malta
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Iceland
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5

Life expectancies

Life expectancy is a summary indicator of overall mortality, adjusted for age, easy to interpret for a lay public and therefore very suitable for comparison. Life expectancies refer to the number of years still to be lived by a person who has reached a certain age, if subjected throughout the rest of his or her life to the actual mortality conditions of the current calendar period. So, life expectancy at birth in a given year refers to the average number of years a newborn baby will live if the age-specific death rates observed in that year will be applicable during his or her entire life. It is not a 'true' (cohort) life expectancy, which can only be determined in the future. If death rates are declining, the cohort life expectancy of a given cohort is longer than the period life expectancy in the year of birth of that cohort. Thus if death rates are expected to decline in the future, a newborn child may expect more years to live than calculated for its life expectancy at birth.

Life expectancy at birth

High life expectancies (i.e. relatively low mortality levels) can be observed in Switzerland, parts of Austria, Iceland, the southern part of the United Kingdom, large parts of Italy, central Spain and the Nordic States except for Denmark.

Low life expectancies are found in Central and Eastern European Member States.

Life expectancy at birth for men currently varies between 62.2 years in a Bulgarian region (Yugoiztochen) and 79.7 years in Åland (Finland), a difference of 17.5 years. However, we must warn against an overinterpretation of such extremes. Extremes may be outliers, caused by random error in small numbers or by special populations (Åland in Finland is known to attract retired persons of higher social classes) or events (such as heat waves). The mean life expectancy at birth in the EU in 2002-2004 was 75.1 years for men and 81.3 years for women. In the 20 percent regions with the highest life expectancy, life expectancy among men varied from 77.5 to 79.7 years; among women, life expectancy varied from 83.1 years to 85.0 years. In the 20 percent regions with the lowest life expectancy, male life expectancy varied from a low 62.2 years to 72.9 years; among women life expectancy varied from 70.1 to 79.7 years.

Life expectancies are lower for men than for women. Both biological and behavioural factors have favoured the survival of women. Risk-taking behaviour by men is reflected in higher accident mortality and higher alcohol and tobacco-related mortalities. Large differences in life expectancy between men and women are due to these causes. The differences between life expectancies among men and women varied from a huge 11.4 years in Estonia to a far lower 3.7 years in Iceland. The average difference for the European regions is 6.1 years.

The spatial pattern of life expectancy at birth for women shows both similarities, but also dissimilarities with the spatial pattern of male life expectancies. The similarity is the division between the EU-15 countries and the former socialist countries, which have high and low life expectancies for both genders respectively. Within the EU-15 countries we see some remarkable differences, however, such as the relatively low life expectancy for women in Scotland, or the high life expectancies for women in France, Spain and Italy.

Life expectancies at birth for women vary between a maximum life expectancy of 85.0 years in Comunidad Foral de Navarra (Spain) and 70.1 years in Yugoiztochen (Bulgaria). Average life expectancy in the European regions is 81.1 years. The variance in mortality is lower among women than among men, indicating a higher variance of risk behaviour among men. The median life expectancy of women in the lowest 20 percent of regions is 78.1 years, in the highest 20 percent it is 83.7 years, which is still a difference of 5.5 years.

Life expectancy at age 65

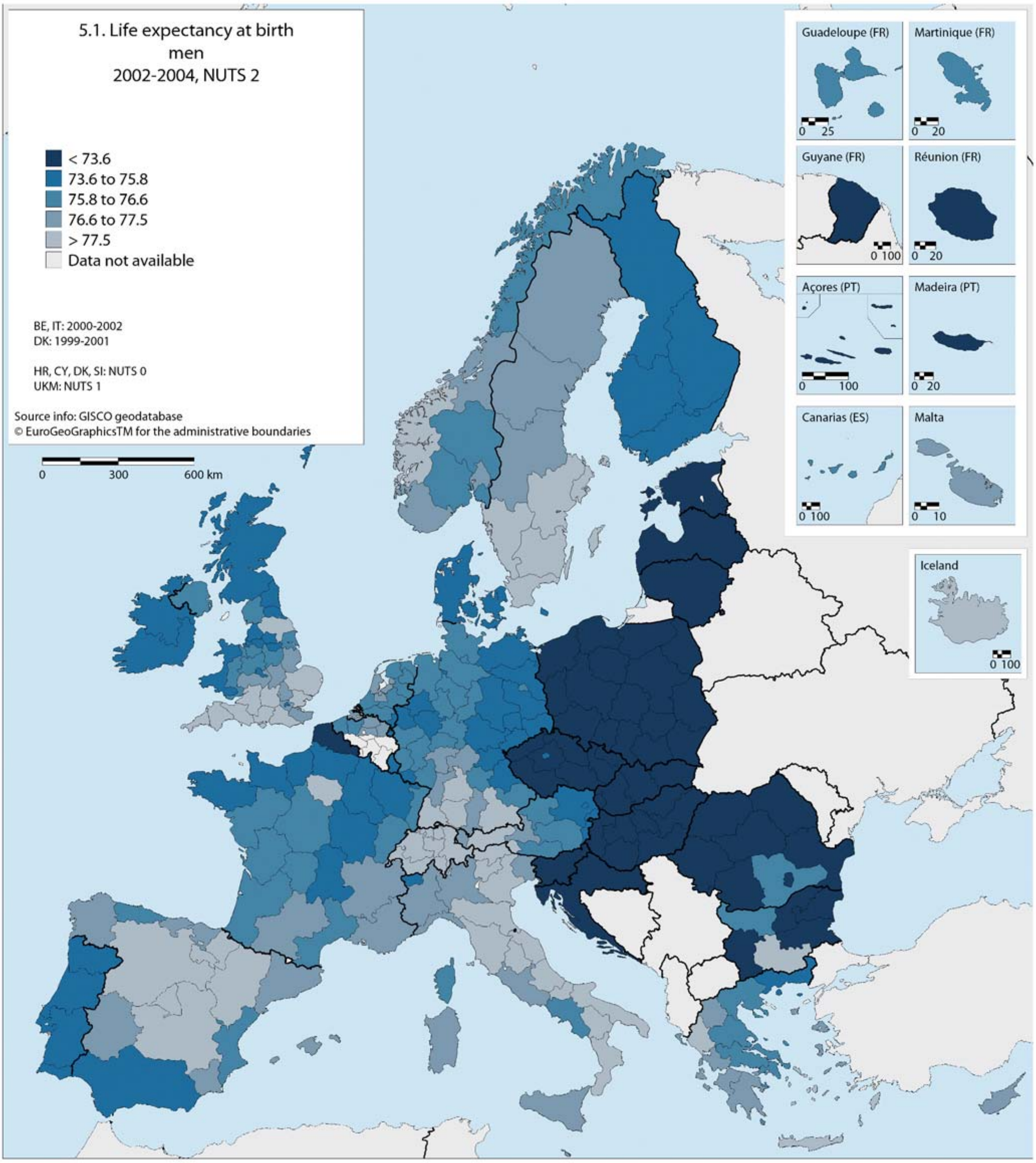
The remaining life expectancy for men at age 65 in the European Union (27 Member States) was 16.0 years. In the 20 percent of regions with highest life expectancy at age 65, male life expectancy varied between 17.3 and 19.4 years. In the regions with the 20 percent lowest male life expectancies, it varied between and 9.8 and 15.2 years. The spatial pattern of life expectancies at age 65 for men is remarkably similar to that of life expectancies at birth for men. Note the somewhat less favourable position of the southern part of the United Kingdom and Scotland, where life expectancy values at age 65 range between 19.4 and 9.8 years.

The remaining life expectancy for women at age 65 in the EU-27 was 19.6 years. In the 20 percent of regions with highest life expectancy at age 65, female life expectancy varied between 21.0 and 23.4 years. In the regions with the 20 percent lowest female life expectancies, it varied between and 12.4 and 19.3 years. The spatial pattern of these life expectancies is almost identical to that of life expectancies at birth. Only Denmark has a remarkably low score for this indicator.

The difference in life expectancy between men and women has decreased by the age of 65. Once women have reached the age of 65 they have, on average, 3.6 more years to live than men of the same age.

Life expectancy at age 85

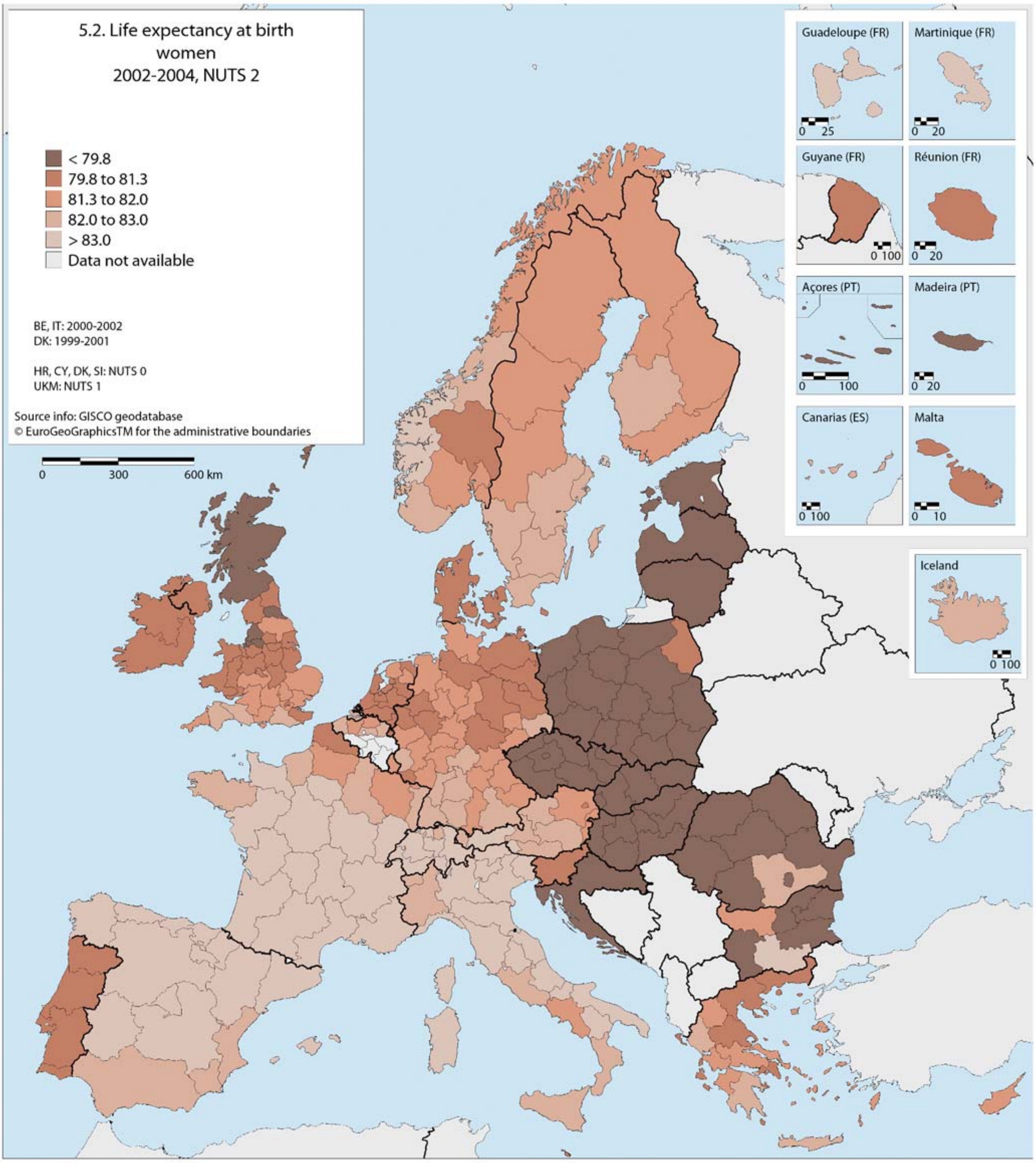
The life expectancy maps for age 85 should be handled with care, as they are based on data for which the highest age group is age 85+. Ages above 85 years are not further divided. Such a division can have a considerable impact on life expectancy at older ages. After the age of 85 men have an average of 5.3 years to go. Both low and high extreme values



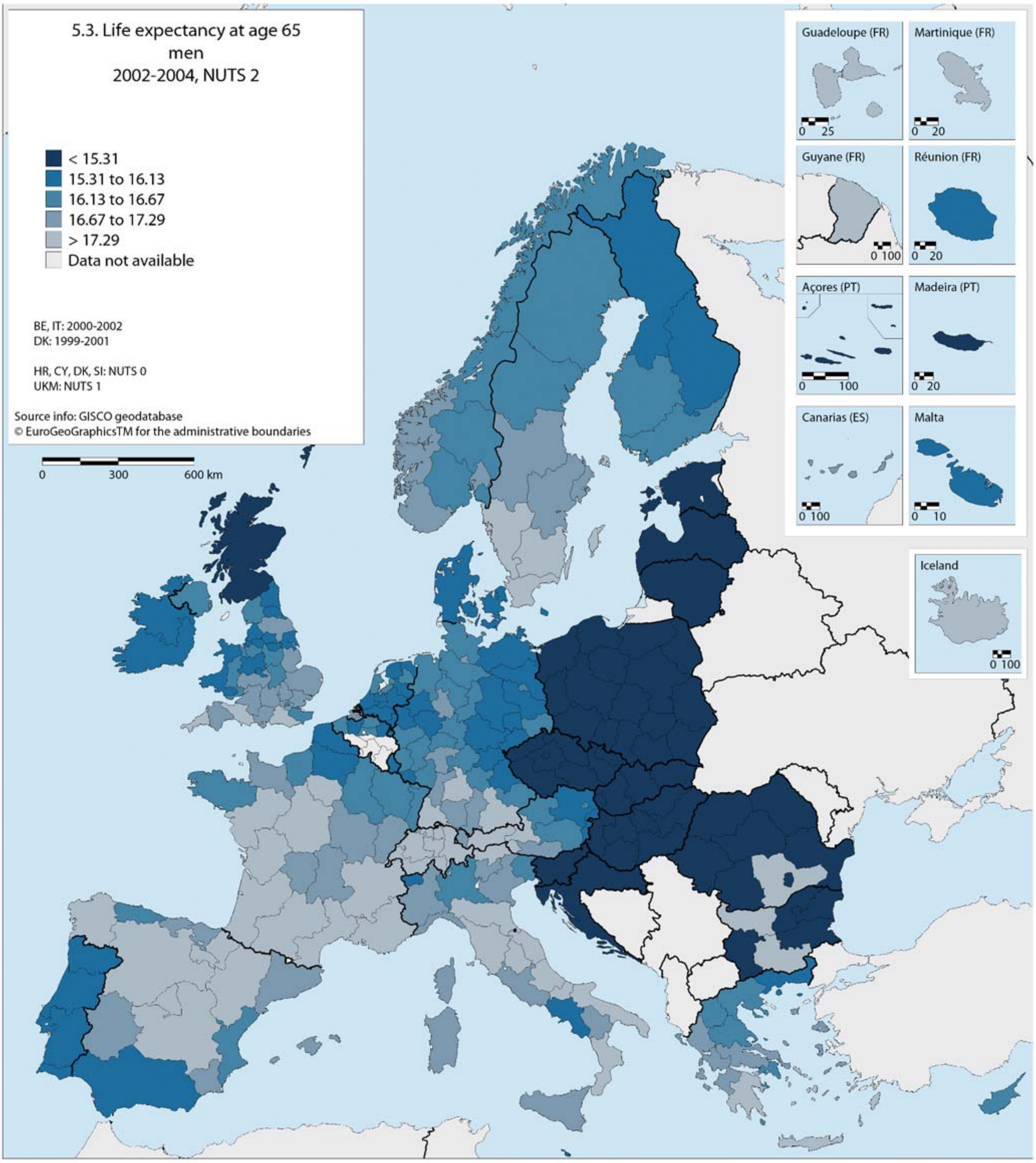
are found in the former socialist countries. On average, 85-year-old women have 6.2 more years to live.

The spatial patterns of this high-age life expectancy show many similarities with the patterns for life expectancies at birth and at age 65. One remarkable difference is the less favourable position of most Portuguese regions and Scotland (for both men and women).

Scattered regions in the Mediterranean, France and Spain and particularly in Italy show remarkably high life expectancies among the oldest old (85 and older). Non-Mediterranean countries and regions with high life expectancies among the oldest old are Iceland, Vestlandet in Norway and Yuzhen tsentralen in Bulgaria. In Bulgaria, high variance of mortality between regions may indicate administrative problems of mortality registration. Dates of births may be



less reliably recorded at the beginning of the 20th century, as a consequence of the Balkan Wars and the First World War. However, high life expectancies at old ages are important sources for further scientific research as they may suggest future trends in the rest of Europe.


5.3. Life expectancy at age 65
men
2002-2004, NUTS 2
< 15.31
15.31 to 16.13
16.13 to 16.67
16.67 to 17.29
> 17.29
Data not available
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HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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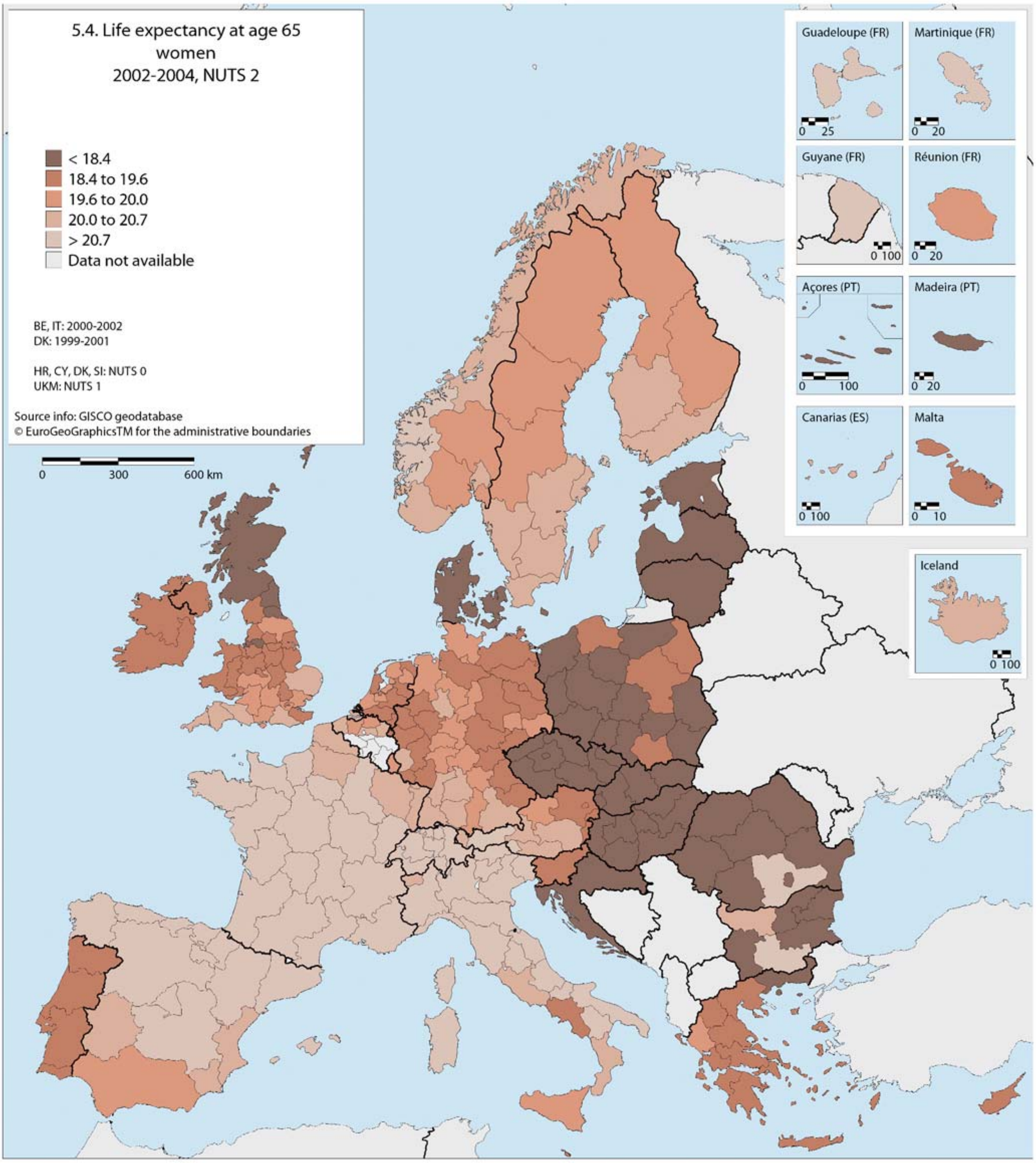
5.4. Life expectancy at age 65
women
2002-2004, NUTS 2
< 18.4
18.4 to 19.6
19.6 to 20.0
20.0 to 20.7
> 20.7
Data not available
BE, IT: 2000-2002
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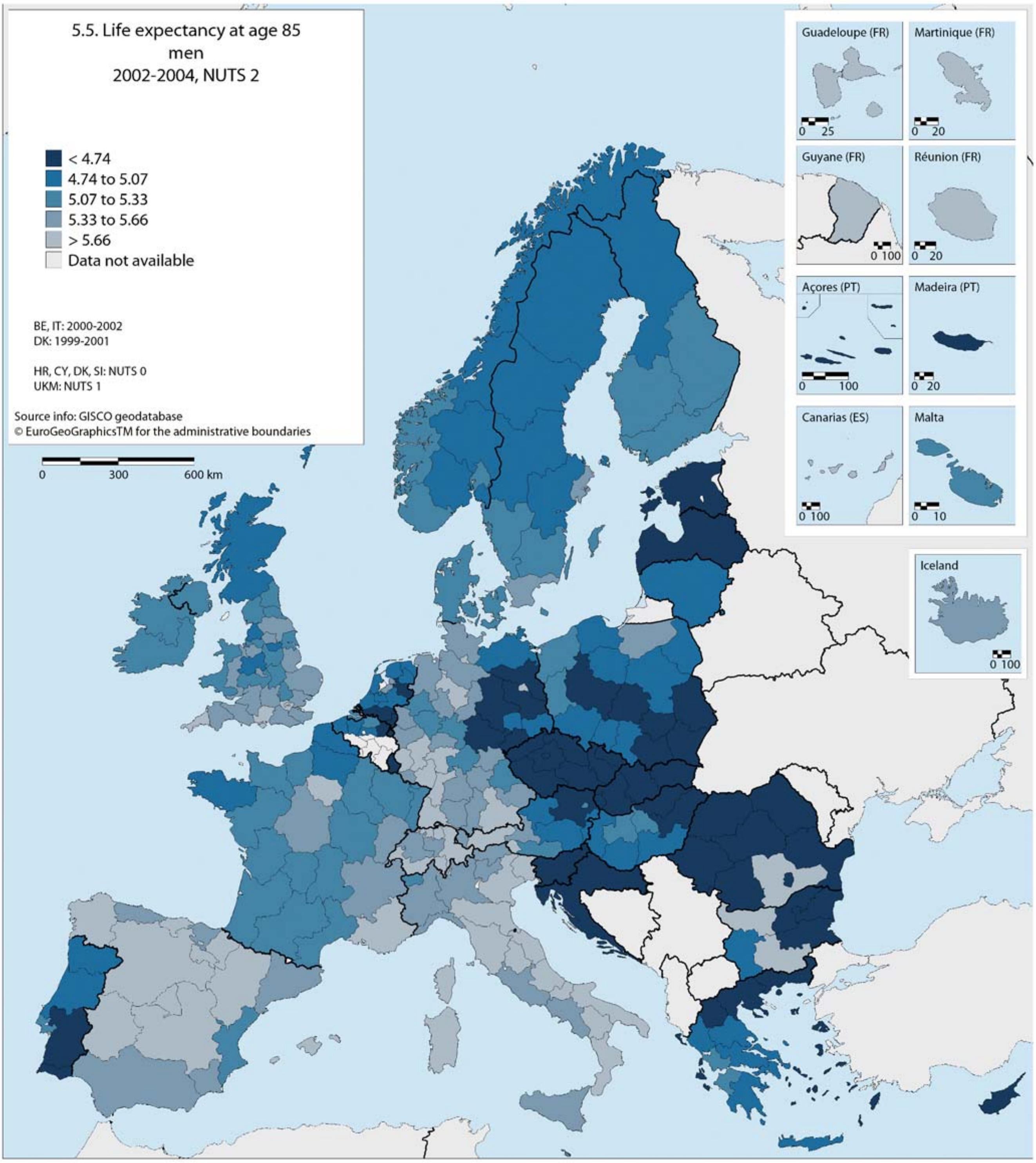

5.5. Life expectancy at age 85
men
2002-2004, NUTS 2
< 4.74
4.74 to 5.07
5.07 to 5.33
5.33 to 5.66
> 5.66
Data not available
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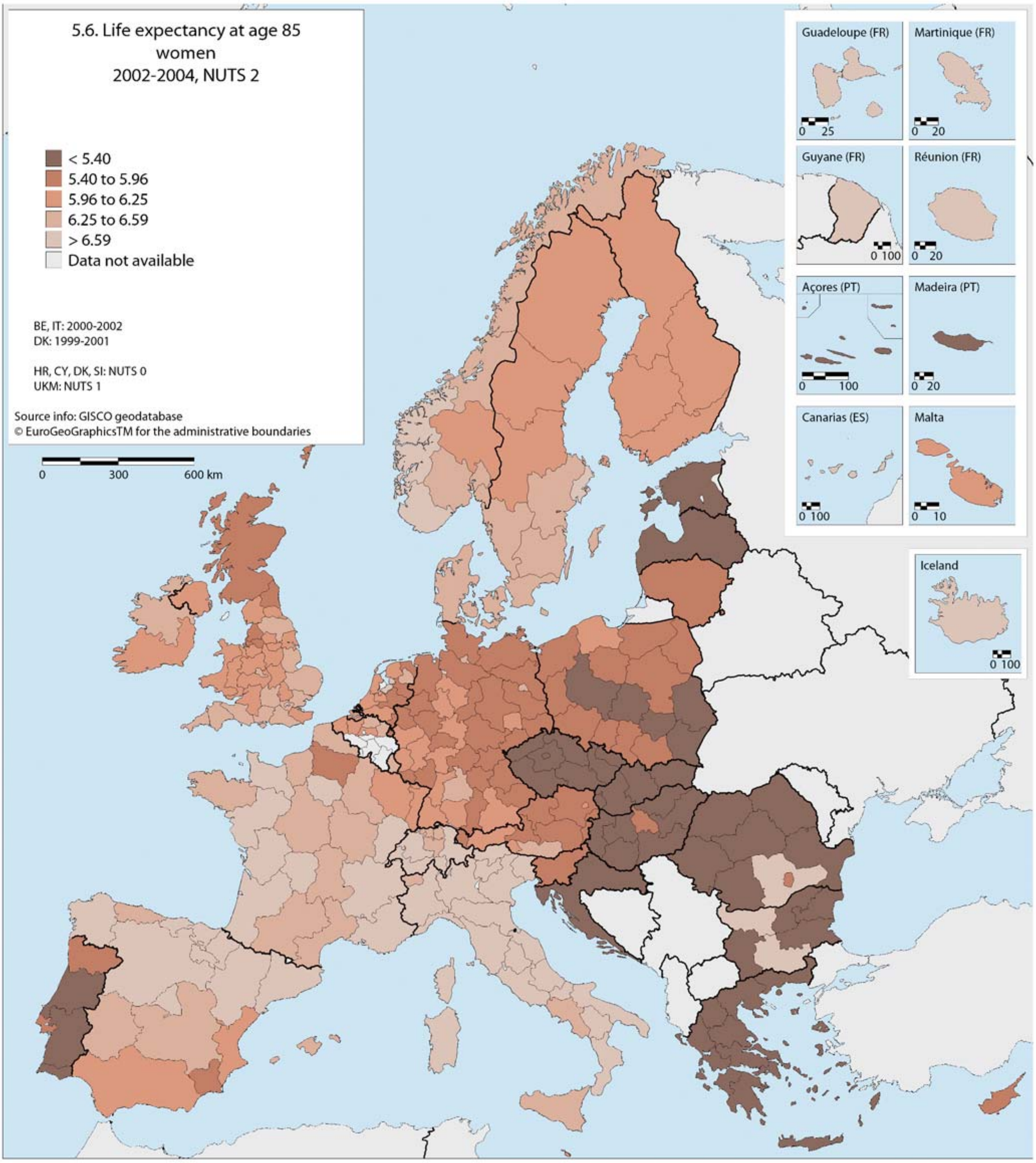
5.6. Life expectancy at age 85
women
2002-2004, NUTS 2
< 5.40
5.40 to 5.96
5.96 to 6.25
6.25 to 6.59
> 6.59
Data not available
BE, IT: 2000-2002
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6

Infectious and parasitic diseases

As for infant mortality, tremendous progress has been made in the control of infectious diseases during the last century. The development and widespread use of antibiotics and vaccines, coupled with earlier improvements in urban sanitation and water quality, have dramatically lowered death and disability from infectious and parasitic diseases. Before the advent of HIV/AIDS, experts predicted we would soon see the end of infectious diseases. However, this optimism was premature. The world saw a global resurgence of infectious diseases, including the identification of new infectious agents such as HIV/AIDS, the re-emergence of old infectious agents such as tuberculosis (TB) and the rapid spread of antimicrobial resistance in developed countries.

The factors that contribute to the resurgence of these diseases increase in importance, such as global travelling, increasing population density and urbanisation, ecological and climatic changes, and the evolution of drug-resistant microbes.

Even though the mentioned arguments are applicable to Europe, deaths from infectious and parasitic diseases in Europe are dominated by differences in age and by differences in coding practices. Infectious diseases are often complications of other diseases, particularly among the elderly: If they die from infectious complication, e.g. from pneumonia, the original disease should be coded as the underlying, primary cause of death, whereas pneumonia should be coded as the secondary cause of death. However, while this makes certain groups of codes of death less reliable (notably respiratory infections), other infectious causes of death are both reliable and relevant, such as tuberculosis and HIV/AIDS. They will be discussed in the next two chapters. The percentage of people dying from infectious diseases is now very low in Europe: only 1.2 percent. The percentage of children below the age of 10 dying due to this cause is even lower: 0.8 percent.

Standardised death rates

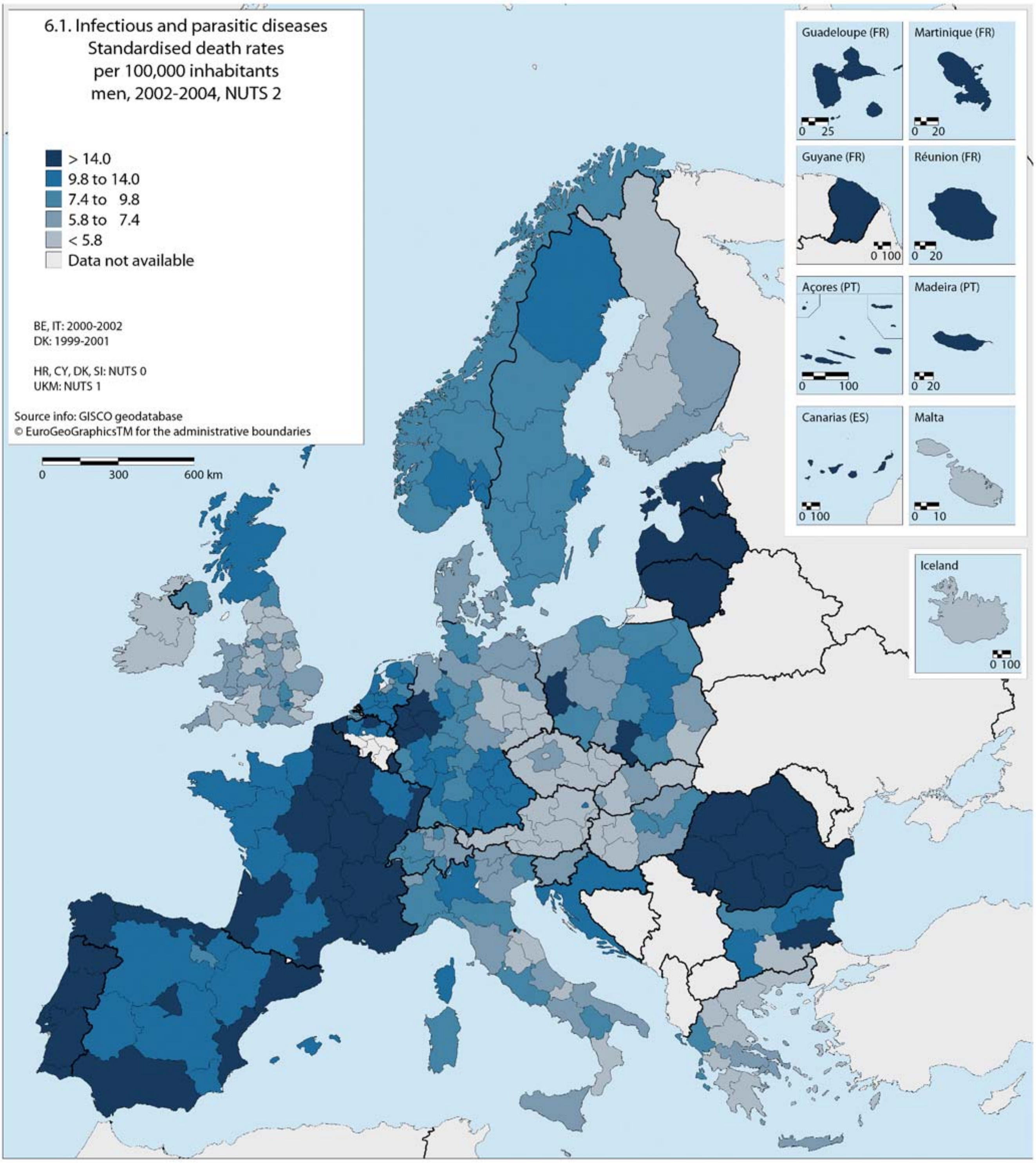
Male mortality levels are higher than female mortality levels: On average men die 80 percent more often due to these diseases than women do. The highest values for both men and women are found in France (Guyane) and Spain (Ciudad Autónoma de Ceuta). The fact that these are not on the European continent is likely no coincidence.

Potential years of life lost

The PYLL focuses on death before age 65, so the figures give an indication of the premature loss of productive life. In the EU-27, 100,000 men lose in average 116 PYLL, women 47 years. The increased resilience of women against infectious and parasitic diseases is a well known biological fact([3]). The highest losses of productive life due to infectious diseases among men can be found in Portugal (538 PYLL per 100,000 men) and in Romania (444 PYLL per 100,000 men). The variance is high in the highest quintile, showing the patchy nature of local epidemics in people under 65: in Lisboa the number of PYLL increased to over 1,000 among men. The lowest figures are found in the Czech republic (23.1 PYLL).

Among women, we observe the same distribution: the highest numbers of PYLL are found again in Romania (190 PYLL) and Portugal (157 PYLL, with 300 PYLL in Lisboa). The lowest figures are found in Malta (only 1.5 years, likely due to the relatively small population) and the Czech Republic again (10.3 PYLL).

([3]) I.P.F. Owens (2002) Science; 297(5589), 2008-2009


6.1. Infectious and parasitic diseases
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 14.0
9.8 to 14.0
7.4 to 9.8
5.8 to 7.4
< 5.8
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
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Source info: GISCO geodatabase
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Guadeloupe (FR)
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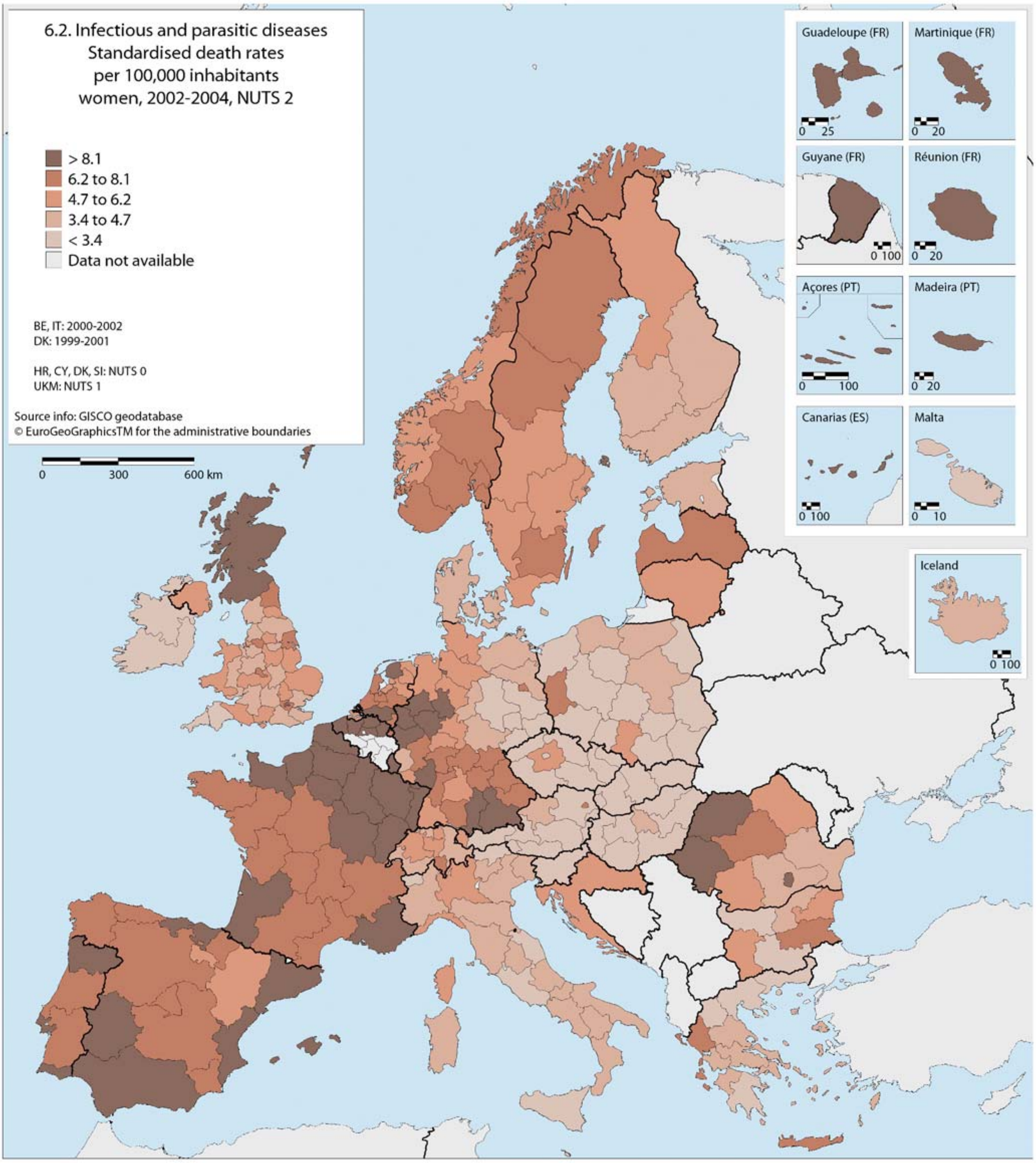
6.2. Infectious and parasitic diseases
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 8.1
6.2 to 8.1
4.7 to 6.2
3.4 to 4.7
< 3.4
Data not available
BE, IT: 2000-2002
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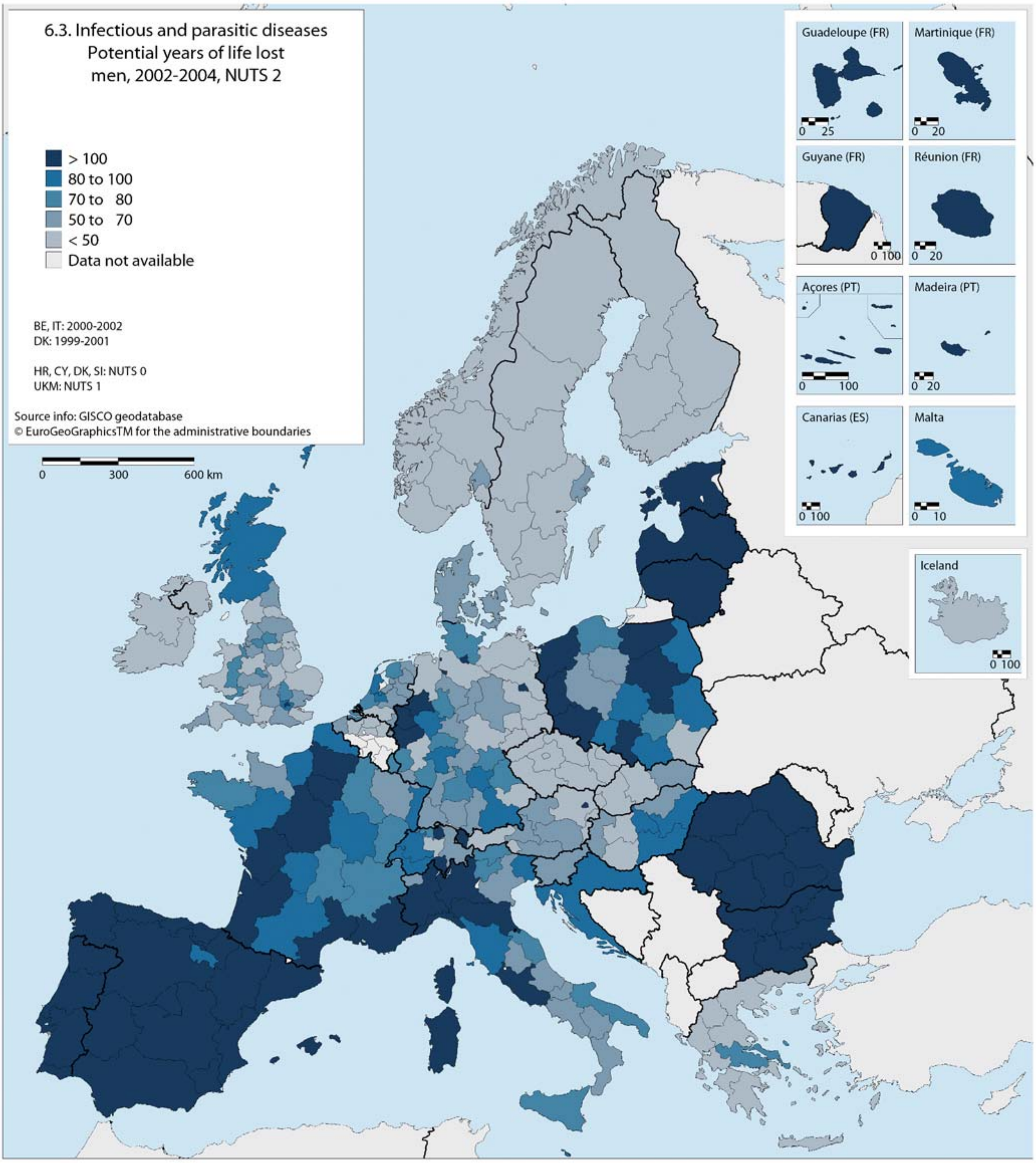
6.3. Infectious and parasitic diseases
Potential years of life lost
men, 2002-2004, NUTS 2
> 100
80 to 100
70 to 80
50 to 70
< 50
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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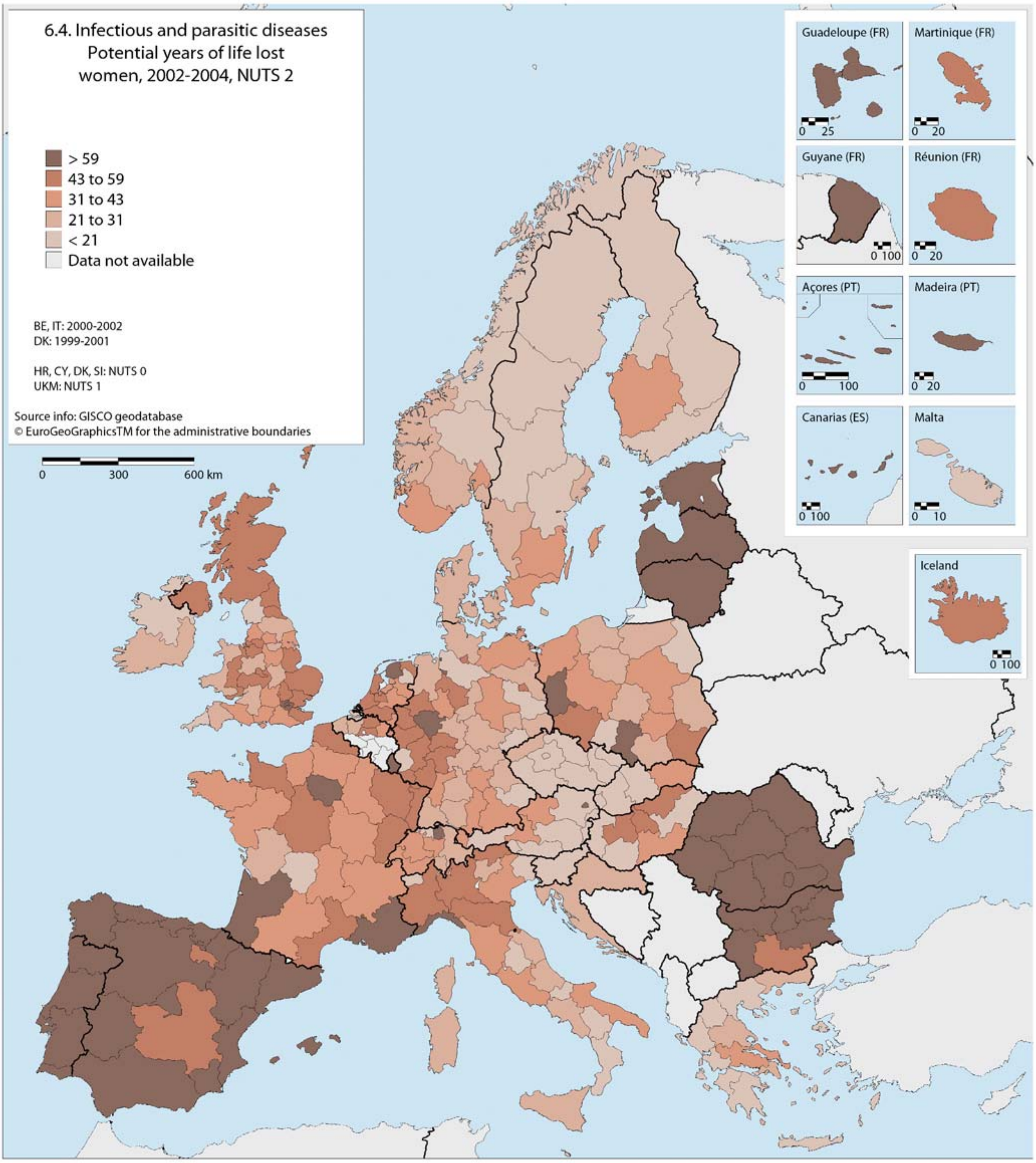
6.4. Infectious and parasitic diseases
Potential years of life lost
women, 2002-2004, NUTS 2
> 59
43 to 59
31 to 43
21 to 31
< 21
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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7

Tuberculosis

Tuberculosis (TB) is a common and often fatal infectious disease caused by mycobacteria, mainly Mycobacterium tuberculosis. Tuberculosis most commonly attacks the lungs (as pulmonary TB) but can also affect most other organs. Skeletal remains show that prehistoric humans (4000 BC) had TB. Asymptomatic, latent TB infections are most common. One in ten latent infections will progress to full-blown disease, which, if untreated, kills more than half of its victims.

The burden of TB is lowest in highly developed regions such as Europe. In the established market economies, such as the EU-15 Member States, TB incidence is still decreasing. However, a rising number of people in the developed world are contracting tuberculosis because their immune systems are compromised by immunosuppressive drugs, substance abuse or HIV/AIDS. New immigrants from high-incidence countries often carry latent infections and are at risk of TB and multidrug-resistant tuberculosis (MDR-TB). MDR-TB occurs when patients no longer benefit from treatment with the two main drugs for tuberculosis, isoniazid and rifampicin. It can arise due to poor adherence to treatment, inappropriate prescription, irregular drug supply or poor drug quality. The cost of treatment of MDR-TB is 100 times more than that for treating non-resistant tuberculosis([4]).

Social turmoil after the fall of communism has enabled a resurgence of TB and particularly MDR-TB in former socialist economies, such as the Central and Eastern European Member States (but the situation is worse in the former socialist European non-Member States). In the literature, the main cited reasons are the dramatic rise in HIV infections and the neglect of TB control and treatment programmes. Alcohol abuse is a contributing factor. Alcohol related mortality among men is high where the male to female TB mortality ratios are very large, According to the World Health Organisation MDR-TB in parts of Eastern Europe is now 10 times as common as in most other parts of the world([5]).

Standardised death rates

The maps with age standardised death rates for all ages demonstrate the serious TB problems in the former socialist economies of Eastern and Central Europe. The Baltic States and Romania have particularly high death rates. The male/female ratio is large, although highly variable across regions. If TB rates are very low among women, the figures are difficult to interpret because of random variability in small numbers.

The high incidence of TB in Portugal can be attributed to HIV infection, use of illicit drugs, alcohol abuse, immigration and homelessness([6]) (see also chapter 8, HIV/AIDS). The interquintile differences are small, but the differences in the highest quintile are large (see next paragraph).

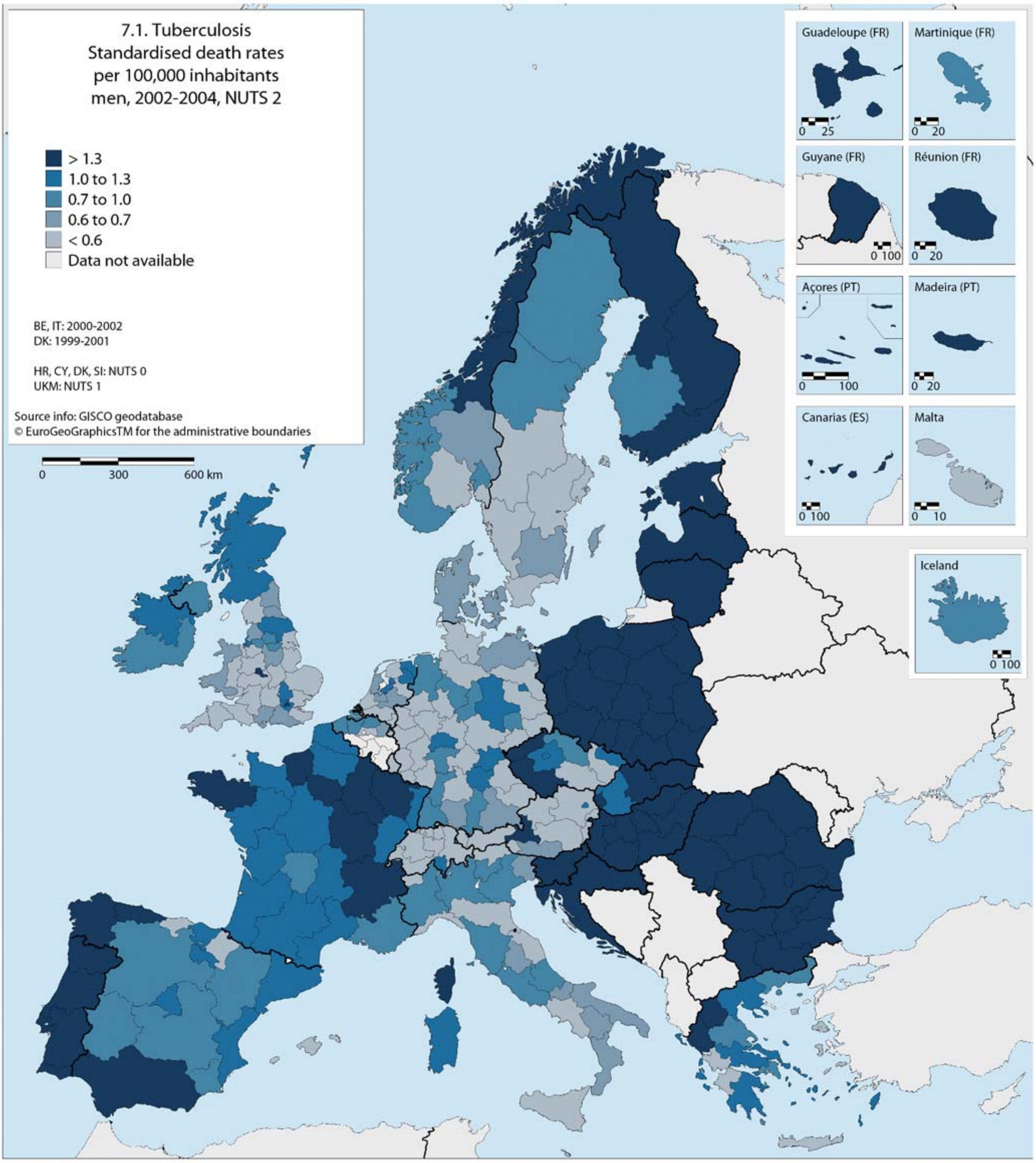
Potential years of life lost

PYLL gives the productive life years lost by death from tuberculosis at young, adult and middle ages. The same patterns emerge, showing significant loss of adult life. 100,000 Romanian men lose 270 PYLL, Cyprus, Malta or Norway did not declare any TB death before age 65. In the highest quintile, the patchiness of TB epidemiology is demonstrated by the large variance: between 348 PYLL (highest) and 12 PYLL (80th percentile). In Romania and the Baltic States, the difference in PYLL is five fold between men and women, suggesting sex specific gender problems making men more susceptible to fatal TB.

Years of life lost

The SDRs and YLL overlap. France has higher tuberculosis mortality among the elderly, particularly among women at older ages. This might be correlated to the very high life expectancy, with declining immunity at old age.

([4]) C. Odigwe (2004) BMJ 328(7441): 663
([5]) http://www.euro.who.int/mediacentre/PR/2007/20070706_1
([6]) F. Marques et al. (2006) Revista portuguesa de pneumologia 2006 12 (issue 6 Suppl 1):37-3


7.1. Tuberculosis
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 1.3
1.0 to 1.3
0.7 to 1.0
0.6 to 0.7
< 0.6
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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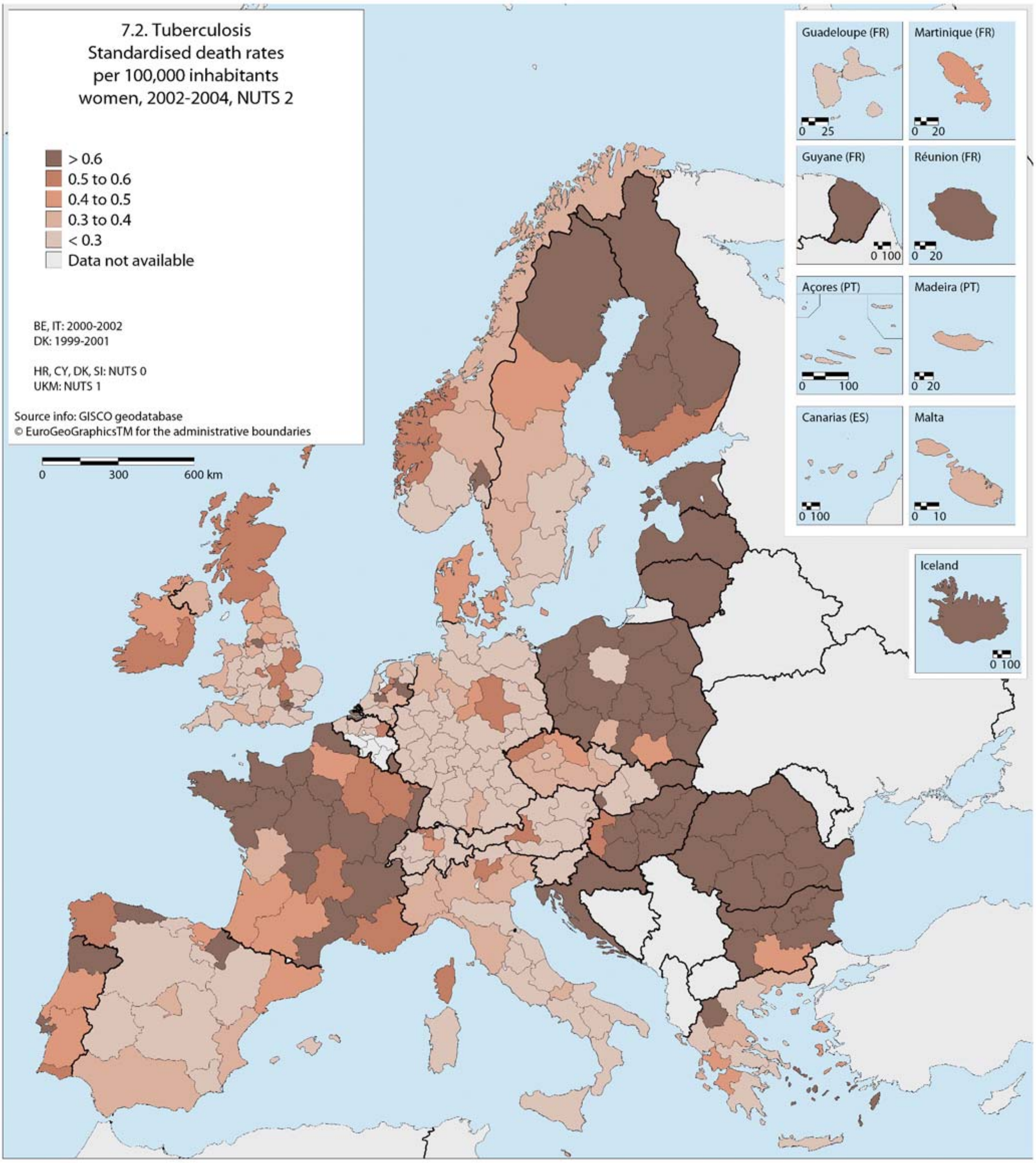
7.2. Tuberculosis
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 0.6
0.5 to 0.6
0.4 to 0.5
0.3 to 0.4
< 0.3
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
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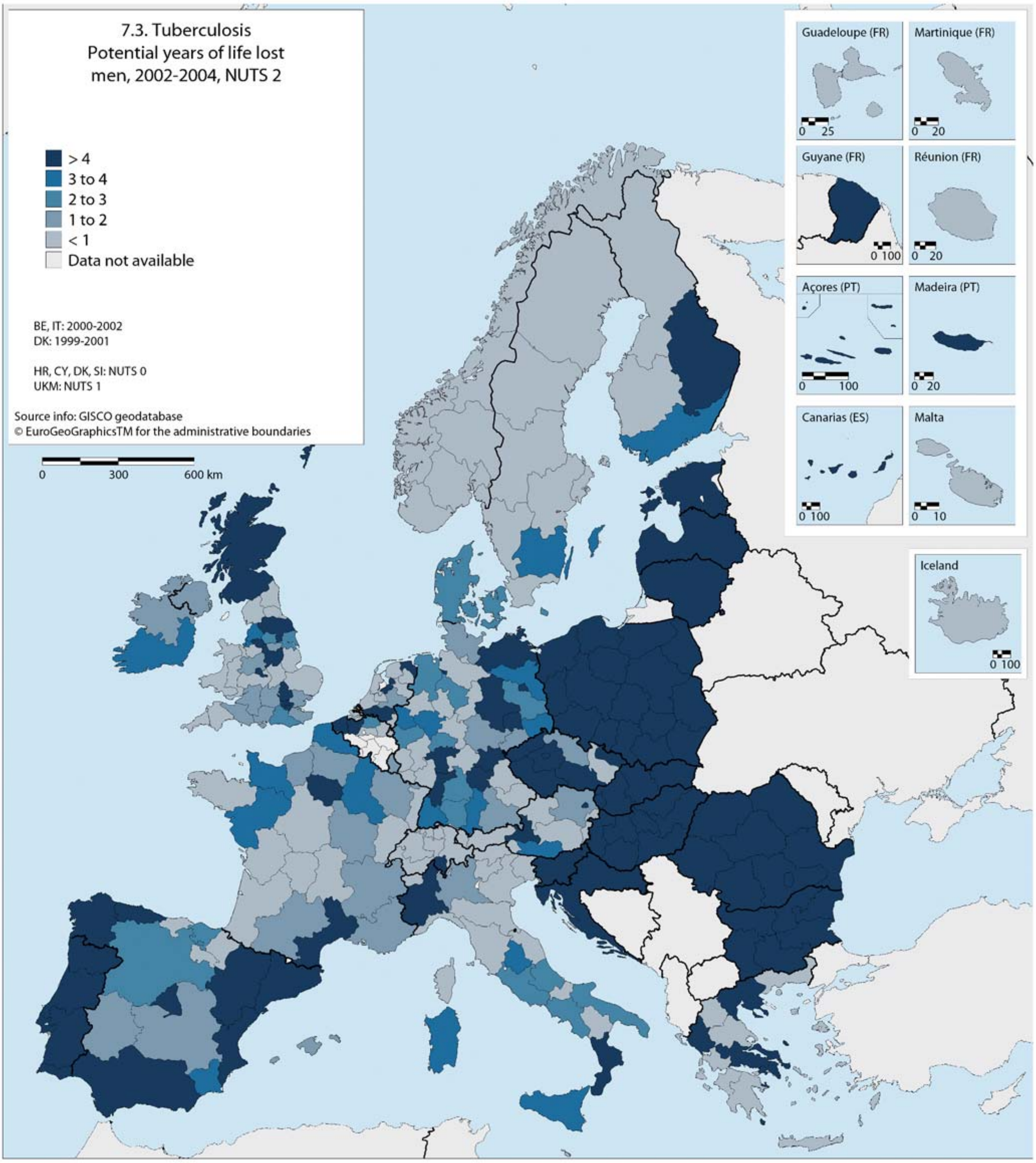
7.3. Tuberculosis
Potential years of life lost
men, 2002-2004, NUTS 2
> 4
3 to 4
2 to 3
1 to 2
< 1
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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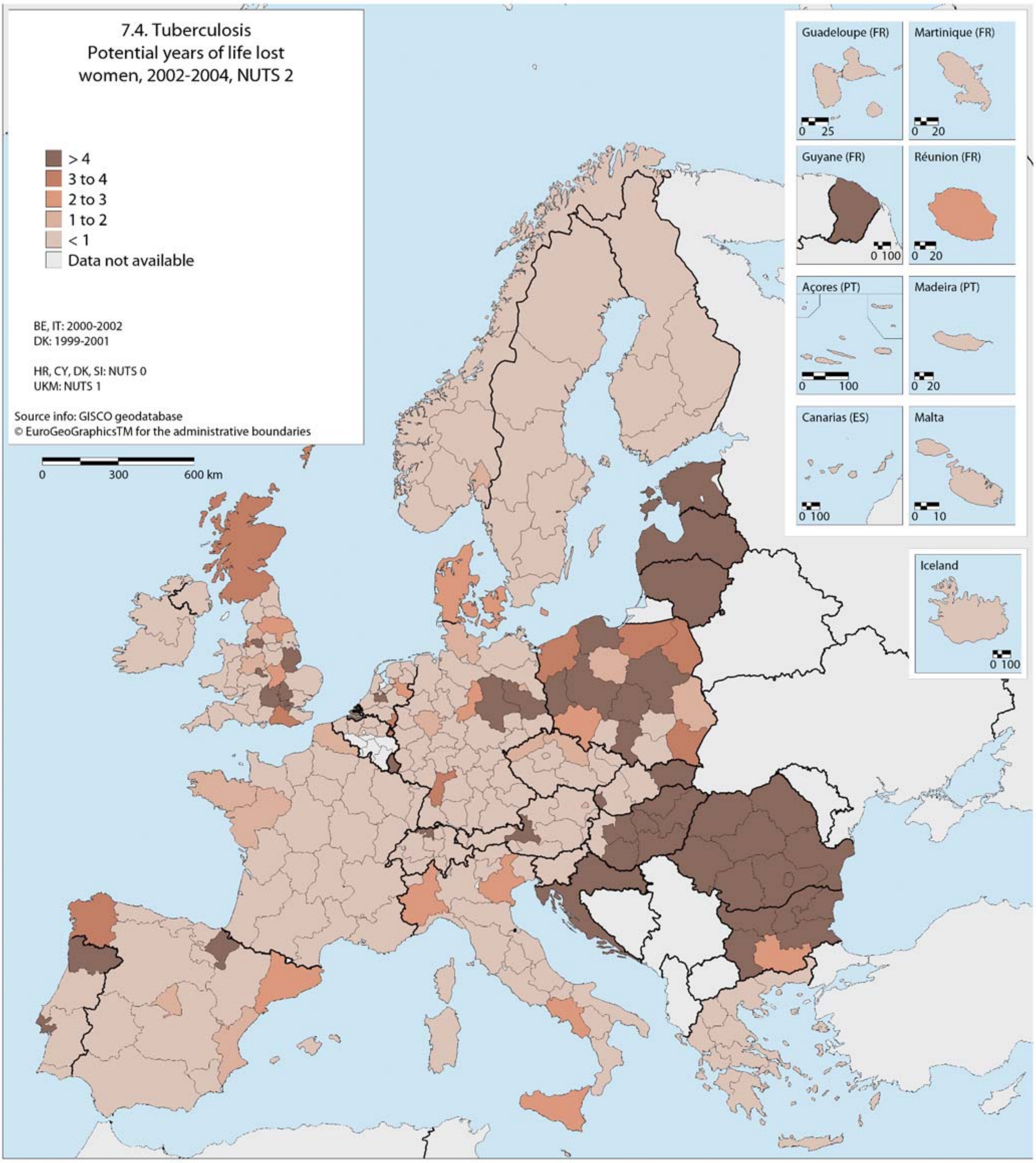
7.4. Tuberculosis
Potential years of life lost
women, 2002-2004, NUTS 2
> 4
3 to 4
2 to 3
1 to 2
< 1
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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8

AIDS (HIV disease)

Acquired immune deficiency syndrome (AIDS) results from specific damage to the immune system caused by the human immunodeficiency virus (HIV), leaving individuals susceptible to opportunistic infections and tumours. HIV is transmitted mainly by sexual contact and by infected needles during intravenous drug use. Blood transfusion, mother-to-child transmission, or other needle stick accidents are less important causes. Migrants from countries with a high prevalence of HIV/AIDS, bear a disproportionate and increasing share of HIV throughout Western Europe and account for the majority of heterosexually acquired HIV infections diagnosed in recent years([7]).

Harm reduction policies have markedly reduced HIV transmission among injecting drug users([8]). Safe blood use has virtually eliminated the risk of HIV transmission through transfusions since 1985. In the 1990s, large-scale voluntary HIV testing of pregnant women followed by antiretroviral treatment reduced the risk of mother-to-child transmission to very low numbers.

Since the introduction of potent anti-retroviral agents in 1996, the incidence of and mortality by AIDS have sharply decreased. However, in the EU, an estimated 500,000 to 600,000 people have an infection that remains incurable and transmissible([8]).

Standardised death rates

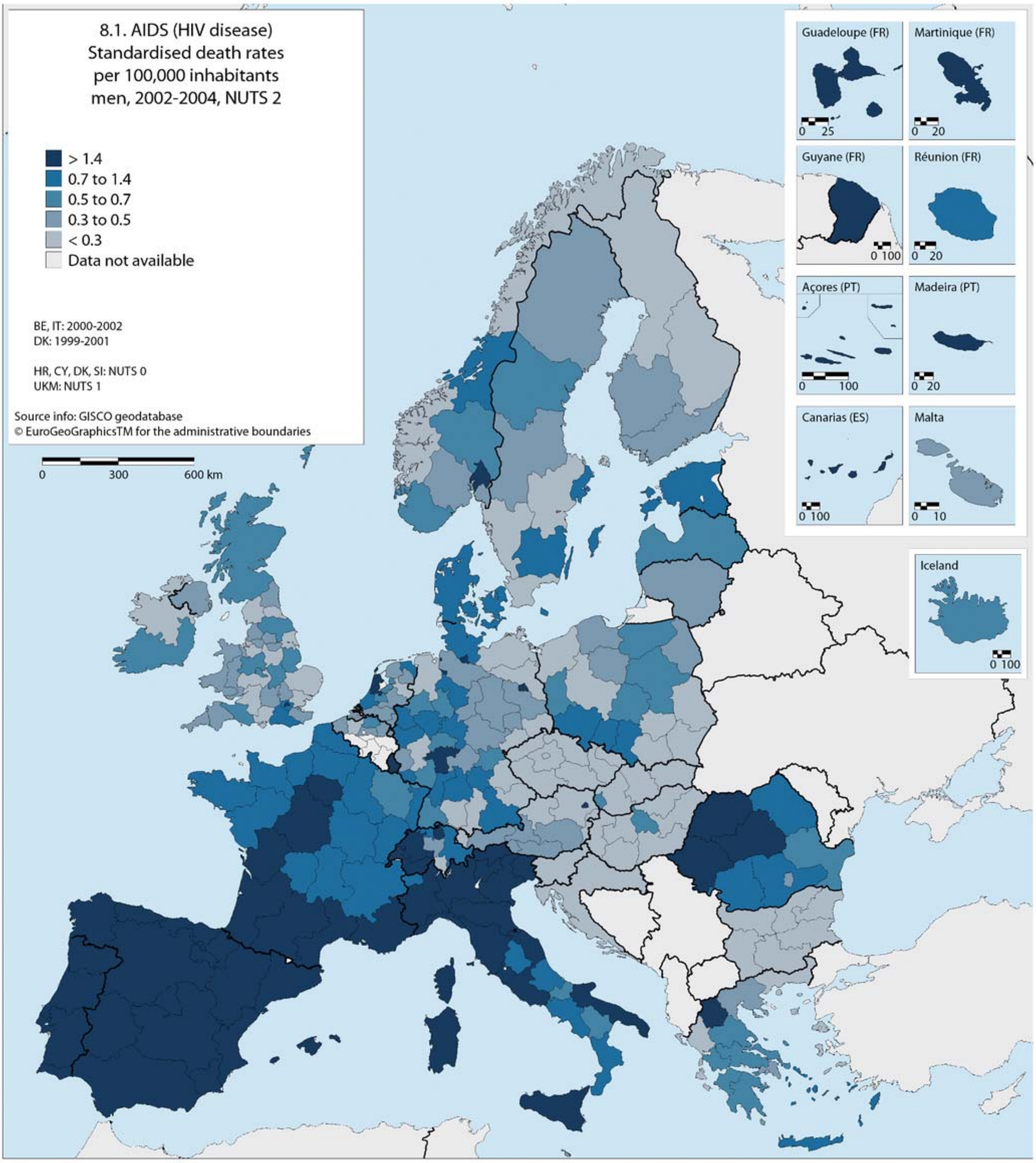
In the European Union, the HIV pandemic is highly heterogeneous, consisting in localised epidemics in specific communities([7, 9]). In the EU15 in the beginning of the HIV/AIDS epidemic, this epidemic was originally strongly linked to communities of men having sex with men, explaining high male to female ratios of AIDS mortality. This has been changing by relatively high AIDS mortality among injecting drug users and migrants, where HIV hits both genders. Migrants from countries with generalised HIV epidemics account for two-thirds of all heterosexually acquired HIV infections diagnosed recently([7]). This reflects both the worsening of the HIV epidemic in Africa during the 1990s and world migration.

In Southern and Eastern Europe, injecting drug use drives the HIV/AIDS epidemic([10]). Injecting drug users are less likely than others to receive and benefit from antiretroviral treatment, explaining part of the high AIDS mortality in countries where intravenous drug use is an important cause of HIV infection. Romania was a special case in the global AIDS crisis, with widespread iatrogenic transmission of blood-borne HIV in children([9]). Mortality has decreased strongly as a consequence of good access to effective treatment.

Potential years of life lost

AIDS is frequent among young people and rare among the elderly. This is testified by the high burden of mortality among people below age 65. Even though the lower limit of the highest ranges in the PYLL-maps are not very high (> 39 for men and > 10 for women), these ranges themselves are very wide: > 39 to 888 for men and > 10 to 417 for women. In the EU-27, 100,000 men lose 49 PYLL, 100,000 women 15 PYLL. In Portugal and Spain, 100,000 men lose respectively 428 and 163 PYLL, women 104 and 43. The maps with the potential years of life lost illustrate an increased burden of HIV mortality among women, in the same regions where the burden of HIV disease has increased among men. As noted above the burden of mortality is shifting away from men having sex with men to intravenous drug users and migrants from Sub Saharan Africa, hard hit by AIDS. This changing face of the HIV/AIDS pandemic highlights the need for specific public health programmes targeting these hard to reach groups([7, 9]).

([7]) F.F. Hamers (2004) The Lancet 364, 83-94
([8]) UNAIDS. 2004 report on the Global HIV/AIDS epidemic: 4th Global Report http://www.unaids.org/bangkok2004/GAR2004_pdf/UNAIDSGlobalReport2004_en.pdf
([9]) F.F. Hamers (2003) The Lancet 361, 1035- 1044
([10]) http://www.euro.who.int/mediacentre/PR/2004/20041130_1


8.1. AIDS (HIV disease)
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 1.4
0.7 to 1.4
0.5 to 0.7
0.3 to 0.5
< 0.3
Data not available
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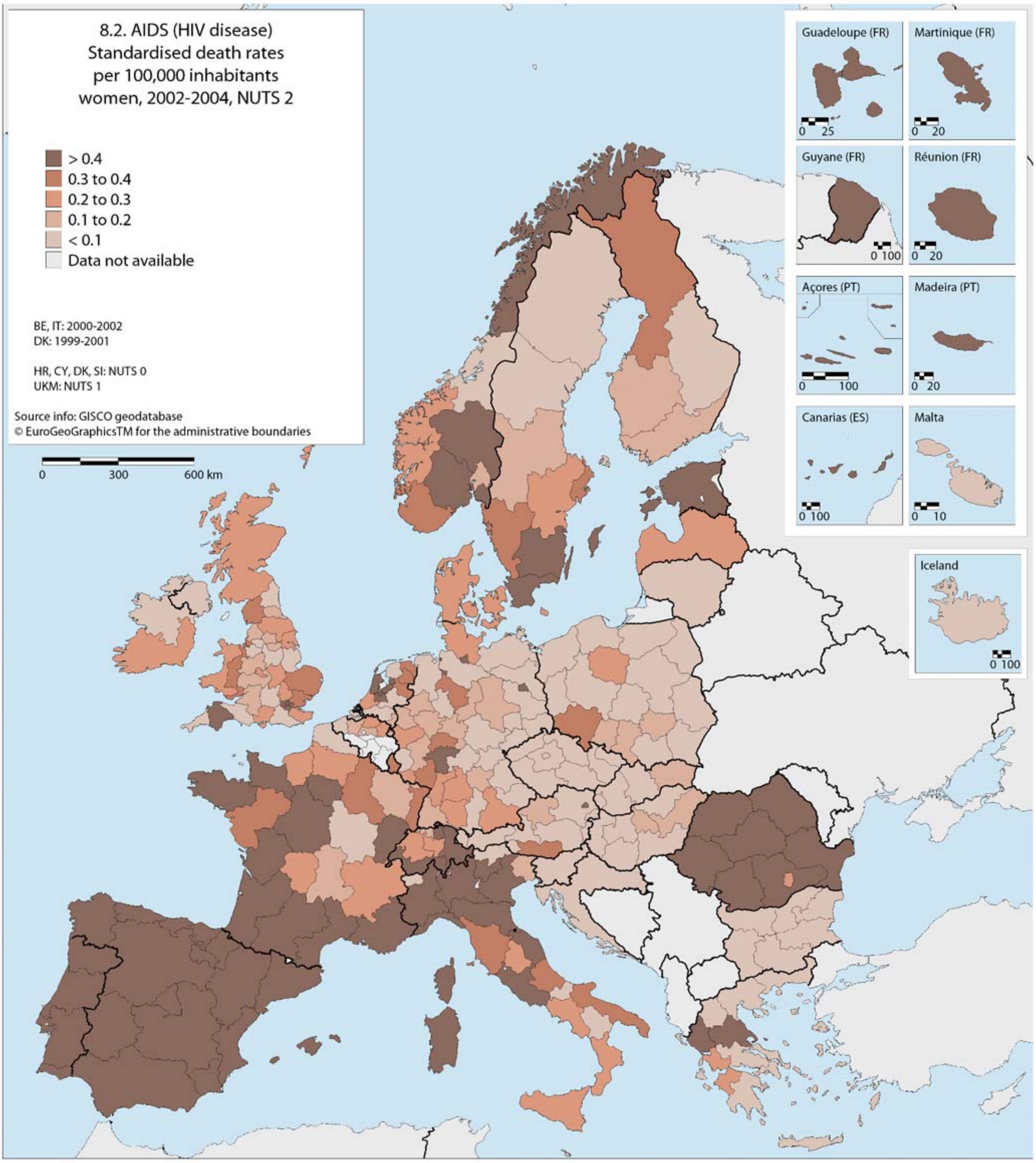
8.2. AIDS (HIV disease)
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 0.4
0.3 to 0.4
0.2 to 0.3
0.1 to 0.2
< 0.1
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
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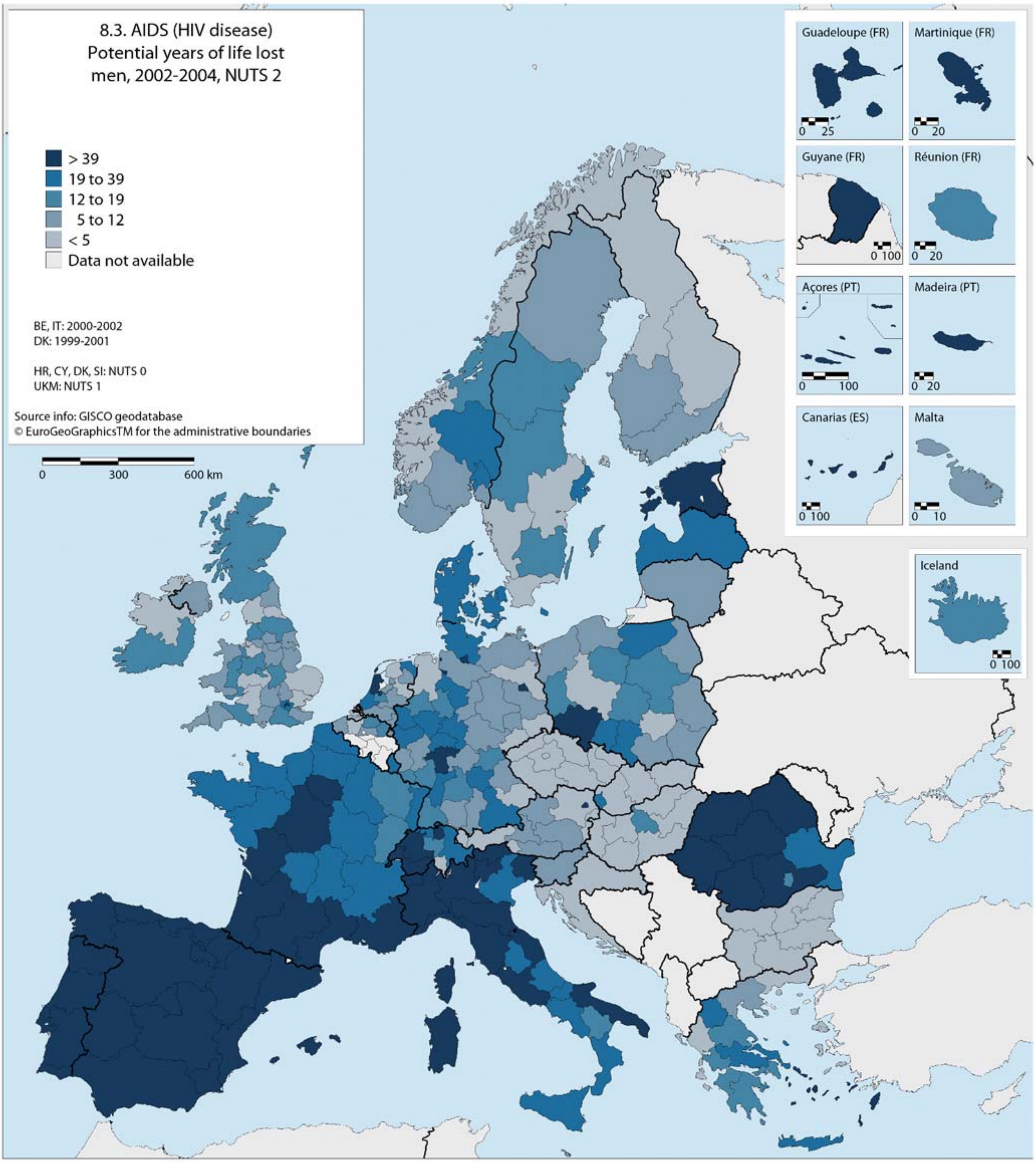
8.3. AIDS (HIV disease)
Potential years of life lost
men, 2002-2004, NUTS 2
> 39
19 to 39
12 to 19
5 to 12
< 5
Data not available
BE, IT: 2000-2002
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HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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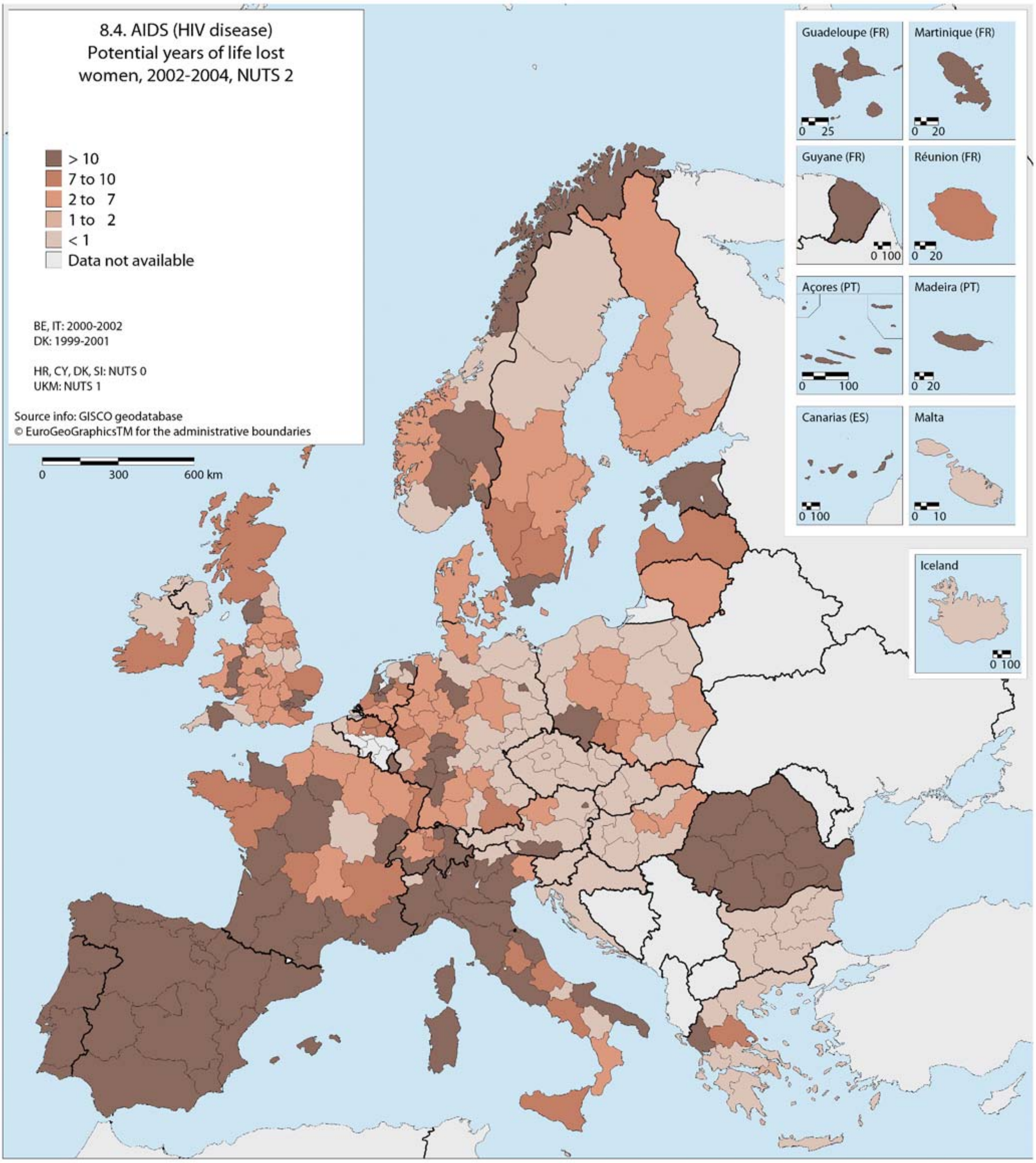
8.4. AIDS (HIV disease)
Potential years of life lost
women, 2002-2004, NUTS 2
> 10
7 to 10
2 to 7
1 to 2
< 1
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Martinique (FR)
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Guyane (FR)
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Réunion (FR)
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Açores (PT)
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Madeira (PT)
0 20
Canarias (ES)
0 100
Malta
0 10
Iceland
0 100

9

All malignant neoplasms

All malignant neoplasms are a diverse group of causes of death, dominated by smoking-related cancers that are linked to smoking intensity in the past([11]). Indeed, among smokers, 60% of all cancers are thought to be caused by smoking([11]). Historically, around 50% of the population have been smokers. As such, even without taking into account passive smoking, some 30% of all cancers have been attributed to smoking([12]).

Another lifestyle variable that is correlated to an increased incidence of cancer is obesity, with estimates of around 10 percent (in the USA) of all cancers caused by obesity([11]).

In men, a 5 kg/m^2 increase in BMI (Body Mass Index) was associated with cancer of the oesophagus, colorectal cancers and renal cancers([13]). Women showed associations between a 5 kg/m^2 increase in BMI and endometrial (uterus) cancer, gallbladder cancer, cancer of the oesophagus, colon cancers, renal cancers and postmenopausal breast cancer([13]). Another important risk factor is the changed reproductive history of women. Having fewer children, childlessness, limited breastfeeding and pregnancies postponed to later ages have been linked to an increased incidence of breast cancer in women([14]). Oncogenic viruses, the best known being HPV (human papillomavirus), may cause 5 percent of all cancers. Lack of sunlight is now considered a more important risk factor for cancer than overexposure([15]). Sunlight overexposure nevertheless remains an important cause of skin cancer.

Historically, occupational hazards were an important cause of cancer. Quantitatively they are less important in the total of all cancers, but they are a health problem for selected populations of workers. The burden of occupational cancer mortality in France has been estimated to be around 2.5 percent([16]). Most of these occur in men, the respiratory tract (lung and larynx) is most affected. Occupational exposure to asbestos, combustion fumes and tars, and metals such as chromium and nickel are the main causes.

Standardised death rates

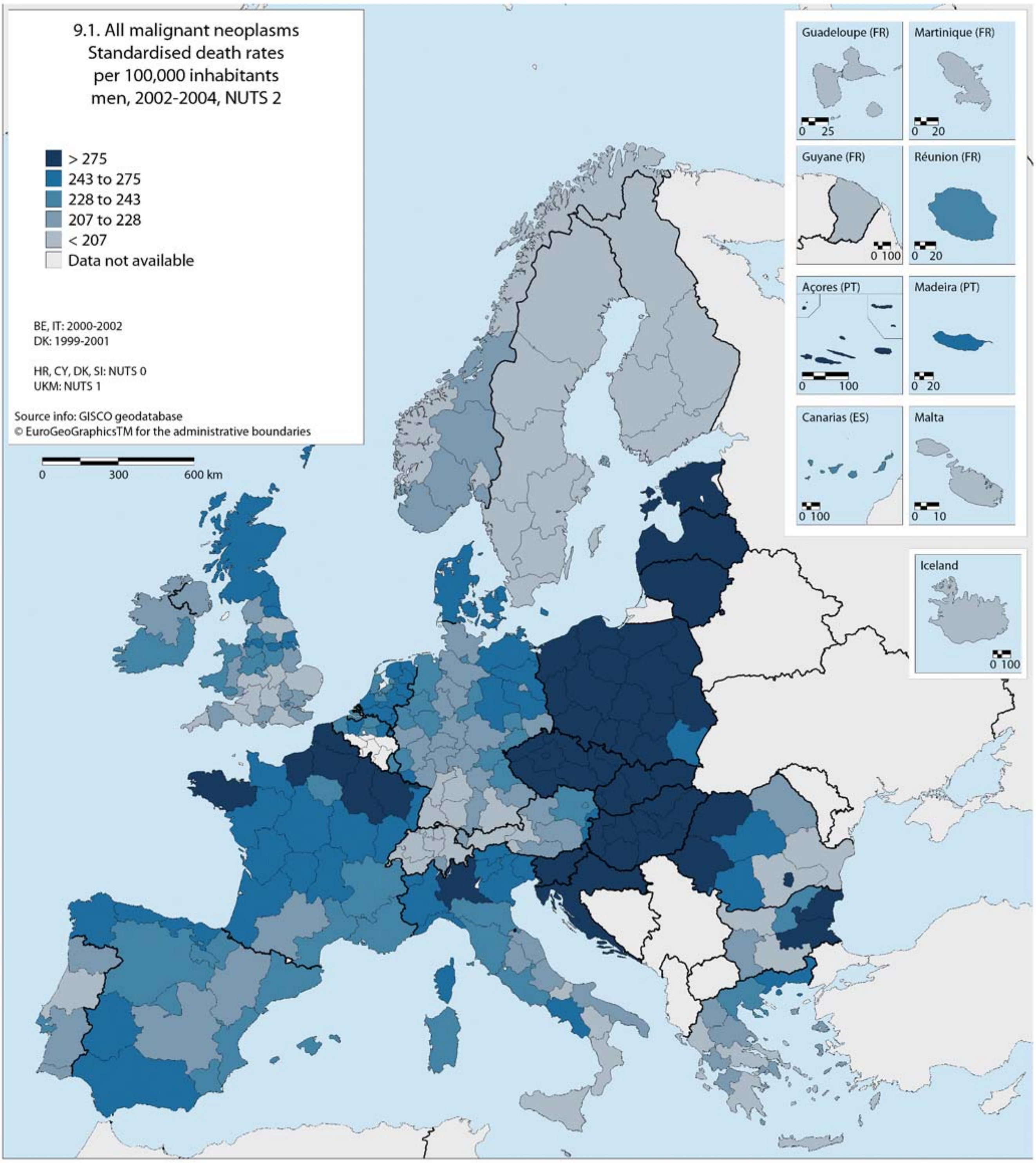
The average standardised death rate for men equals 243 per 100,000. For women the figure is lower: 137 per 100,000. This in part reflects the different smoking epidemic among men. While the highest rates of lung cancer (indicative of smoking-related cancers) among men have been observed in the cohorts born at the beginning of the 20th century, the highest rates among women have been observed in the baby boom cohorts born after World War II. Since male cancer mortality is expected to decrease and female cancer mortality is expected to increase, the gender gap is likely to narrow still further in the coming years. Public health interventions take a long time to be reflected in lowered cancer mortality, as the time lag between not up taking smoking or quitting smoking and cancer is twenty to fifty years([17]).

Smoking is such a strong cause of cancer that it overwhelms all other etiologic factors. Historical smoking therefore obscures potential relationships with other carcinogenic causes.

Potential years of life lost

PYLL show the burden of mortality of cancer before age 65. In the EU-27; 100,000 men lost 960 PYLL, 100,000 women lost 772 PYLL. Contrary to most other diseases, the difference between genders is more limited, caused by exceedingly high breast cancer mortality in younger women (see chapter 12). The highest PYLL, due to cancer mortality are found in Hungary (2,000 among 100,000 men, 1,300 among 100,000 women) and Romania (1,400 among 100,000 men, 1,000 among 100,000 women). The lowest PYLL are found in the Nordic countries except Denmark. 100,000 men and women from Iceland lost respectively 480 (four times less than Hungary) and 660 PYLL (two times less than Hungary). Swiss women lost also remarkably few PYLL (610). In the United Kingdom, the old industrial belt of Northern England has the highest premature mortality from cancer among women (927 PYLL), followed by Scotland (870 PYLL). The lowest numbers (630 and 700 PYLL respectively among women) were, remarkably, found in Inner and Outer London.

([11]) J. Peto (2001) Nature 411, 390-395
([12]) P. Vineis et al. (2004) Journal of the National Cancer Institute 96(2): 99-106
([13]) A.G. Renehan (2008) The Lancet 371, 569-578
([14]) Collaborative Group on Hormonal Factors in Breast cancer and Breastfeeding (2002) The Lancet 360, 187-195
([15]) H.J. van der Rhee et al. (2006) European Journal of Cancer 42, 2222-2232
([16]) P. Boffetta (1999) Environmental Health Perspectives 1999; 107(Suppl 2):229
([17]) A.D. Lopez et al. (1994) Tobacco Control 1994:242-247


9.1. All malignant neoplasms
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 275
243 to 275
228 to 243
207 to 228
< 207
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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© EuroGeoGraphicsTM for the administrative boundaries
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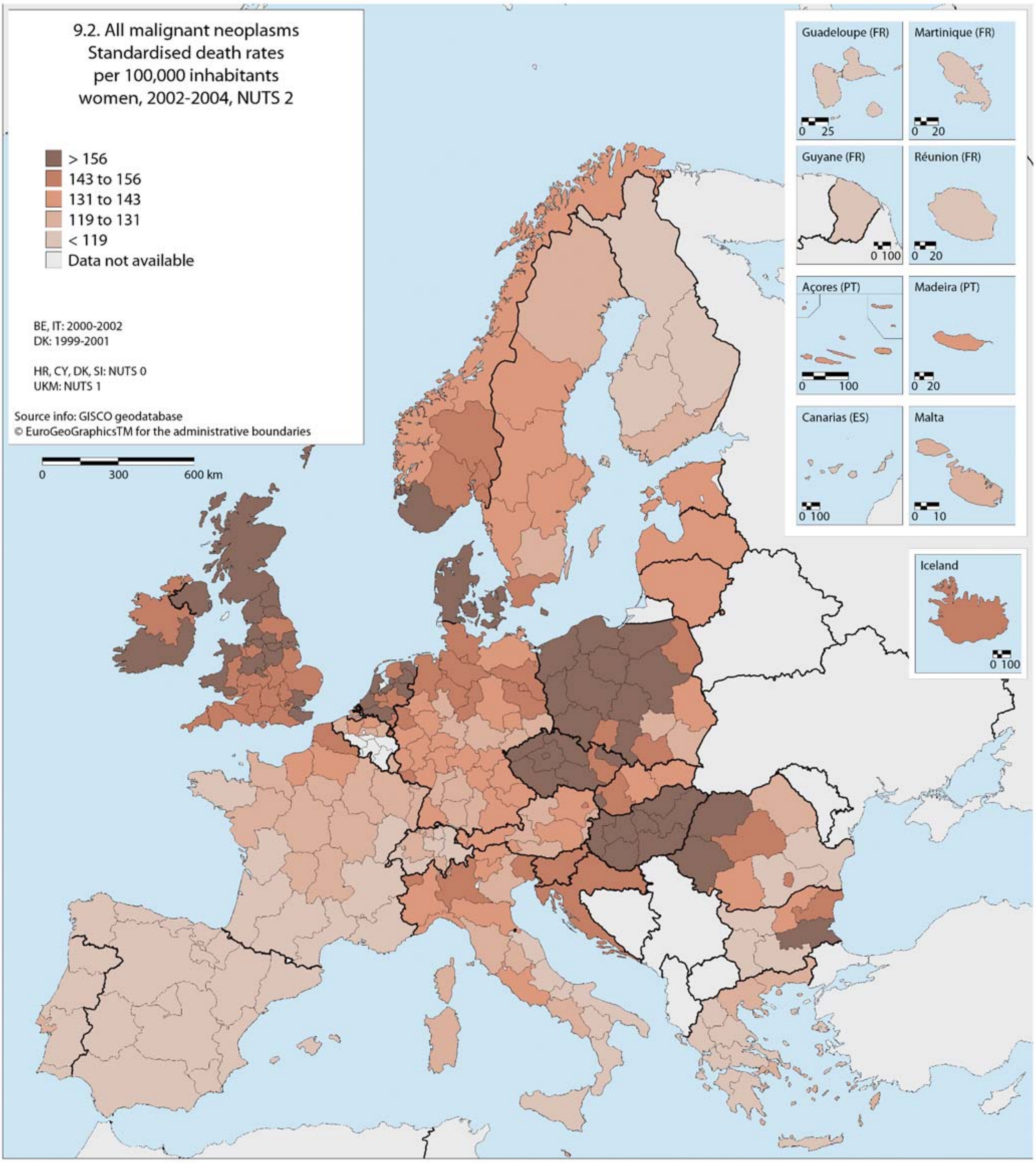
9.2. All malignant neoplasms
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 156
143 to 156
131 to 143
119 to 131
< 119
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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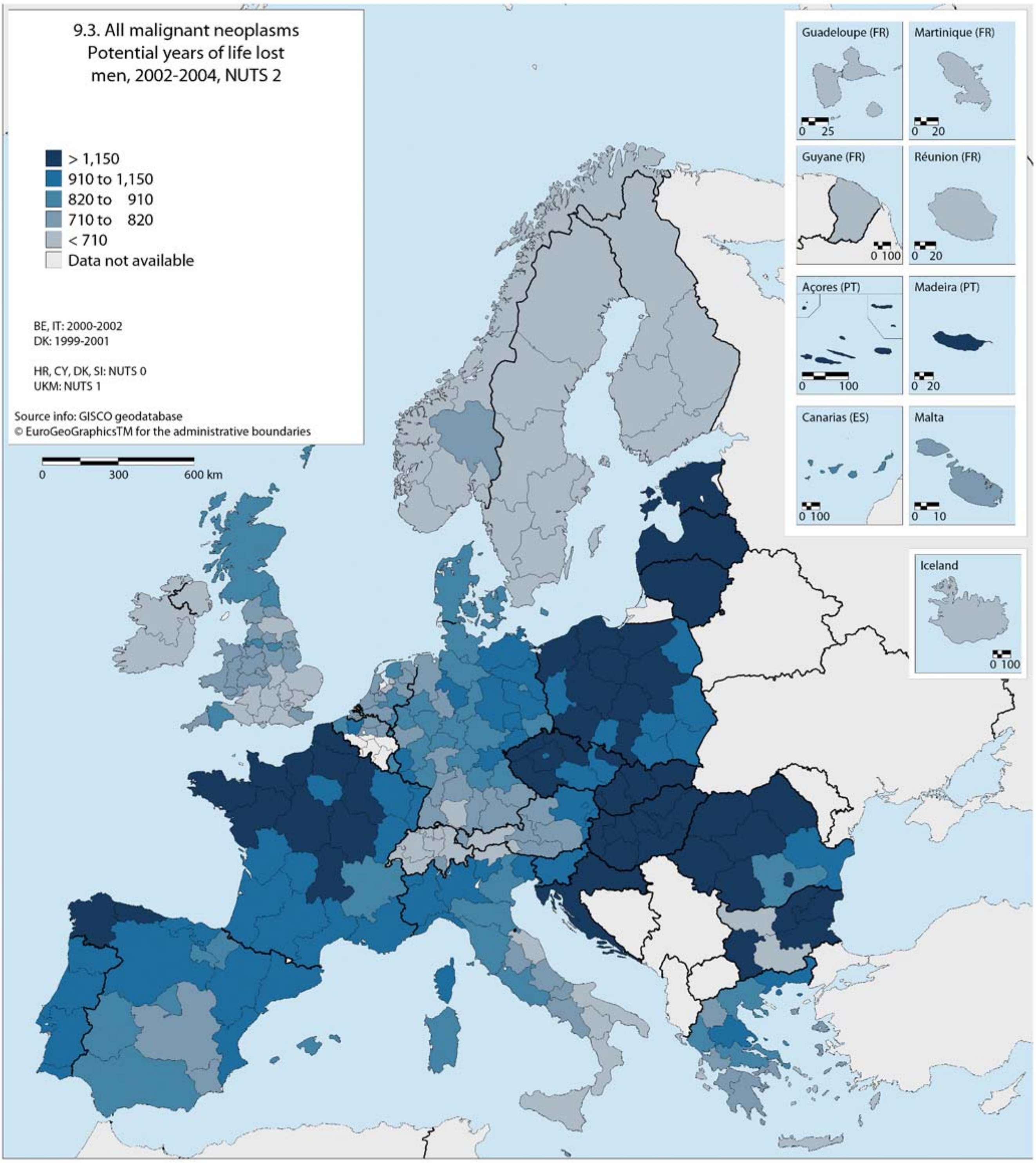
9.3. All malignant neoplasms
Potential years of life lost
men, 2002-2004, NUTS 2
> 1,150
910 to 1,150
820 to 910
710 to 820
< 710
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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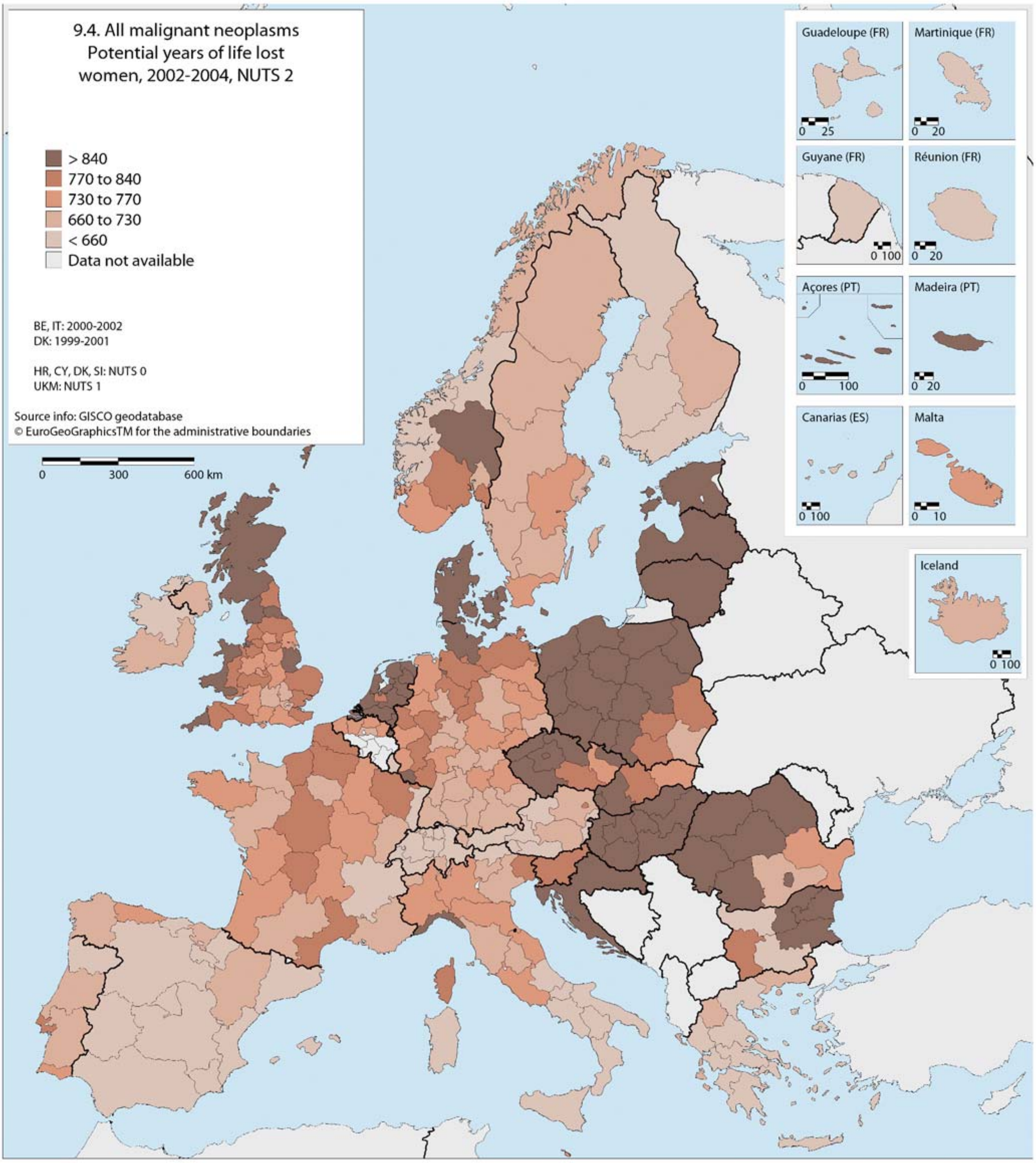
9.4. All malignant neoplasms
Potential years of life lost
women, 2002-2004, NUTS 2
> 840
770 to 840
730 to 770
660 to 730
< 660
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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10

Malignant neoplasms of larynx and trachea/bronchus/lung

Lung cancer is (still) the most common cause of cancer mortality in the European Union, accounting for one fifth of all cancer deaths. Although less common than in men, it is the third cause of death from cancer in women, with high rates observed in Northern and Central Europe. In Denmark, Sweden, the Netherlands, Poland and the United Kingdom it has now become the first cause of death from cancer. Curative treatment of clinical lung cancer is rarely successful and lung cancer has low survival rates. Lung cancer is close to entirely preventable, as lung cancer among non-smokers is a rare cause of death. The twentieth century saw an unprecedented rise in lung cancer. Since the 1970s increasingly effective anti-tobacco policies have succeeded to lower smoking prevalences.

In European populations, lung cancer is a rare disease among non-smokers and a frequent one among smokers. The high risks and prevalence of tobacco smoking therefore smother all other causes of lung cancer, which may be either occupational or air pollution. Lung cancer has a high case fatality. Maps of lung cancer mortality are a good reflection of lung cancer incidence, which represents past smoking histories. Before World War II, smoking was largely a male privilege, and smoking among women was not well accepted. The smoking epidemic among women started among the emancipating baby boom generation. A few decades later, lung cancer rates started to rise. In the 1960s and 1970s, growing knowledge about the harms of smoking started to accumulate, increasing numbers of young people avoided addiction and more and more smokers quit smoking. This was followed by decreasing lung cancer rates. By documenting historical smoking intensity, the maps of lung cancer mortality are an invaluable document of the European history of public health, its failures and its achievements.

Standardised death rates for men

The large differences among men and women represent differences in smoking history. The interquintile difference of mortality is rather low, given the importance of exogenous risk factors: among men it is 1.6. High lung cancer rates represent both high levels of uptake of smoking and low levels of control of tobacco use. We find the highest rates in the former socialist economies of Europe: Hungary, the Czech Republic and Poland. Lung cancer has a clear east/west gradient.

The Communist parties actively refused to engage in public health campaigns and had vested interests in the state alcohol and tobacco monopolies([18]). By the late 1980s Eastern Europe had the highest level of tobacco-related disease, hitting predominantly the lower socioeconomic classes. In Poland, the risk of being killed by smoking before age 70 was more than four times higher (22 percent) in the bottom socioeconomic class than in the top echelons (5 percent)([19]). This heavy historical legacy still burdens the new Central and Eastern European Member States. However, Central and Eastern European Member States have recently seen remarkable improvements in public health since the lowest point in the early 1990s. There have been large reductions in the number of smokers and lung cancer mortality is starting to decrease. As it needs decades to take effect, further decreases in cancer mortality may be anticipated in the former socialist economies of the EU-27.

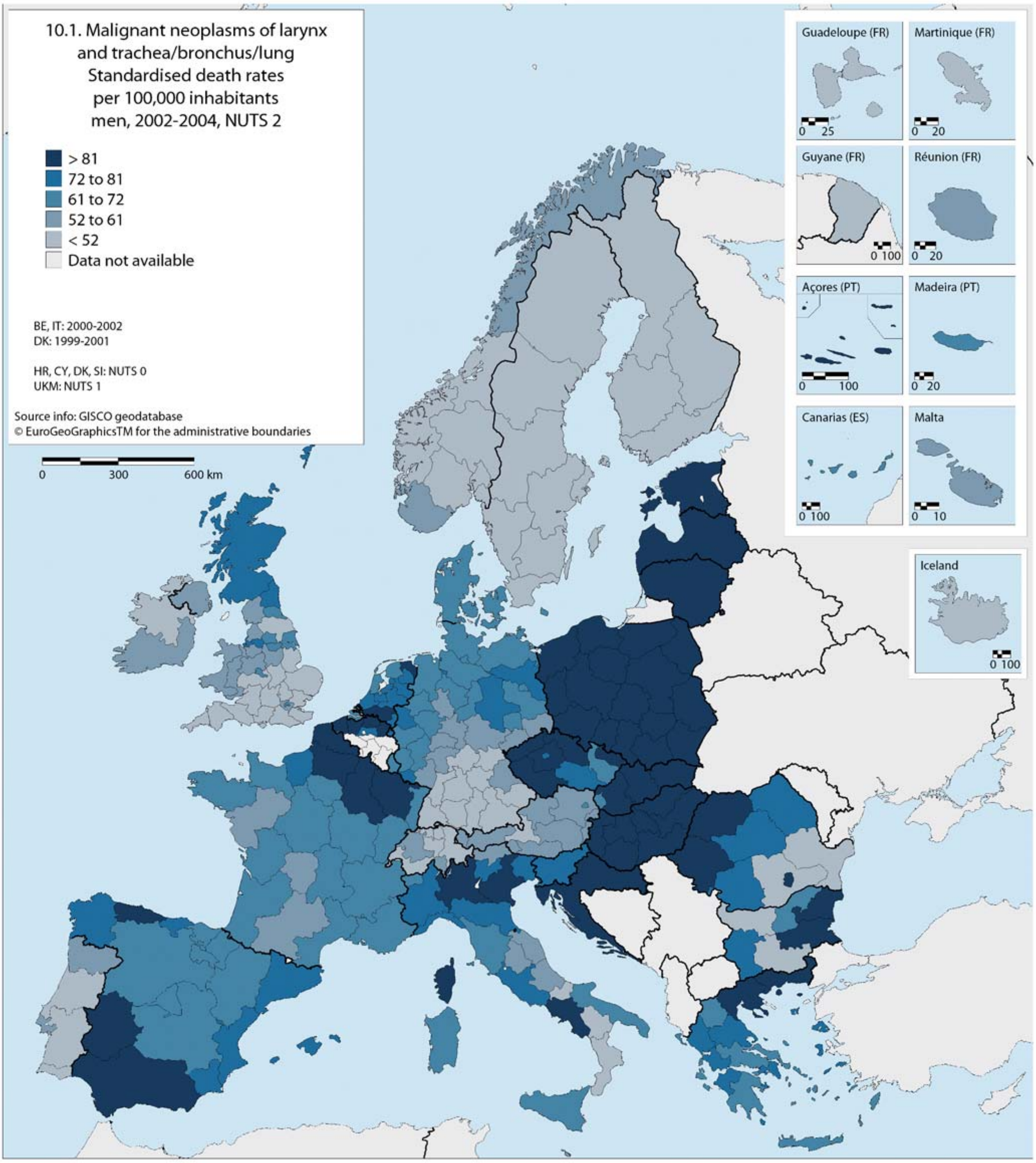
Old industrial areas are at high risk of tobacco-related mortality. They are likely to follow the same history of social upheaval, escape from high levels of stress in alcohol and cigarettes. We find these old industries in the north of France, in Western Germany, Northern England and in the coastal areas of Spain. In Southern England, the present lower rates of lung cancer were reached after declines in lung cancer rates that were among the highest ever reached in the world. This shows the great potential of effective anti-tobacco policies.

Standardised death rates for women

The maps for women are remarkably different, showing low rates of lung cancer in Southern Europe, likely reflecting a historically traditional society, frowning on smoking among women. The difference between the lowest and highest ranges (interquintile difference) is 2.4, showing a more heterogenic epidemic among women than among men. Among non-smokers, lung cancer rates are similar among men and women. The major differences can be explained by smoking. The high rates in the United Kingdom and Ireland, the Netherlands, and Scandinavian countries are the result of the high uptake of smoking in the post-war baby boom generation. In several of these countries, lung cancer exceeds breast cancer as a major cause of cancer death among women. In Poland and Hungary, women have followed the poor example of men.

Potential years of life lost

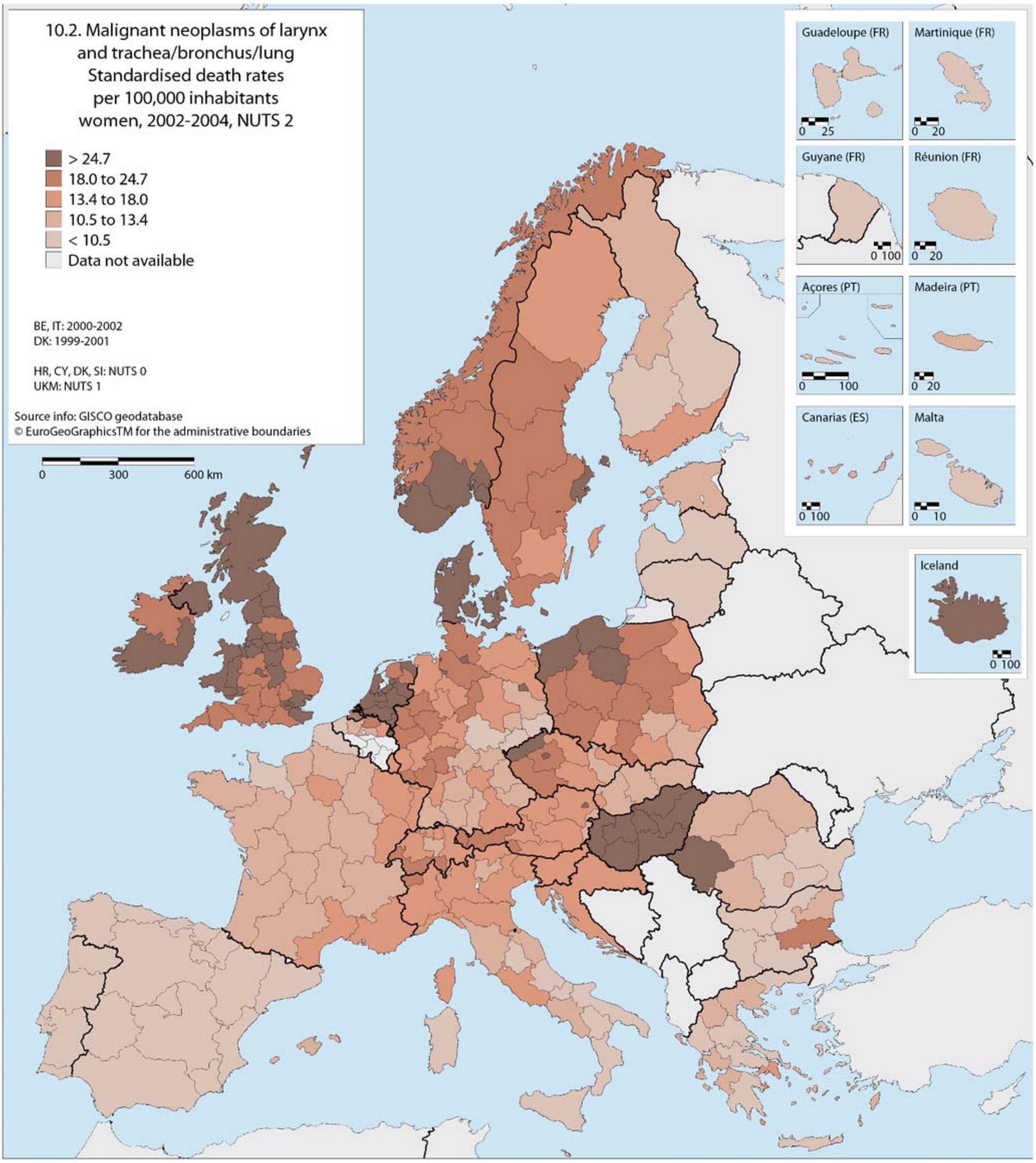
The potential years of life lost by lung cancer show the loss of productive life by tobacco smoking. In the EU-27, 100,000 men and women lost respectively 275 and 95 PYLL. Variance between countries was large: In Hungary, 100,000 men and women lost respectively 700 and 270 PYLL. In Sweden, 100,000 men and women lost respectively 86 and 98 PYLL. Note that for every year lost due to lung cancer, more than one year is lost due to other smoking-related disorders. PYLL shows the evolution of the smoking epidemic among younger people, and hence the future of the smoking epidemic when these cohorts are ageing. The reversal of the gender differential in Sweden is therefore meaningful: it shows the relative success of anti tobacco policies in men, but the relative failure of these policies with respect to smoking behaviour in women. Dutch and UK men came from historically the highest levels of lung cancer in the world, but they have dropped below the EU average (respectively 240 and 200 PYLL). Remarkably, Dutch women took the opposite trend: with 170 PYLL per



100,000 they are now far above the EU average, preceded only by Hungary.

The maps showing the potential years of life lost for women therefore illustrate the historical failure of effectively protecting younger women from taking up smoking. The epidemic of lung cancer as a consequence of tobacco use is now typically a large problem in the female baby boom cohorts of developed Europe. In the former socialist Central and Eastern European Member States, the epidemic is patchier, with high rates in Poland and Hungary. The Baltic States have remarkably lower levels of lung cancer mortality among women before age 65 (57 for Estonia, 43 for Lithuania and 38 for Latvia).

([18]) P. Neroth (2005) The Lancet 366, 109-110
([19]) Jha. Prabhat (2006) The Lancet 369, 367-370


10.2. Malignant neoplasms of larynx and trachea/bronchus/lung
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 24.7
18.0 to 24.7
13.4 to 18.0
10.5 to 13.4
< 10.5
Data not available
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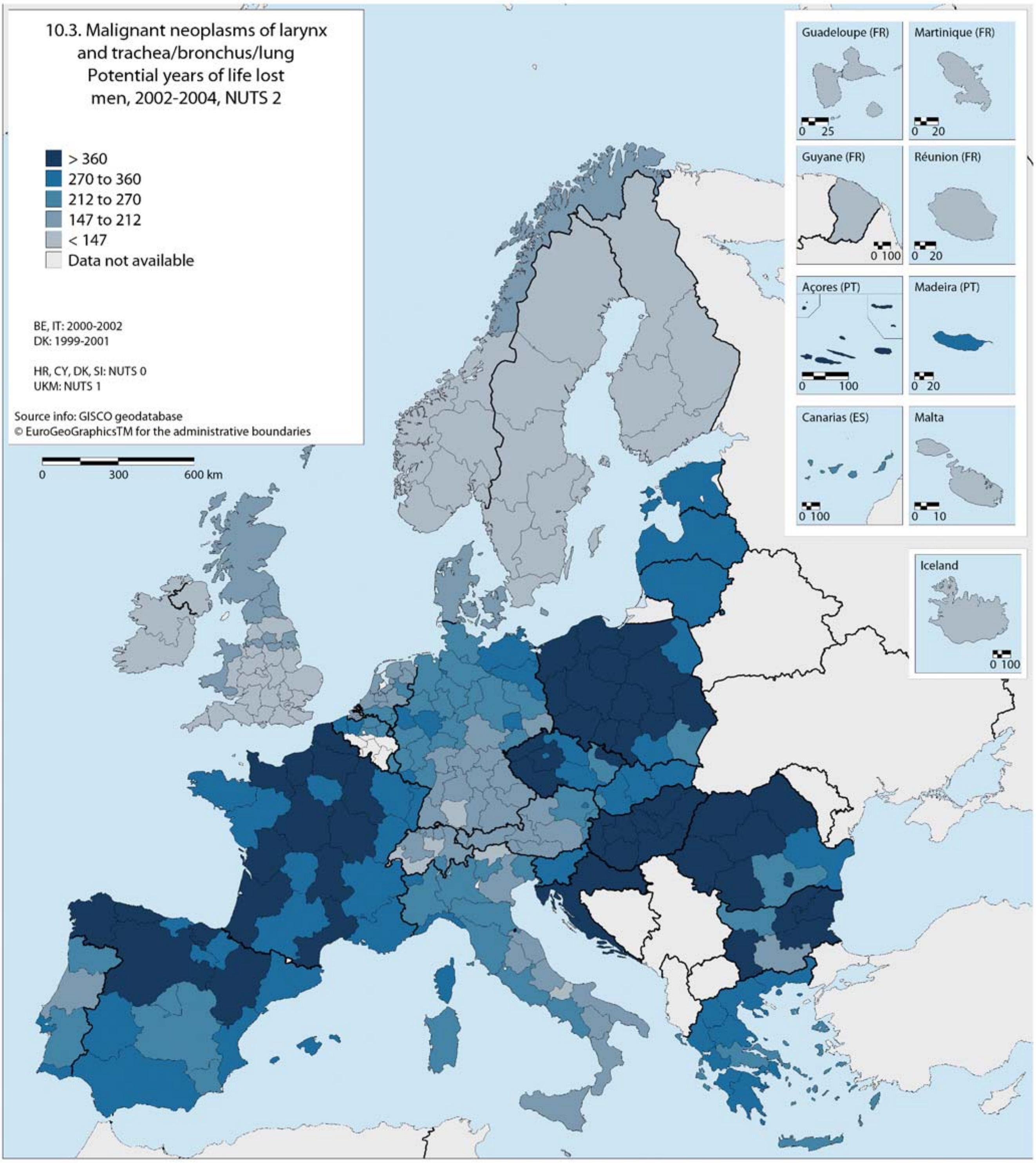
10.3. Malignant neoplasms of larynx and trachea/bronchus/lung
Potential years of life lost
men, 2002-2004, NUTS 2
> 360
270 to 360
212 to 270
147 to 212
< 147
Data not available
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UKM: NUTS 1
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0 100
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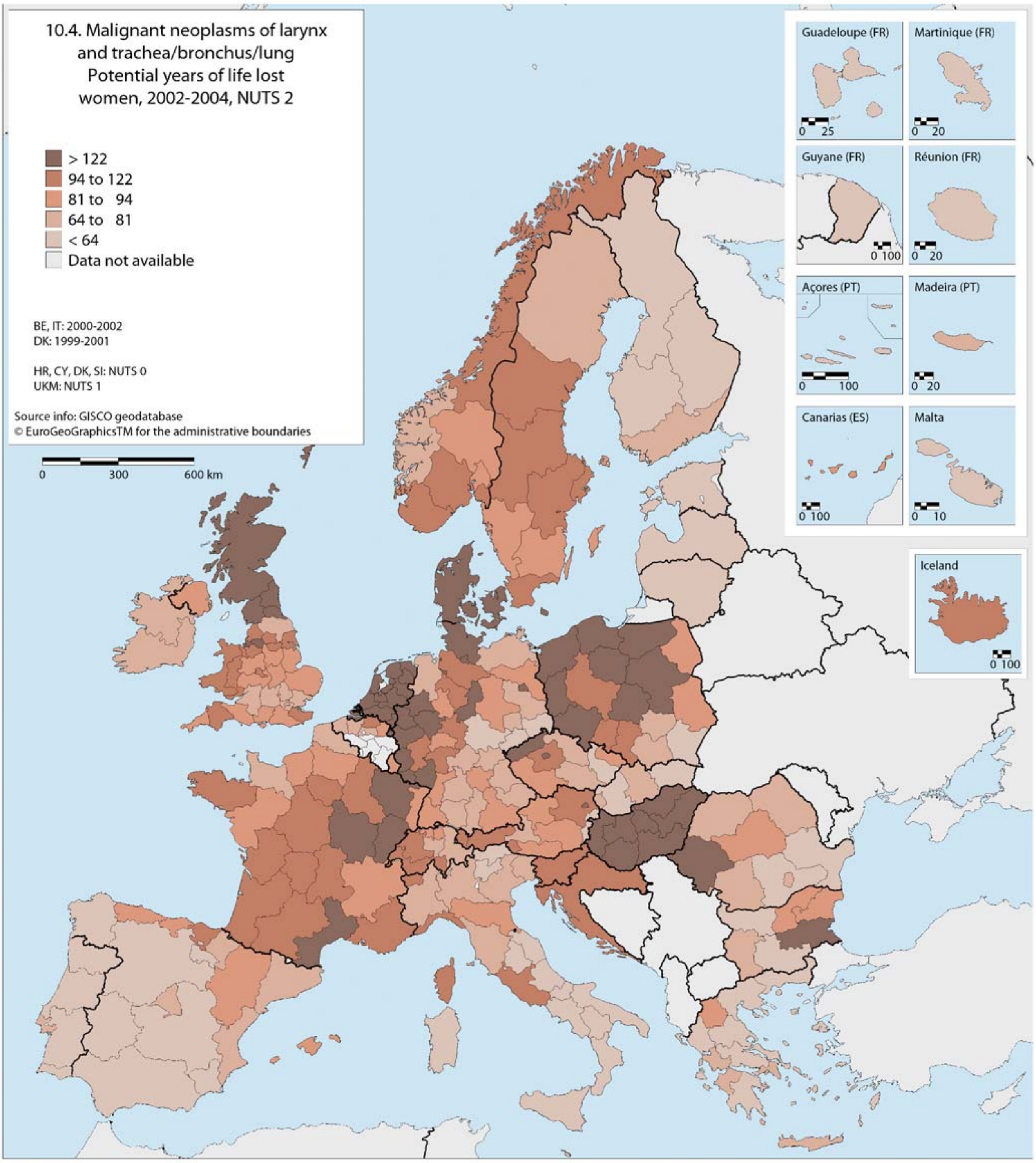
10.4. Malignant neoplasms of larynx and trachea/bronchus/lung
Potential years of life lost
women, 2002-2004, NUTS 2
> 122
94 to 122
81 to 94
64 to 81
< 64
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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0 300 600 km
Guadeloupe (FR)
0 25
Martinique (FR)
0 20
Guyane (FR)
0 100
Réunion (FR)
0 20
Açores (PT)
0 100
Madeira (PT)
0 20
Canarias (ES)
0 100
Malta
0 10
Iceland
0 100

Malignant neoplasms of colon, rectum and anus

11

Colorectal cancer or bowel cancer are malignant neoplasms of the colon, rectum and appendix. It is the second leading cause of cancer deaths in Europe, accounting for one in eight cancer deaths. Most cases occur at ages between 60 and 70 years; the numbers are increasing, mainly because of population ageing. Cases before age 50 are uncommon unless a family history of early colon cancer is present. Genetic predisposing factors are important.

There is considerable agreement about smoking and diet as risk factors for bowel cancer, but the quantitative importance of these risks is debated. Studies, including the European Prospective Investigation into Cancer and Nutrition, show that a diet high in red meat and low in fresh fruit, vegetables, poultry and fish increases the risk of colorectal cancer. People who are physically active are at lower risk of developing colorectal cancer.

Mean age adjusted 5-year relative survival for colorectal cancer is somewhat higher than 50 percent([20]), being highest in the Nordic countries (except Denmark) and Central Europe, intermediate in Southern Europe, lower in the United Kingdom and Ireland, and lowest in Eastern Europe. There is considerable evidence that high-quality cancer care extends survival and improves cure rates of bowel cancer([20]).

Standardised death rates

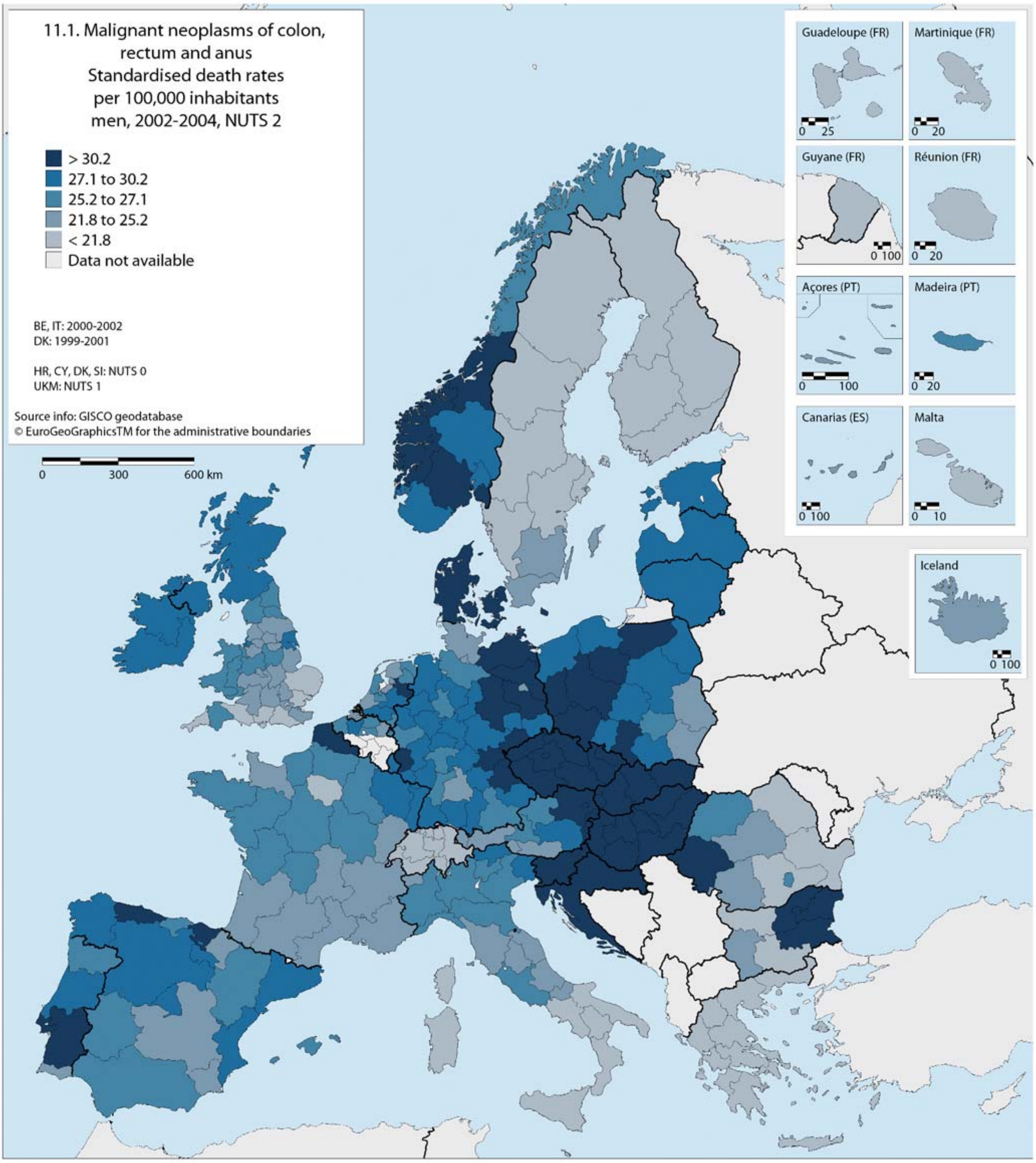
The variability of colorectal cancer mortality is quite limited, witnessing limited possibilities of control. In Europe, colorectal mortality is declining and converging between different countries([21]). The difference between lowest and highest ranges (interquintile difference) is 1.38 for men and 1.35 for women. The limited difference and equal mortality patterns of men and women suggest relatively little possibility for control. The main epidemiological asset of the European Union and its many regions is its very diverse cultural, social, economic and industrial background, with very different lifestyles, diets and other exposures. If these do not show mortality differences, health policy has limited handles on the primary driver of cancer mortality: cancer incidence. Improving cancer care, by the development of evidence based guidelines and strengthening quality control of cancer treatment is extremely important for cancer patients, but has a limited influence on population mortality figures.

The death rates in Central and Eastern European Member States are relatively high. National diets rich in meat and poor in fruits and vegetables may contribute to these high rates. The lower rates in France and the higher rates in Germany and regions of the Netherlands have been explained by the healthier Mediterranean diet, with less meat and more vegetables and the unhealthier Central European diets, rich in animal fats. In Iberia however, colorectal cancer rates seem to be increasing([22]) which may be indicative of unhealthy changes in a healthy lifestyle. Marked differences exist between individual Nordic countries in colorectal cancer mortality, and known dietary or other lifestyle-associated factors cannot fully explain them. While in absolute numbers these differences are limited, their consistency merits further study.

Years of life lost

The other maps show basically the same distributions. The burden of mortality among young people is limited, as colorectal cancer is a small cause of death under age 65. In the EU-27, 100,000 men and women lost respectively 450 and 390 PYLL. In Hungary (the top country), 100,000 men and women lost respectively 900 and 720 PYLL, in Greece (the bottom country) this was 258 and 240. Spain and Portugal moved up above the EU average. The burden of mortality increased to 500 and 410 PYLL (Portuguese men and women) and 460 and 360 PYLL (Spanish men and women). Countries that, besides Greece, were more than 20 percent below EU average were Iceland, Finland and Switzerland. Countries that, besides Hungary, were more than 20 percent above EU average were Denmark, the Czech and Slovak Republics and Croatia.

([20]) G. Gatta et al. (2000) a EUROCARE high resolution study. Gut 2000; 47(4):533-538.
([21]) E. Fernández (2005) European Journal of Cancer 41, 430-437
([22]) http://www.projectfact.eu/publication/publication-available-on-line-in-february-2008-/media/cancer.-.web.version.pdf



11.1. Malignant neoplasms of colon, rectum and anus
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 30.2
27.1 to 30.2
25.2 to 27.1
21.8 to 25.2
< 21.8
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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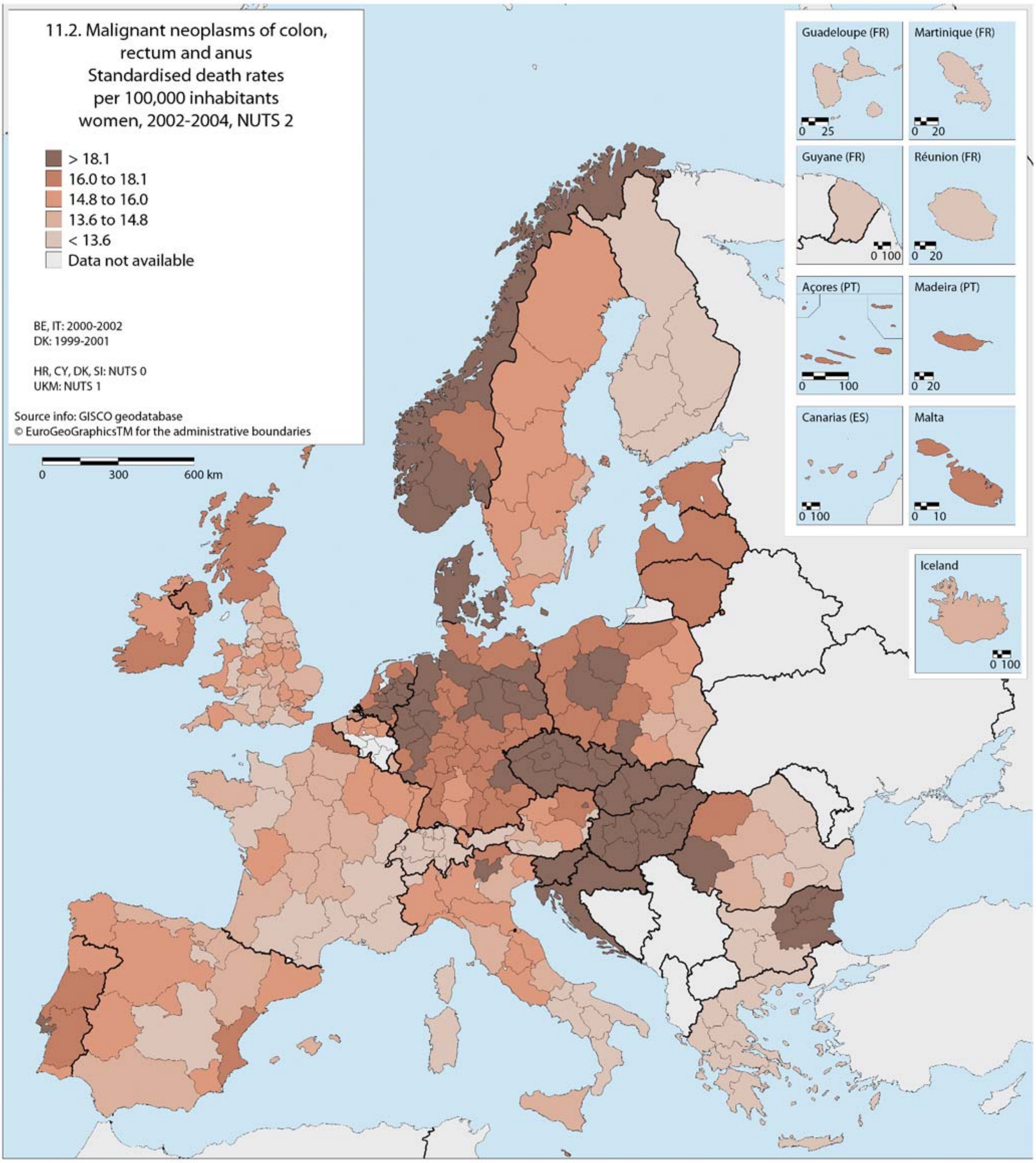
11.2. Malignant neoplasms of colon, rectum and anus
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 18.1
16.0 to 18.1
14.8 to 16.0
13.6 to 14.8
< 13.6
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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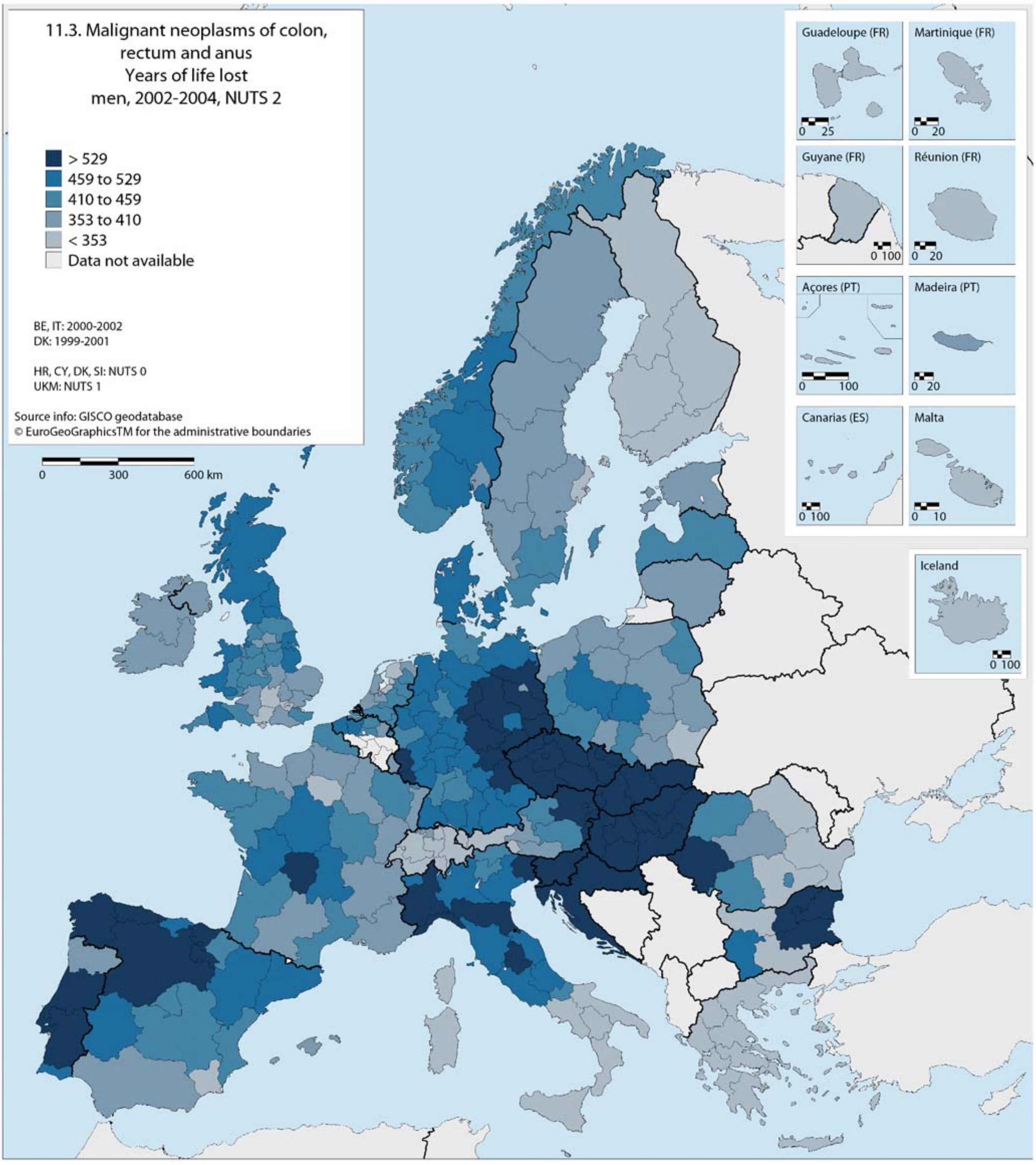
11.3. Malignant neoplasms of colon, rectum and anus
Years of life lost
men, 2002-2004, NUTS 2
> 529
459 to 529
410 to 459
353 to 410
< 353
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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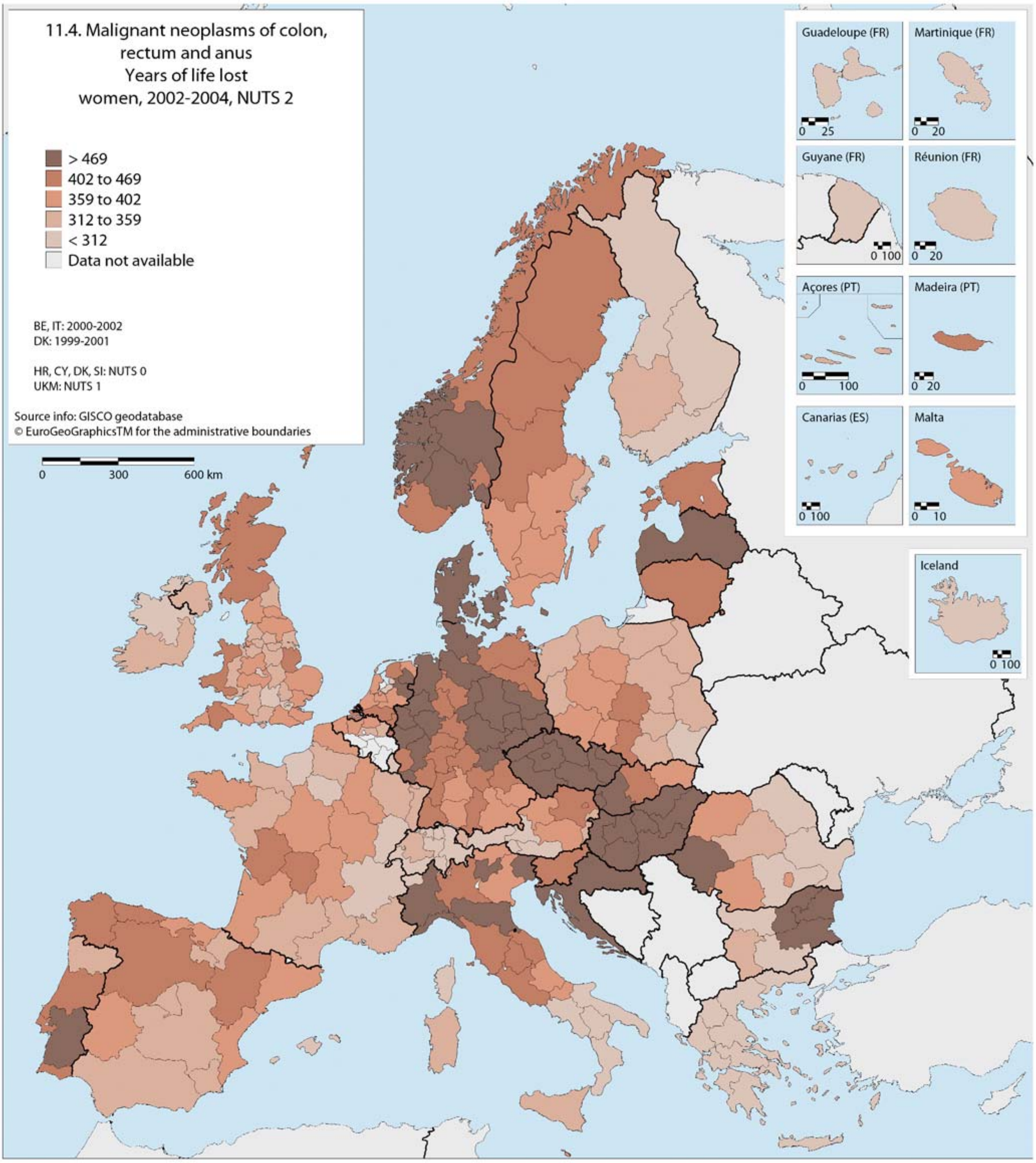
0 100


11.4. Malignant neoplasms of colon, rectum and anus
Years of life lost
women, 2002-2004, NUTS 2
> 469
402 to 469
359 to 402
312 to 359
< 312
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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12

Malignant neoplasms of breast (women)

Breast cancer is a cancer of the glandular breast tissue. In European women, breast cancer is the leading cause of cancer death, causing one in six of all deaths from cancers in women. Breast cancer may occur in men, but in men it is a rare disease.

Breast cancer is considered to be the final outcome of multiple environmental and hereditary factors. The prevalence of breast cancers attributable to hereditary syndromes varies, depending on population, between 2 to 12%. In unselected UK and Finnish populations, prevalence varied between 2 and 3%([23]). Diet, alcohol use and obesity are risk factors for the occurrence of breast cancer, but their quantitative importance remains debated. Reproductive life histories which increase exposure to endogenous estrogens raise the risks for breast cancer considerably. It is estimated that more than half of all breast cancers in Europe are attributable to childlessness, having fewer children, delaying first childbirth until later ages, not breastfeeding, early menarche (the first menstrual period) and late menopause([24]). Post-menopausal hormone replacement therapy (HRT) have also increased breast cancer risks.

At pre-menopausal age, breast cancer incidence increases more rapidly with age. At post-menopausal age the incidence increase with age is slower. The high incidence and high aggressiveness at younger ages cause a uniquely high burden of breast cancer among adult pre-menopausal women.

Mortality is a consequence of incidence and breast cancer survival. In most countries survival has increased, attributable to improved cancer care and introduction of screening. In the EU, five year survival is now around 80 percent([25]). The effectiveness of breast cancer screening programmes in reducing breast cancer mortality still remains debated.

Standardised death rates

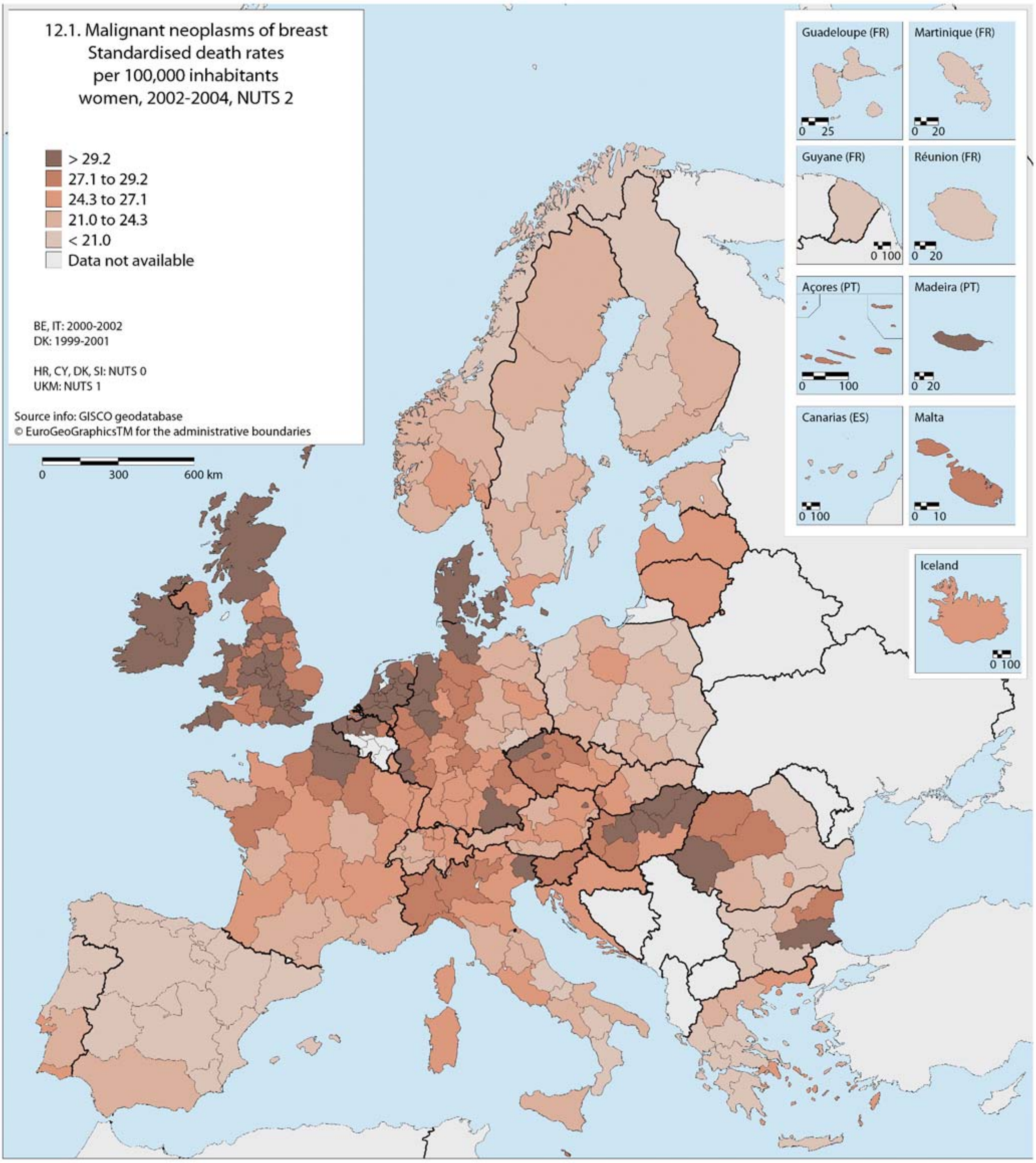
The interquintile difference is 1.39, which is relatively limited. As mentioned in the previous chapter, the main epidemiological asset of the European Union is its diversity. If mortality differences are limited, health policy has limited handles on control. Therefore, interregional differences must not be overinterpreted. However, a remarkable band of excess breast cancer mortality runs across the EU, with highest rates in the United Kingdom (31.7 in Cornwall and Isles of Scilly), the Netherlands (36.9 in Drenthe), North-western France (34.7 in Nord - Pas-de-Calais), Western Germany (30.8 in Trier), the Czech Republic (31.7 in Severozapad), Hungary (35.9 in Kozep-Magyarorszag) and parts of Romania (38.7 in Vest) and Bulgaria (42.7 in Yugoiztochen). North and south of that band, mortality is clearly lower. The reason is not well-known.

The primary prevention of breast cancer is sociologically not a viable option, as it would involve modern women to have many children at young ages and to breastfeed them for a long time. High quality breast cancer care, based on the best scientific evidence, is the most effective way of further lowering mortality.

Potential years of life lost

Breast cancer causes large losses of life among young women. In the EU-27, 100,000 women lost 190 PYLL. While the PYLL weighs mortality at younger ages more strongly than the SDR, the patterns are similar. Breast cancer screening programmes start at age 50 and mortality reduction by screening takes in average more than five years, as screening needs time to modify the natural evolution of breast cancer([26]). This is limiting the impact of screening programmes in women before age 65. Optimal breast cancer treatment is the only available strategy to reduce breast cancer mortality at premenopausal age. Countries with higher breast cancer mortality among younger women were Denmark (237 PYLL), Flanders (the Dutch speaking Belgian regions; 255 PYLL), Hungary (240 PYLL) and the Netherlands (248 PYLL). Countries with lower breast cancer mortality (20 percent or less) were limited to Spain and Poland. The interregional differences are relatively small, pointing to strong common risk factors and limited differences in providing optimal cancer care.

([23]) Kirsi Syrjäkoski et al. (2000) Journal of the National Cancer Institute 2000 92(18):1529-1531
([24]) Collaborative Group on Hormonal Factors in Breast cancer and Breastfeeding (2002) The Lancet 360, 187-195
([25]) M.P. Coleman et al. (2008) Responding to the challenge of cancer in Europe. Institute of Public Health of the Republic of Slovenia
([26]) O.S. Miettinen et al. (2002) The Lancet 359 (9304): 404-5


12.1. Malignant neoplasms of breast
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 29.2
27.1 to 29.2
24.3 to 27.1
21.0 to 24.3
< 21.0
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Martinique (FR)
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Guyane (FR)
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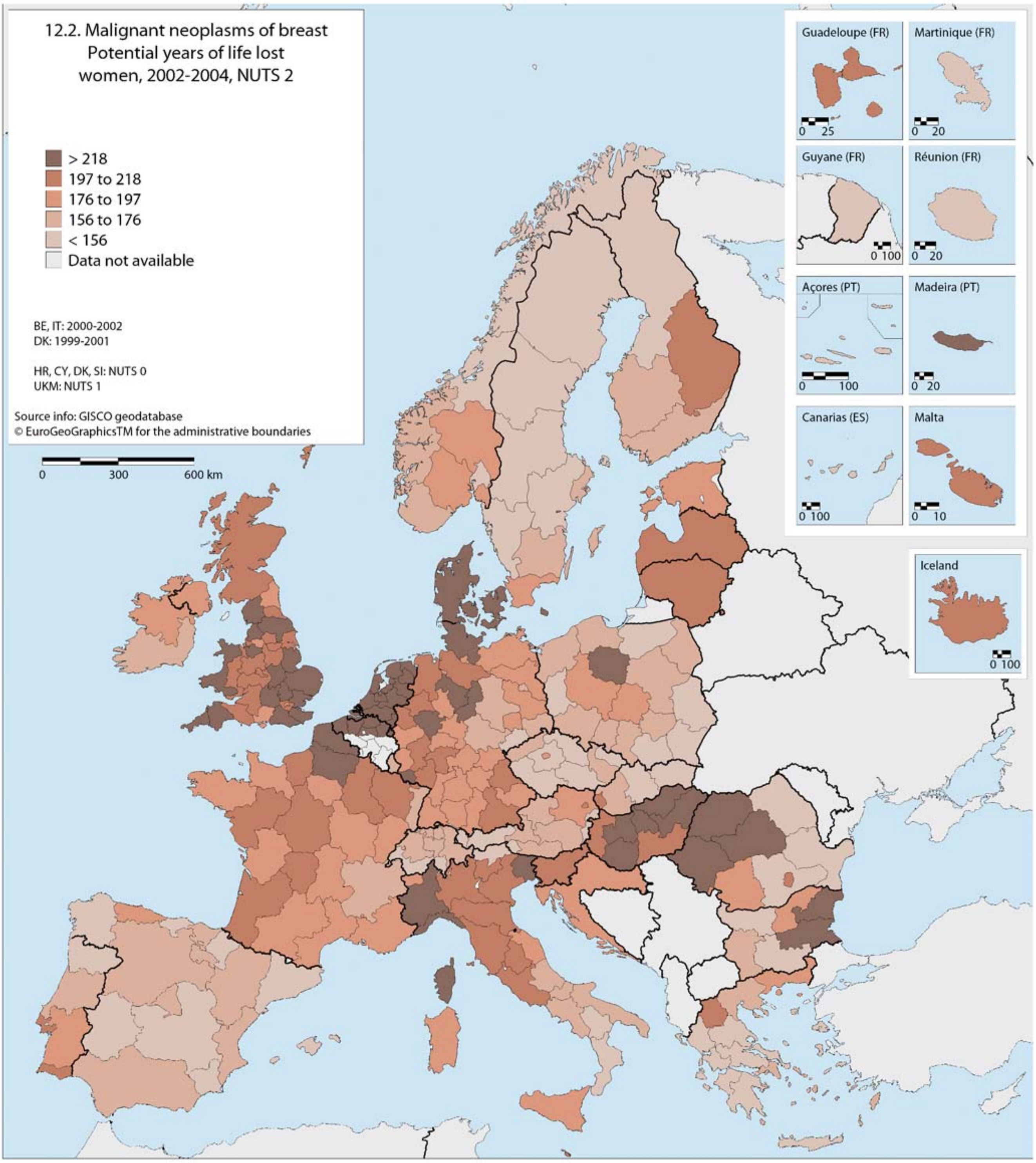
12.2. Malignant neoplasms of breast
Potential years of life lost
women, 2002-2004, NUTS 2
> 218
197 to 218
176 to 197
156 to 176
< 156
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Malignant neoplasms of cervix uteri and other parts of uterus (women)

13

Cancers of the cervix and uterus are taken together because of the frequent classification of 'cancer of the uterus' without further clarification. We will use cancer of the uterus as short hand for cancer of other parts of the uterus than the cervix. As cancer of the cervix and cancer of the uterus have very different etiologies and epidemiology, this hinders interpretation. The age distribution may help interpretation, as cancer of the cervix is frequent at young age and relatively more rare after middle age, while this is the opposite for cancer of the uterus. In the average European country, cancer of the uterus is more or less as frequent as cancer of the cervix, but the age distributions are different. PYLL, reflecting mortality at younger ages, reflect better cervical cancer. The etiology of uterus cancer is comparable to the etiology of breast cancer. The variation of cancer mortality of the uterus is limited, while the variation in cervical cancer mortality is large. Variation of cancer of both cancers of the uterus and cervix will therefore be dominated by cervical cancer mortality. However, all comparisons should take into account the aggregation of cancers of uterus and cervix.

Cervical cancer is associated with infection with high-risk strains of the human papillomavirus (HPV). A patient must have been infected with HPV to develop cervical cancer, and hence cervical cancer has to be viewed as a sexually transmitted disease. Having unprotected sex, especially at a young age, makes HPV infection more likely. Women who have many sexual partners or who have sex with men who have had many partners have a greater chance of getting HPV. However, most women with HPV infection do not develop cervical cancer and other risk factors must come into play.

Transmission of sexually transmitted diseases depends on sexual behaviour in sexual networks, which are dependent on social change and cultural subgroups. Rates of sexually transmitted diseases were high in the baby boom generation but fell steeply in the European generations exposed to the risk of HIV/AIDS. Smoking may contribute to the risk, but confounding of risky behaviours is likely.

Vaccines have been developed against several types of HPV. Vaccination programmes are being planned in many countries of the developed world, including Europe. HPV vaccines cover most but not all high-risk strains that infect humans, thus vaccines do not protect fully against cervical cancer. It will take decades before the effect of vaccination can show up in decreased cancer mortality.

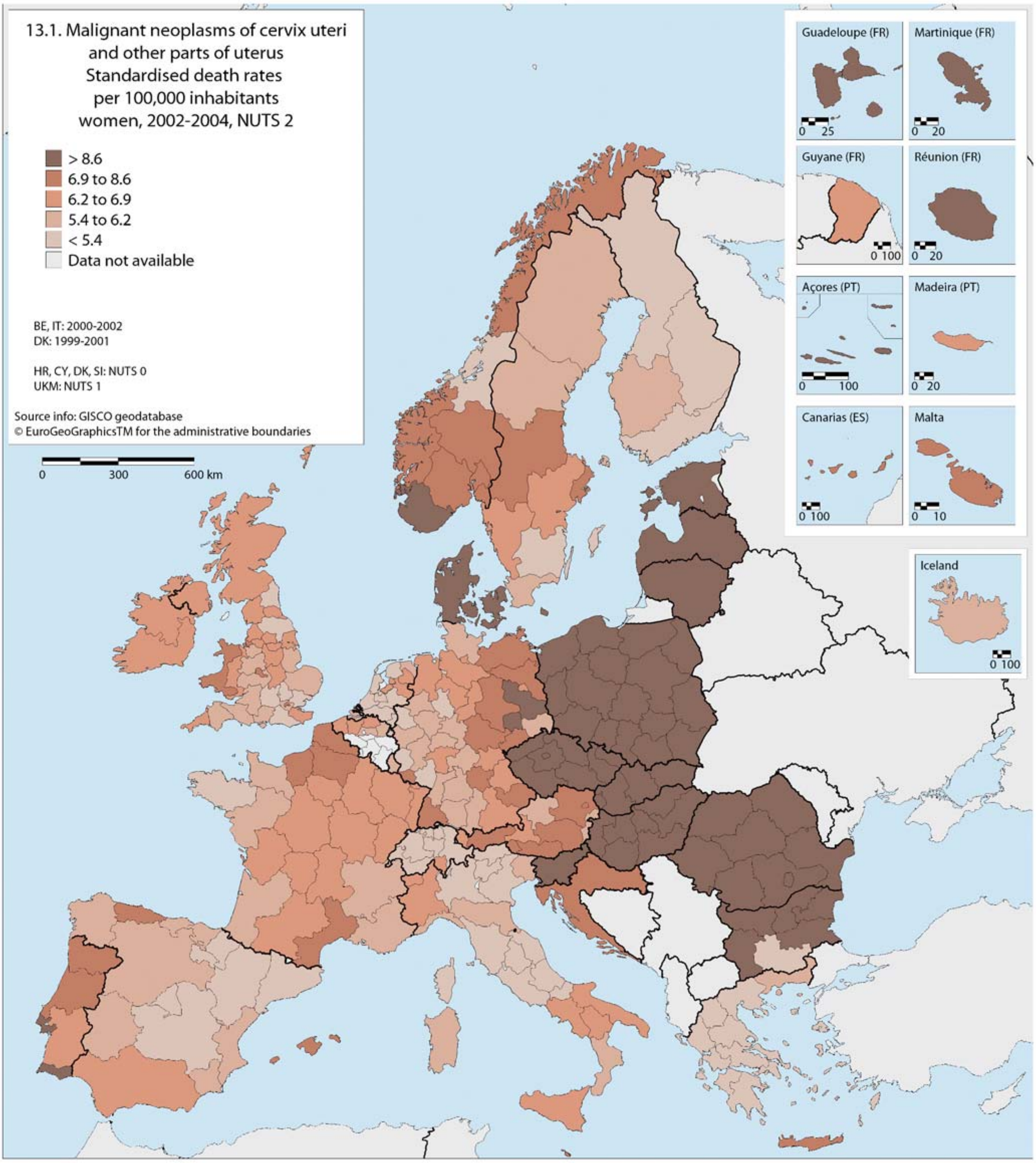
Cervical cancer screening with PAP smears is highly effective in reducing incidence and mortality of invasive cervical cancer. Most cases of cervical cancer occur in women who are not screened adequately. To be effective, well-organised cancer screening programmes have to actively target women at high risk of cervical cancer, while limiting the adverse effects of overscreening and overtreatment in women at low risk.

Standardised death rates

The interquintile difference of death rates between regions is quite large, 2.4, indicating a high potential for improvement through prevention and control. As mentioned before, the main reason is likely variance in cervical cancer mortality. However, this is better highlighted by the PYLL, as uterus cancer is a rare cause of death among younger people.

Potential years of life lost

The map of the PYLL shows the same distribution as the SDRs, and is consistent with the hypothesis that the main reason of variance is cervical cancer mortality. The results highlight the relatively young age at which women with cervical cancer die, and the many years of lost productive life. In the EU-27, 100,000 women lost 64 PYLL. The situation in the Central and Eastern European Member States is considerably worse than average. Romania (230), Lithuania (170), Bulgaria (170), Hungary (140), Latvia (130), Poland (110), the Slovak Republic (100), Estonia (98), the Czech Republic (88), and Slovenia (83) all have higher PYLL (20 percent or more than average). Low access to healthcare and preventive healthcare of good quality remains the most cited factor in the epidemiologic literature. On the other hand, the map shows ancillary evidence that countries with well-organised national cervical cancer screening programmes have lowered rates of cervical cancer mortality. Finland, Sweden, the United Kingdom, the Netherlands have well-organised screening programmes. Among the Nordic countries, Norway introduced systematic screening at a later date. Since then, cancer mortality has been decreasing there too. Among the old Member States (EU-15), 100,000 women lost 42 PYLL. Denmark (66) and Portugal (64) (together with adjacent Spanish regions) had higher than average cervical cancer mortality in the EU-15. Countries with lower than average mortality in the EU-15 were Greece (30), Luxembourg (24), Finland (19) and Switzerland (18).


13.1. Malignant neoplasms of cervix uteri and other parts of uterus
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 8.6
6.9 to 8.6
6.2 to 6.9
5.4 to 6.2
< 5.4
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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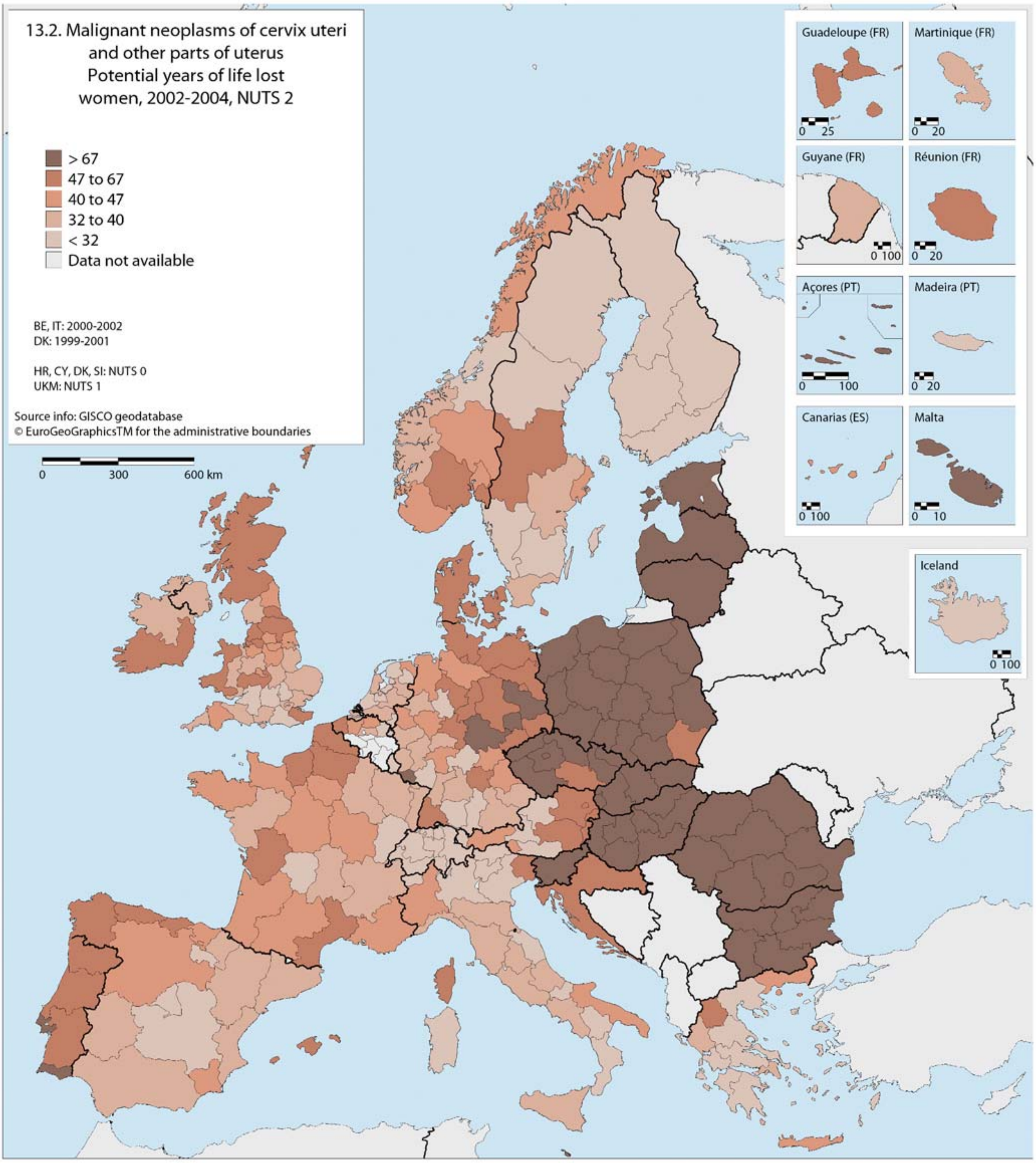
13.2. Malignant neoplasms of cervix uteri and other parts of uterus
Potential years of life lost
women, 2002-2004, NUTS 2
> 67
47 to 67
40 to 47
32 to 40
< 32
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Martinique (FR)
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Guyane (FR)
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Réunion (FR)
0 20
Açores (PT)
0 100
Madeira (PT)
0 20
Canarias (ES)
0 100
Malta
0 10
Iceland
0 100

14

Malignant neoplasms of prostate (men)

Prostate cancer develops in the prostate, a gland of the male reproductive system. It is the second most common type of cancer death in men in Europe, claiming 10 percent of deaths due to malignant neoplasms. However, it is predominantly a disease of old men. Half of all the prostate cancer deaths in the EU occur in men 80 and older, one in 13 prostate cancer deaths occurs in men under 65. Many men who develop prostate cancer never have symptoms and die of other causes before its manifestation. This makes treatment decisions difficult.

Many factors, including genetics and diet, have been implicated in the development of prostate cancer, but the specific causes of prostate cancer remain unknown. Men who have a brother or father with prostate cancer have twice the usual risk of developing prostate cancer([27]). The primary risk factor is age. Ageing of the baby boom generation and decreasing all cause mortality, particularly at older ages, cause therefore severe increases of prostate cancer in the European Union.

Prostate cancer death is uncommon in men younger than 55, but becomes more common with advancing age. The average age at the time of death is over 75. Autopsy studies show high prevalences of occult prostate cancer([27]). Prostate cancer screening sharply increases prostate cancer detection rates and therefore incidence, but is not known to be effective in reducing mortality. There are no conclusive, evidence-based methods of primary or secondary prevention. Reasons for geographical differences in prostate cancer mortality in Europe are therefore largely unknown.

Standardised death rates

The interquintile difference, 1.35, is relatively small. As mentioned before, if mortality differences are limited, health policy has limited handles on control. Given the advanced age of the patients, the high levels of co-morbidity and the chronic nature of prostate cancer, national differences in coding practices may explain part of the observed geographical variance. The differences between 'dying with' and 'dying of' prostate cancer in elderly and frail males with many diseases may be subtle and may easily lead to differential coding decisions.

Like breast cancer, prostate cancer mortality is positively but subtly related to economic development, and has been increasing in Europe over time. Adequate treatment according to evidence-based guidelines benefits the patient, but the effects on mortality are likely to be limited in these elderly populations with slow growing tumours.

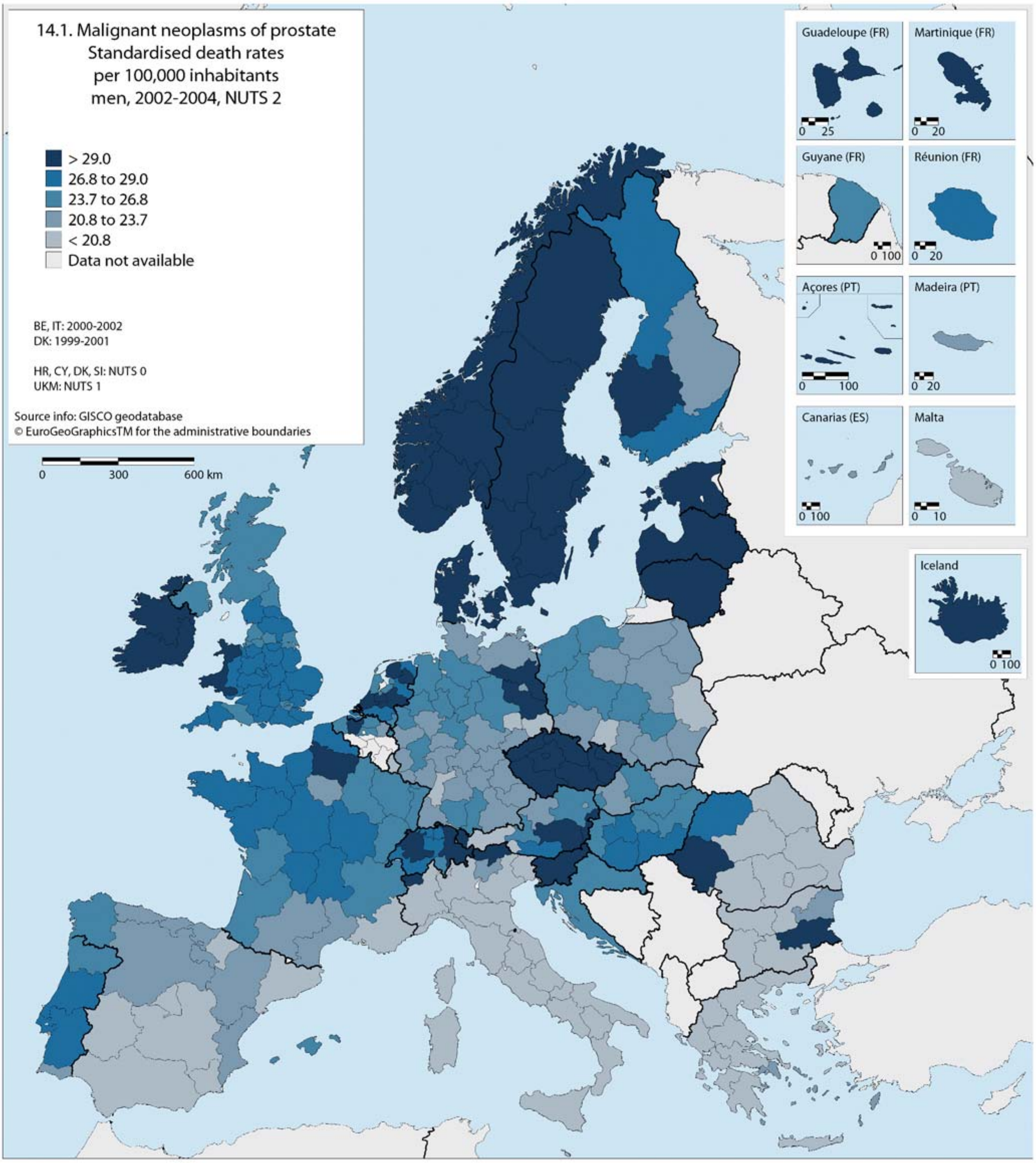
The Nordic and Baltic States and Ireland have higher levels of prostate cancer mortality. Coding differences have been excluded. Further reasons are unknown.

Years of life lost

The YLL is based on the same data as the SDRs, but weighs by the age at death. The PYLL is not shown as it is limited in prostate cancer, since few people die before age 65. Differences between the SDRs and the YLL map show different age patterns at the moment of (coded) death. While prostate cancer is a frequent and growing cause of death because of population ageing, the YLL map shows a more limited loss of life as the mean age at prostate cancer death is high. As all causes of death at old age, the registered cause of death at older ages is less certain and may be subjected to cultural and diagnostic habits.

Taking these caveats into account, in the EU-27 100,000 lost 290 PYLL. Countries with above average prostate cancer mortality were in the Northern European regions: the Nordic and Baltic States. We cite Sweden (530), Norway (440), Denmark (420), Estonia (360) and Latvia (360). Countries with a lower than average burden or prostate cancer mortality were Poland (220), Slovak Republic (210), Luxembourg (200), Romania (180) and Malta (170).

([27]) J.E. Damber et al. (2008) The Lancet 371 (9625): 1710-21


14.1. Malignant neoplasms of prostate
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 29.0
26.8 to 29.0
23.7 to 26.8
20.8 to 23.7
< 20.8
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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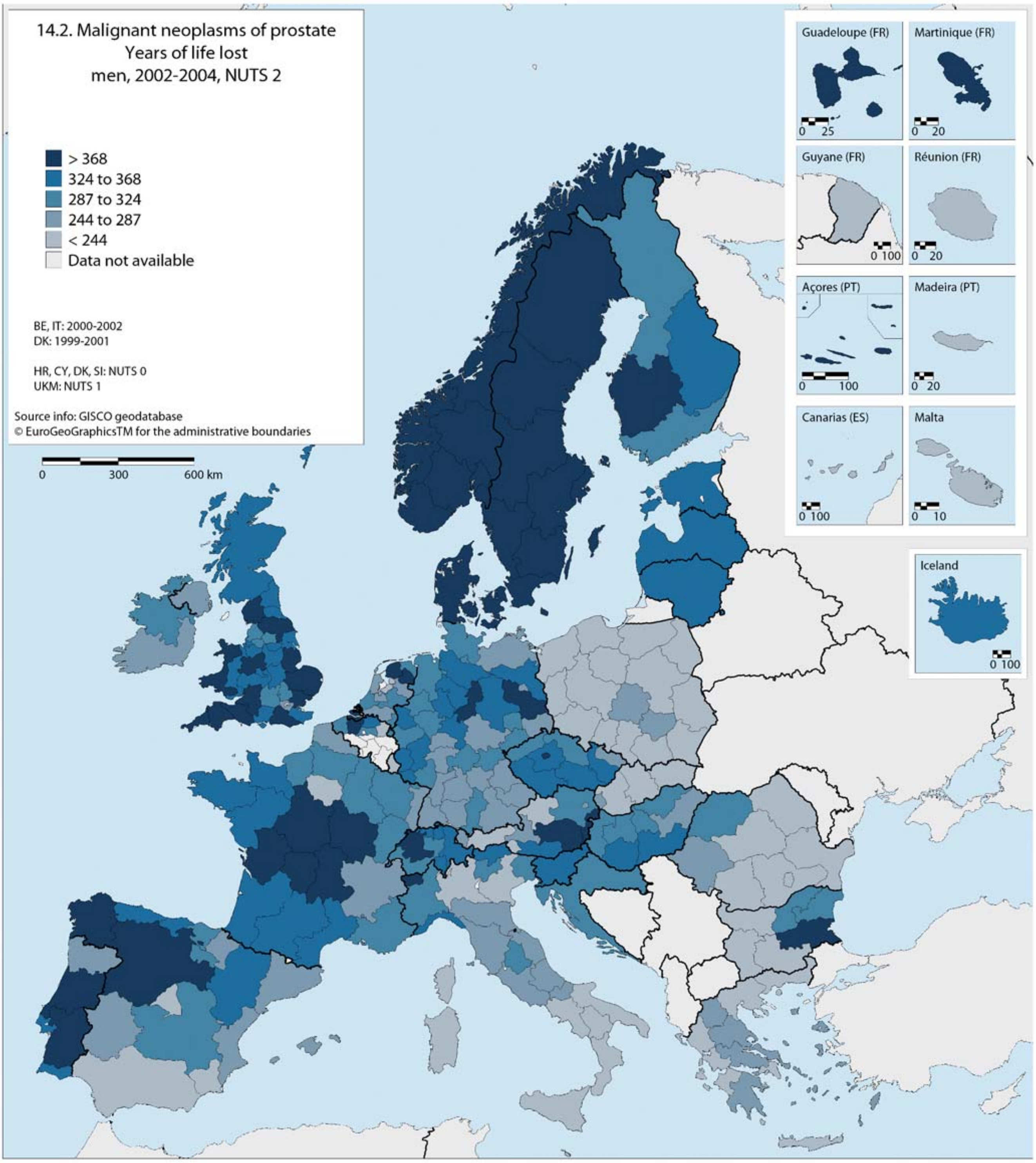
14.2. Malignant neoplasms of prostate
Years of life lost
men, 2002-2004, NUTS 2
> 368
324 to 368
287 to 324
244 to 287
< 244
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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15

Diseases of the circulatory system

Diseases of the circulatory system or cardiovascular diseases are the main cause of death in the European Union. They account for 42 percent of all deaths in the total population.

Diseases of the circulatory system are more common at advanced ages: 81 percent of male deaths and 94 percent of female deaths due to this disease are older than 65 years.

Cardiovascular mortality is a major cause of death at older ages, mostly as a result of a single disease process: atherosclerotic changes of the vessel wall. Deaths from ischaemic heart diseases make up 37 percent of all deaths from circulatory diseases, deaths from cerebrovascular diseases another 26 percent. Other heart diseases are often related to ischaemic heart disease, too, and lethal vascular diseases of other origins, such as aorta aneurysms and renal vascular disease often have the same atherosclerotic cause.

There is little doubt that a more sedentary lifestyle and diets rich in animal fats are an important factor in the causation of atherosclerotic disease. Coronary heart disease, the most important cause of fatal circulatory disease, has been rare in traditional agricultural societies where diets rich in animal fats are less available and food is won by hard manual labour. Smoking, a diet rich in saturated fats and poor in vegetables and fruits, obesity, lack of physical activity and alcohol abuse are important lifestyle causes, which are related to diabetes mellitus type 2, increased blood pressure, increased low density lipoprotein (LDL) serum cholesterol and decreased high density lipoprotein (HDL) serum cholesterol. Socioeconomic factors such as a shorter education, lower income and high unemployment also contribute considerably and independently to the risk of vascular mortality. Gender and age are other important risk factors. The risks of fatal circulatory diseases increase sharply with age. Women reach the disease risks of men at older ages. The reasons for the relative lower risks of women are manifold. Gender differences in physiology are certainly important, but the mortality gap between genders increased in the twentieth century. Differential tobacco use by men and women explained part of that increasing gap.

After a period of sharp increases after World War II, ischaemic heart disease mortality started to decrease in the Western world in the fourth quarter of the previous century and in the recent period it has decreased even spectacularly. As it is the most important cause of cardiovascular death, it decreased circulatory mortality. The regional differences seen in the maps are largely caused by differences in ischaemic heart disease mortality (see further).

Lifestyle changes were important, predominantly smoking cessation and diets with less saturated fat. Obviously, the obesity epidemic is counteracting these changes. However, much gain has been made by cardiovascular risk management, particularly by hypertension control, lipid lowering statins and aspirins. Alcohol use is to be treated cautiously, since low to moderate levels of alcohol use give some protection to affluent populations against vascular disease, while alcohol addiction causes disease, added to the many social problems of alcoholics. Treatment of heart attack was revolutionised in the fourth quarter of the previous century, with spectacular decreases of the originally very high case fatality.

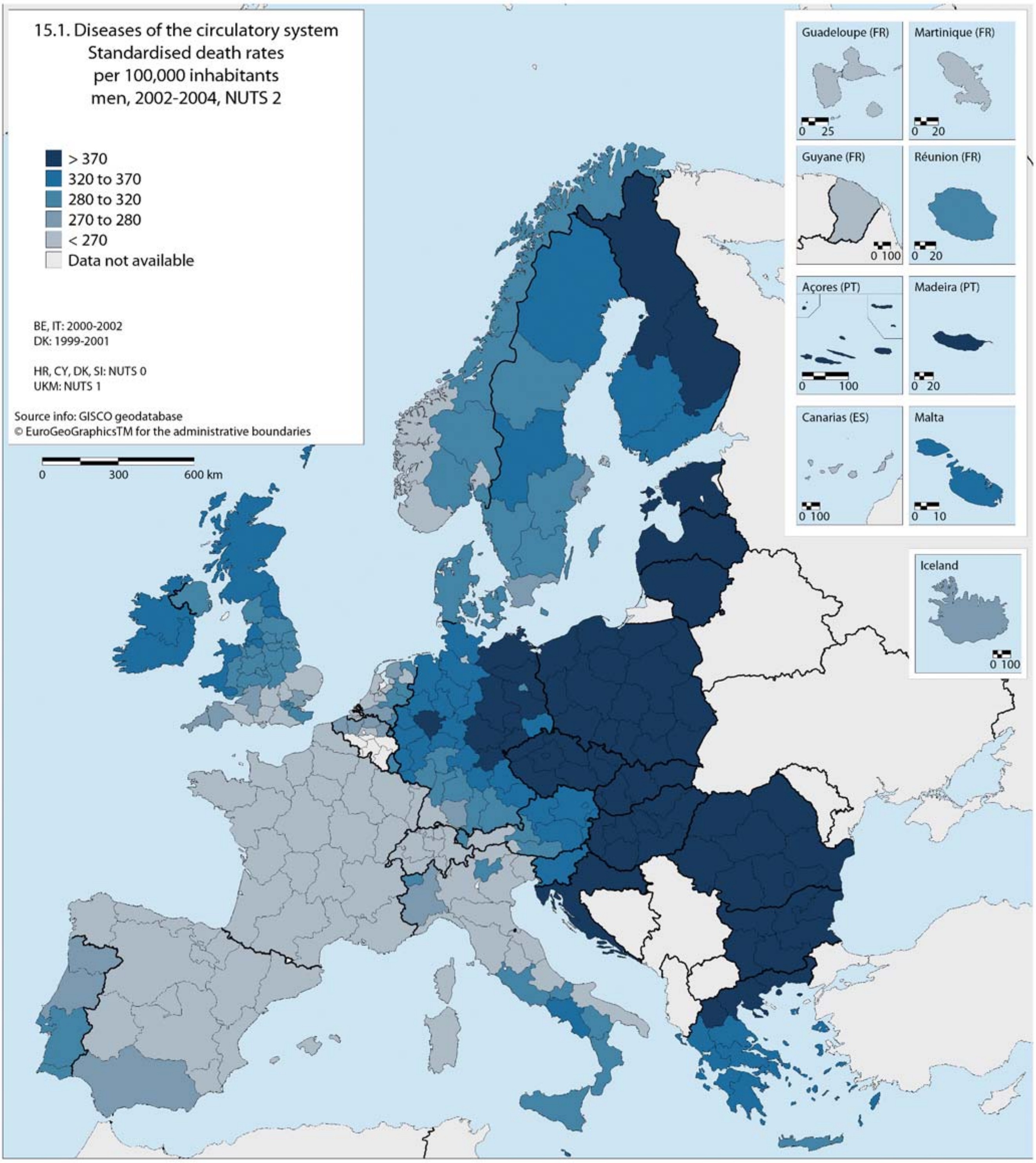
Prevention requires a comprehensive effort on all fronts: lifestyle changes for the whole population, cardiovascular risk management for those at high risk (and particularly for those with clinical disease), adequate first aid and urgency services to help heart attack patients survive until in hospital, full access to proven effective treatment in hospital and long-term treatment of clinical disease according to evidence-based guidelines. The most effective prevention is still believed to be raising levels of education and socioeconomic well-being.

One important problem in interpreting these administrative vital statistics data are different diagnostic, certification, coding and classification practices of causes of death between countries. Cardiovascular mortality is a cause of death among the elderly, and often occurs suddenly and unexpectedly. Many 'sudden' deaths of unknown origin are therefore cardiovascular, but can only be reliably identified as such by an autopsy. Countries with high autopsy rates tend therefore to have higher cardiovascular mortality than countries with lower autopsy rates. Another spurious cause of high mortality from circulatory causes is good medical record keeping. If a patient is known to have pre-existing severe ischaemic heart disease, it is acceptable to code a sudden and unforeseen death as ischaemic by origin.

Standardised death rates

For cardiovascular diseases male mortality is higher than female mortality, but differences are less pronounced than for most other causes. On average, male standardised death rates are 53 percent higher than those for women. Rates for men vary between 151 and 1,500 per 100,000 inhabitants. For women these figures are 97 and 1,054 respectively. The highest rates are found in Bulgaria and the lowest in France. The low rates of circulatory mortality in the Mediterranean region gave rise to the still poorly explained 'Mediterranean paradox'. Moderate consumption of alcohol, together with other subtly beneficial lifestyles such as diets rich in fruits and vegetables, olive oil consumption, sunshine and physical activity are considered to be responsible.

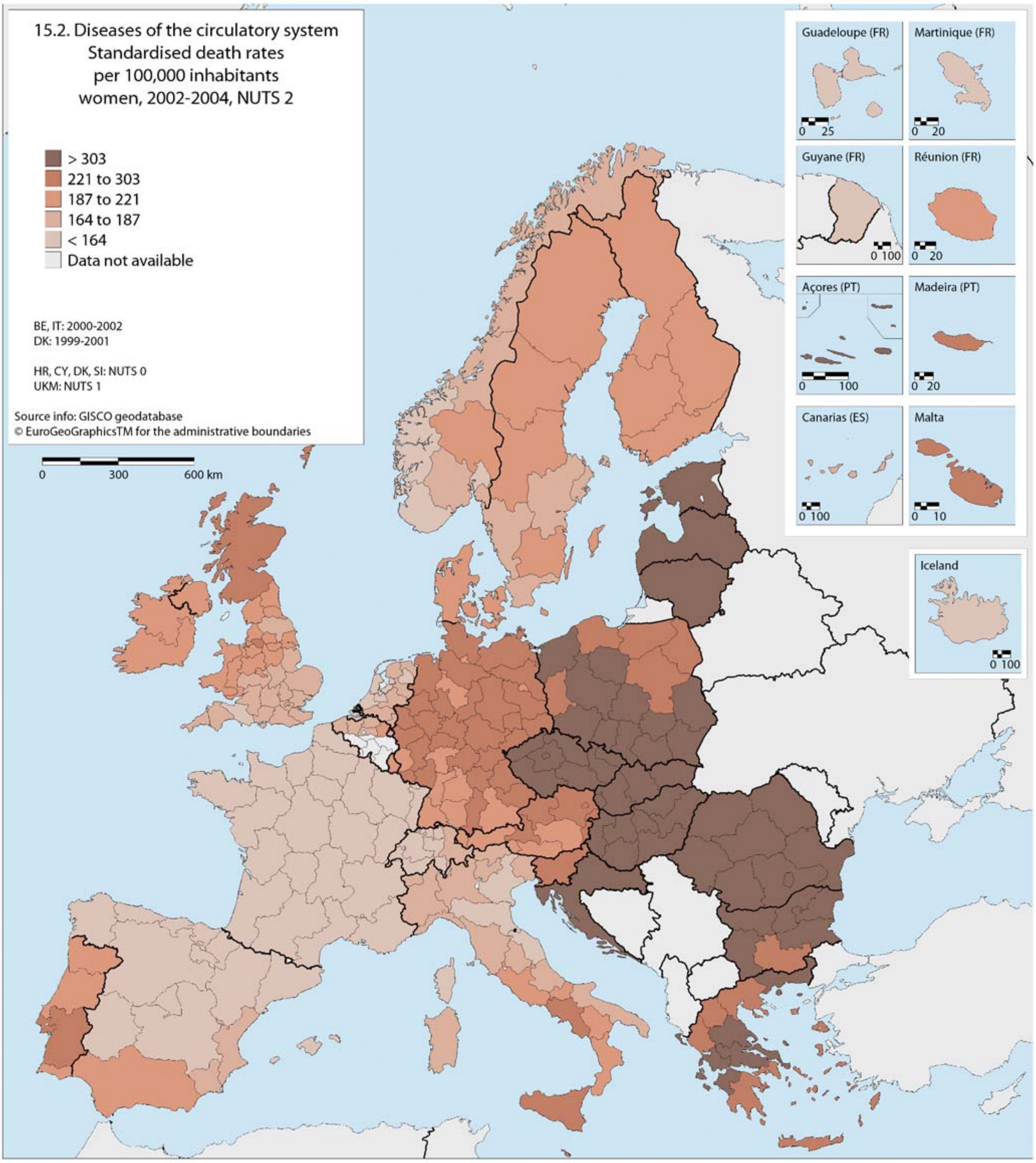
The geographical distribution of age standardised death rates is remarkably similar for men and women. In most cases values seem to nicely follow country borders. This may indicate



national differences in certification, classification and coding practices of causes of death, but mortality from circulatory disease is heavily correlated with socioeconomic conditions, lifestyle, public health policy and accessible and effective healthcare. The regional patterns of this cause of death should be compared with the patterns in the next two chapters: ischaemic heart diseases and cerebrovascular diseases, the two most important causes within this large group.

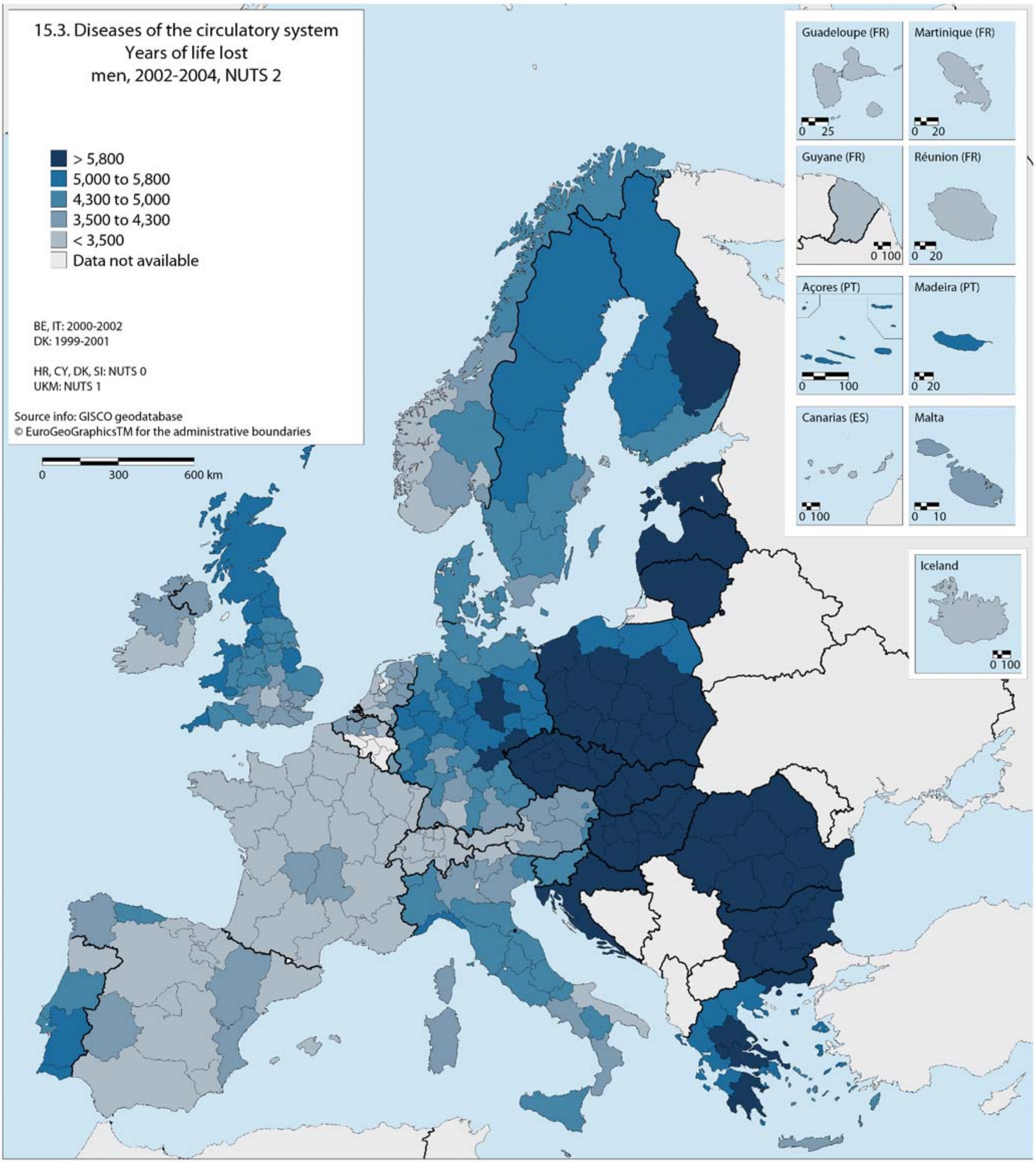
Years of life lost

In the EU-27, the burden of cardiovascular mortality was 5,000 and 4,700 PYLL in respectively 100,000 men and women. The new Member States suffered disproportionately high losses: (between parentheses the numbers for men and women) Bulgaria (14,000 and 12,000), Latvia (12,000 and 10,000), Romania 10,000 and 9,800), Estonia (11,000 and 8,800), Hungary (9,300 and 8,300), Lithuania (9,300



and 7,800), Croatia (7,600 and 7,500), the Slovak Republic (7,100 and 6,400), the Czech Republic 6,800 and 6,500) and Poland (6,500 and 5,300). In the old Member States EU-15, the loss of life was lower: 4,100 among men and 3,900 among women.

The lowest loss of life among men is found in Southern Europe: France and Spain. Switzerland and neighbouring regions of Austria also have low circulatory disease mortality. The burden of mortality was lowest in France (2,800 and 2,500), Spain (3,200 and 3,000), and Switzerland (3,000 for both genders).


15.3. Diseases of the circulatory system
Years of life lost
men, 2002-2004, NUTS 2
> 5,800
5,000 to 5,800
4,300 to 5,000
3,500 to 4,300
< 3,500
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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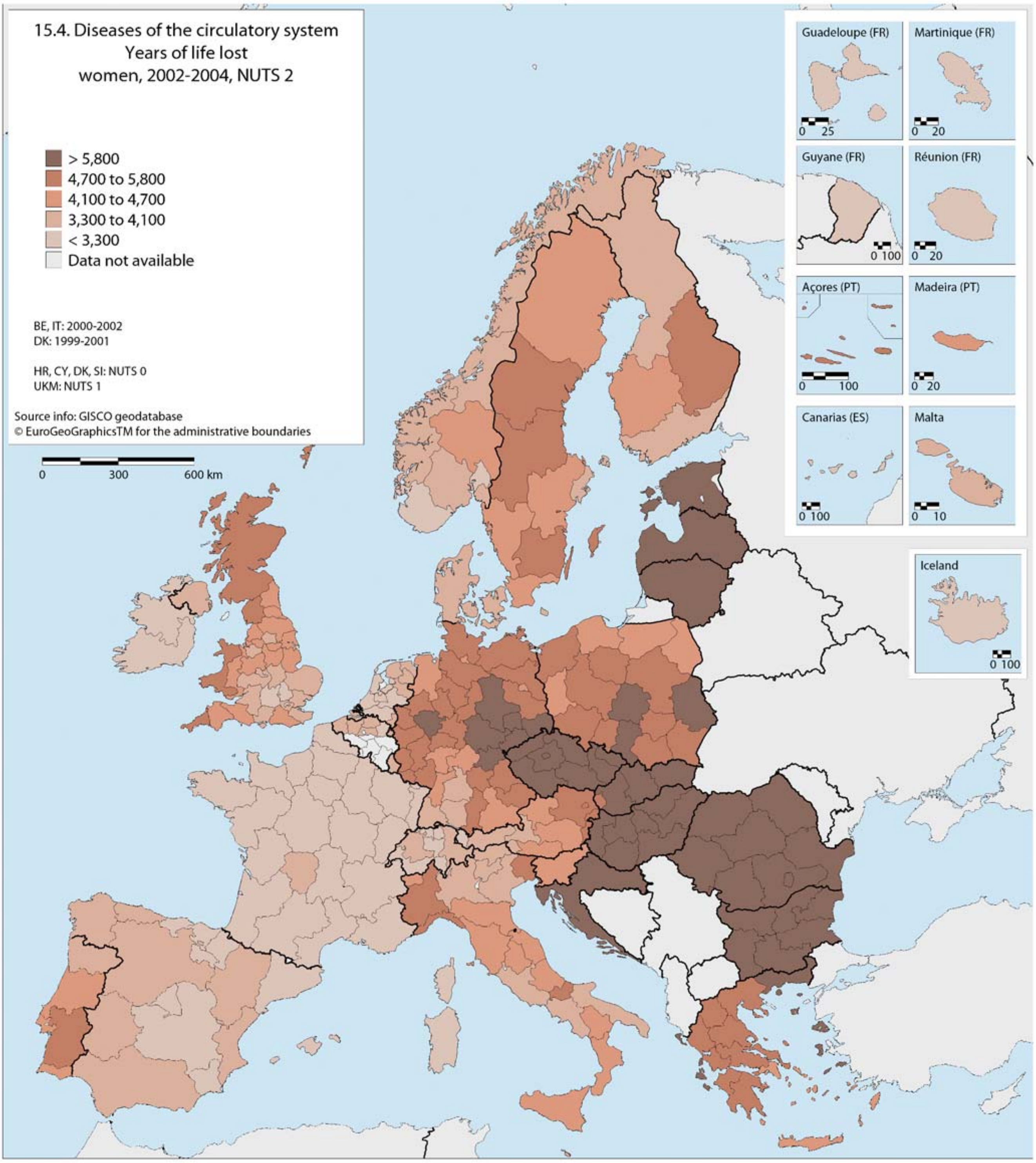
15.4. Diseases of the circulatory system
Years of life lost
women, 2002-2004, NUTS 2
> 5,800
4,700 to 5,800
4,100 to 4,700
3,300 to 4,100
< 3,300
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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16

Ischaemic heart diseases

Ischaemic heart disease (IHD), or myocardial ischemia, is a disease characterised by reduced blood supply to the heart, caused by atherosclerosis. It is still the most common specific cause of lost life in Europe. Ischaemia means a 'reduced blood supply'. Most deaths are caused by a heart attack. Acute myocardial infarction (AMI or MI), commonly known as a heart attack, occurs when the blood supply to a part of the heart is interrupted. The resulting ischaemia or oxygen shortage causes damage and potential death of heart tissue. It is a medical emergency. Further potentially lethal consequences may be chronic heart failure, and cardiac arrhythmias: irregular heartbeat which can be fatal. Most deaths are due to arrhythmias, usually tachyarrhythmias. Classical heart attacks have never been described for the nineteenth century, and are still very rare in poor populations. There is little doubt that an affluent lifestyle is an important factor in the causation of atherosclerotic disease. Smoking, a diet rich in saturated fats and poor in vegetables and fruits, obesity, lack of physical activity, alcohol abuse, lower levels of education, lower income, poor housing and high unemployment all contribute considerably and independently to the risk of MI. Gender and age are important risk factors, with women attaining male risks generally five to ten years later.

Ischaemic heart disease mortality reached high levels in the market economies around the 1960s, and then started to decrease. In the two recent decades, cardiovascular mortality declined steeply in the EU-15, driven by both ischaemic heart disease and stroke mortality decreases. Lifestyle changes were important, predominantly smoking cessation. However, cardiovascular risk management, secondary prevention of relapses among known patients and treatment of heart attacks have lead to spectacular decreases in the originally very high case fatality of myocardial infarctions. In the EU-15, age adjusted ischaemic heart disease mortality decreased with 40% from 1975 to 1995([28]). Acute ischaemic heart disease mortality must therefore be considered to be preventable. Prevention requires a comprehensive effort on all fronts. Changes in ischaemic heart disease mortality are sensitive measures of the national and regional pulse of public health.

High levels of ischaemic heart disease may be part of an unavoidable historical burden, but all European regions are able to decrease ischaemic heart disease mortality further. In Europe, ischaemic heart disease costs 14.2 percent (men) and 12.4 percent (women) of all years of life lost (YLL). It is still the first specific cause of lost life years. Ischaemic heart disease accounts for 8.5 percent of PYLL among men and 3.9 percent among women. Among men, it is the second cause of PYLL after transport accidents. Among women, it is the sixth cause of PYLL: Transport accidents (5.3 percent of all PYLL), breast cancer (8.8 percent), suicide (4.5 percent), stroke (4.6 percent) and lung cancer (4.4 percent) cause more loss of young productive life than ischaemic heart disease does (3.9 percent).

Standardised death rates

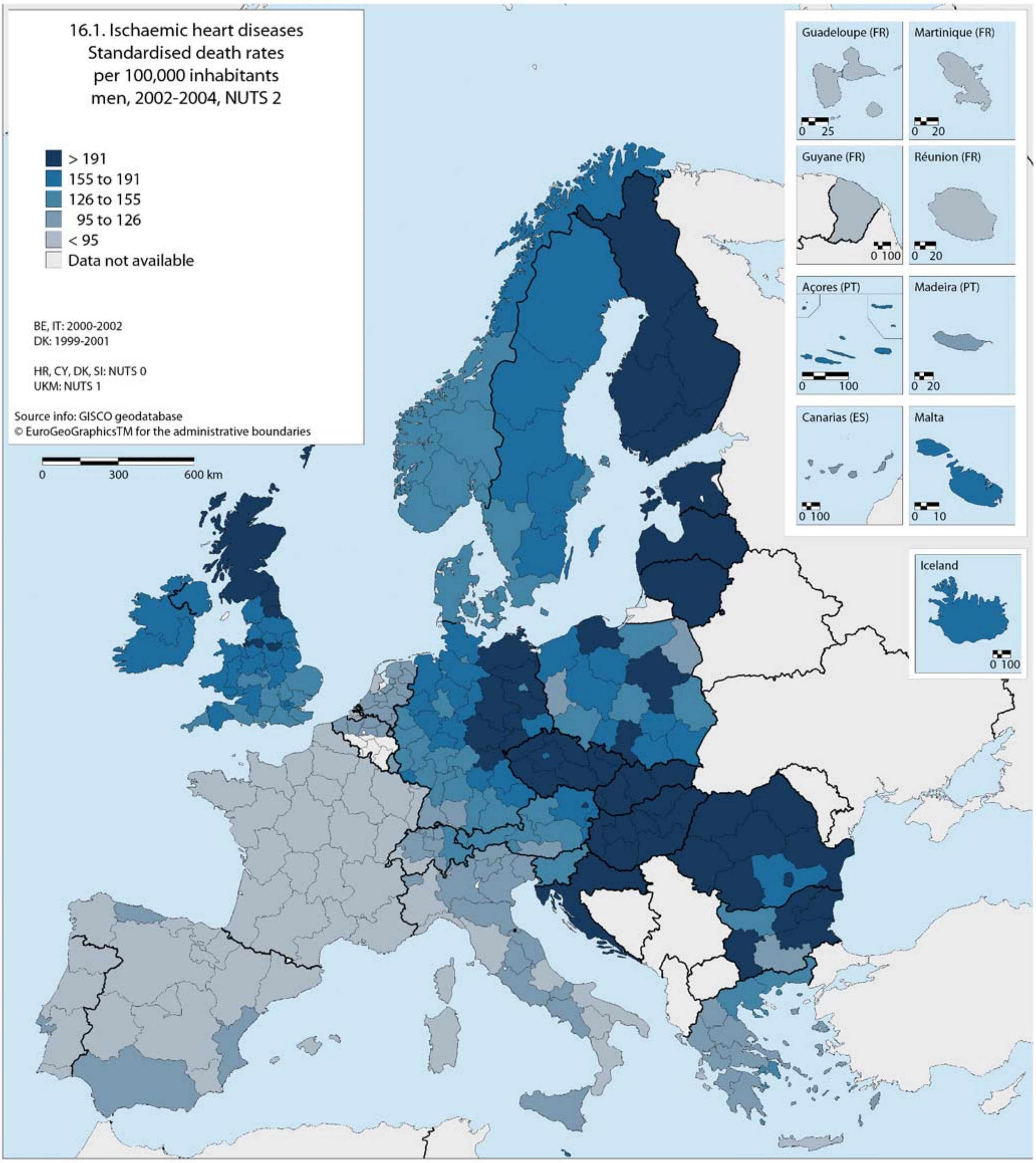
Standardised registration of ischaemic heart disease is difficult. Ischaemic heart disease is a cause of death, but also a cause of other diseases leading to death. Sudden cardiac death, heart failure and cardiac arrhythmias are often caused by underlying ischaemic processes, but may or may not be coded as such. Unknown and unforeseen deaths are often, but not always, ischaemic by origin, and reliable coding needs high autopsy rates and good medical record keeping. International differences may be based on different methodologies. Comparisons with circulatory diseases suggest that the lower IHD mortality in Poland might be spurious, caused by such methodological coding differences.

Given the differences in absolute rates, the relative interquintile difference of 2.1 is large. The diversity of mortality rates in the European Union suggests a high potential for prevention by effective health policy. Convergence to the lower mortality rates can save many European live years. There are clear south/north and west/east gradients, with higher levels in north and east.

The low levels of ischaemic heart disease in Southern Europe are traditionally explained by the 'Mediterranean paradox' (also called the French paradox). French epidemiologists formulated this paradox in the 1980s when they found that the regions of France where heart disease was the lowest, were those regions where animal fats were eaten the most. The main question behind this paradox is why the relatively high intake of saturated fats does not lead to higher risks of heart disease. Moderate consumption of alcohol, together with other subtly beneficial lifestyles are considered to explain this paradox. One of these lifestyles was the "Mediterranean diet", a heart healthy diet prevalent in the Mediterranean regions: high consumption of olive oil, legumes, unrefined cereals, fruits and vegetables, moderate consumption of dairy products (mostly cheese and yogurt), fish and wine, and low consumption of meat (yet another paradox since the paradox itself is about high observed fat intake in the first place).

The south to north gradient is even present within countries (minimising spurious coding effects) such as the United Kingdom and Ireland, and the west to east gradient within the Nordic countries, with still high IHD rates in Finland.

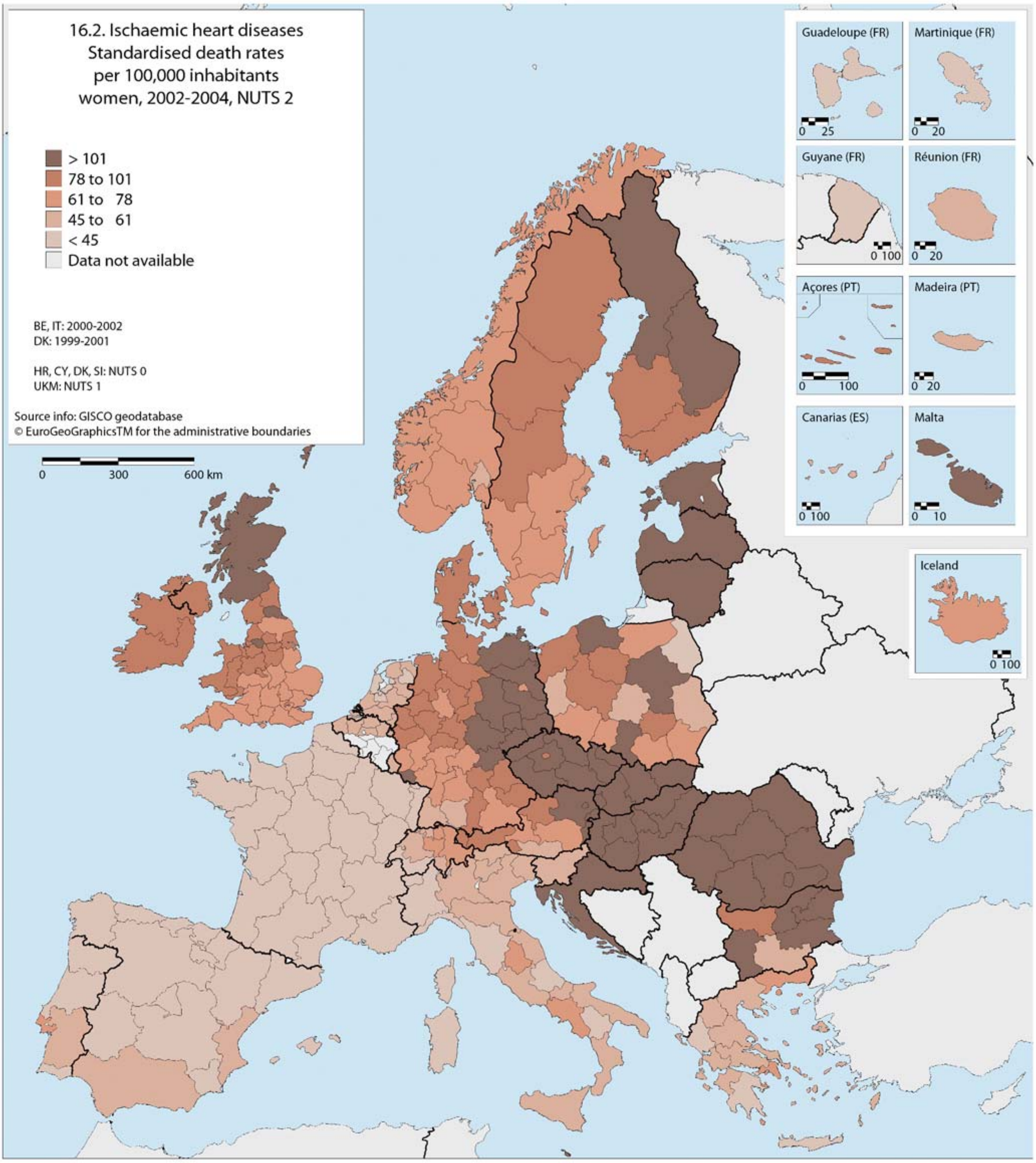
However, the differences between the older market economies and the former socialist economies are most striking. Lung cancer rates (see maps in chapter 10) show marked differences in historical smoking intensities. By the late 1980s Eastern Europe had the highest level of tobacco-related disease. Smoking is an important risk factor for ischaemic heart disease, and marked differences in lung cancer will therefore show up in marked differences



in ischaemic heart disease. This heavy historical legacy still burdens the Central and Eastern European Member States. However, the lower mortality in Poland, compared with other Central and Eastern European Member States, has been attributed by Polish scholars to a rapid and effective implementation of public health campaigns, showing great potential for rapid decline: ischaemic heart disease is far more sensitive to policy changes than lung cancer, for example. Men and women show the same patterns, with the same gradients for women, but at half the rates.

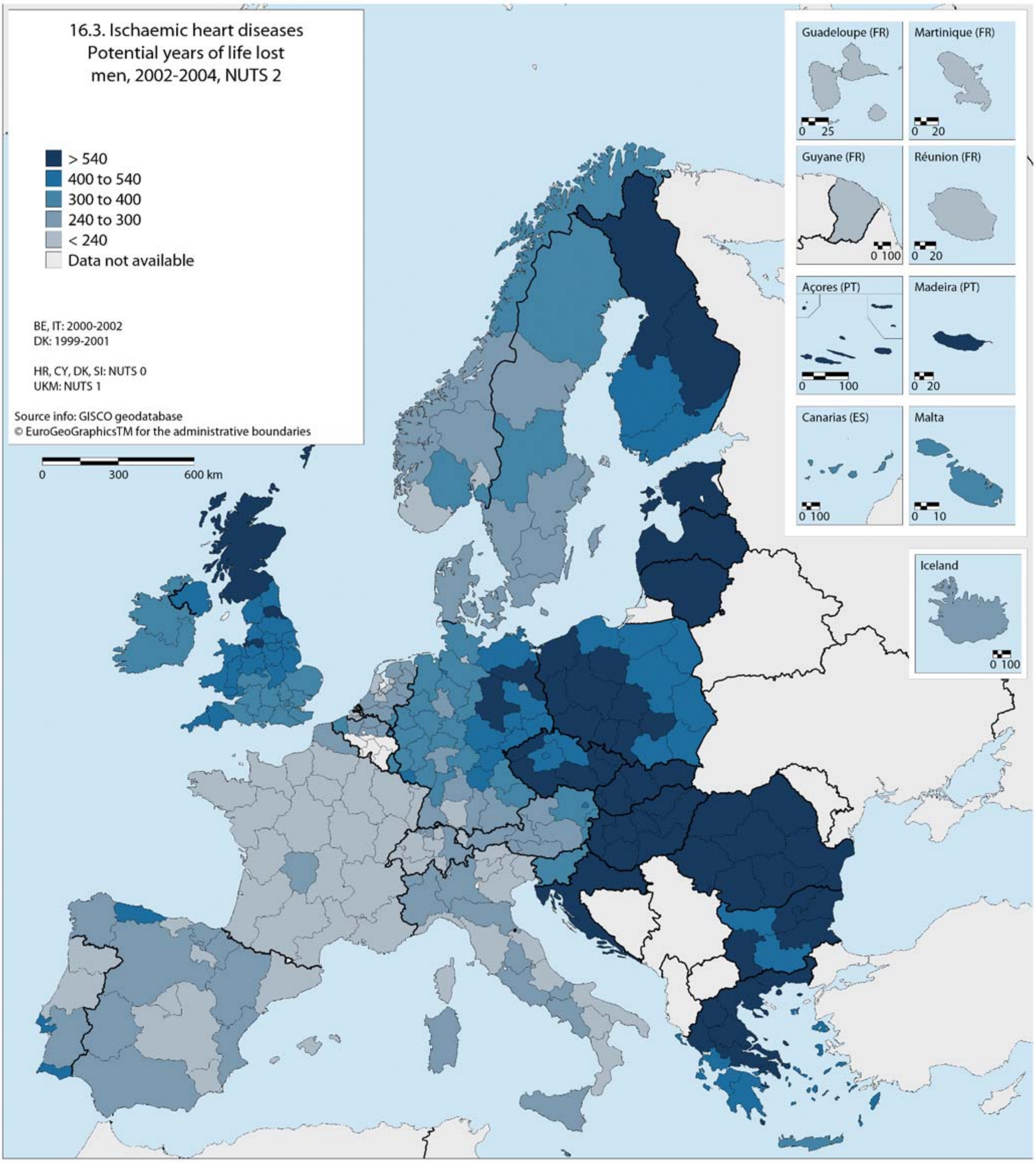
Potential years of life lost

The PYLL charts follow the same patterns, but illustrate the large losses of life in adult and middle ages, with a disproportionate fraction of these for men. In the EU-27, 100,000 men lost 400 PYLL compared to 92 among women,



ischaemic heart disease death being indeed rarer at young ages for women. The figures show that in the lowest quintile of mortality, 100,000 men lose between 70 and 240 years, 100,000 women lose less than 45 years. In the highest quintile, 100,000 men lose between 540 to 1,600 productive life years, women 110 to 500 years. New Member States from Central and Eastern Europe had a burden of premature mortality that was 20 percent or higher than the EU-27 average. In the EU-15, the burden of premature mortality was considerably lower: 100,000 men lost 310 PYLL, women 67 PYLL.

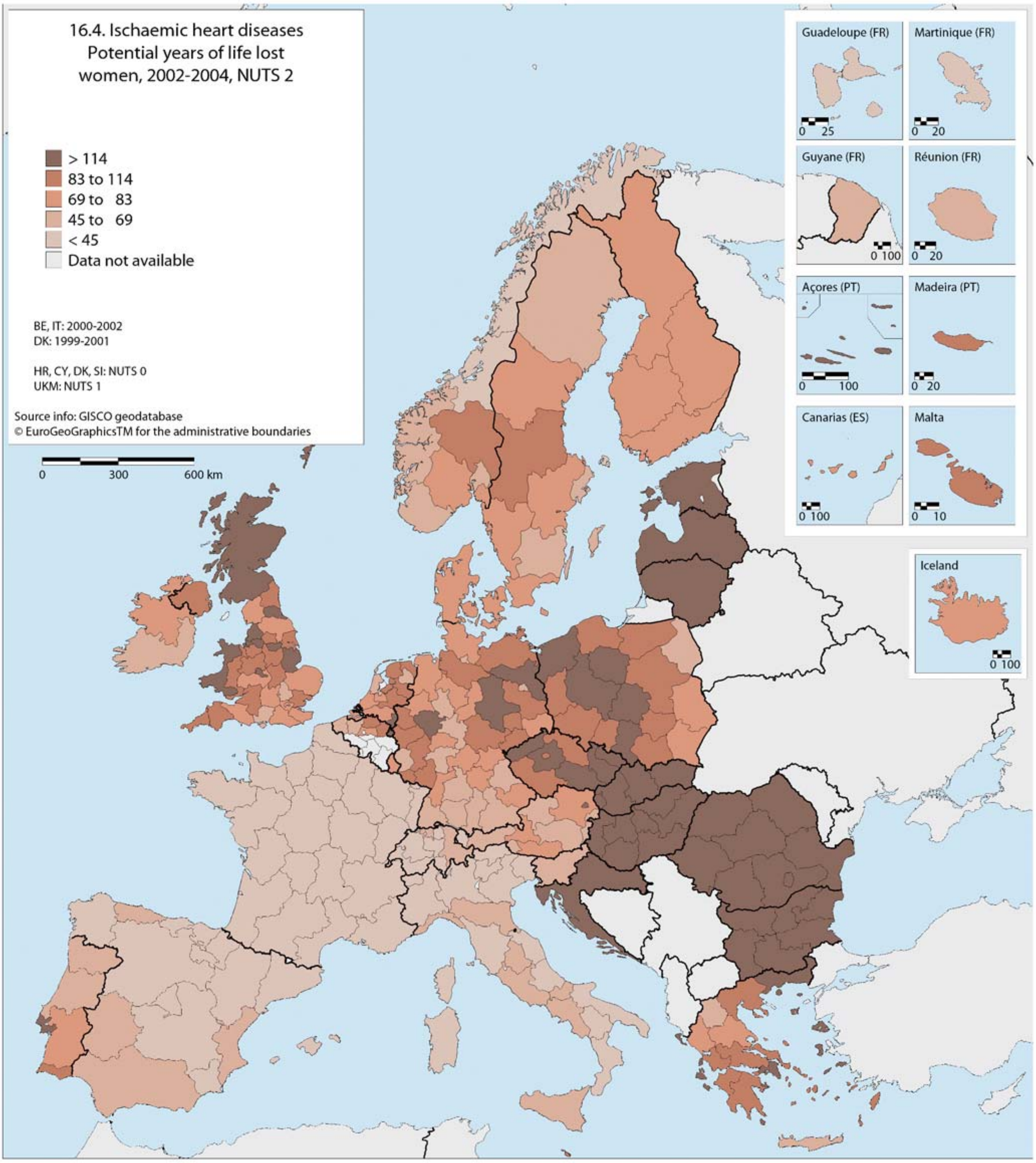
Countries with a 20 percent lower than average premature burden of mortality for the EU-15 were (between parentheses respectively men and women) France (186 and 31), Switzerland (220 and 40), Italy (240 and 46) and Spain



(260 and 41). Greece scored relatively high for ischaemic heart disease mortality at young age.

Years of life lost

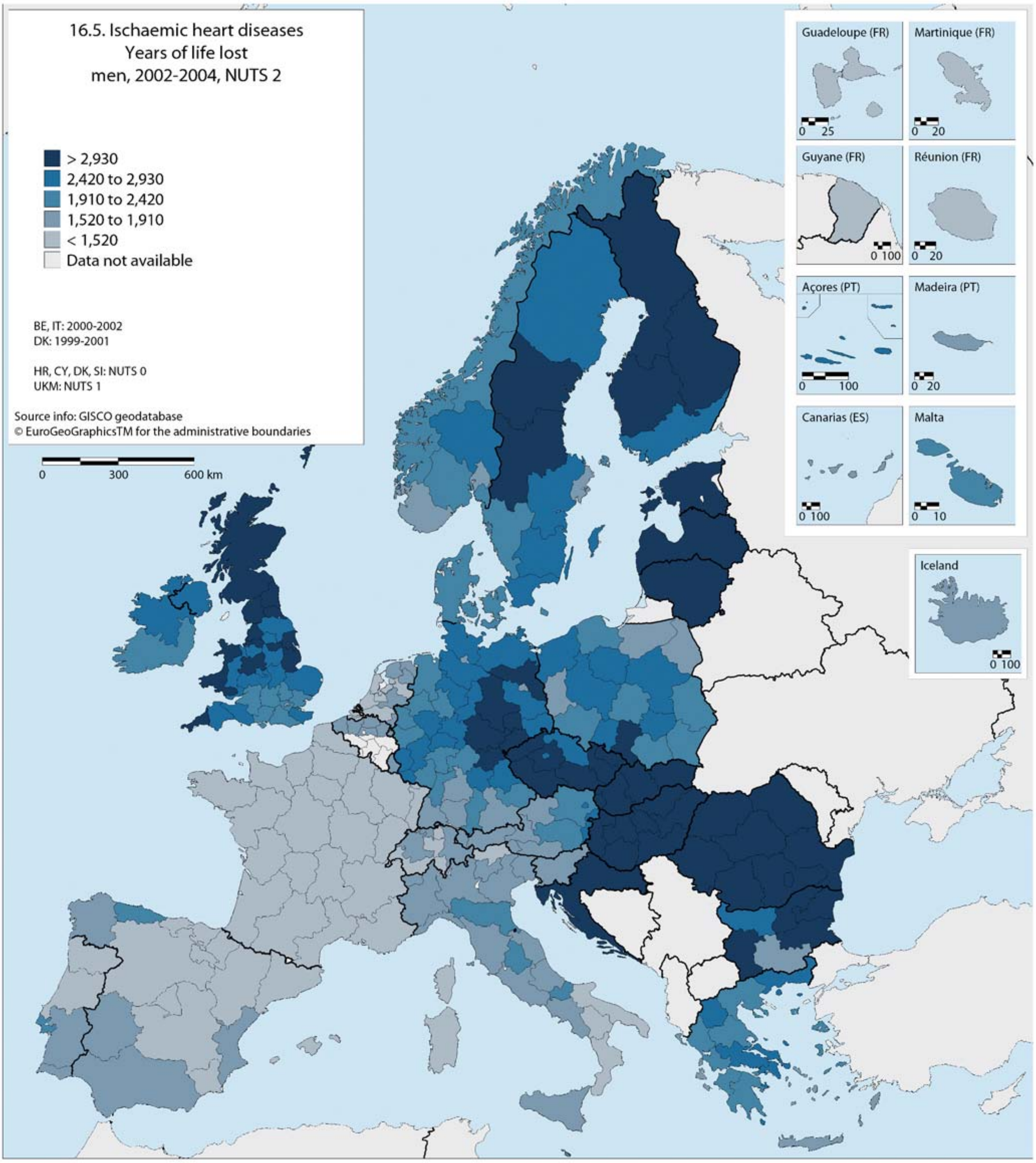
The YLL charts are comparable, but the absolute numbers illustrate the large loss of life due to ischaemic heart disease: In the EU-27, 100,000 men and women lost 2,200 and 1,600 YLL. The Baltic States, Lithuania, Hungary, Romania, Bulgaria, Croatia and the Czech and Slovak Republics, scored highest. In the old EU-15, the same figures were 1,900 and 1,300. Countries with relatively elevated burden of mortality in the EU-15 were Finland (63 percent higher than the EU-15 average), the United Kingdom (38 percent higher), Germany (33 percent), Sweden (32 percent) and Austria (26 percent). Countries with relatively lower burden of mortality in the EU-15 were Netherlands (0.27 percent



lower) Portugal 0.28 percent), Spain (0.32 percent) and France (51 percent lower). It is maybe timely to repeat the warning for intercultural coding differences.

In high-mortality areas, in a population of 100,000 men, men may lose between 2,900 to 7,300 years to ischaemic heart disease. At older ages, women catch up: in a population of 100,000 women, women living in high mortality regions may lose 2,100 to 5,500 years to ischaemic heart disease. In low-mortality regions, the men may lose 330 to 1,520 years, women 180 to 950 years. These large differences in the burden of mortality maps show the still great potential for prevention in Europe.

([28]) F.Levi et al. (2002) Heart 88 (2): 119-24


16.5. Ischaemic heart diseases
Years of life lost
men, 2002-2004, NUTS 2
> 2,930
2,420 to 2,930
1,910 to 2,420
1,520 to 1,910
< 1,520
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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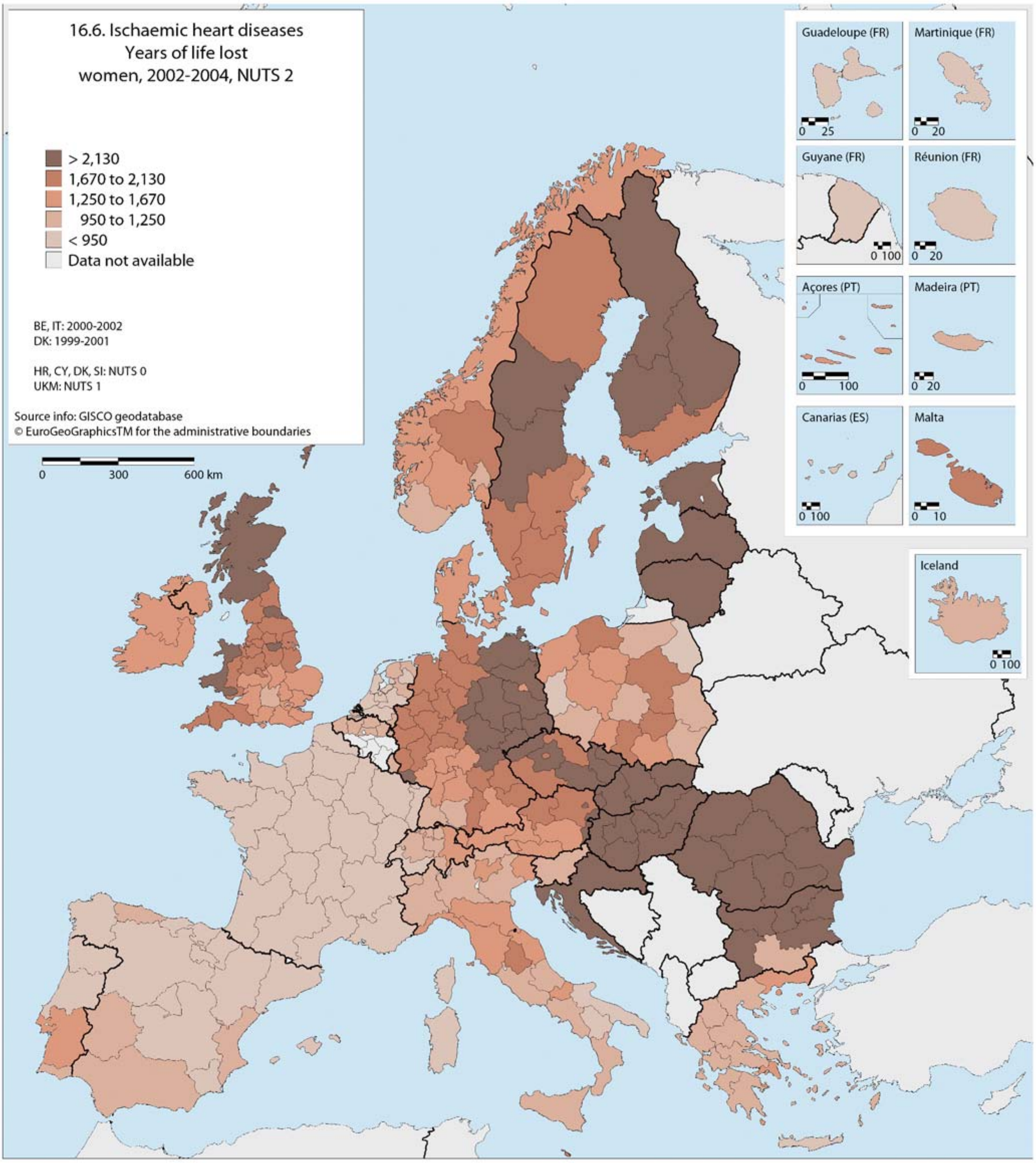
16.6. Ischaemic heart diseases
Years of life lost
women, 2002-2004, NUTS 2
> 2,130
1,670 to 2,130
1,250 to 1,670
950 to 1,250
< 950
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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17

Cerebrovascular diseases

Death from cerebrovascular disorders is a heterogeneous group of disorders where death is most often caused by a stroke. A stroke is a rapidly developing loss of brain function due to an interruption in the blood supply to all or part of the brain, caused by thrombosis, embolism or bleeding. Contrary to ischaemic heart disease, descriptions of 'apoplexy', from the Greek 'struck down', date back a long time, to Hippocrates (460 to 370 BC).'

Death from stroke is the third large cause of death in the EU (after ischaemic heart disease and cancer). Stroke is not only important as a cause of death: the burden of morbidity and healthcare costs of stroke are very high, caused by the neurological consequences, of which (hemi-) paralysis and damaged cognition are the most frequent. Stroke is among the top three causes of healthcare costs for the elderly.

Risk factors or risk markers for stroke are classified according to their potential for modification (nonmodifiable, modifiable or potentially modifiable). Nonmodifiable risk factors include age, male gender, race/ethnicity, and genetic factors. Well-documented and modifiable risk factors include hypertension, smoking, diabetes, atrial fibrillation and certain other cardiac conditions, dyslipidemia, carotid artery stenosis, poor diet, physical inactivity and obesity. Low birth weight is modifiable on a prospective basis in populations, but is obviously not modifiable retrospectively in individuals. A less well-documented modifiable risk factor is alcohol abuse. Stroke rates are higher in lower socioeconomic classes and decline with increasing development. In the developed market economies stroke rates are historically lower than ever recorded and lower than in developing economies.

Methodological artefacts by different codification practices in different countries are likely to exist, as stroke is a frequent cause of sudden and unforeseen death and a frequent underlying cause of debilitating disease in elderly impaired patients.

Large differences in stroke mortality are likely avoidable. A strong decline in countries and regions with high stroke rates would save many life years, and many life years free of disability. Given its importance as a source of mortality, morbidity, disability and healthcare costs, controlling stroke in high-mortality countries should have high priority.

Standardised death rates

In the EU-15, age adjusted cerebrovascular disease mortality decreased with 55% from 1965 to 1995([29]). Age standardised mortality in Europe shows similar patterns for men and women, suggesting generalised social influences on stroke mortality. The east-west difference is remarkable, showing highest stroke mortality in all New Member States. The United Kingdom shows a clear north-south gradient (from 75 in Scotland to 51 in Inner London for women). France (24.4 in Île de France for women for example) has low stroke mortality.

Southern European countries have a well-known low cardiovascular mortality and high life expectancy, with the exception of Portugal (124 in Região Autónoma dos Açores or 108 in Centro for women) and Greece (134 in Anatoliki Makedonia, Thraki also for women) with high stroke mortality. These differences need to be further examined.

Potential years of life lost

Potential Years of Life Lost (PYLL) show the loss of life at young, adult and middle ages. The differences in PYLL between highest and lowest quintiles are very high, and higher among males. This implies that in some regions, men or women lose much more productive life years than in others. In the highest quintile, men lost between 195 and 1,100 PYLL, women lose between 110 and 550 PYLL. In the lowest quintile, men lost between 36 and 77 PYLL, women between 6 and 54 PYLL. It is likely that a large proportion of these differences is avoidable, predominantly by effective prevention.

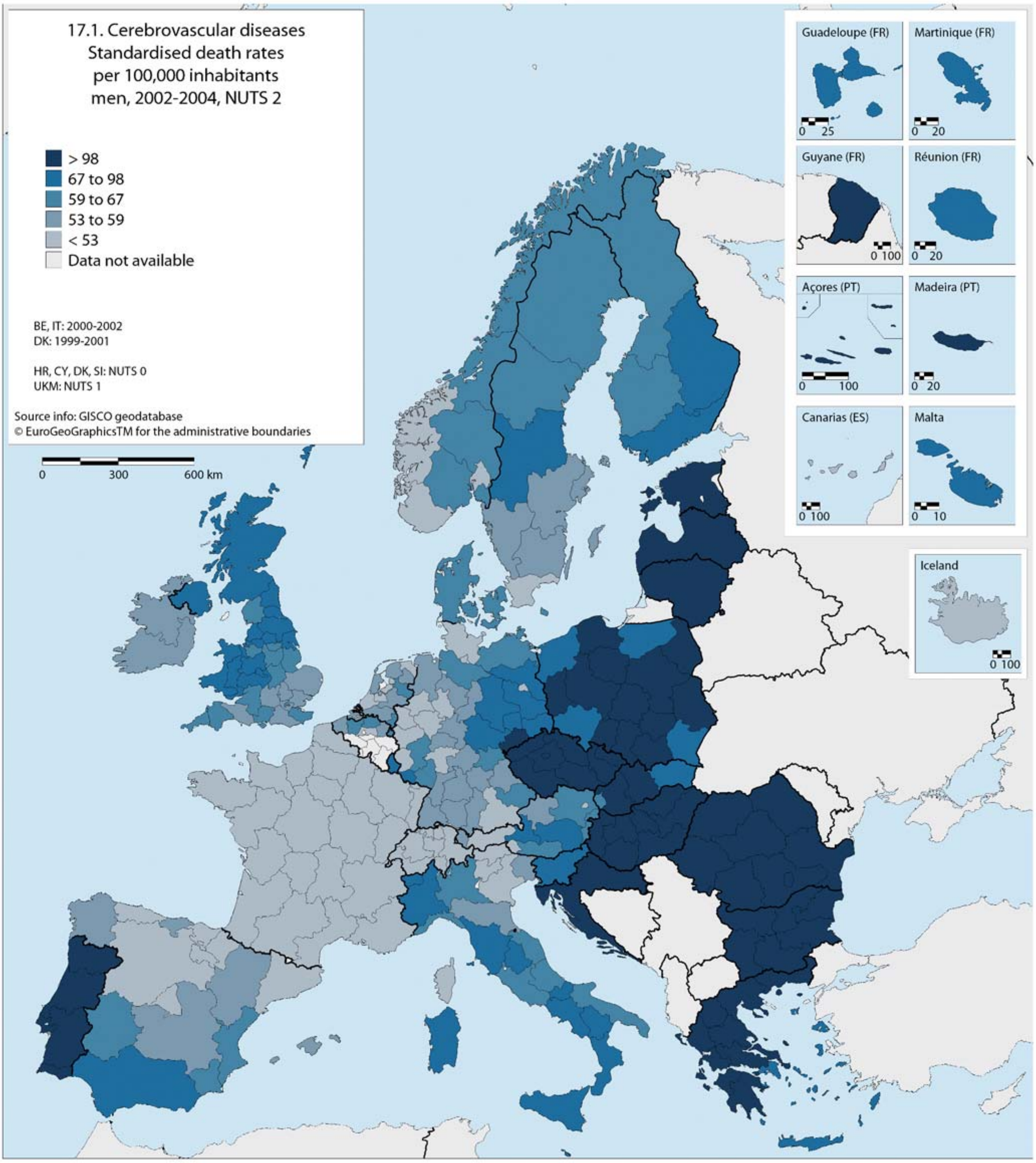
Years of life lost

Different regional patterns between maps with standardised death rates on the one hand and maps with years of life lost on the other hand (for the same cause of death), are explained by differences in age at death (dying at a younger age costs more life years) and differences in the population age distribution. For cerebrovascular diseases similar patterns emerge, showing that higher mortality at younger ages is generally correlated to higher mortality at older ages.

In the EU-27, 100,000 men lost 1,100 and 100,000 women lost 1,300 YLL. In the old EU-15, this was 22 percent lower, indicating the increased mortality in the new Member States. In the highest quintile, men lost between 1,300 and 4,900 YLL, women lost between 1,600 and 4,400 YLL. In the lowest quintile, men lost between 240 and 670 YLL, women between 220 and 870 YLL.

The differences between countries were huge. The top countries had a burden of mortality that was more than two times higher than the EU-27 average. Bulgaria (3.0 times higher), Latvia and Romania (each 2.9 higher) and Estonia (2.1 times higher). The bottom countries had a burden of mortality that was nearly twice as low France (51 percent), Ireland (50 percent), Switzerland (45 percent), Iceland (44 percent), yielding a difference of a factor four between high and low.

([29]) F. Levi et al. (2002) Heart 88 (2): 119-24


17.1. Cerebrovascular diseases
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 98
67 to 98
59 to 67
53 to 59
< 53
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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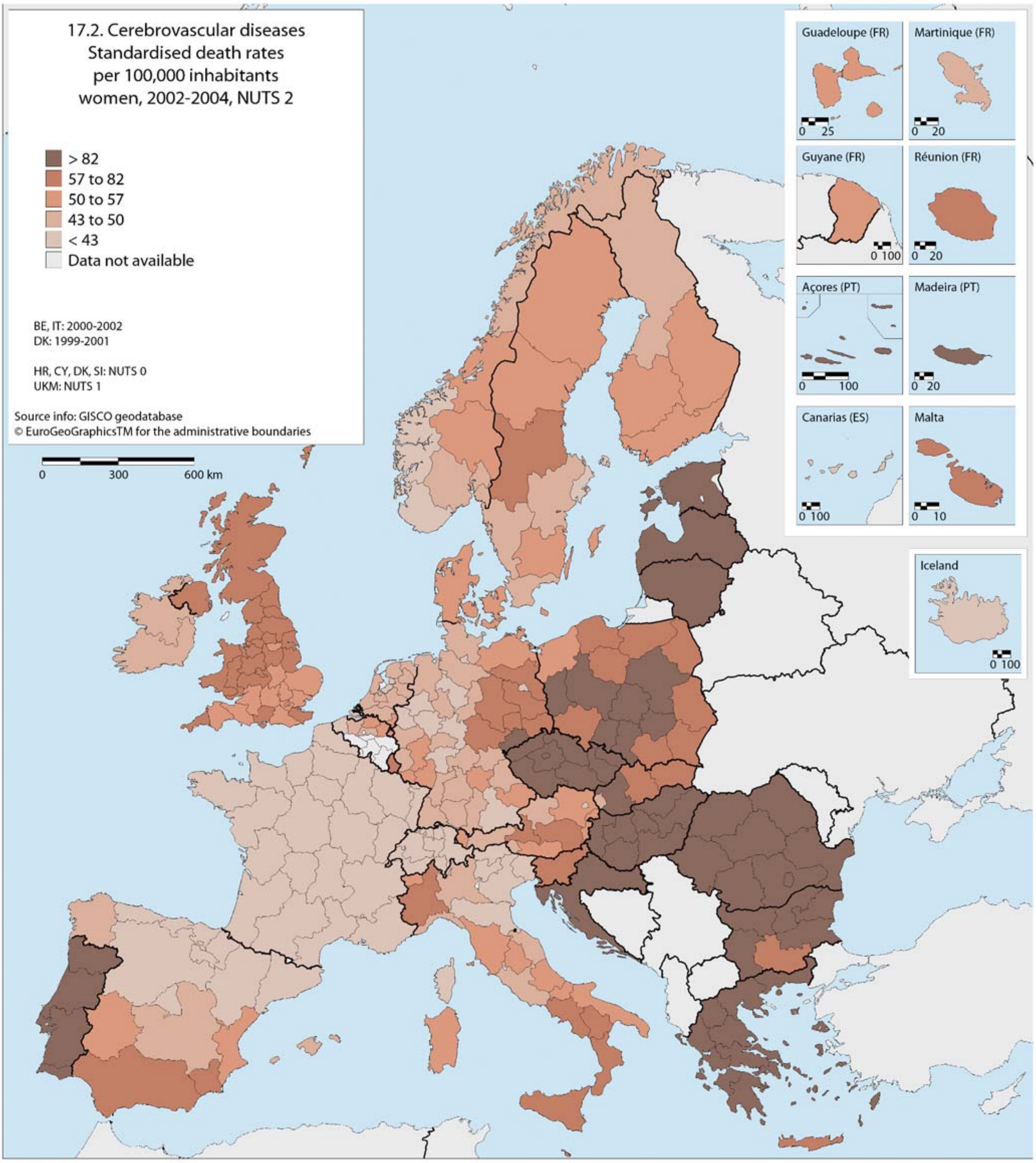
17.2. Cerebrovascular diseases
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 82
57 to 82
50 to 57
43 to 50
< 43
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Martinique (FR)
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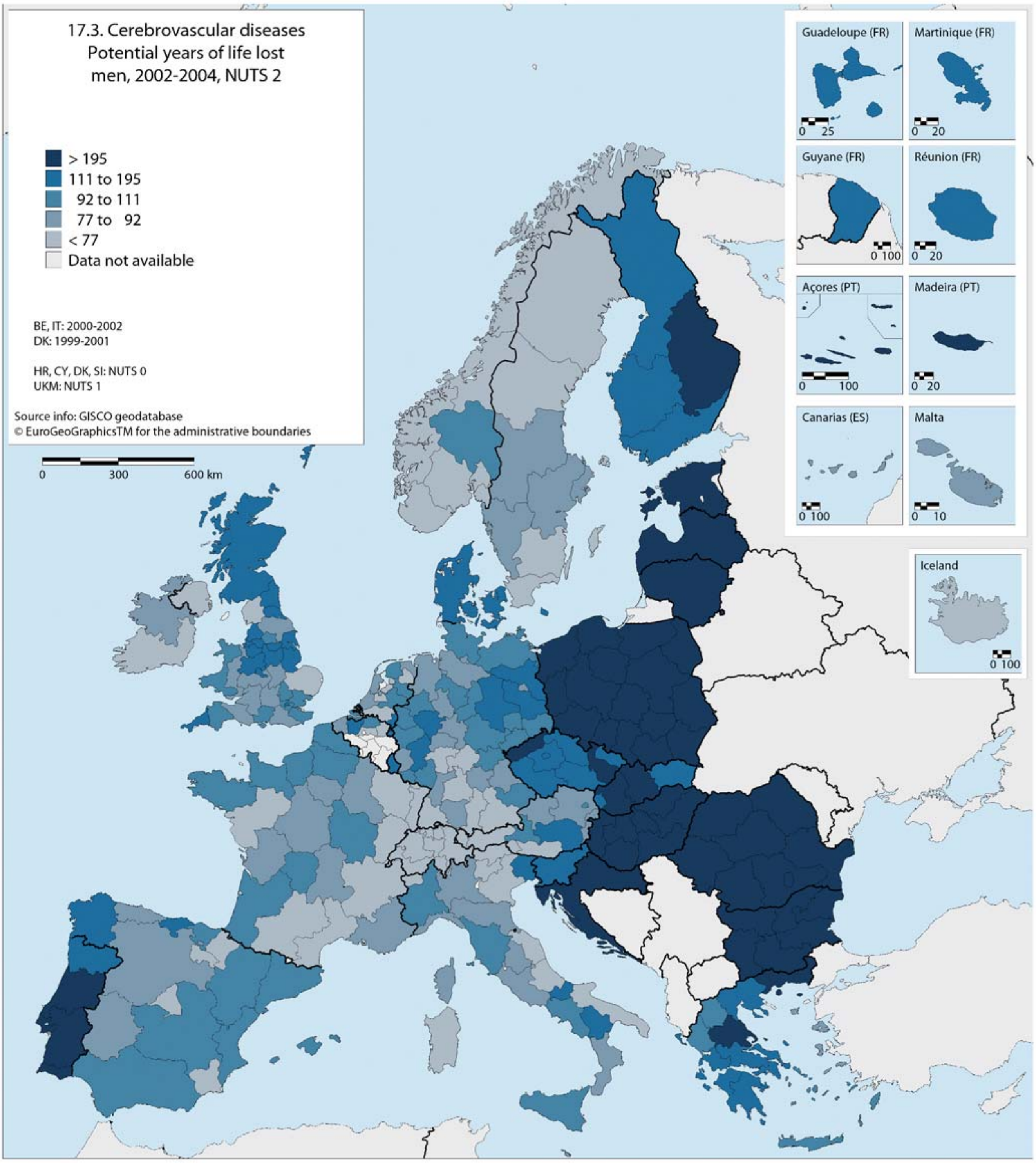
Malta
0 10
Iceland
0 100



17.3. Cerebrovascular diseases
Potential years of life lost
men, 2002-2004, NUTS 2
> 195
111 to 195
92 to 111
77 to 92
< 77
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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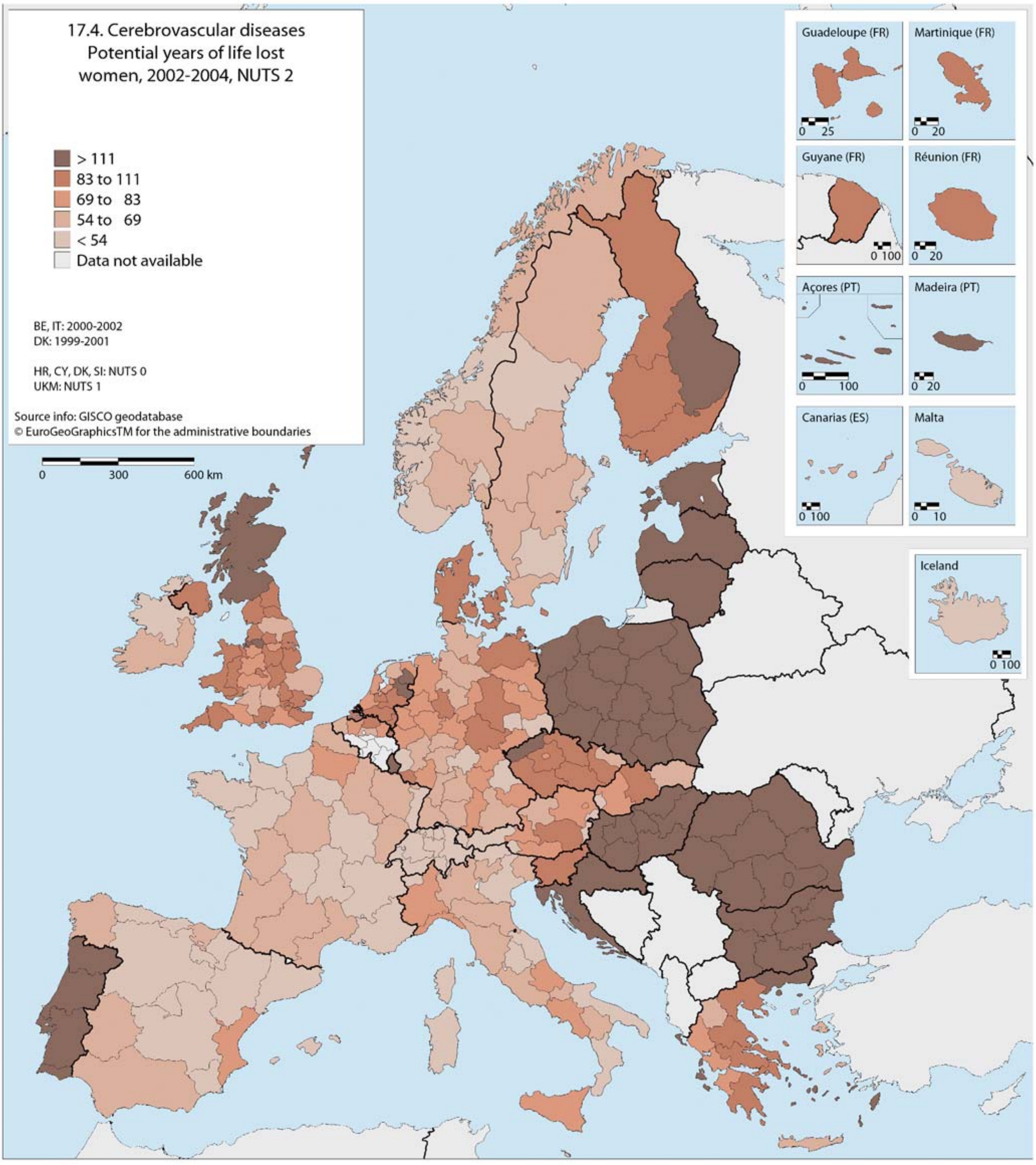
Malta
0 10
Iceland
0 100


17.4. Cerebrovascular diseases
Potential years of life lost
women, 2002-2004, NUTS 2
> 111
83 to 111
69 to 83
54 to 69
< 54
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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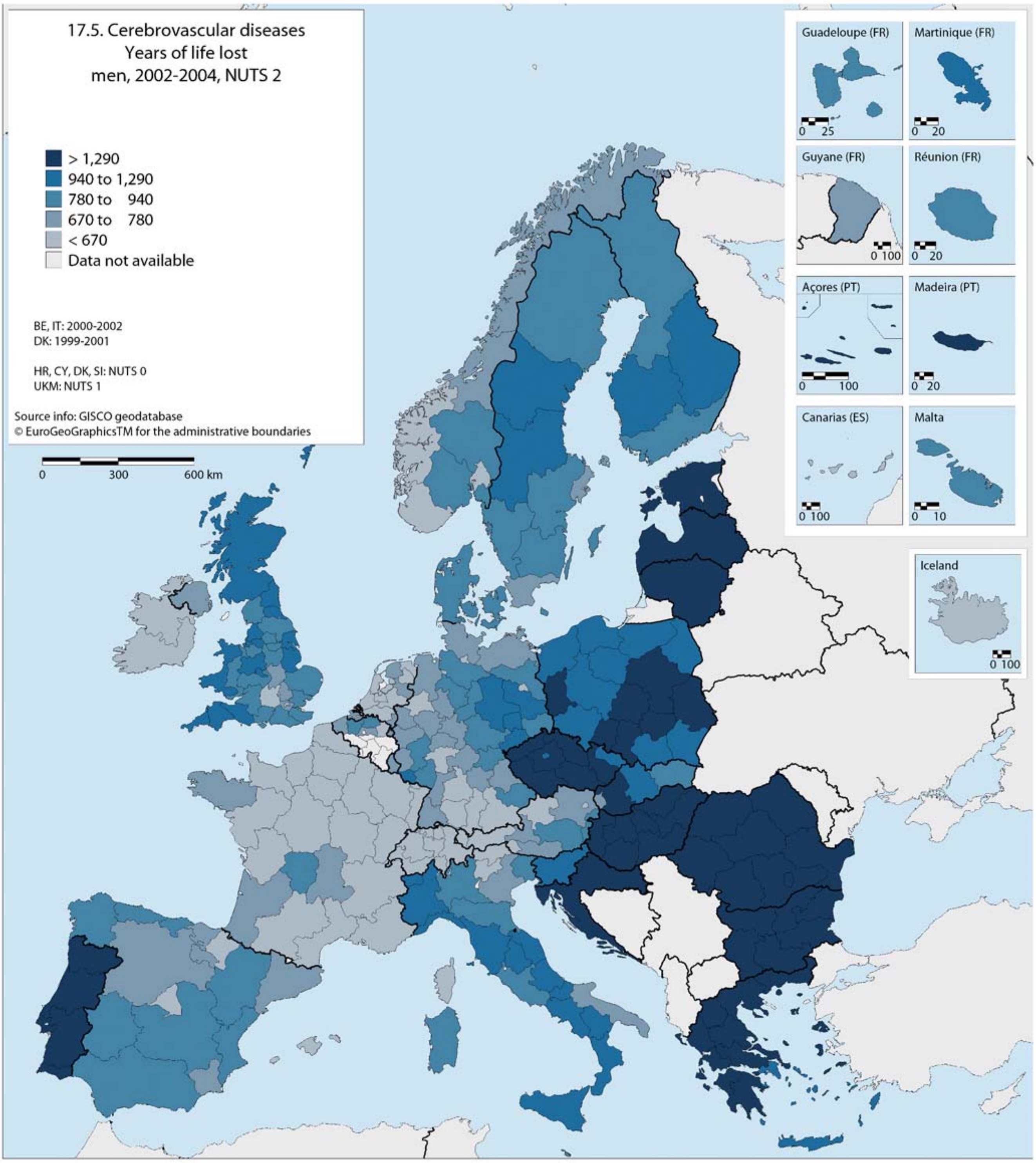
0 10
Iceland
0 100


17.5. Cerebrovascular diseases
Years of life lost
men, 2002-2004, NUTS 2
> 1,290
940 to 1,290
780 to 940
670 to 780
< 670
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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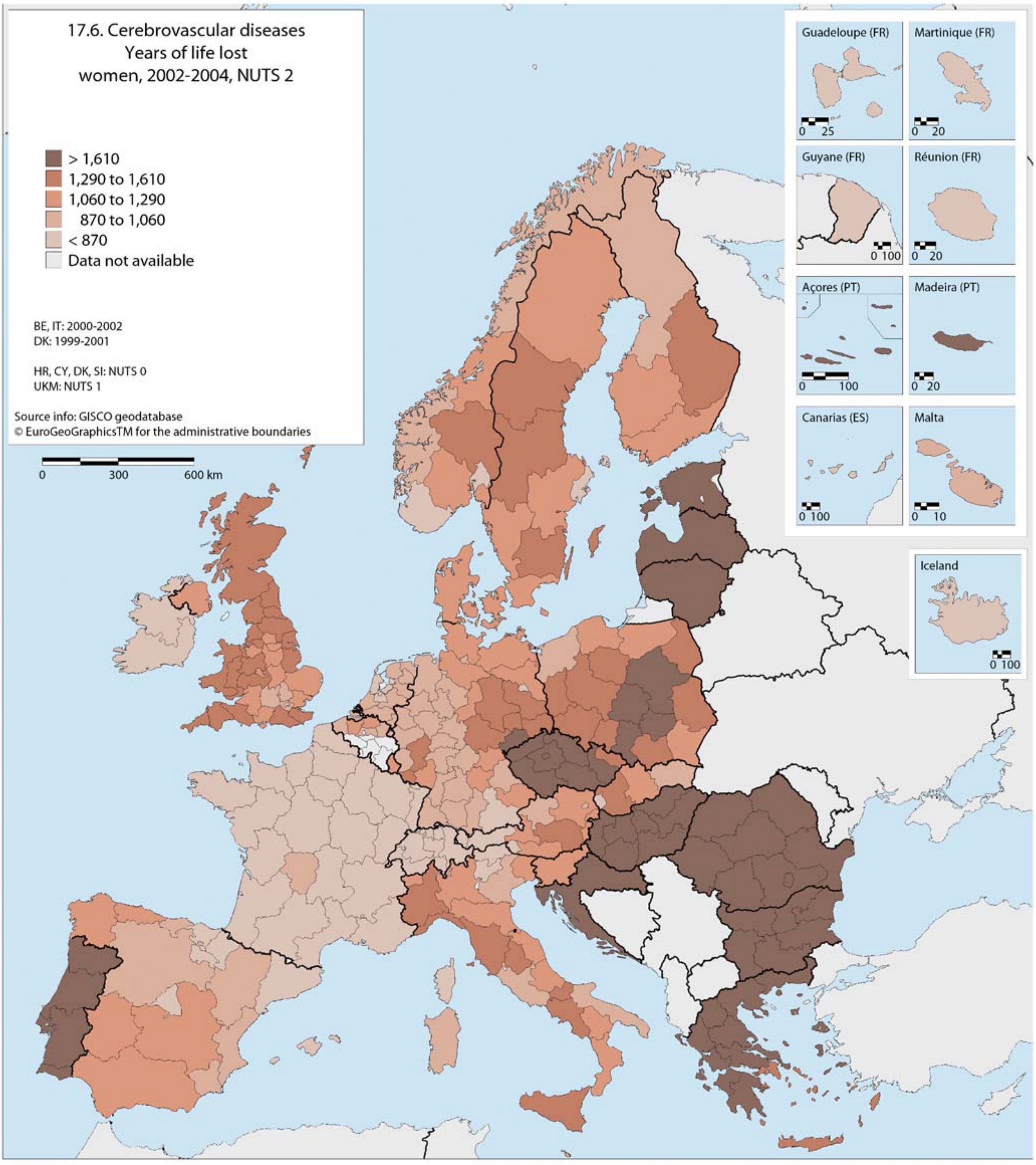
17.6. Cerebrovascular diseases
Years of life lost
women, 2002-2004, NUTS 2
> 1,610
1,290 to 1,610
1,060 to 1,290
870 to 1,060
< 870
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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Pneumonia and influenza

Pneumonia is an inflammatory disease of the lung. Pneumonia can result from a variety of causes, including infection with bacteria, viruses, fungi or parasites, and chemical or physical injury to the lungs([30]). Modern antibiotics are usually highly effective in avoiding death from bacterial pneumonia. However, antibiotic resistance, particularly of Staphylococcus aureus (methicillin resistant Staphylococcus aureus - MRSA) is an important threat to public health, warranting strong policies of antibiotic use.

Pneumonia is a common illness which occurs in all age groups, but is particularly fatal in the frail. It is a leading cause of death among the elderly and the chronically ill. The immune system weakens with age, and therefore older people are more vulnerable to pneumonia and influenza. Also people with a damaged lung function due to smoking are more vulnerable. Vaccines to prevent certain types of pneumonia are available. The prognosis depends on the type of pneumonia, the appropriate treatment, any complications, and the person's underlying health.

A common cause of pneumonia are bacteria called pneumococci. Pneumococci cause not only pneumonia, but also meningitis and many other diseases. A new and effective vaccination has been developed, protecting against seven common strains. The vaccine protects against severe disease of pneumocci from the selected strains. In the USA vaccination has been highly effective in reducing incidence rates of severe pneumococcal disease, directly among the vaccinated children and indirectly among their grandparents([31]). The heptavalent pneumococcal vaccine has been increasingly introduced by European countries, and is expected to change the epidemiology of severe pneumococcal disease.

Influenza, commonly known as flu, is a contagious viral disease. In humans, common symptoms of the disease are fever, sore throat, muscle pains, severe headache, coughing, weakness and general discomfort([32]). In more serious cases, influenza may cause pneumonia, which can be fatal, particularly in young children and the elderly.

Vaccinations against influenza are given to people with a high risk of contracting the disease and developing complications, predominantly the elderly (ages 65 and older) and chronically ill. A vaccine formulated for one year may be ineffective in the following year, since the influenza virus changes rapidly over time and different strains become dominant.

Pneumonia and influenza occur in people of all ages. However, they occur far more commonly in older people, in whom they tend to be much more serious.

Pneumonia and influenza account for only 2.7 percent of all deaths in Europe. Slightly more women (3 percent) die of this disease than men (2.5 percent). Influenza and pneumonia, which are common at all ages, become serious and lethal at advanced ages: approximately 90 percent of deaths due to this cause happen to people aged 65 or older. The large number of older (and thus more susceptible) women explains the difference in the percentages. Differences in mortality from pneumonia and influenza are very marked in Europe. However, certification practices probably contribute to the differences in rates for pathologies that affect populations at ages where there is a high level of co-morbidity. Pneumonia is very often a direct cause of death, caused by waning immunity and debilitating underlying causes of death.

Standardised death rates

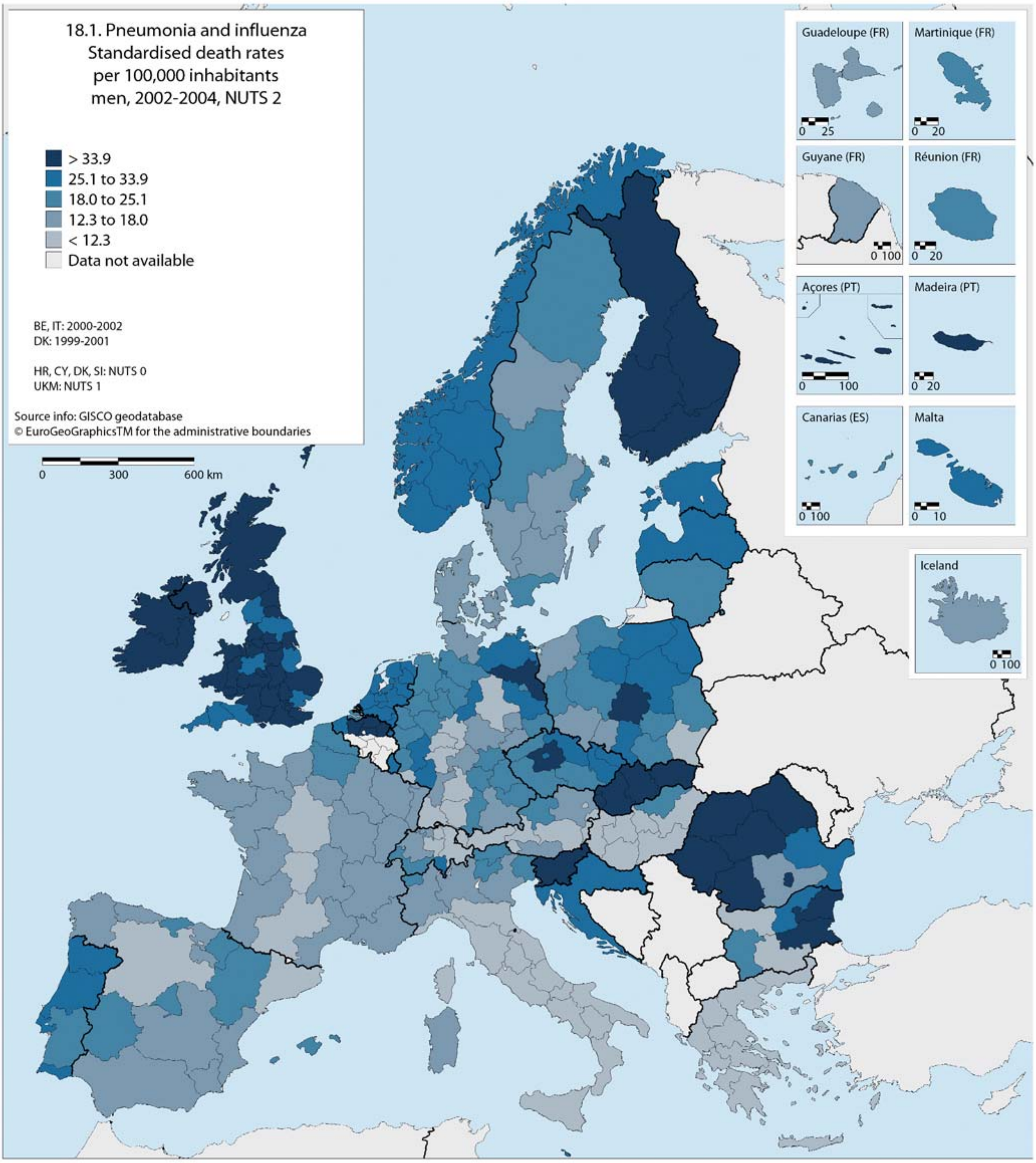
Age standardised death rates for men differ between 2.5 and 100.0 deaths per 100,000 inhabitants. High values are noticeable in large parts of the United Kingdom and in Finland. For women the rates vary between 1 and 68 deaths per 100,000 inhabitants. Regional patterns are rather similar for men and women. The negative position of the United Kingdom is particularly striking.

Potential Years of Life Lost

The geographical distribution of the potential years of life lost provides us with a different view of this specific cause. Values for the United Kingdom are now more or less average, suggesting that the high age standardised rates are caused by high registered mortality among elderly. Differences in coding and diagnostic habits are hard to exclude in pneumonia. Pneumonia is a frequent cause of death in frail elderly, where it is a matter of debate if it is pneumonia or immunity waned by senescence that caused the end of life.

Pneumonia is a very frequent direct cause of death among elderly, but is more rarely coded as the primary (underlying) cause of death in most countries, used for this Atlas. The New Member States stand out for deaths due to pneumonia and influenza in the younger age groups. Indeed, in Romania, for example, 52 percent of all pneumonia and influenza deaths occur in persons younger than 65.

([30]) http://en.wikipedia.org/wiki/Pneumonia
([31]) MMWR (2005) Morb Mortal Wkly Rep. Vol. 16; 54(36): 893-897
([32]) http://en.wikipedia.org/wiki/Influenza


18.1. Pneumonia and influenza
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 33.9
25.1 to 33.9
18.0 to 25.1
12.3 to 18.0
< 12.3
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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0
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600 km
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Martinique (FR)
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Guyane (FR)
0 100
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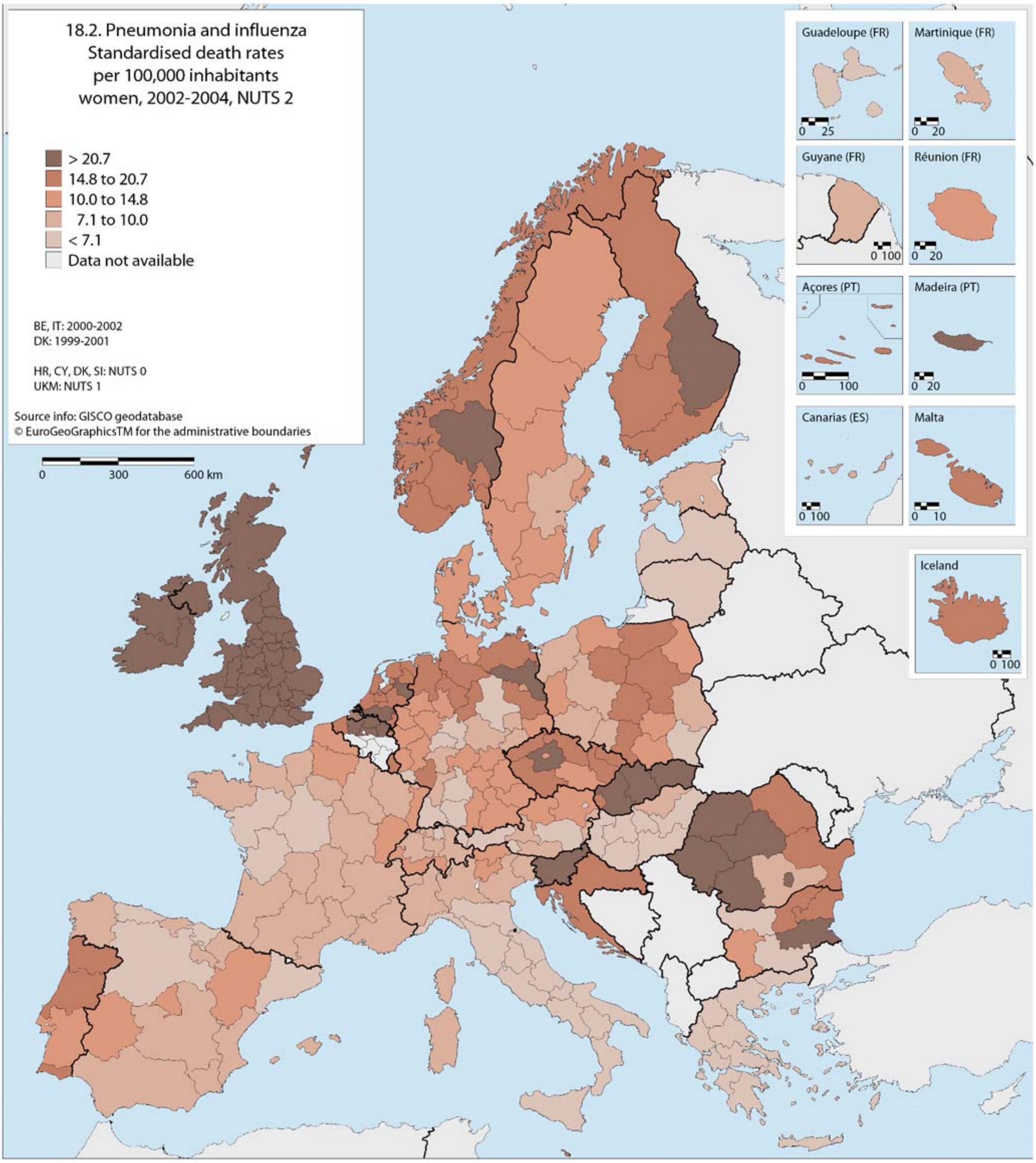
18.2. Pneumonia and influenza
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 20.7
14.8 to 20.7
10.0 to 14.8
7.1 to 10.0
< 7.1
Data not available
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HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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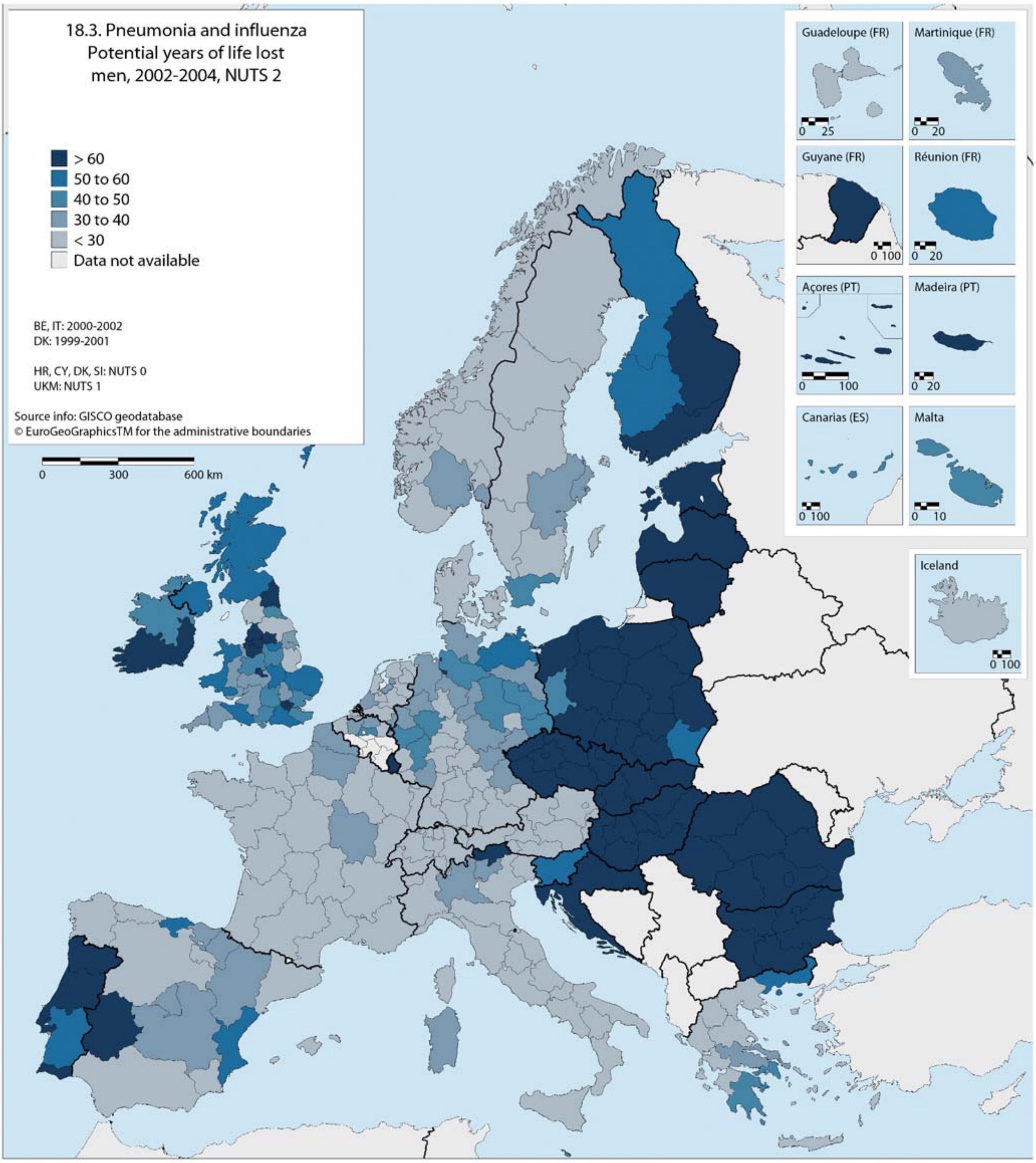
18.3. Pneumonia and influenza
Potential years of life lost
men, 2002-2004, NUTS 2
> 60
50 to 60
40 to 50
30 to 40
< 30
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
© EuroGeoGraphicsTM for the administrative boundaries
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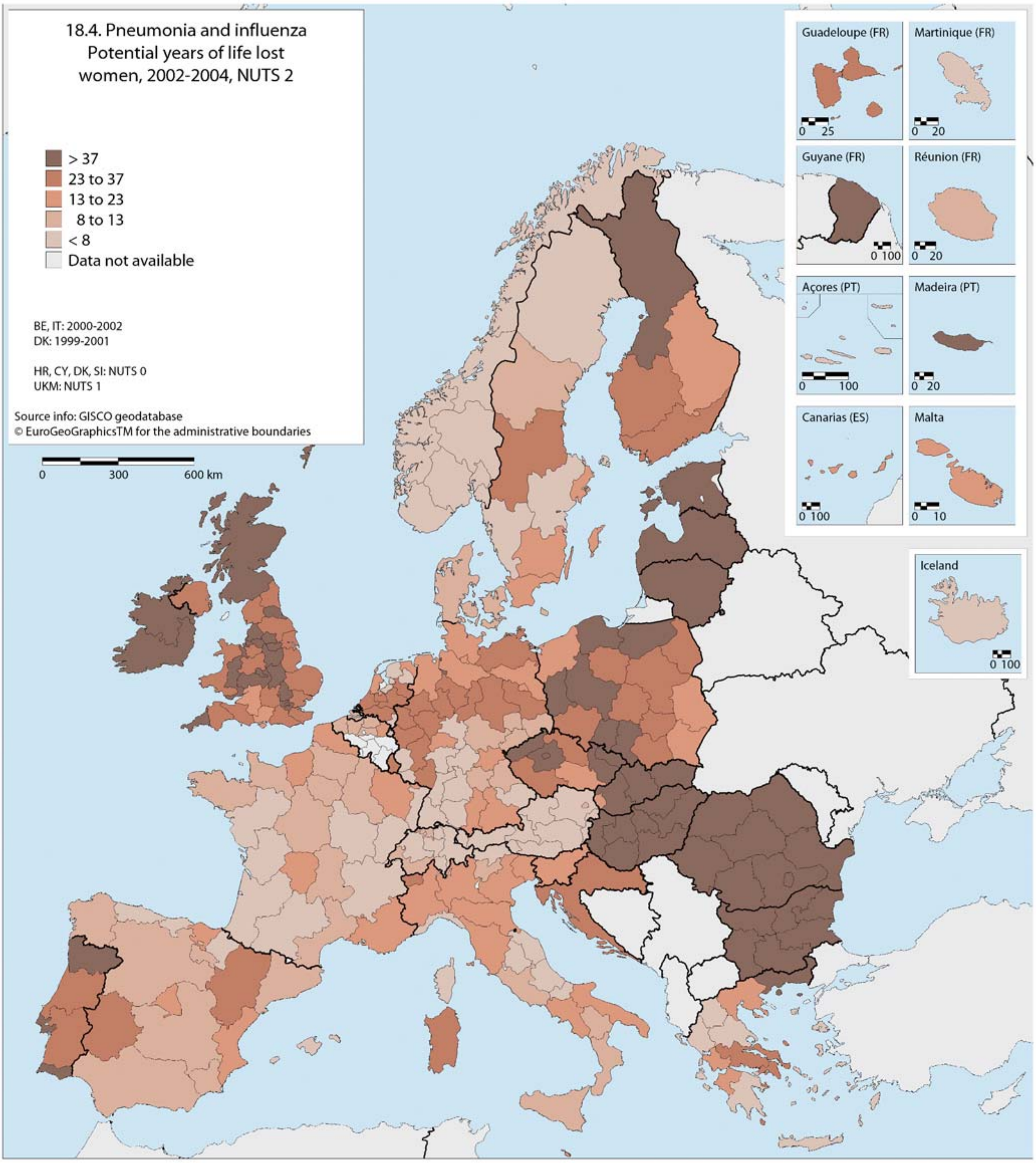
18.4. Pneumonia and influenza
Potential years of life lost
women, 2002-2004, NUTS 2
> 37
23 to 37
13 to 23
8 to 13
< 8
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
© EuroGeoGraphicsTM for the administrative boundaries
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Guadeloupe (FR)
Martinique (FR)
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Madeira (PT)
Canarias (ES)
Malta
Iceland

19

External causes of injury and poisoning

An injury is a physical damage caused by an outside cause. Injuries can be intentional or non-intentional. In the 272 EU regions, 6.9 percent and 3.5 percent of all deaths among men and women respectively were caused by injuries. Two thirds were caused by unintentional injuries, one third by intentional injuries. 56,000 deaths or 21.8 percent of all fatal injuries were caused by transport accidents, in great majority road traffic accidents. 76.0 percent of the victims were male. 50,000 deaths or 19.4 percent of all injury deaths were caused by accidental falls. Here, 53 percent of all victims were women. Other unintentional causes of fatal injuries are poisoning, drowning, and burns.

The main cause of death from intentional injuries is suicide. In the 272 regions, 63,000 committed suicide, 24.7 percent of all injury victims. Again, the large majority are men: 76 percent. Homicide is a relatively rare cause of death in the EU: 6,300 have been murdered, 2.5 percent of all injury mortality, 1.3 per thousand of all deaths. The majority were again men: 67.0 percent. Except for accidental falls, men dominate injury mortality: two thirds of all deaths are men.

Among European men, injuries are the most prominent cause of PYLL, causing no less than 27.8 percent of all PYLL, nearly 10 percentage points more than circulatory diseases. Women are less affected, but injuries still cause 15.2 percent of all PYLL, still more than circulatory diseases. Only cancer causes more PYLL. As accidental falls is predominantly a cause of death among the elderly, the causes of PYLL are dominated by suicide and traffic accidents. This is a consequence of high numbers of deaths at young ages: injury is the most frequent cause of death in people aged 1 to 44. However, injuries still cause 13.2 percent of all YLL among men and 5.9 percent among women. Among men, this is close to the percentage for ischaemic heart disease, among women it is close to breast cancer.

Injuries cause even more spoiled life years than lost life years. Death is but the tip of an iceberg of high healthcare costs and many years lived with disability in young victims. Partners, children and siblings of injury victims pay the highest price in terms of bereavement and irretrievable loss. Among men, transport accidents cause 60 percent of all YLL by injuries, suicide 30 percent. Among women, transport accidents cause 63 percent of all YLL by injuries, suicide 25 percent.

Low income is considered one of the determinants of the risk of injury. This holds for countries and individual people. Injuries are linked to poverty and inequality in many ways([33]). Poor individuals and families live riskier lives in more risky environments and have less access to high-quality emergency medical and rehabilitative services. They are financially more vulnerable, and once injured, the healthcare costs and lost income increase poverty([33]).

This determinant is important in the EU for two reasons: First, the Central and Eastern European Member States have been undergoing political changes with a transition to market economies. This has been associated with huge political and social uncertainty, resulting in inflation, unemployment, inequality and poverty. Second, even in the high income countries, the unemployed, ethnic minority groups, guest workers, refugees, disabled people and the homeless are at high risk. In the United Kingdom, children from lower social classes are 3 to 4 times more likely to die from injuries than those of higher classes([34, 35]). Suicide rates are higher for people experiencing unemployment.

Alcohol and drugs, in particular when related to lower socioeconomic status, further increase risks for all unintentional injuries and violence. In general, reducing inequalities between people could most likely lead to decreases in injuries and violence.

Standardised death rates

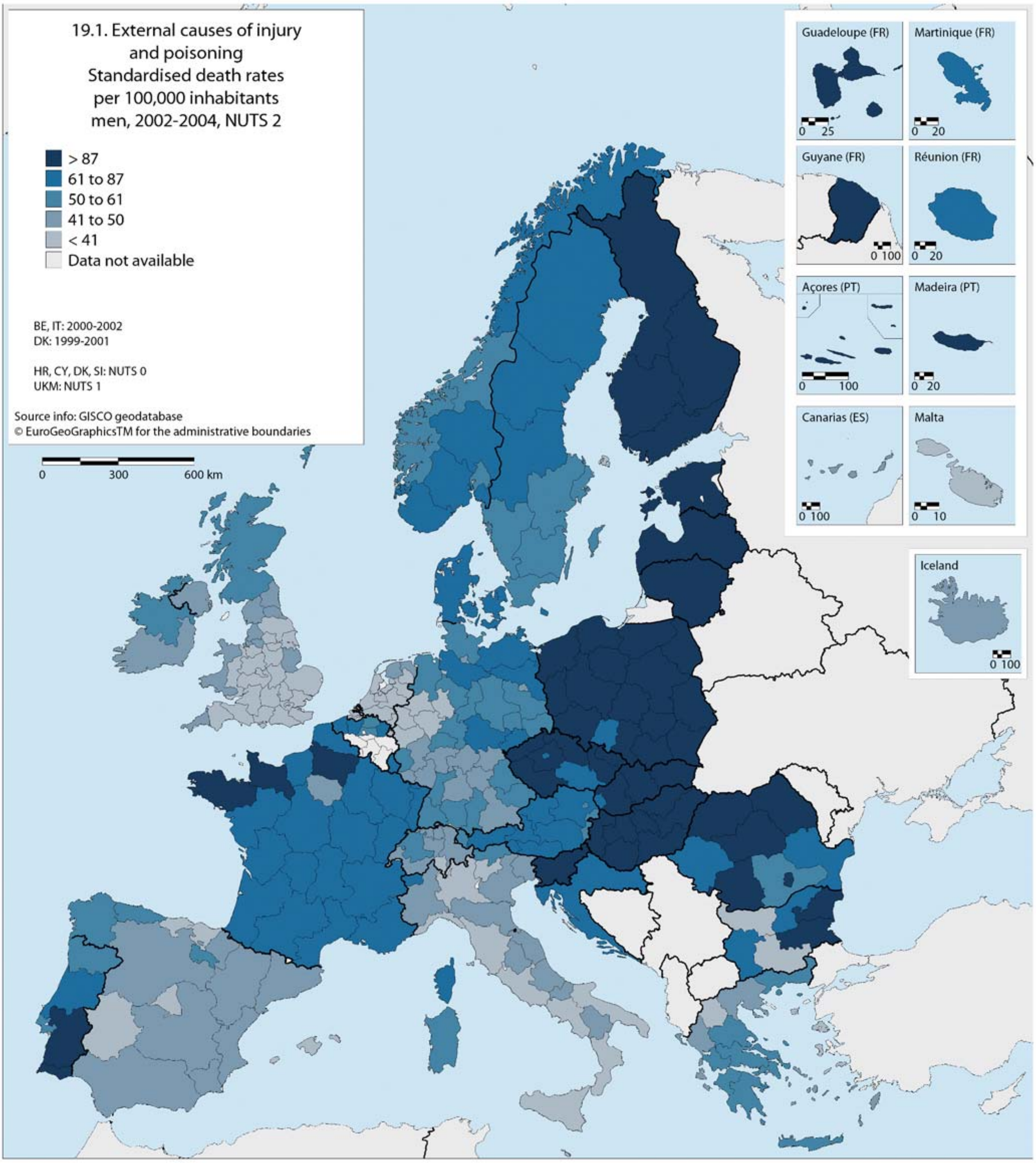
The interquintile difference for men is 2.1 and for women it is 1.9, showing a high gradient between low and high-mortality countries. Figures are dominated by transport accidents. The correspondence of high mortality with specific country borders, such as France and Portugal, suggests the importance of national policies to reduce injury mortality. However, accident mortality has a U-shaped relationship with traffic density. If there is no traffic, accident mortality is obviously low. If traffic is very dense, accident mortality is limited again due to low speed. Accident mortality is higher in less densely populated areas with sufficient traffic, allowing driving at great speed. Spain, Greece and the United Kingdom have remarkably low injury mortality, together with the densely populated areas of the Netherlands and Western Germany.

Men in the Central and Eastern European Member States (much more than women) have particularly high injury rates. Social disruption caused by the transition from socialist to market economies, and concomitant high levels of alcohol use are often cited as reasons. However, Finland has high injury rates, too.

Potential years of life lost

The PYLL maps show the loss of young life. 62 percent of all PYLL are caused by transport accidents and suicide. In the EU-27, 100,000 men lose 1,300 and women 330 PYLL.

In the lowest quintile of injury mortality, 100,000 men lose 400 to 850 productive life years and 1,000 women 100 to 250 years. In the highest quintile 100,000 men lose 1,800 to 5,500 PYLL, 100,000 women lose 470 to 1,200 years. Accidental falls cause nearly 20 percent of all deaths, but only 5 percent of all PYLL, a consequence of the advanced age at death.

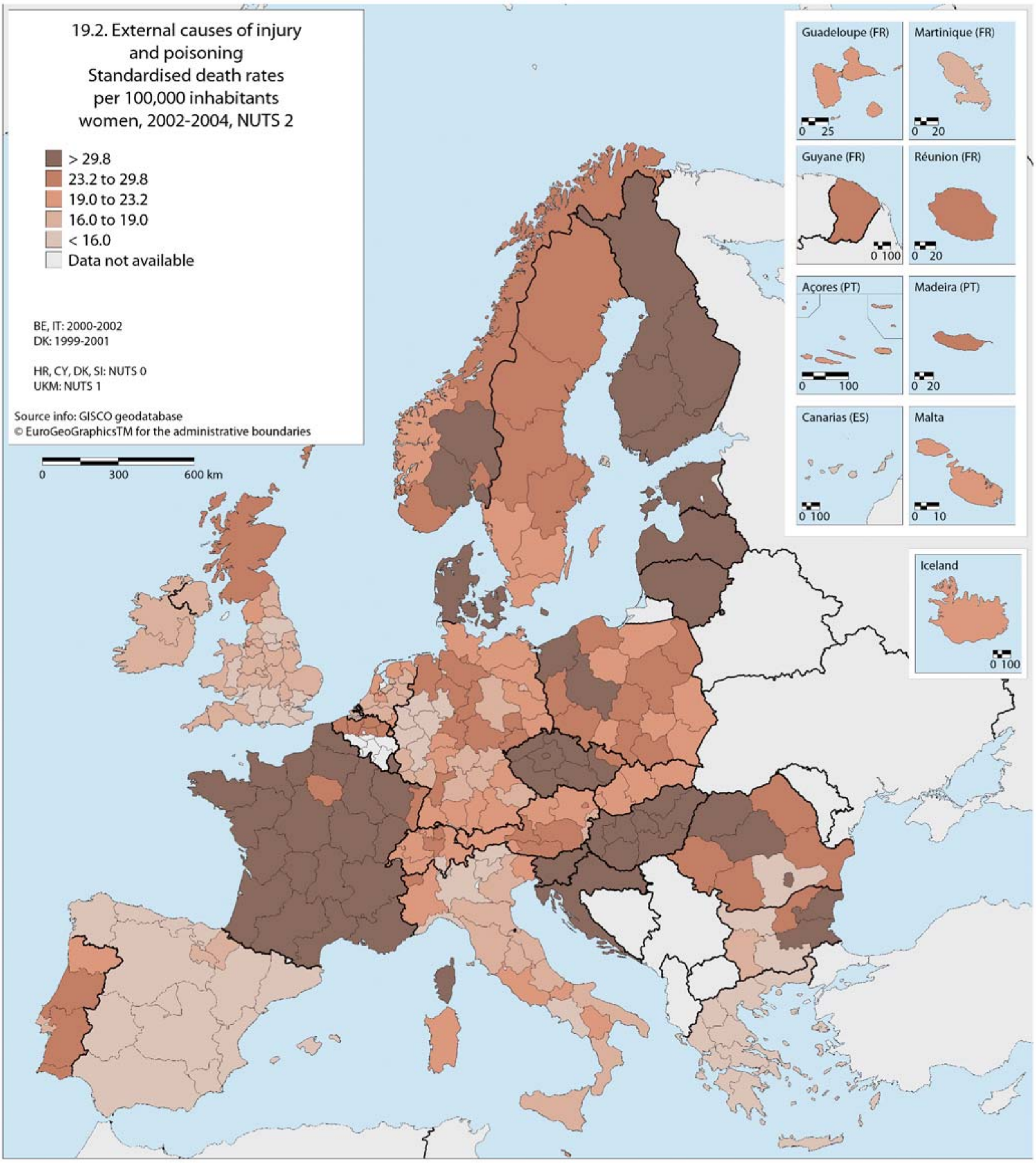


The gender difference is partly explained by the fact that in general men tend to run more risks than women.

The Baltic States stand out with a very high burden of premature mortality, close to 4 times the EU average. The figures are Lithuania (100,000 men and women lose 5,500 and 1,000 PYLL), Latvia (4,900 and 1,200) and Estonia (5,000 and 1,000). Countries with a relatively lower than average burden of premature mortality are Italy (670 and 170), Malta (750 and 155), Switzerland (710 and 270), the Netherlands (740 and 270), and Spain (870 and 220).

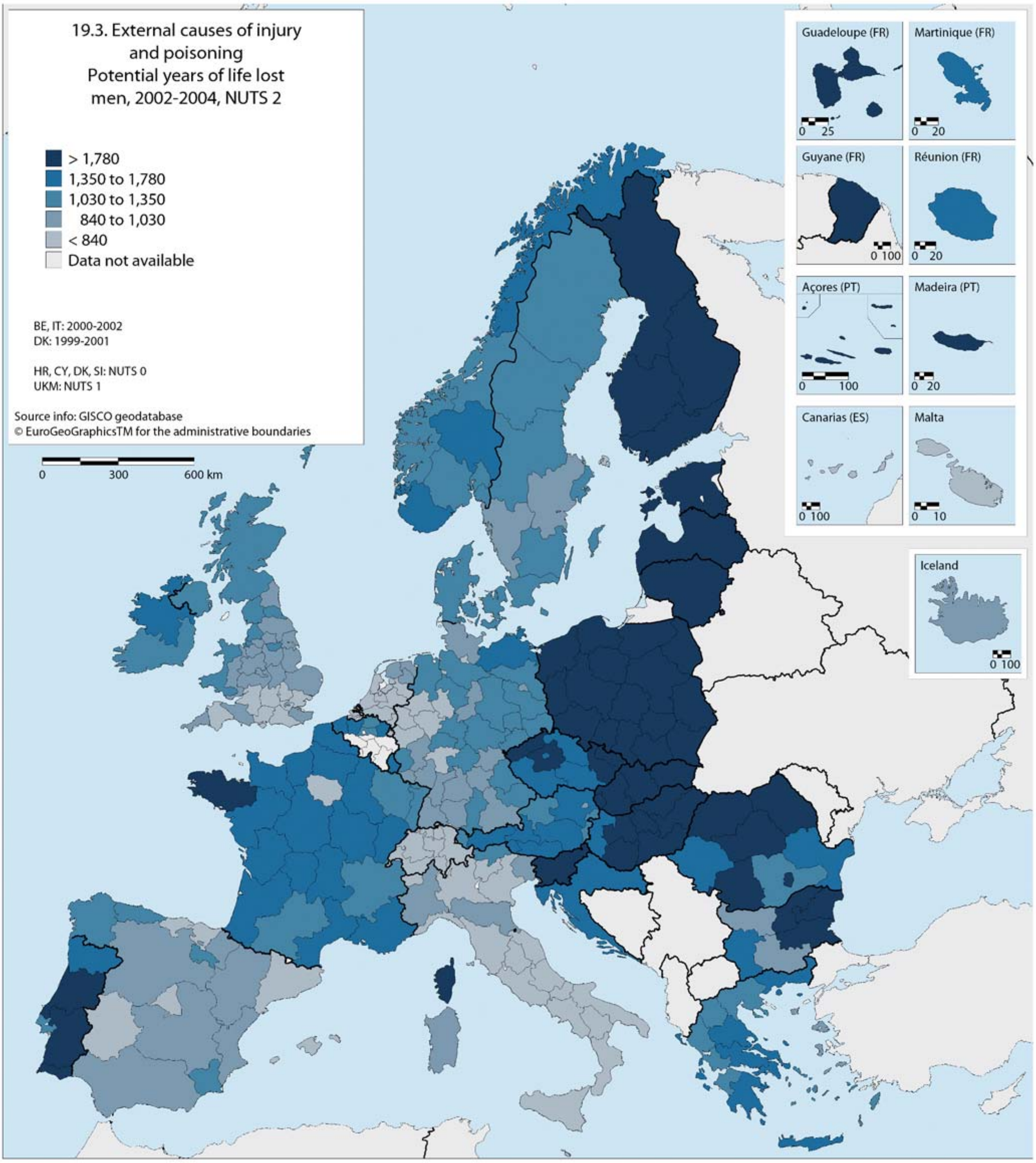
Years of life lost

The years of life lost show the same patterns. Regions with lower loss of life are England, the densely populated areas of the Netherlands, Germany, Spain and Italy. There, 1,000



men lose 10 to 14 years to external causes, 1,000 women 1 to 6 years. In high-mortality areas, predominantly in Central and Eastern Europe, Finland, Portugal and France, 1,000 men lose 29 to 87 years, 1,000 women lose 10 to 23 years. These are large differences.

([33]) D. Sethi et al. (2006) http://www.euro.who.int/document/e87321.pdf
([34]) I. Roberts et al. (1996) Bmj 313 (7060): 784-6
([35]) P. Edwards et al. (2006) Bmj 333 (7559): 119


19.3. External causes of injury and poisoning
Potential years of life lost
men, 2002-2004, NUTS 2
> 1,780
1,350 to 1,780
1,030 to 1,350
840 to 1,030
< 840
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Guadeloupe (FR)
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Martinique (FR)
0 20
Guyane (FR)
0 100
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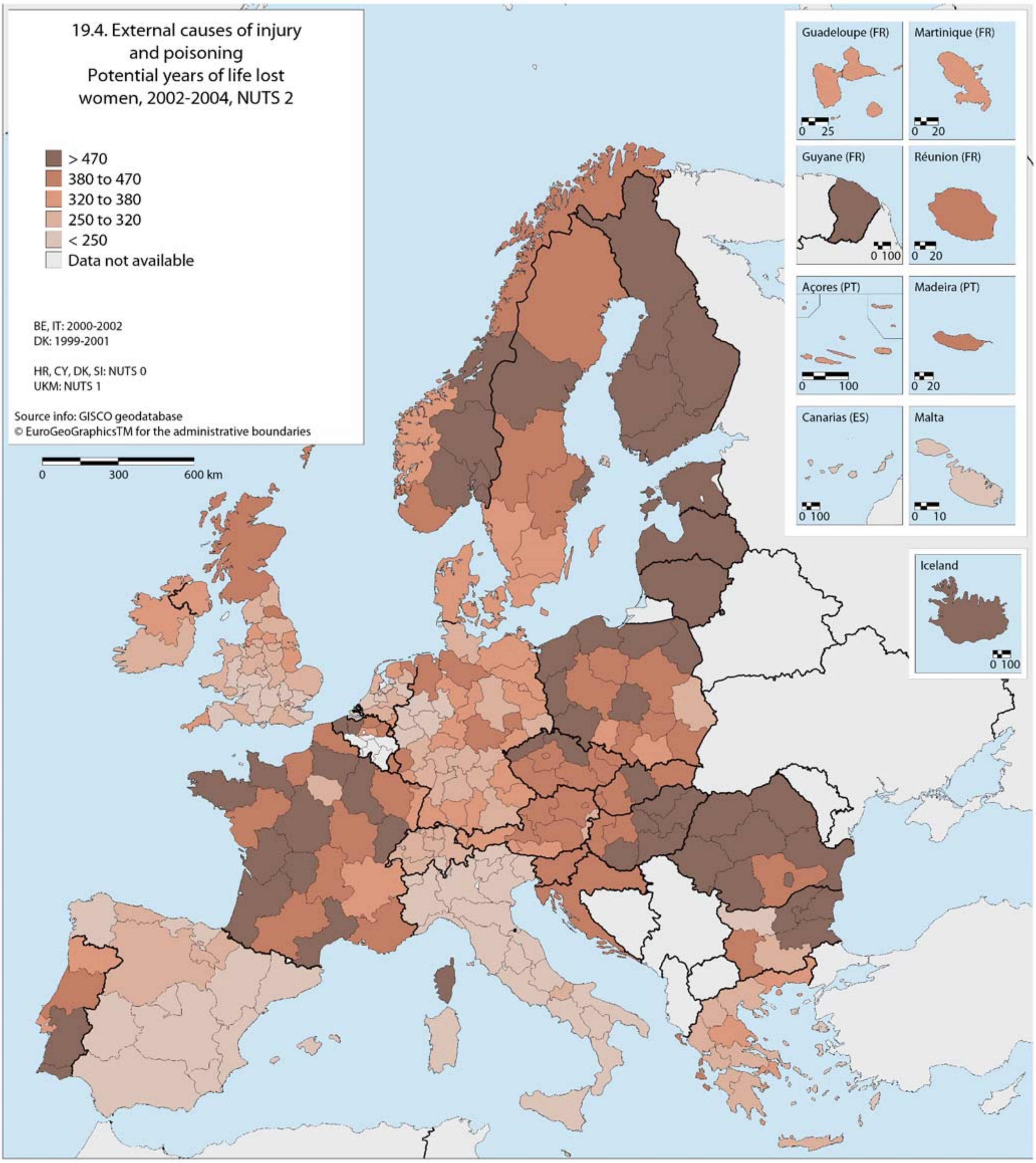
19.4. External causes of injury and poisoning
Potential years of life lost
women, 2002-2004, NUTS 2
> 470
380 to 470
320 to 380
250 to 320
< 250
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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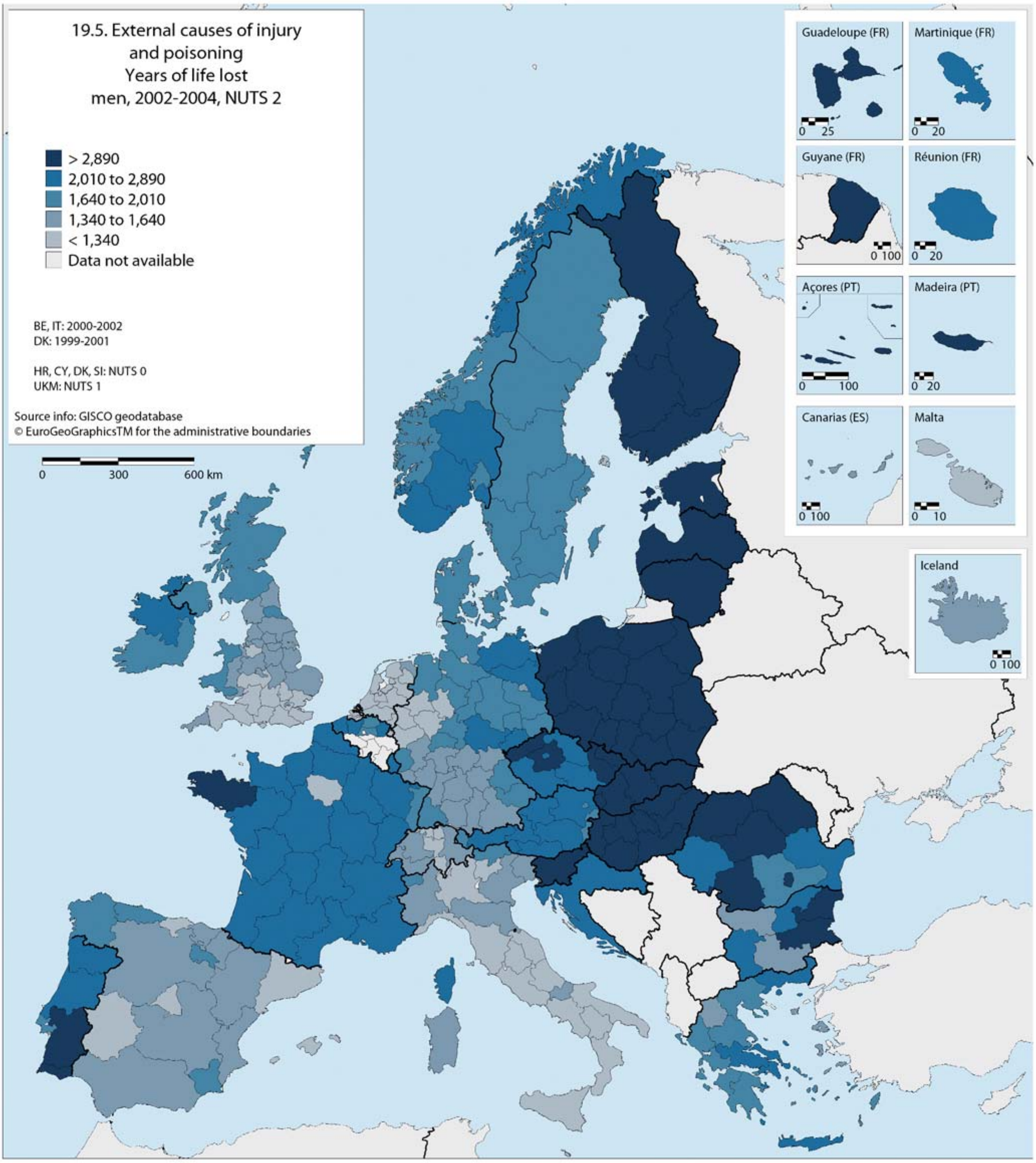
19.5. External causes of injury and poisoning
Years of life lost
men, 2002-2004, NUTS 2
> 2,890
2,010 to 2,890
1,640 to 2,010
1,340 to 1,640
< 1,340
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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0 300 600 km
Guadeloupe (FR)
0 25
Martinique (FR)
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Guyane (FR)
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Réunion (FR)
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Açores (PT)
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Iceland
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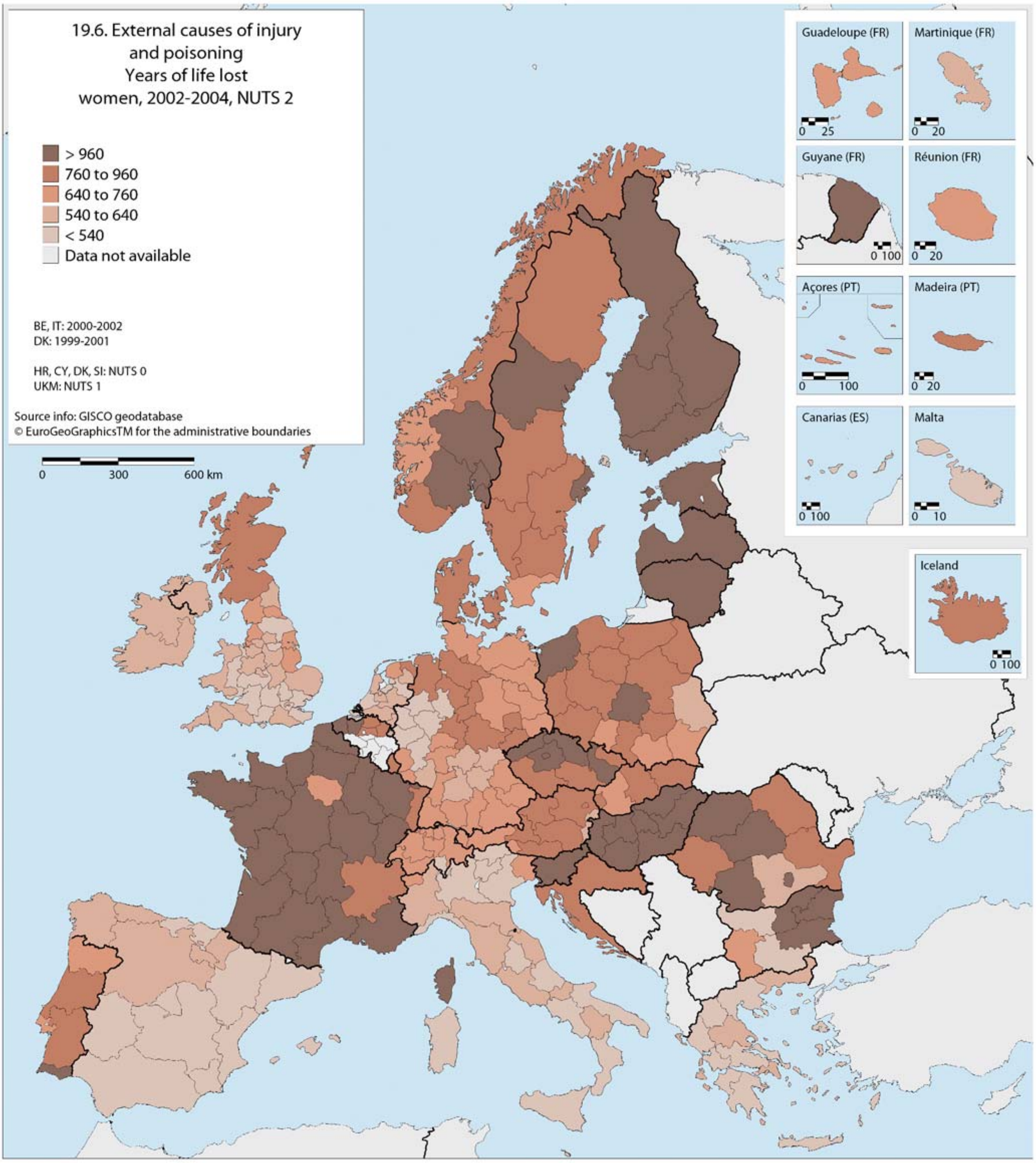
19.6. External causes of injury and poisoning
Years of life lost
women, 2002-2004, NUTS 2
> 960
760 to 960
640 to 760
540 to 640
< 540
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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20

Transport accidents

Transport accidents, overwhelmingly road traffic accidents (RTAs) are an important cause of death. Since many victims are persons in their teens or twenties, its impact on the burden of mortality is without parallel. In 2002, among men, 4.0 percent of all YLL and 9.5 percent of all PYLL were lost because of transport accidents. As a cause of YLL among men, it is in the order of magnitude of lung cancer. No single specific disease in Europe causes more loss of productive life among men than transport accidents: more productive years are lost to transport accidents than to ischaemic heart disease or suicide. Greece is the most extreme example: 19 percent of all PYLL in Greece are lost due to transport accidents, whereas ischaemic heart disease account for 15 percent and suicide for 2.5 percent. But even in the total of EU-27 the impact of transport accidents is remarkable: 10 percent of total PYLL is lost by this cause, 9 percent by IHD and 8 percent by suicide. The gender differences are remarkably big. Women are known to take fewer risks than men. Transport accidents cause 1.5 percent of all YLL among women and 5.2 percent of all PYLL.

As a group, young people represent a bigger public health problem, but older people have a higher case fatality. Whereas children, elderly, pedestrians and cyclists are vulnerable groups in modern traffic, most safety interventions have been addressed towards protecting vehicle occupants.

The main risk factors for RTAs are speed, alcohol, exposing vulnerable road users to motorised traffic, poor visibility and not using protective equipment([36]).

Standardised death rates

The interquintile differences are 12.6 and 3.3 for men and women respectively, implying wide disparities between European countries. High or low risks follow country borders, suggesting an important role for policy makers. Among the older EU Member States, Greece and Portugal have high accident mortality, with Portugal having the highest mortality due to transport accidents in Europe. The Nordic countries, the United Kingdom, Switzerland, the Netherlands and the densely populated industrial areas in Western Germany have the lowest rates. On average, the Baltic States and other Central and Eastern European Member States have higher transport accidents mortality than the old Member States.

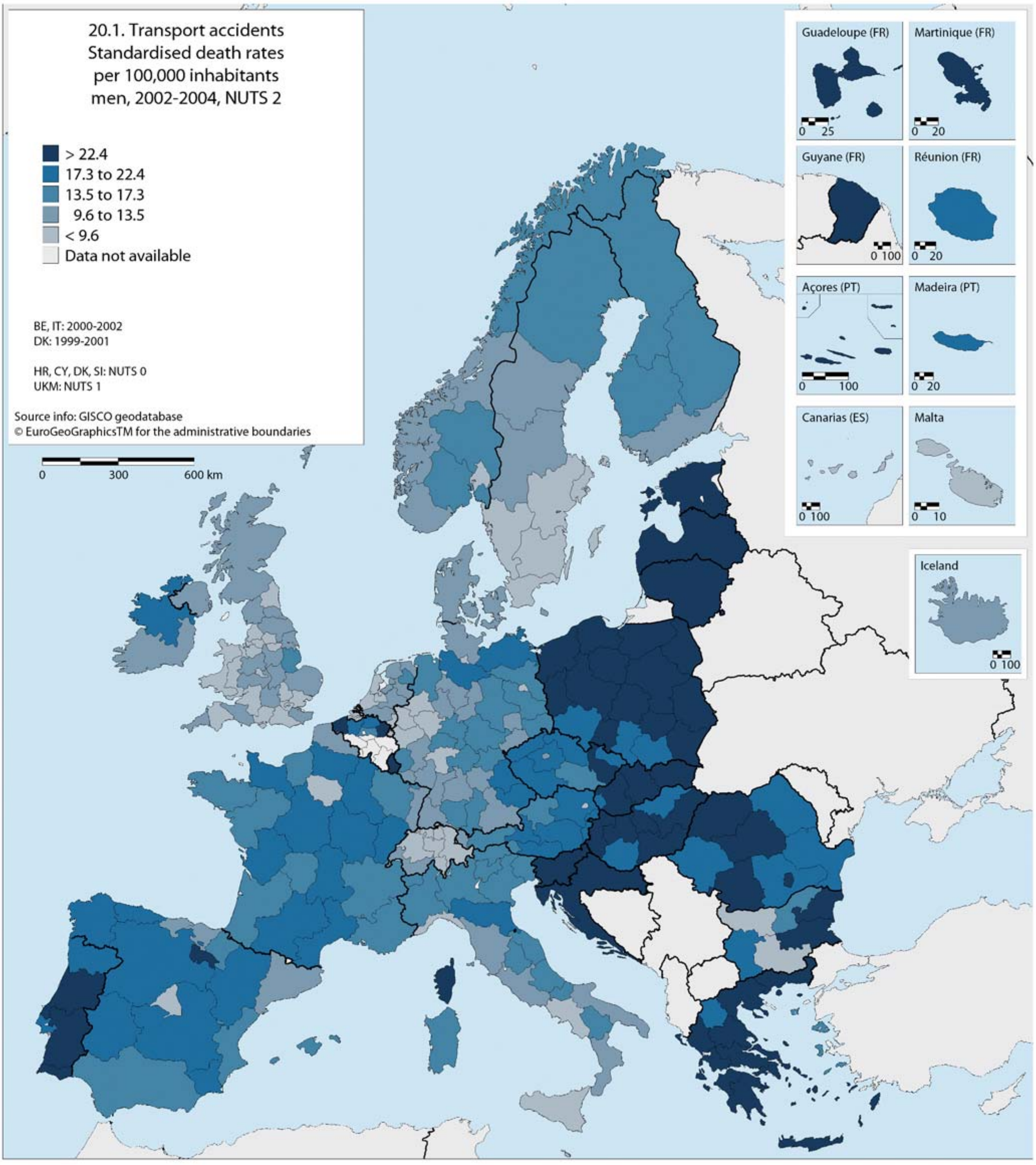
Potential years of life lost

In the EU-27, 100,000 men and women lost 440 and 110 PYLL. In the old EU-15, this was 390 and 100 PLL. In the lowest quintile, 100,000 men under 65 years of age lost between 110 and 290 PYLL. In the highest quintile, they lost between 660 and 1640 PYLL. 1,000 women under 65 years of age lost in the lowest quintile less then 75 PYLL. In the highest quintile, they lost between 175 and 310 PYLL. Male and female mortality is correlated, but male transport mortality is four times as high. The highest burden of transport mortality is found in Lithuania and Latvia (2.4 times the EU-27 average), Portugal (1.8), Luxembourg and Greece (1.7), Estonia, Croatia and Poland (1.6 times the EU-27 average). The lowest burden of transport mortality is found in Malta (0.47 the EU-27 average), Switzerland (0.47), Sweden (0.57), the Netherlands (0.61), the United Kingdom (0.67) and Italy (0.74).

Years of life lost

The YLL charts, dominated by loss of young life, show the same patterns. This estimate of the burden of mortality still shows a five-fold difference between the highest quintile and the lowest quintile of mortality in regions. In low-mortality countries, 1,000 men lose between 1.4 and 4 YLL. In high-mortality regions such as the Algarve in Portugal, the Baltic States Lithuania and Latvia, Greece (Anatoliki Makedonia, Thraki), some regions in France (Guadeloupe and Guyane), and Lodzkie and Mazowieckie in Poland, they lose between 12 and 22 YLL, nearly five times more. In low-mortality countries 1,000 women lose between 1.2 and 1 YLL. In high-mortality countries they lose between 3 and 5 years, again nearly five times more. In public health terms, transport accidents are arguably the most avoidable causes of loss of productive life.

([36]) D. Sethi et al. (2006) http://www.euro.who.int/document/e87321.pdf


20.1. Transport accidents
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 22.4
17.3 to 22.4
13.5 to 17.3
9.6 to 13.5
< 9.6
Data not available
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UKM: NUTS 1
Source info: GISCO geodatabase
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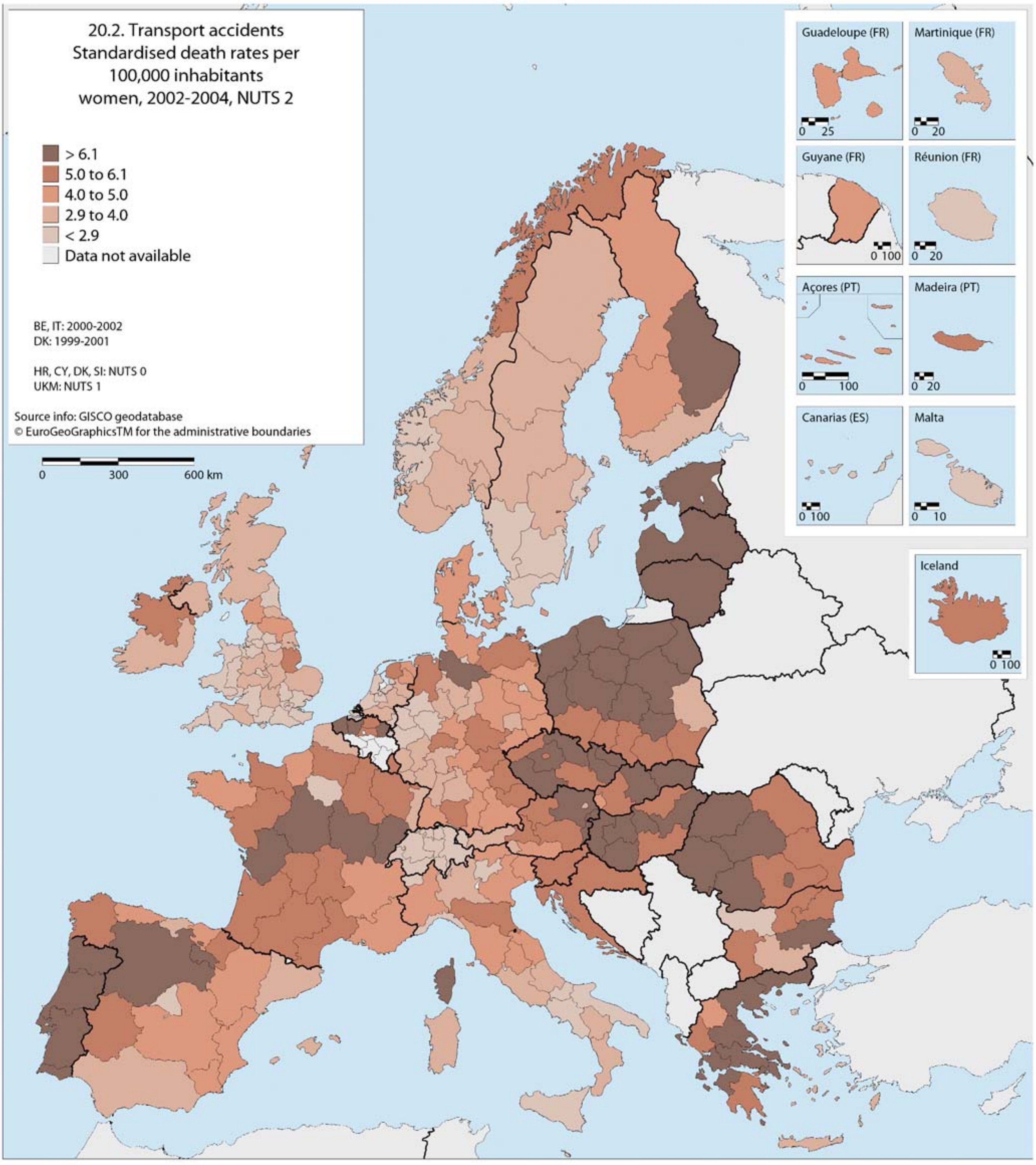
20.2. Transport accidents
Standardised death rates per
100,000 inhabitants
women, 2002-2004, NUTS 2
> 6.1
5.0 to 6.1
4.0 to 5.0
2.9 to 4.0
< 2.9
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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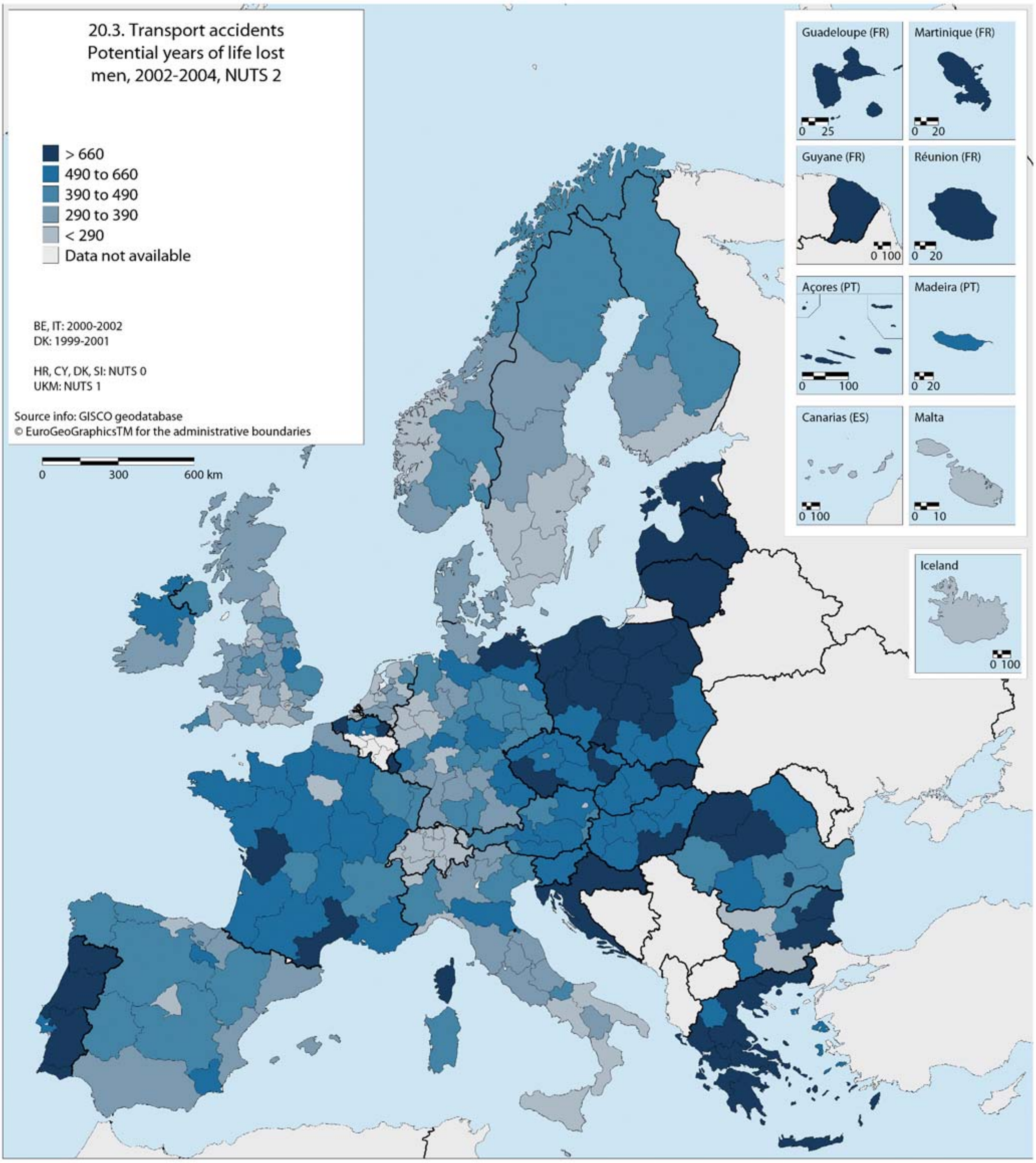
20.3. Transport accidents
Potential years of life lost
men, 2002-2004, NUTS 2
> 660
490 to 660
390 to 490
290 to 390
< 290
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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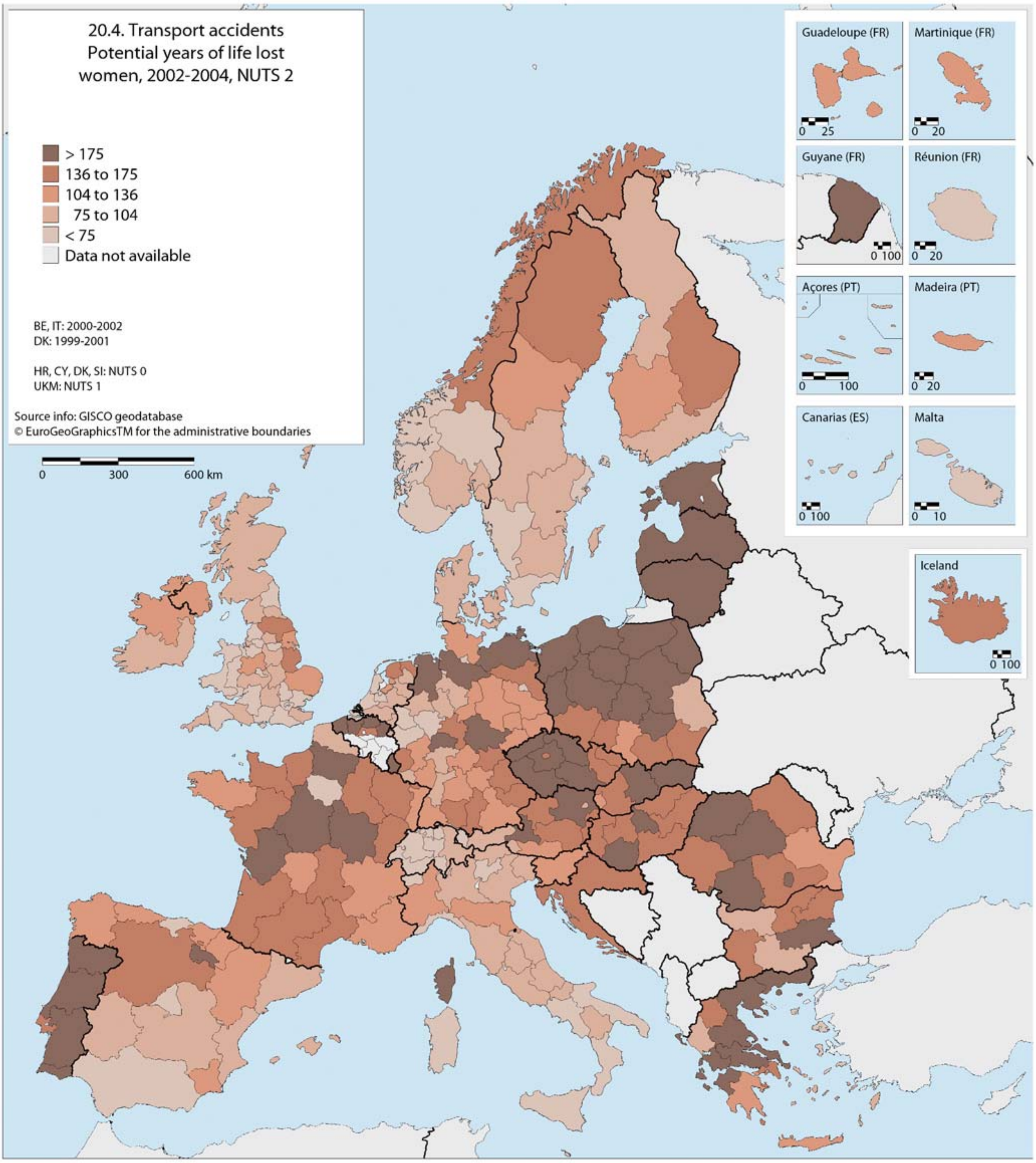
20.4. Transport accidents
Potential years of life lost
women, 2002-2004, NUTS 2
> 175
136 to 175
104 to 136
75 to 104
< 75
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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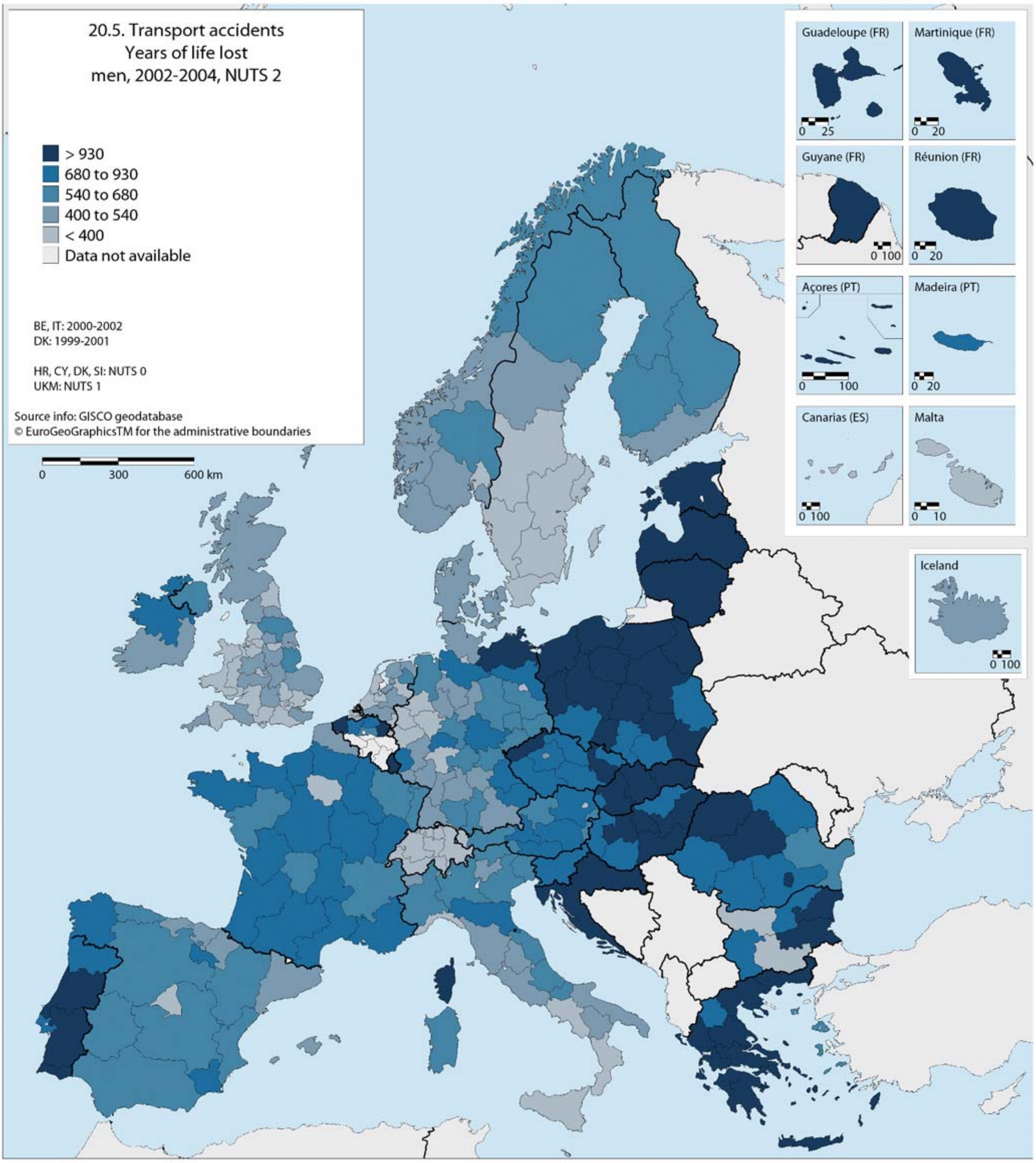
20.5. Transport accidents
Years of life lost
men, 2002-2004, NUTS 2
> 930
680 to 930
540 to 680
400 to 540
< 400
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Martinique (FR)
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Açores (PT)
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Canarias (ES)
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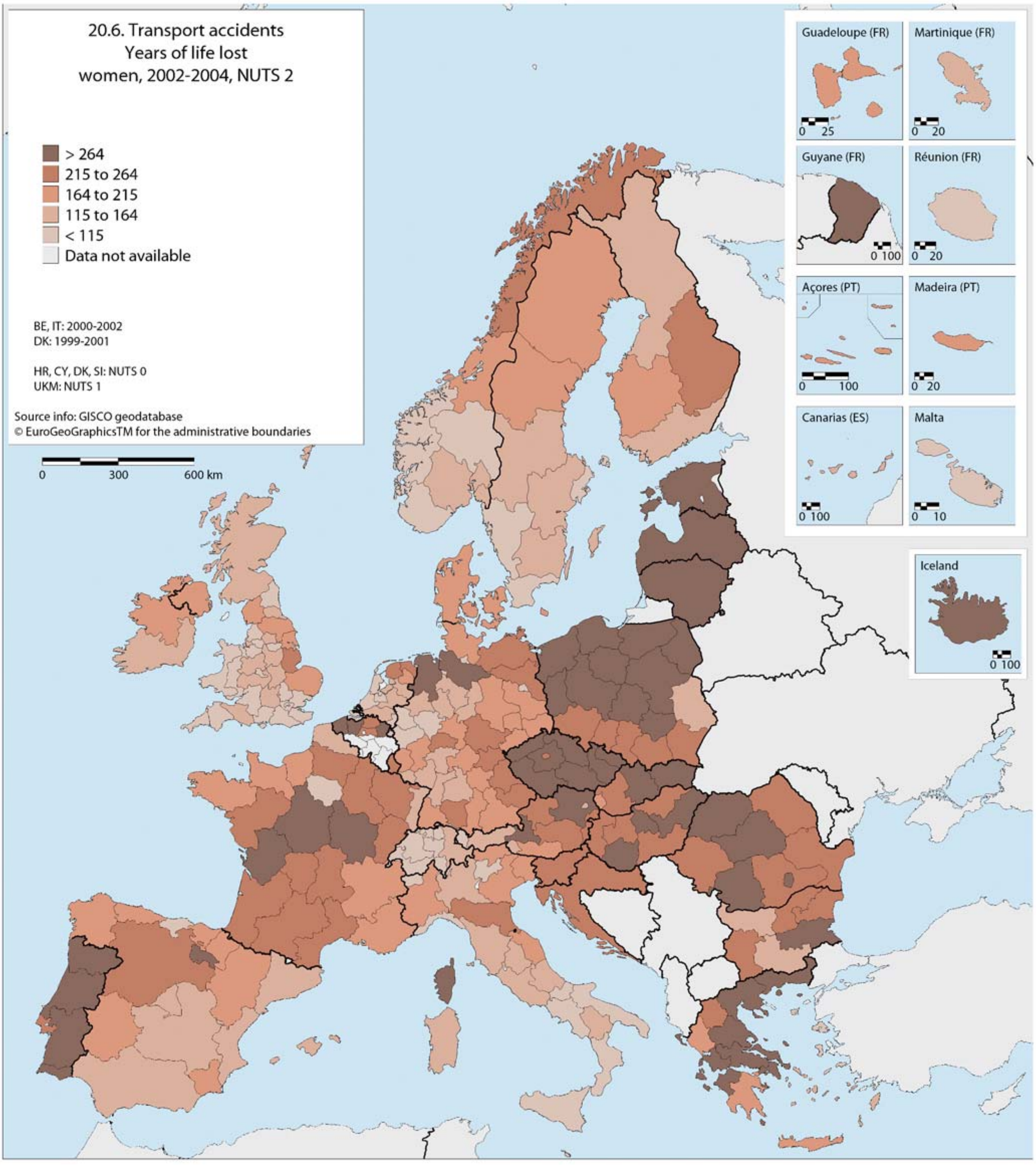
20.6. Transport accidents
Years of life lost
women, 2002-2004, NUTS 2
> 264
215 to 264
164 to 215
115 to 164
< 115
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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0
300
600 km
Guadeloupe (FR)
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Martinique (FR)
0 20
Guyane (FR)
0 100
Réunion (FR)
0 20
Açores (PT)
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Madeira (PT)
0 20
Canarias (ES)
0 100
Malta
0 10
Iceland
0 100

21 Suicide and intentional self-harm

Self-inflicted injuries and suicide claim as many life years as transport accidents in the EU-15. Suicide rates are high among young people, but still increase with age until the age of 80+. At all ages, men are much more likely to take their own lives than women. In the EU-27, men lose 3.4 more life years than women, regardless of their shorter life expectancy.

Risk factors for suicidal behaviour are numerous. Apart from age and gender, the most important factors are psychological and social. Many people who commit suicide have demonstrated depression and hopelessness. Hopelessness can be associated with nine out of ten cases of suicide([37]). Drugs and alcohol use also play an important part; a quarter of suicides involve alcohol abuse. Among the elderly, suicide may also be the consequence of severe, painful or disabling diseases, often in combination with social isolation. Rates of suicide are higher in rural than in urban areas, presumably due to social isolation. Religious affiliation is one of the determinants that protects against suicide, by religious prohibitions and by strengthening the social network([38]). Suicide rates increase during periods of economic recession and unemployment, suggesting an explanation for the recent increases in Central and Eastern European Member States. Efficient primary healthcare may identify and treat mental disorders on time, resulting in a decrease in suicidal behaviour and suicide rates. Control and treatment of alcohol and substance abuse are important in lowering suicide rates. Social interventions include restricting access to dangerous substances used in suicide, removal of carbon monoxide from domestic gas and handgun control.

Standardised death rates

International comparisons have to be interpreted with caution. In many legal systems, a death is certified as suicide if the circumstances are consistent with it, and if murder, accidental death and natural causes are ruled out. Diagnostic and certification practices vary considerably from country to country. Suicide may carry a cultural or religious stigma, or it may lead to financial consequences, e.g. with respect to life insurances. This means that the suicide mortality figures of different countries may not be exactly comparable, however, the range of countries in terms of high and low mortality rates from suicide is probably correct.

The burden of mortality of suicide is four times higher in the highest quintile than in the lowest quintile of European regions. These are very large spatial differences; among the highest of all causes of death. This indicates a high potential for (health) policy and prevention.

Among the Member States of the EU-15, Finland, France and Austria have longstanding high suicide rates. The Central and Eastern European Member States have high suicide rates. Women have always had much lower suicide rates, but they follow the same patterns as men. Spain, England and particularly Greece have very low suicide rates. For Greece, this has been attributed to strong family ties([39]). In England, the observation has been made that the vast majority of those who die by suicide make contact with health professionals within a relatively short time before death([37]), which suggests that clinicians can play an important role in preventing suicide.

Potential years of life lost

Suicide is an important cause of death among young people, and is even increasing in many countries. Among men, suicide causes 8.2 percent of all PYLL, in the order of magnitude of ischaemic heart disease. Among women, suicide still causes 4.2 percent of all PYLL. In the EU-27, 100,000 men and women lost 380 and 96 PYLL. Men lost again nearly four times as many PYLL.

In the highest quintiles, young adult men lost five times more life years than in the lowest quintiles. In the highest quintiles, 100,000 men lost in average 720 PYLL, in the lowest quintile 100,000 men lose 170 PYLL, or a difference of 550 PYLL.

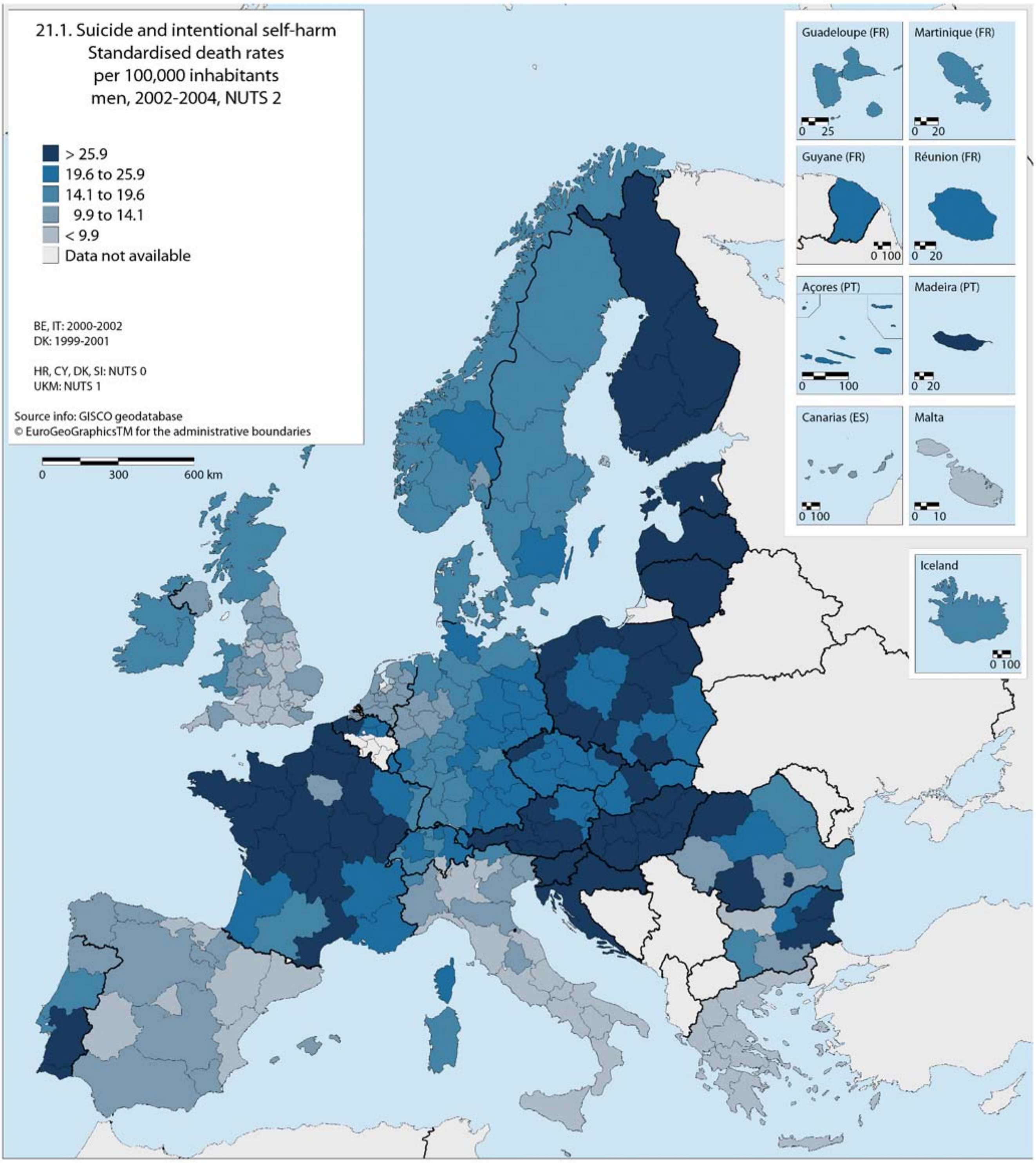
The Baltic States carried a very high burden of suicide mortality: Lithuania had 4.0 times the EU-27 average, Estonia and Latvia each 2.3 times. A neighbour, Finland, has twice the EU average. However, neighbouring countries often show sharp and unexplained contrasts. The disparity between Slovenia and Italy is particularly large. Slovenia lost twice as much PYLL as the EU-average, Italy only 0.4 times, or a five fold difference. Flanders, the Dutch speaking part of Belgium, lost 1.7 times the EU average, the Netherlands 0.81 times, a more than twofold difference between regions that share a common language and history. Such diversity is a rich source for European research that should lead to better understanding and prevention of determinants of suicide.

While the patterns are similar, Scotland's suicide rates among young people are remarkably higher than in the rest of the United Kingdom. Social deprivation and living in remote rural areas were key factors in Scotland's high suicide rates.

Years of life lost

In high-mortality countries, 1,000 men lose 12 YLL and 1,000 women lose 3 YLL, a well-known remarkable gender difference. In low-mortality countries, 1,000 men lose 3 YLL (or four times less) and women 0.8 YLL. Together with alcohol abuse, the burden of mortality maps of suicide show the high burden of mortality of hopelessness in Europe.

([37]) http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/
([38]) J. Neeleman (1999) Journal of Epidemiology Community Health 53, 204-210
([39]) C.A.Zacharakis et al. (1998) Social Psychiatry and Psychiatric Epidemiology 33(10): 471-476


21.1. Suicide and intentional self-harm
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 25.9
19.6 to 25.9
14.1 to 19.6
9.9 to 14.1
< 9.9
Data not available
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DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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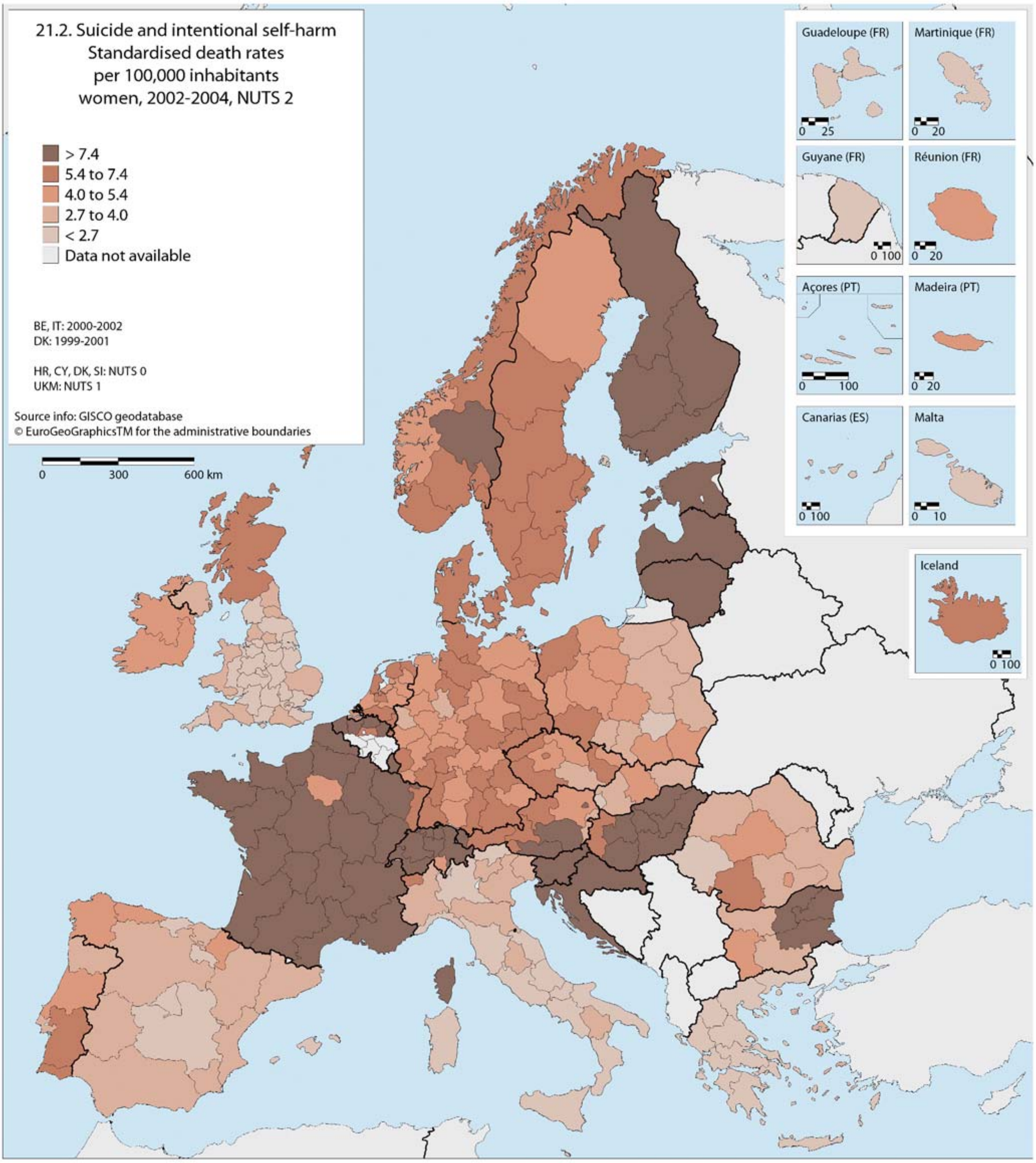
21.2. Suicide and intentional self-harm
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 7.4
5.4 to 7.4
4.0 to 5.4
2.7 to 4.0
< 2.7
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Guadeloupe (FR)
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Martinique (FR)
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Guyane (FR)
0 100
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Madeira (PT)
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Iceland
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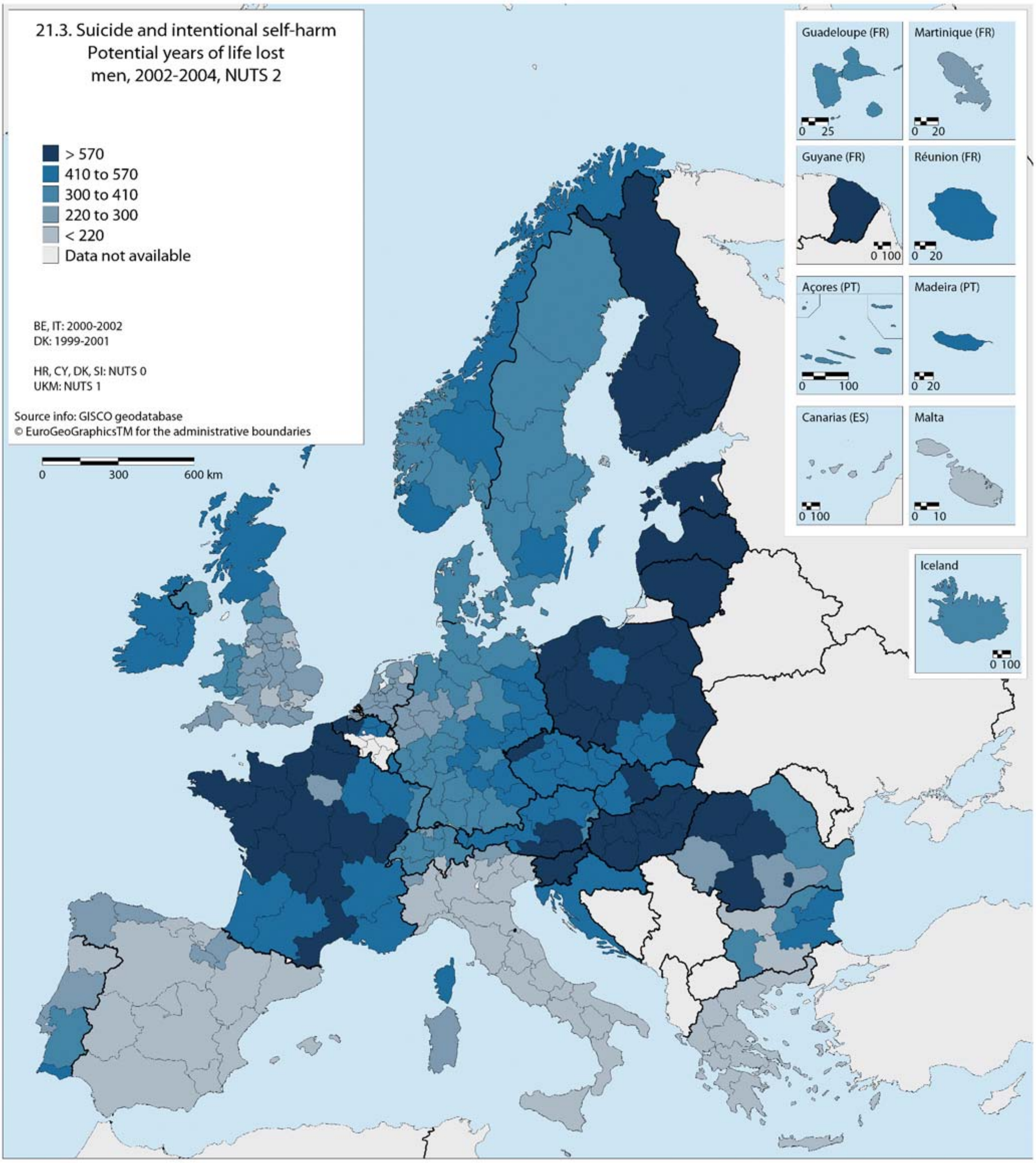
21.3. Suicide and intentional self-harm
Potential years of life lost
men, 2002-2004, NUTS 2
> 570
410 to 570
300 to 410
220 to 300
< 220
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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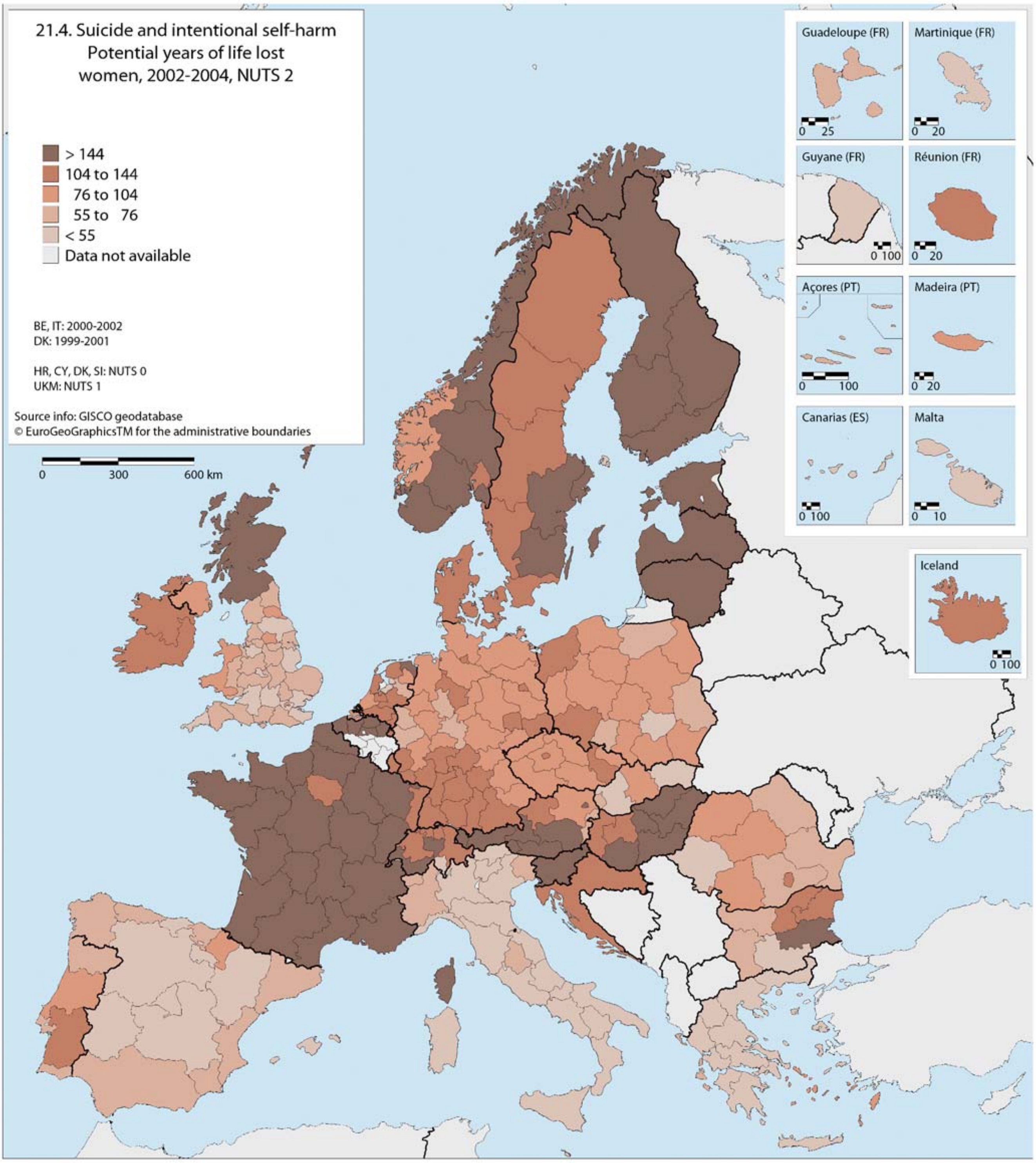
21.4. Suicide and intentional self-harm
Potential years of life lost
women, 2002-2004, NUTS 2
> 144
104 to 144
76 to 104
55 to 76
< 55
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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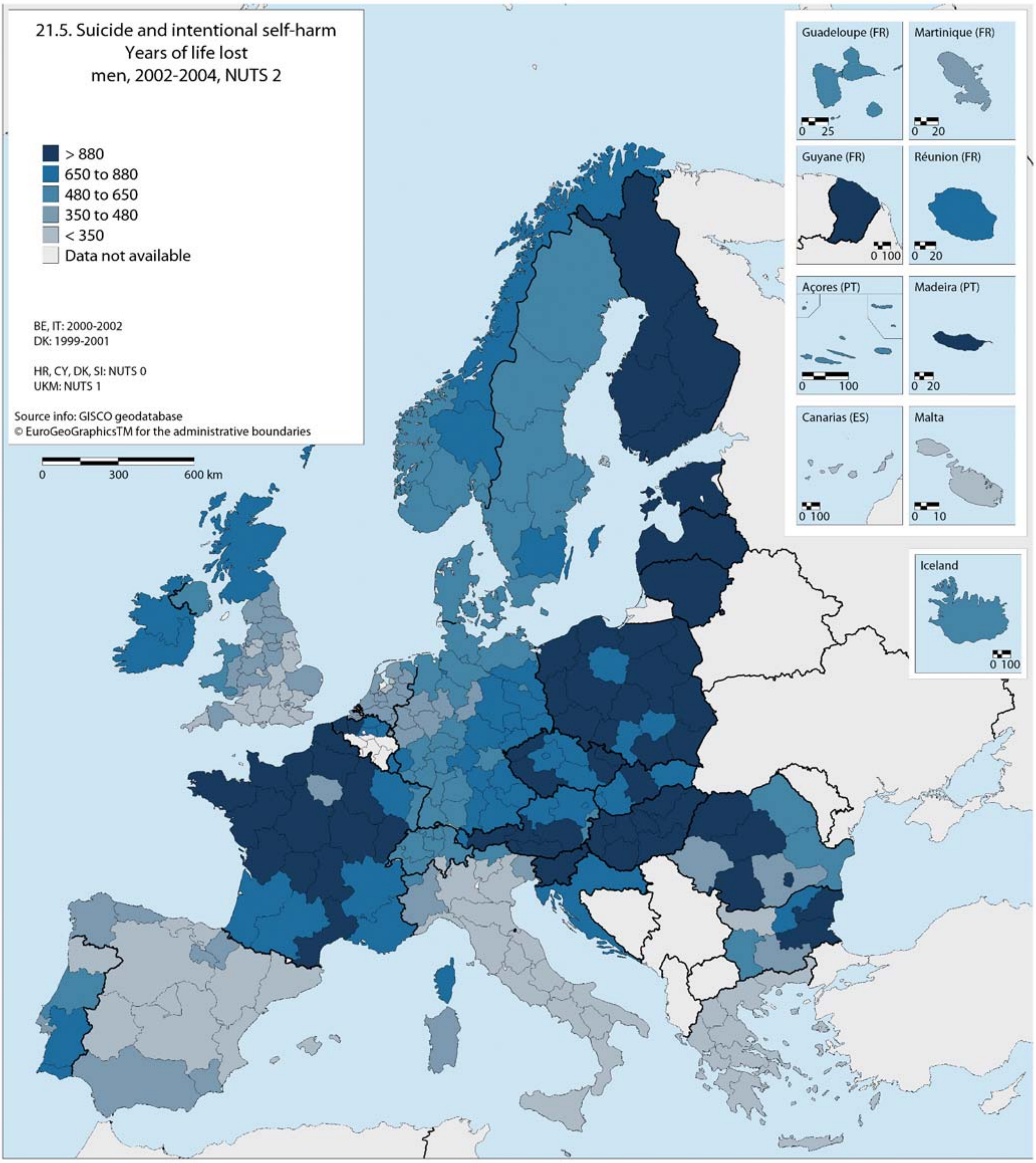
21.5. Suicide and intentional self-harm
Years of life lost
men, 2002-2004, NUTS 2
> 880
650 to 880
480 to 650
350 to 480
< 350
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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0 300 600 km
Guadeloupe (FR)
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Martinique (FR)
0 20
Guyane (FR)
0 100
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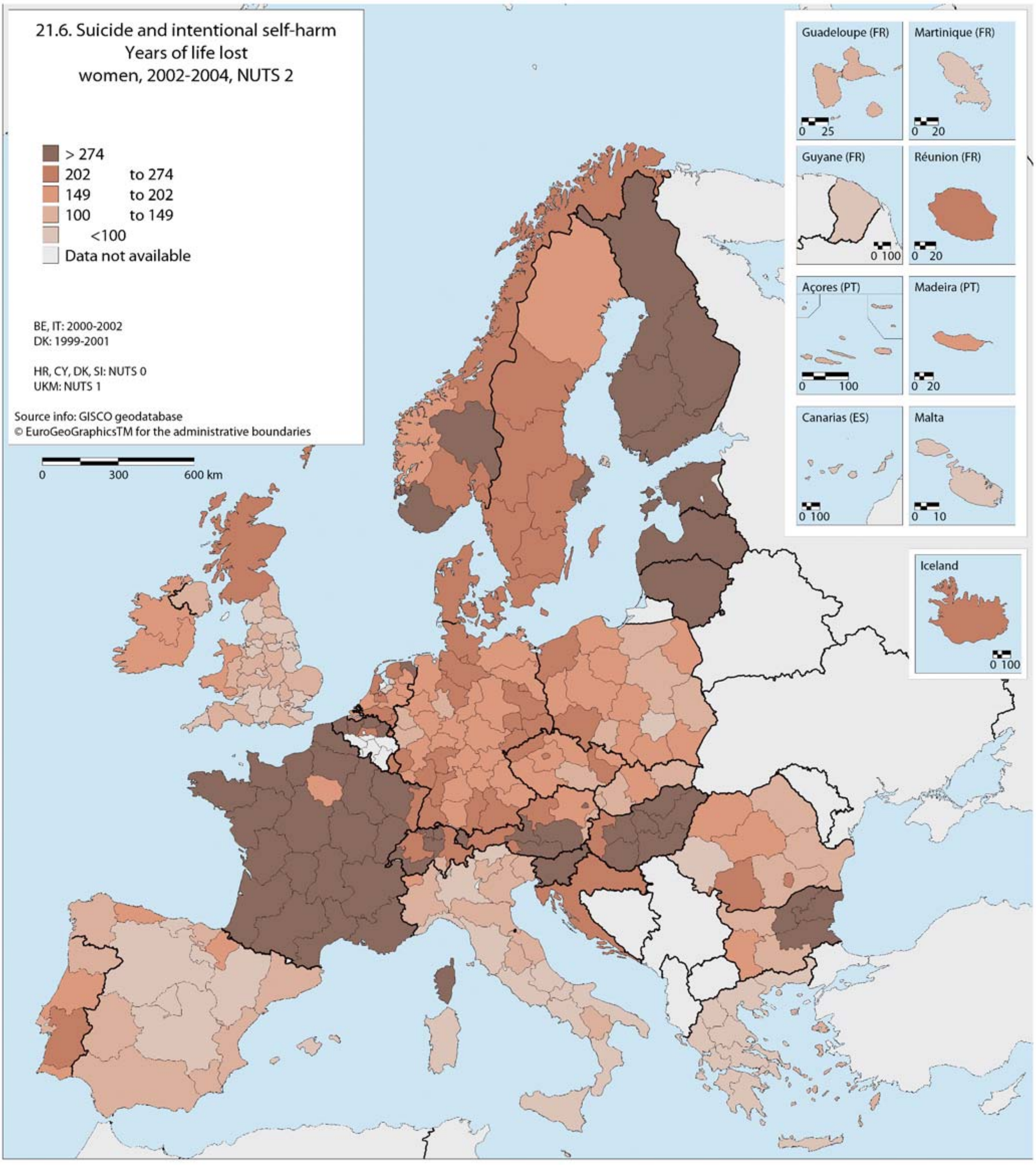
21.6. Suicide and intentional self-harm
Years of life lost
women, 2002-2004, NUTS 2
> 274
202 to 274
149 to 202
100 to 149
<100
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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22

Alcohol related causes of death

Alcohol related causes of death are but a crude proxy of true alcohol-related mortality. The used codes aggregate the mortality caused by cancers of mouth, throat and oesophagus (gullet), chronic liver disease and alcohol abuse. Cancers of the throat and oesophagus are caused by both smoking and alcohol. The inflammation caused by alcohol facilitates the carcinogenic activity of smoking. Chronic liver disease may be cirrhotic, caused by alcohol, but may be caused by infectious agents (hepatitis B or C) or many other affections. Alcohol is also an important risk factor for road traffic injuries, suicide and other violent causes of death, and alcohol abuse is correlated to circulatory disease mortality. Furthermore, methodological differences in coding alcohol-related causes of mortality should lead to even more caution in interpreting differences between countries.

Among men, these four causes of death take 6.6 percent of YLL, among women 3.0 percent. Among men, death by alcohol abuse in its strict sense took 0.9 percent of YLL, among women 0.3 percent.

The alcohol-related cancers took 2.2 percent of YLL among men and 0.6 percent among women. The gender difference is even more impressive if we consider that women are more vulnerable to the health effects of high levels of alcohol intake. Chronic liver disease, more confounded by other causes, accounts for 3.5 percent of YLL among men and 2.0 percent among women. While alcohol abuse causes serious medical conditions and is correlated to increased mortality, the social consequences are worse. For every YLL lost, many more are spoiled by alcohol.

Standardised death rates

The maps show a two-fold difference between the 20th and 80th percentile, indicating a quite large mortality gradient in Europe between high- and low-mortality countries. Among the EU-15, France, Scotland and Eastern Germany have high alcohol-related mortality. Many of the Central and European Member States are hard hit, with Hungary, Romania, Slovenia, Croatia, Slovakia and the eastern part of the Czech Republic topping the list. Greece, the Netherlands, regions in Spain and the Nordic countries except for Finland show low alcohol-related mortality. Female mortality shows the same patterns, with Romania and Hungary at the top, followed by Scotland, the old industrial areas of north-east France and England and Eastern Germany. Low-mortality countries for men are also low-mortality countries for women.

Potential Years of Life lost

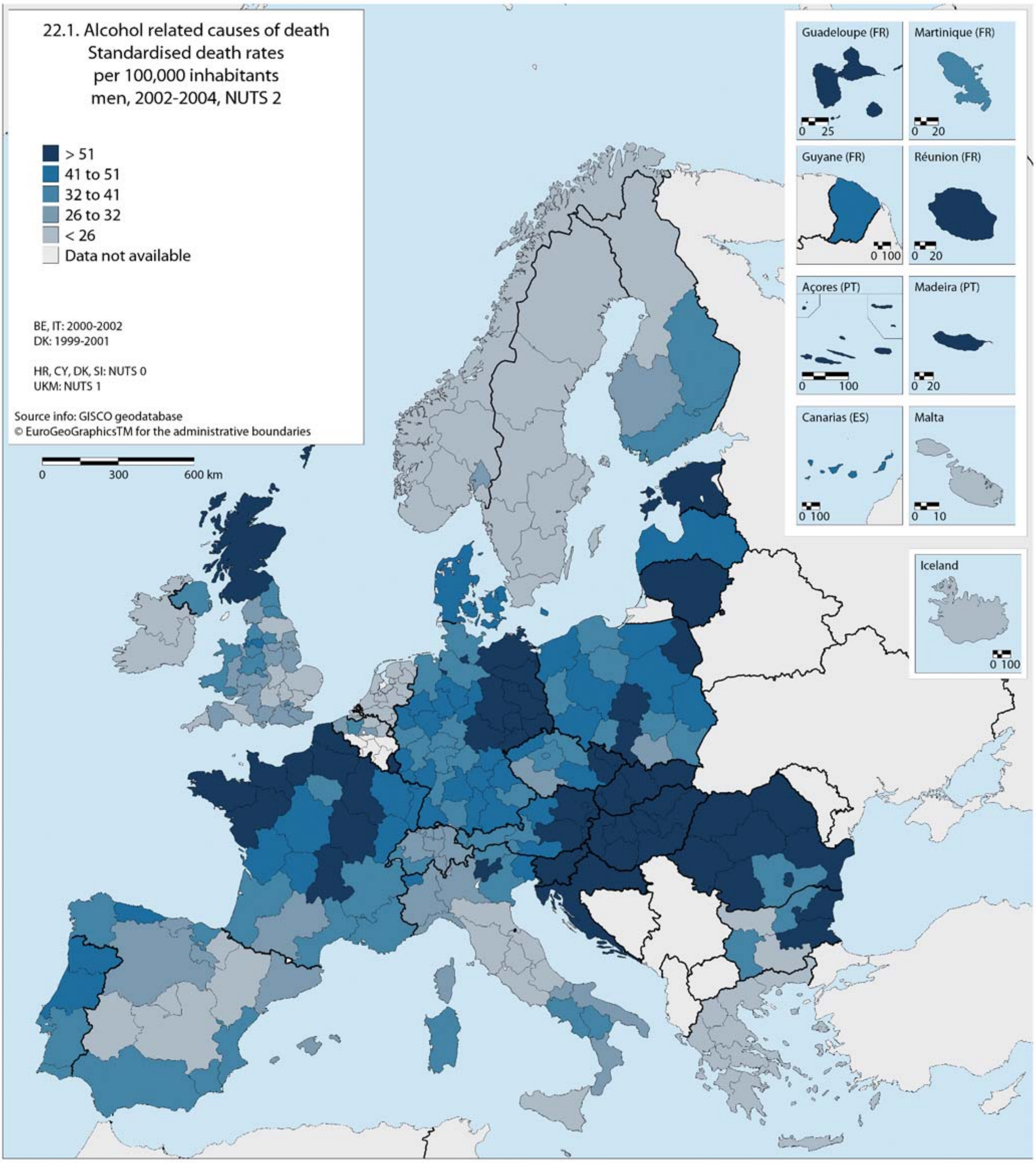
Many people with alcohol-related problems die young, and lose many life years. In the EU-27, 100,000 men lost 380 PYLL and women 110 PYLL. The disparity between the highest and lowest quintile are large: in high-mortality regions, 100,000 men lose 780 PYLL, in low-mortality regions they lost 120 PYLL or six time less. Among women, the differentials are even larger. In high-mortality regions, 1,000 women lost 220 years, in low-mortality countries 30 years, or seven times less. In high- and low-mortality countries mortality among women is 4 times lower than among men. Gender differences in alcohol use are universal, with women drinking less than men([40]). Women may be more likely than men to experience unpleasant effects, and may not enjoy the risky and poorly controlled behavioural effects of alcohol as much as men do. Drinking among women is also culturally less well accepted. However, gender differences in drinking behaviour have grown smaller in modern societies. Countries with a high burden of alcohol related premature mortality, compared to the EU-27 are Hungary (3.8 times the EU average), Romania (2.2), Estonia (1.9), Slovenia (1.7) and the Slovak Republic (1.6). Countries with a low burden of alcohol related premature mortality, compared to the EU-27 are Sweden (0.4 times the EU-27 average), Norway (0.4 times), Malta (0.3 times), Greece (0.2 times) and Iceland 0.1 times). In other words, the burden of alcohol related premature mortality is 40 times bigger in Hungary than in Iceland (a non-EU country), or twenty times than in Greece.

Here, an interesting statistic is also the male to female mortality ratio. In average in the EU-27; the burden of alcohol related premature mortality in men is 3.4 times that in women. In Bulgaria (6.3), Greece (6.1), Malta (5.4), Poland (4.9) or Spain (4.9), the burden of mortality in young and adult men is close to five times or more higher than in women.

Years of life lost

The burden of mortality among men is five times higher in the highest quintile than in the lowest quintile of regions. In the highest quintile, 100,000 men lose 1,900 YLL; in the lowest quintile they lose 400 YLL, or nearly five times less. In Hungary, 100,000 men may lose between 3,000 to 4,000 YLL. In the highest quintile, 1,000 women lose 700 YLL; in the lowest quintile they lose 130 YLL, again five times less. In Romania and Hungary, 100,000 women may lose 1,000 YLL. The large differentials in the burden of mortality show an important potential for prevention. If the many spoiled years are added, it is obvious that strict alcohol policies and guidance preventing alcohol abuse are a major public health priority.

([40]) http://www.who.int/substance_abuse/publications/alcohol_gender_drinking_problems.pdf


22.1. Alcohol related causes of death
Standardised death rates
per 100,000 inhabitants
men, 2002-2004, NUTS 2
> 51
41 to 51
32 to 41
26 to 32
< 26
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
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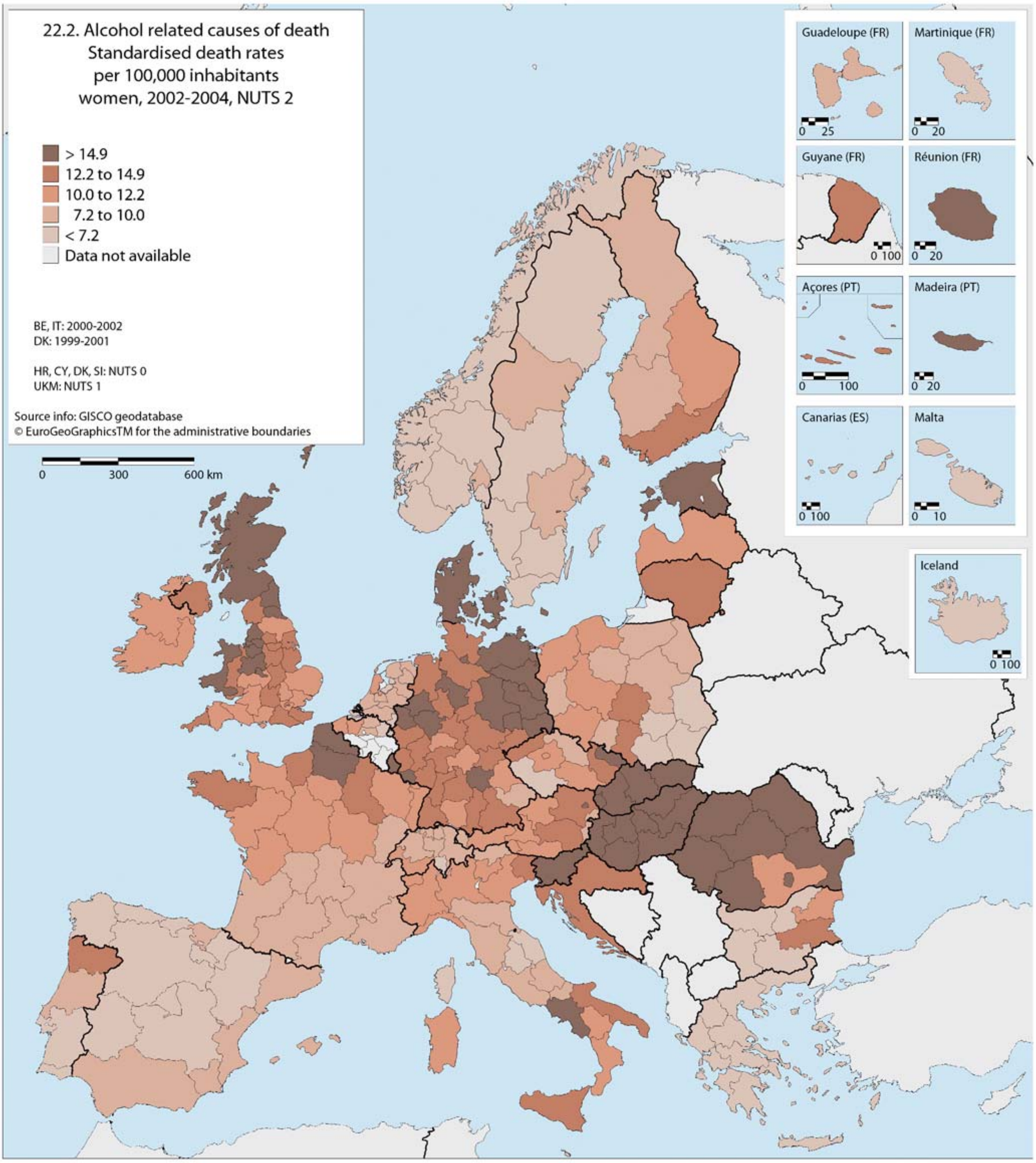
22.2. Alcohol related causes of death
Standardised death rates
per 100,000 inhabitants
women, 2002-2004, NUTS 2
> 14.9
12.2 to 14.9
10.0 to 12.2
7.2 to 10.0
< 7.2
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Guadeloupe (FR)
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Martinique (FR)
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Guyane (FR)
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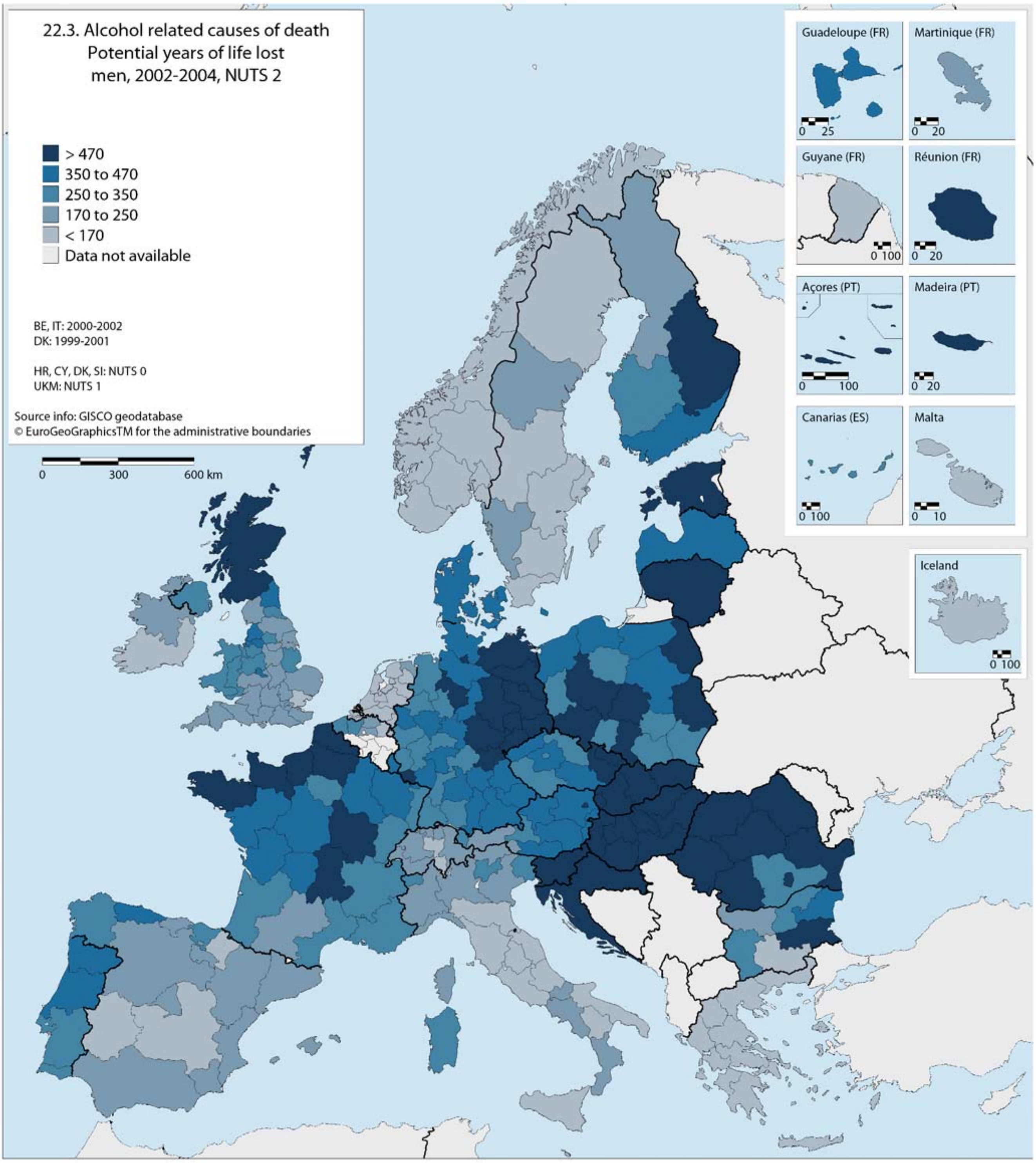
22.3. Alcohol related causes of death
Potential years of life lost
men, 2002-2004, NUTS 2
> 470
350 to 470
250 to 350
170 to 250
< 170
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Martinique (FR)
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Guyane (FR)
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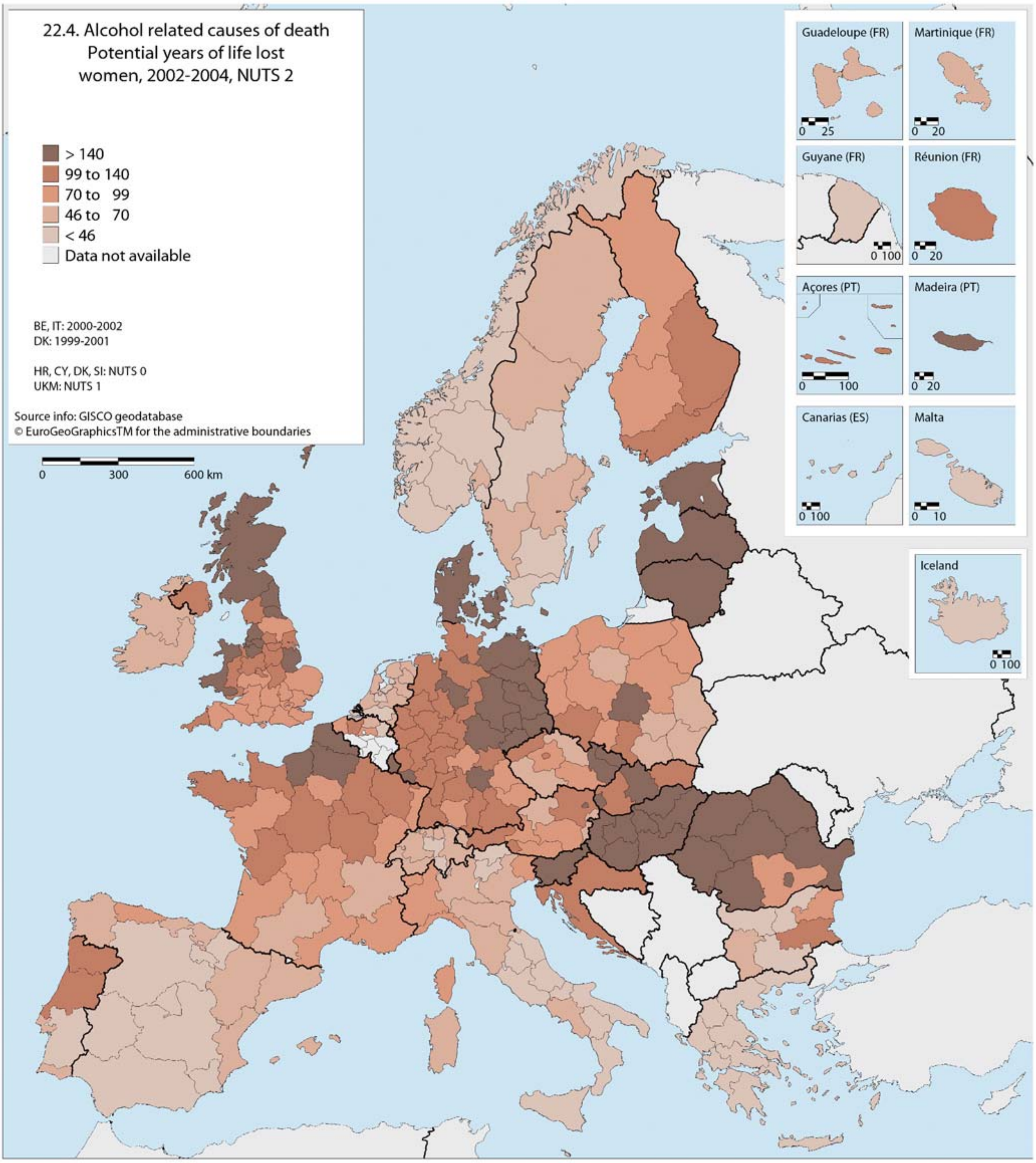
22.4. Alcohol related causes of death
Potential years of life lost
women, 2002-2004, NUTS 2
> 140
99 to 140
70 to 99
46 to 70
< 46
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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Guadeloupe (FR)
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Martinique (FR)
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Guyane (FR)
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Açores (PT)
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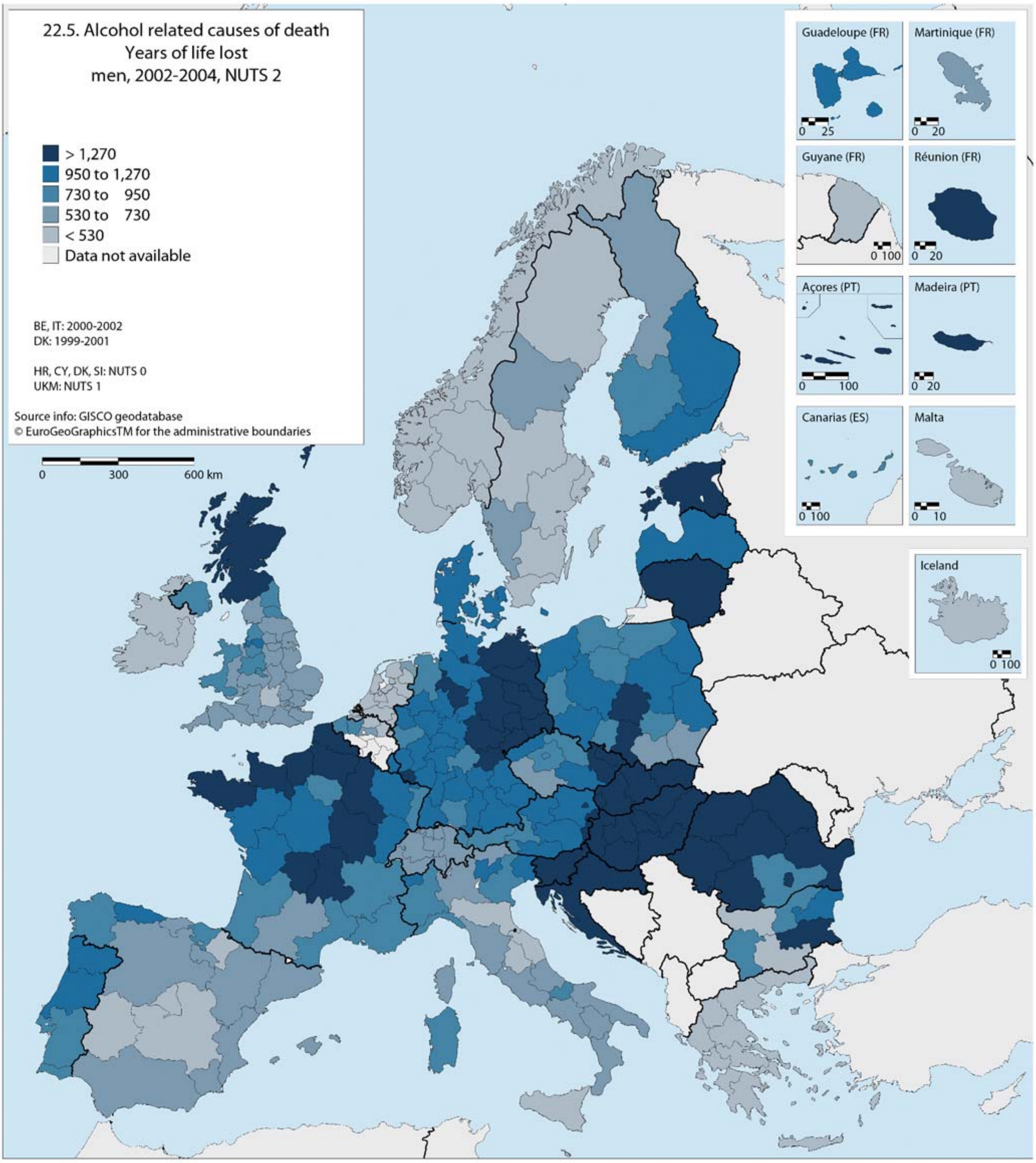
22.5. Alcohol related causes of death
Years of life lost
men, 2002-2004, NUTS 2
> 1,270
950 to 1,270
730 to 950
530 to 730
< 530
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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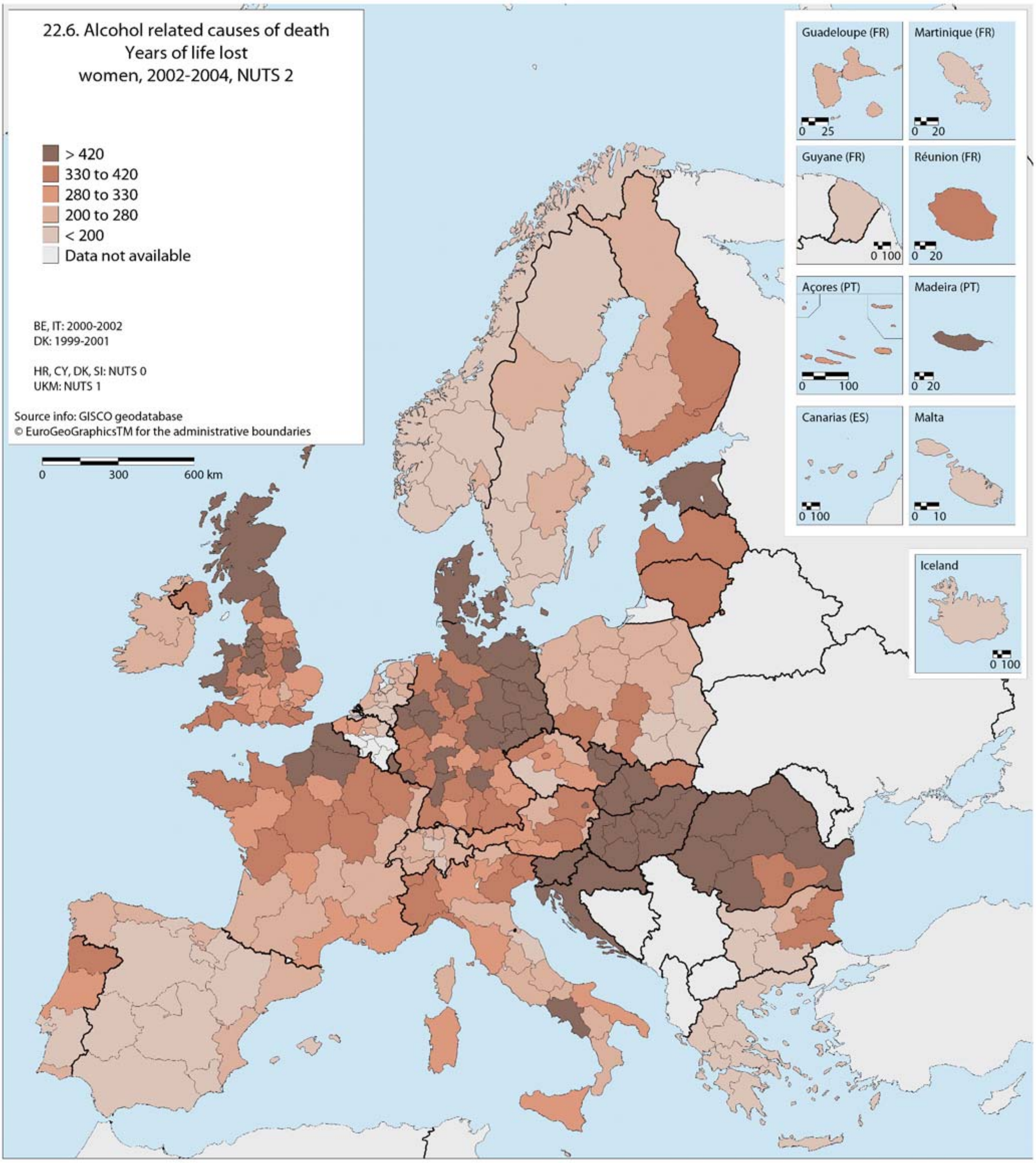
22.6. Alcohol related causes of death
Years of life lost
women, 2002-2004, NUTS 2
> 420
330 to 420
280 to 330
200 to 280
< 200
Data not available
BE, IT: 2000-2002
DK: 1999-2001
HR, CY, DK, SI: NUTS 0
UKM: NUTS 1
Source info: GISCO geodatabase
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23 Typologies of mortality based on factor analysis

Similarities in environmental, cultural and socioeconomic conditions may be expected within countries and between regions that are located close to each other. Therefore, inspection of the geographical pattern of mortality profiles may provide evidence of these underlying factors. As mentioned in the introduction, the reader should note that diagnosis of disease and classification of cause of death are culturally determined and may cause spurious typologies.

In order to construct regional profiles, an analysis of mortality data by cause of death was carried out using factor analysis. Factor analysis is a statistical data reduction technique used to explain variability among many observed variables in terms of fewer unobserved 'latent' variables. The observed variables are modelled as linear combinations of latent variables (plus 'error' terms). In this model a number of the most important cause of death profiles were constructed as multidimensional latent variables, termed also the common factors. Factor scores computed for individual regions make it possible to classify any single region on several scales, each scale defined by a factor or factor combinations as the classification criterion. This approach offers an alternative to cluster analysis, where each unit can only belong to one cluster. Instead, we focus on several dimensions of mortality simultaneously. Factor analysis was applied in an explanatory way, which assumes that the number and nature of factors were not known a priori. A factor selections procedure enabled us to reduce the initial information contributed by all causes of death and regions to a minimum set of underlying factors that largely accounted for the variation observed in the complete dataset. The typical cause of death profiles were identified irrespective of the mortality intensity.

The period 2002-2004 is considered for the regions of the European Union and age standardised death rates (based on the direct standardisation method using the WHO 1976 standard population) for all ages were taken into account. For three countries data for other periods were used: Denmark (1999-2001), Italy (2000-2002) and Belgium (2000-2002). Data used in the analysis refer to 272 regions and 25 causes of death (12 for men and 13 for women).

In principle the same causes of death were selected as the ones shown in this Atlas. However, since the causes overlap, the following were excluded from the analysis: tuberculosis and HIV/AIDS (covered by the general group of infectious diseases), diseases of the circulatory system, external causes and alcohol-related causes (covered by the more specific causes).

In the factor model, seven significant factors (eigenvalues larger than or close to 1) are extracted that explain 83.9 percent of the data variability. Factor 1 is correlated most strongly with mortality from colon cancer and from other malignant neoplasms (males and females). Also, male lung cancer and female breast cancer show high correlation with this first factor. A factor complementary to factor one is factor six, which correlates to female lung cancer and pneumonia and influenza. Mortality from remaining cancers is usually strongly associated with mortality from major cancers (lung cancer for men, breast and lung cancer for women). This is partly because smoking increases the risk of many cancers and partly because of misclassifications of cancer sites. Because of this association, it is not surprising that the category of remaining cancers mortality has become part of both factors 1 and 6, which both include lung cancer. Also, another lifestyle factor such as an unhealthy diet is correlated to these factors through cancer from colon, rectum and anus.

The factor scores are the values of the identified factors for each region. In maps 23.1 to 23.7 they are plotted for each individual factor. The further a score is from zero, the larger the region's deviation from the overall mean of the European Union. Positive changes indicate an increasing force of mortality, negative changes a decreasing force of mortality, thus demonstrating the existence of region-specific forces underlying the causes of mortality in the areas studied.

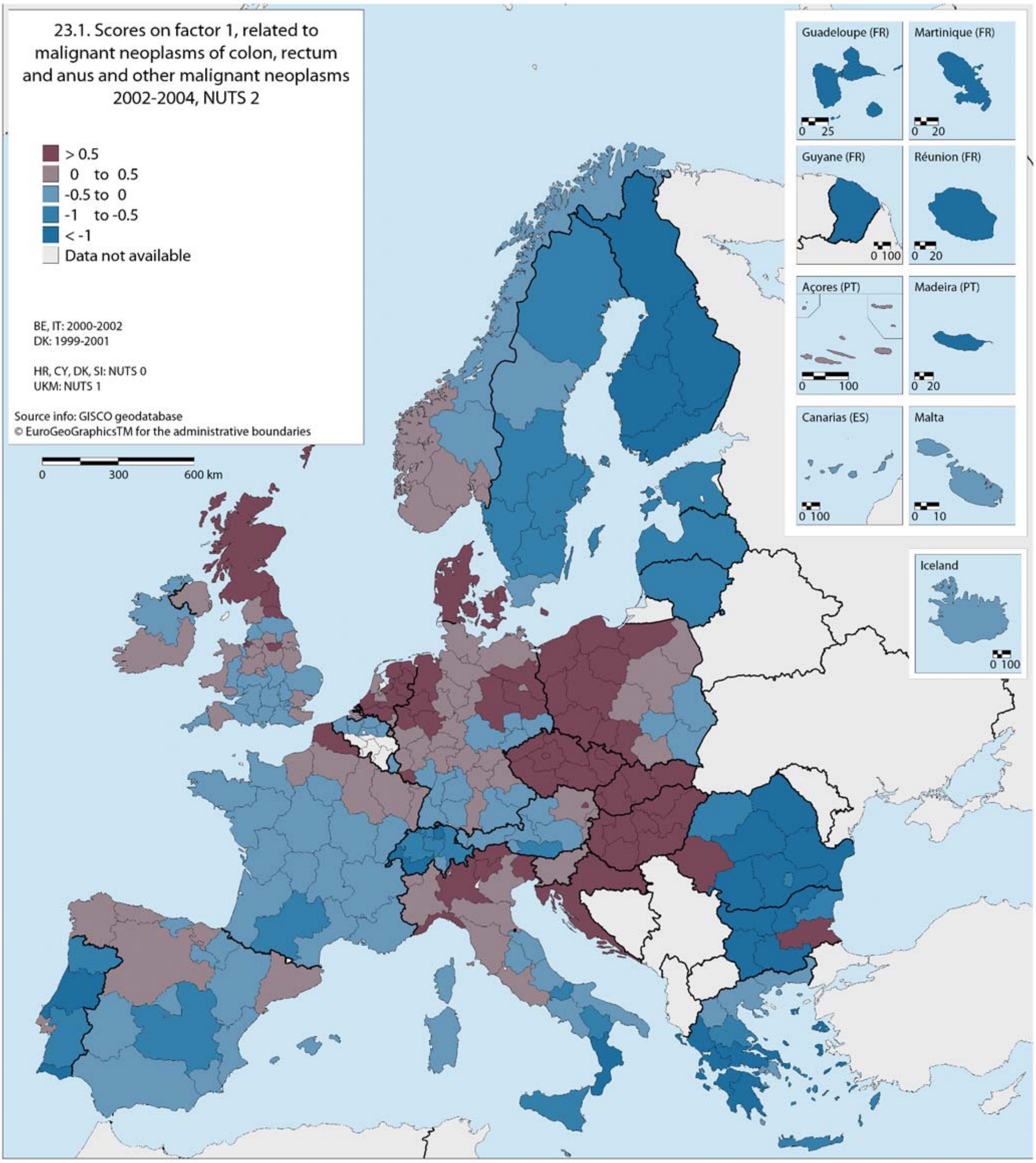
When studying the figures for the different factors (maps 23.1 to 23.7) the reader should be aware that many factors may drive these results, from epidemiology to culture to administrative coding practices. All interpretations are bound to be highly speculative.

Factor 1

This factor strongly relates to the major cancers: malignant neoplasms of the colon, rectum and anus and to other malignant neoplasms, and to a lesser extent also to lung cancer, as well as breast cancer for women. Cancer codes are in general reliable, thus the observed differences may be expected to be true and not spurious. Cancer mortality is higher at lower levels of development. Lower cancer mortality is partly determined by healthier diets with more fresh fruits and vegetables and less meat, lower levels of alcohol consumption and smoking and obesitas. Another important determinant of cancer mortality is effective healthcare: timely and appropriate diagnosis and treatments according to evidence-based guidelines. We observe high levels of this combined cancer mortality in the old industries of Northern England, Scotland, North East France, the industrial Ruhr region in Germany, and the North of Italy. Further high levels are noticed in Denmark, Poland, the Czech Republic, Slovakia, Hungary and Croatia, presumably due to smoking-related cancers. The sharp boundary between the Flemish regions in Belgium and the Netherlands is remarkable but without any reasonable explanation.

Factor 2

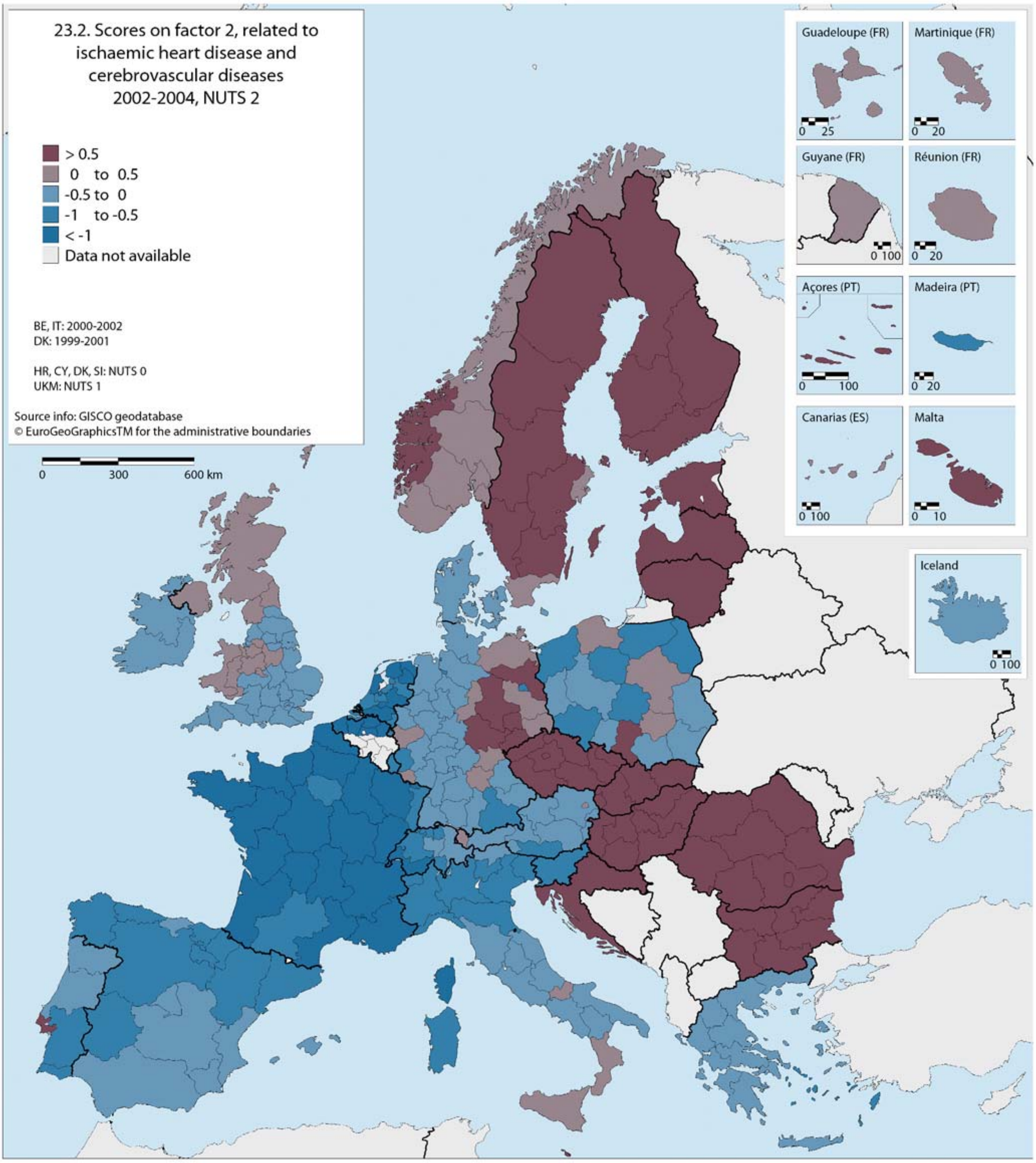
The second factor relates to ischaemic heart disease, to cerebrovascular diseases and, unexpectedly to malignant



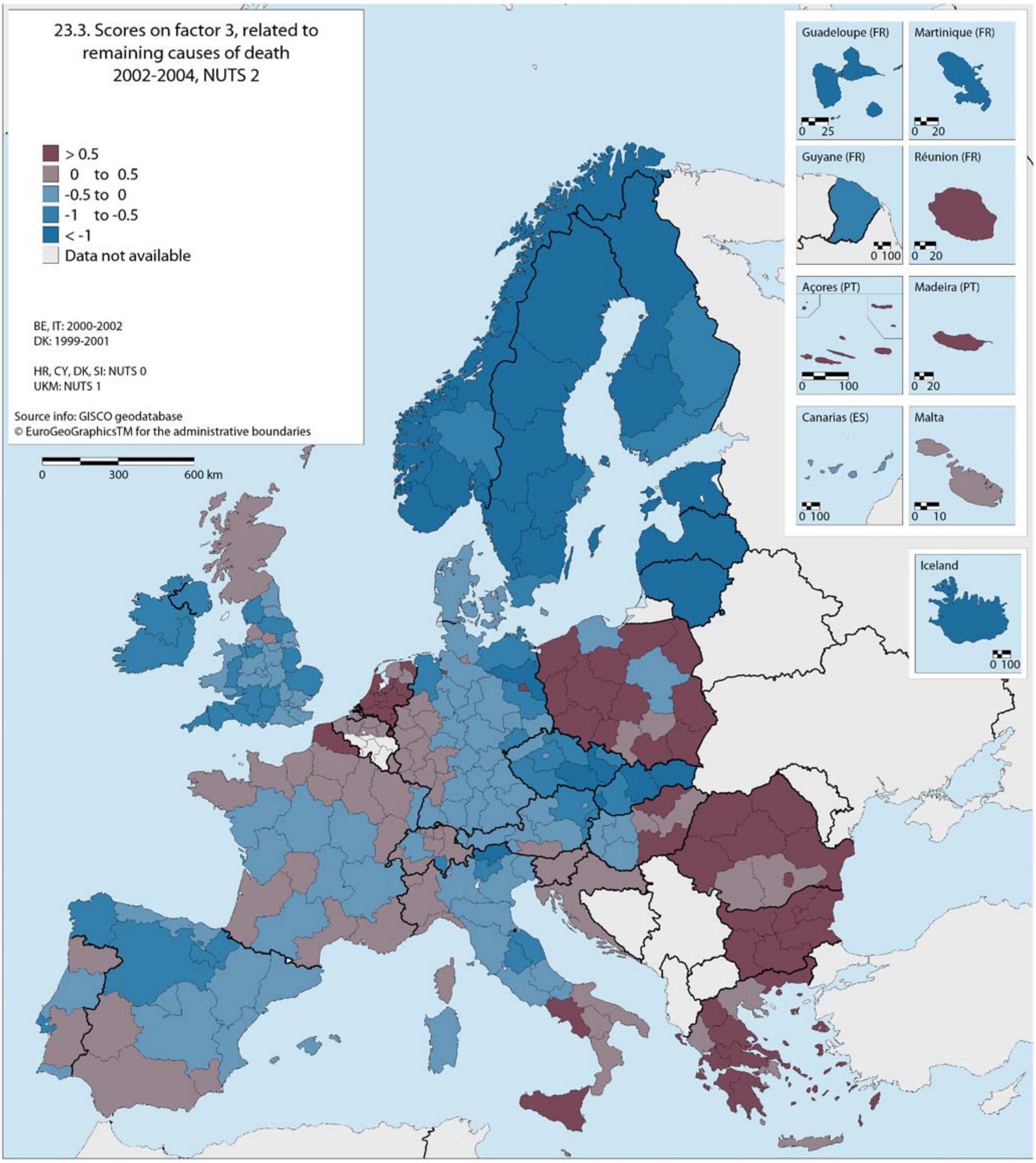
23.1. Scores on factor 1, related to malignant neoplasms of colon, rectum and anus and other malignant neoplasms 2002-2004, NUTS 2

neoplasms of the cervix and other external causes. Here, we have to warn against variance in coding practices. Vascular causes of death (and fatal consequences of falls in old age) are notoriously related to cause of death ascertainment and classification practices. These are frequent causes of sudden death, with missing information or frequent causes of death in elderly, with difficult choices in a multifactorial web of causation.

The relation with cervical cancer is entirely spurious and caused by concomitant high rates of circulatory disease mortality and of cervical cancer mortality by coincidence. The correlation with other external causes could be explained by underlying cardiovascular frailty causing fatal falls, the most important external cause of death other than suicide or transport accidents. This correlation is stronger among men than among women, where the correlation



of fatal falls with vascular frailty is more confounded by osteoporosis-related fractures. The relatively high levels in Nordic countries, compared to other Western European countries, can presumably be explained by both relatively high cardiovascular mortality and high autopsy rates. Ascertainment and classification practices are believed to explain why this factor follows the boundaries between countries. High levels of cardiovascular mortality (and fatal falls) are known to exist from many sources in Romania, Bulgaria, the Czech Republic, Slovakia, Croatia, the Baltic States and Eastern Germany. Relatively lower values in Poland run parallel with higher levels of factor 3, suggesting different classification patterns between cardiovascular disease and ill defined causes. Low mortality rates of circulatory disease (and high life expectancies) exist in the Mediterranean countries. However, the low levels of this

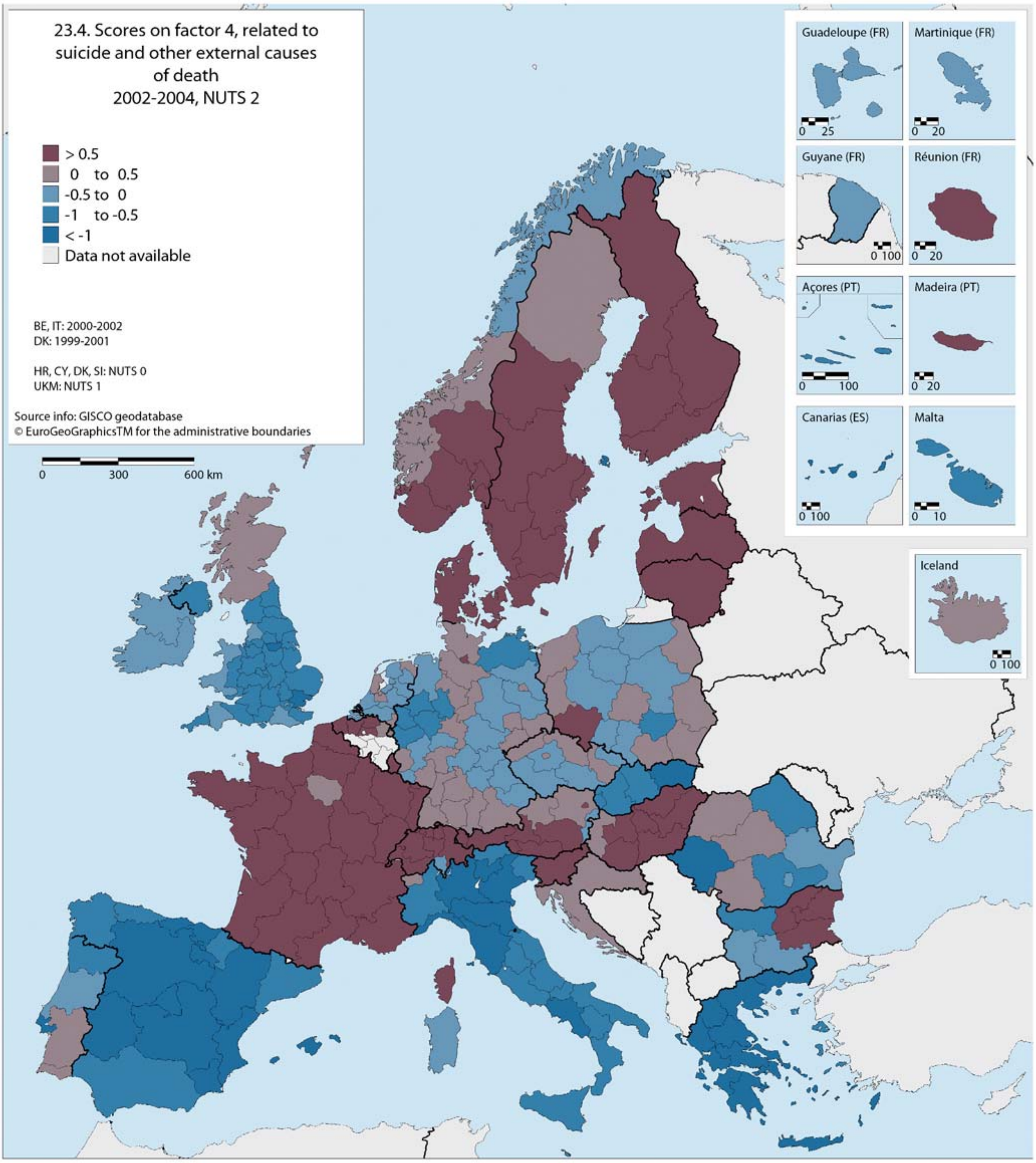


factor in France, the Netherlands and the Flanders region in Belgium are to a certain degree explained by low autopsy rates and lower quality of cause-of-death ascertainment than in the United Kingdom and Nordic countries.

Factor 3

Factor three largely mirrors factor two. Note the trade offs, caused by cause of death ascertainment. This factor relates strongly to remaining causes of death. Uncertain causes of death often cover cardiovascular frailty, causing sudden death in the elderly.

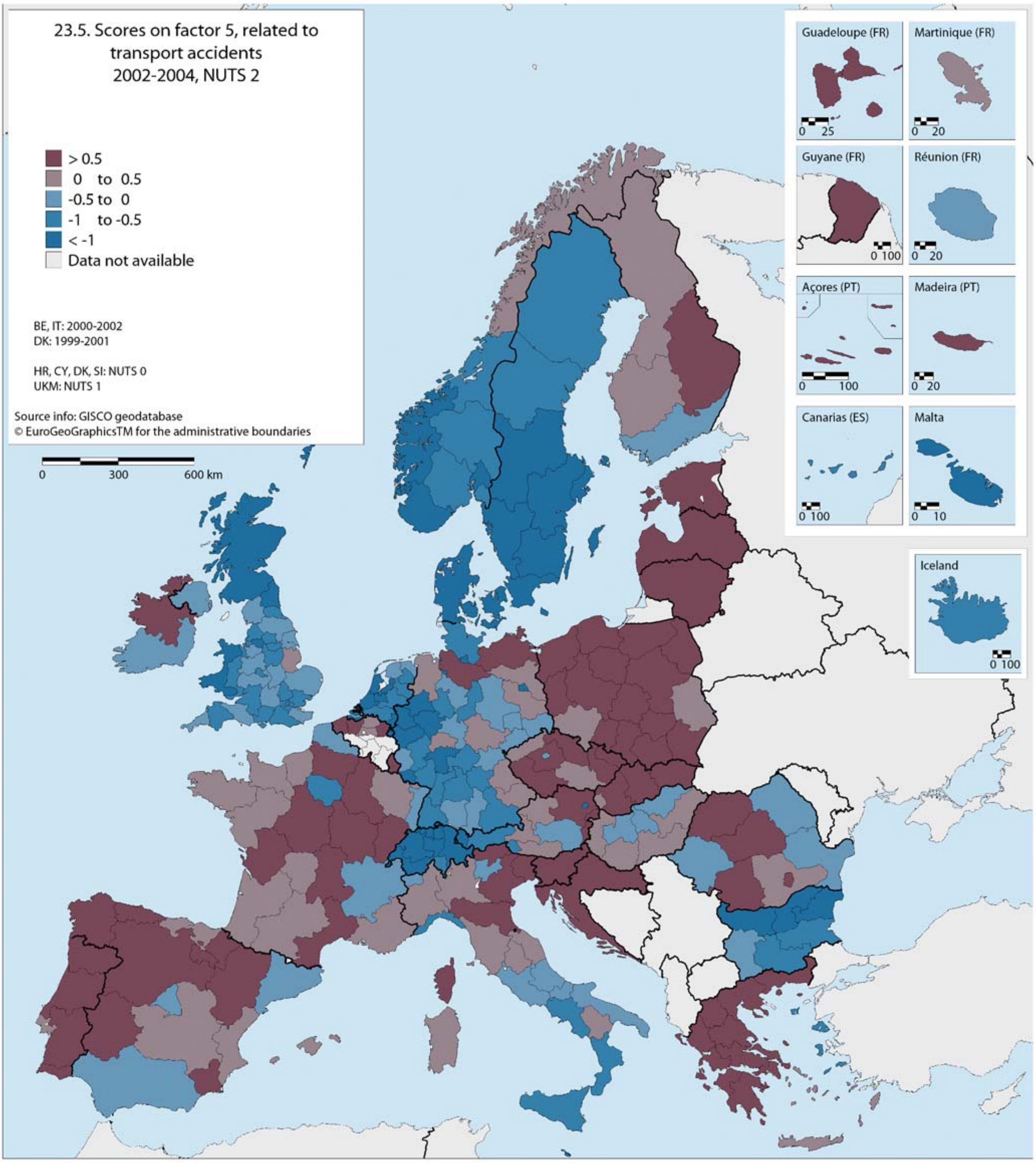
Countries that score high on factor two tend to score low on factor three and vice versa. The Nordic countries score low on factor 3 indeed, while regions in France, Flanders and particularly the Netherlands score high. Poland also scores



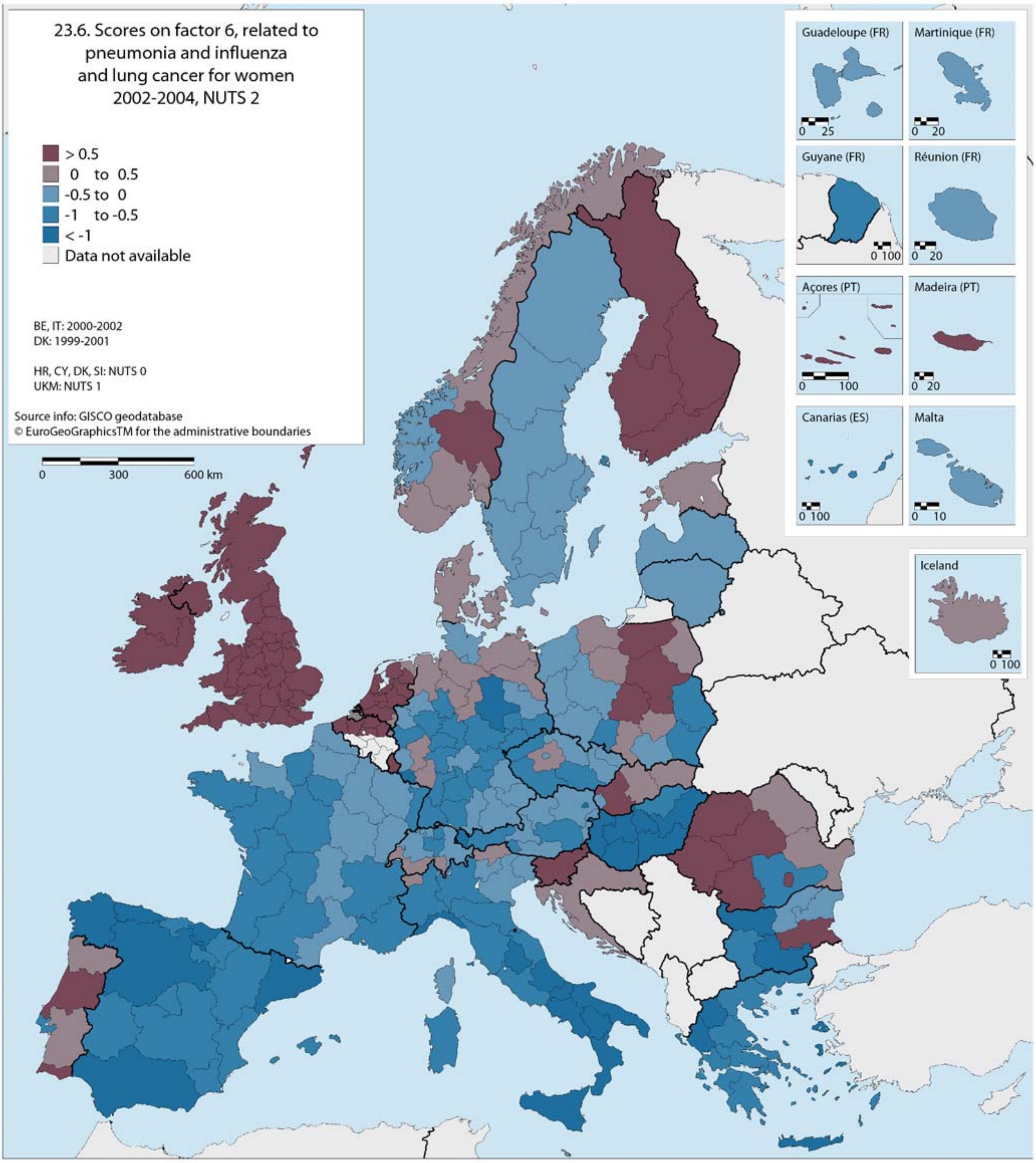
high, while the Czech Republic and Slovakia score low. In a culturally diverse Europe, standardising cause of death ascertainment will be a major challenge. The reader should note that cause of death ascertainment is closely linked to the 'culture of death', and that few things are culturally more important than the way we treat our deceased loved ones. A certain cultural diversity will be inevitable, and is a European asset, not a liability.

Factor 4

The fourth factor is dominated by mortality from suicide and other external causes (non-transport) for women and to a lesser extent for men. These codes of death are moderately reliable, although suicide can be underregistered because of cultural or administrative reasons. The values are strongly correlated to national borders. While in factor 3, this cultural effect was presumably caused by cause of death



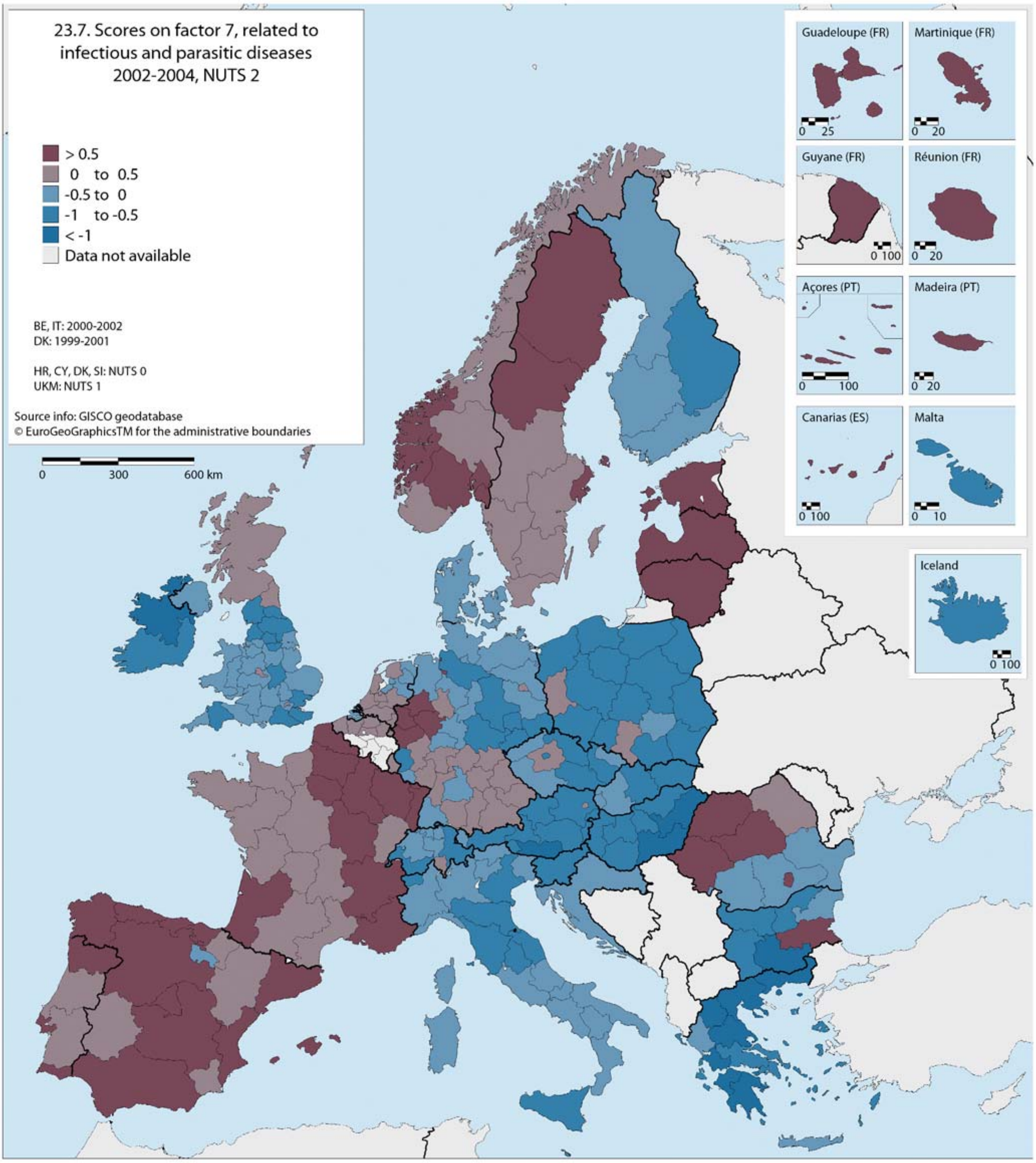
ascertainment, the differences causing high (or low) suicide rates are the result of cultural differences. The concomitant high level of other external causes of mortality can be explained by high levels of other risk-seeking behaviour and low motivation for bodily integrity and survival of the self, leading both to accidents and suicide caused by mental disorders, depression and addiction to alcohol or drugs. Cultures are diverse in their proneness to suicide. A good example is the difference between Flanders (the Dutch speaking part of Belgium) and the Netherlands: culturally and linguistically very similar but with very different suicide rates. While the Belgian and French have the reputation of being more easygoing and the Dutch more moody, factor 4 suggests the opposite. Low levels of suicide in Greece, Italy and Spain have been explained by the stronger presence of the Greek Orthodox and Catholic religions, which forbid



suicide, while high levels of suicide in the Nordic and Baltic States are longstanding. These cultural differences make a fascinating source of European research into the etiology and prevention of suicide.

Factor 5

This factor is dominated by transport accidents and loosely correlated to other causes of death indicating risk-taking behaviour among men, such as lung cancer mortality (smoking) and accident mortality other than road transport accidents. Fatal transport accidents are affected by governance (safe roads and law enforcement of speed limits and drunken driving), population density, healthcare (effective emergency care) and cultural factors regarding risk-taking and car use. Sharp boundaries between countries (e.g. the Flanders region of Belgium,



the Netherlands and Germany or Switzerland, Northern Ireland and the North of Ireland) show the importance of traffic policies.

Factor 6 and factor 7

Factor 6 is dominated by influenza and pneumonia, and factor 7 is dominated by infectious and parasitic diseases, but correlated to prostate cancer, breast cancer and lung cancer among women. The correlated cancers are typically 'reversed' in their social class gradient (increased risks among higher social classes). Mortality from these causes of cancer is high in prosperous countries. Pneumonia and influenza are fatal diseases among the elderly, and therefore liable to various classification practices.

ANNEXES

1. Standard European Population

WHO 1976 Standard European Population

Age group	Population
0	1,600
1-4	6,400
5-9	7,000
10-14	7,000
15-19	7,000
20-24	7,000
25-29	7,000
30-34	7,000
35-39	7,000
40-44	7,000
45-49	7,000
50-54	7,000
55-59	6,000
60-64	5,000
65-69	4,000
70-74	3,000
75-79	2,000
80-84	1,000
85+	1,000
Total	100,000

2. Causes of death, 'European Shortlist'

Final list - August 1998

Nr	Disease or external cause	ICD-10 code	ICD- 9 code	ICD- 8 code
	All causes of death	**A00-Y89**	**001-E999**	**000-E999**
1	*Infectious and parasitic diseases*	*A00-B99*	*001-139*	*000-136*
2	Tuberculosis	A15-A19,B90	010-018, 137	010-019
3	Meningococcal infection	A39	036	036
4	AIDS (HIV-disease)	B20-B24	042-044	-
5	Viral hepatitis	B15-B19	070	070
6	*Neoplasms*	*C00-D48*	*140-239*	*140-239*
7	Malignant neoplasms	C00-C97	140-208	140-209
8	of which malignant neoplasms of lip, oral cavity, pharynx	C00-C14	140-149	140-149
9	of which malignant neoplasm of oesophagus	C15	150	150
10	of which malignant neoplasm of stomach	C16	151	151
11	of which malignant neoplasm of colon	C18	153	153
12	of which malignant neoplasm of rectum and anus	C19-C20-C21	154	154
13	of which malignant neoplasm of liver and the intrahepatic bile ducts	C22	155	155, 197.8
14	of which malignant neoplasm of pancreas	C25	157	157
15	of which malignant neoplasm of larynx and trachea/bronchus/lung	C32-C34	161-162	161-162
16	of which malignant neoplasm of skin	C43	172	172
17	of which malignant neoplasm of breast	C50	174-175	174
18	of which malignant neoplasm of cervix uteri	C53	180	180
19	of which malignant neoplasm of other parts of uterus	C54-C55	179, 182	182
20	of which malignant neoplasm of ovary	C56	183.0	183.0
21	of which malignant neoplasm of prostate	C61	185	185
22	of which malignant neoplasm of kidney	C64	189.0	189.0
23	of which malignant neoplasm of bladder	C67	188	188
24	of which malignant neoplasm of lymph./haematopoietic tissue	C81-C96	200-208	200-209
25	*Diseases of the blood(-forming organs), immunol. disorders*	*D50-D89*	*279-289*	*280-289*
26	*Endocrine, nutritional and metabolic diseases*	*E00-E90*	*240-278*	*240-279*
27	Diabetes mellitus	E10-E14	250	250
28	*Mental and behavioural disorders*	*F00-F99*	*290-319*	*290-315*
29	Alcohol abuse (including alcoholic psychosis)	F10	291, 303	291, 303
30	Drug dependence, toxicomania	F11-F16, F1-8-F19	304-305	304-305
31	*Diseases of the nervous system and the sense organs*	*G00-H95*	*320-389*	*320-389*
32	Meningitis (other than 3)	G00-G03	320-322	320
33	*Diseases of the circulatory system*	*I00-I99*	*390-459*	*390-444.1, 444.3-458, 782.4*
34	Ischaemic heart diseases	I20-I25	410-414	410-414
35	Other heart diseases	I30-I33, I39-I52	420-423, 425-429	420-423, 425-429

Nr	Disease or external cause	ICD-10 code	ICD- 9 code	ICD- 8 code
36	Cerebrovascular diseases	I60-I69	430-438	430-438
37	*Diseases of the respiratory system*	*J00-J99*	*460-519*	*460-519*
38	Influenza	J10-J11	487	470-474
39	Pneumonia	J12-J18	480-486	480-486
40	Chronic lower respiratory diseases	J40-J47	490-494, 496	491-493, 518
41	of which asthma	J45-J46	493	493
42	*Diseases of the digestive system*	*K00-K93*	*520-579*	*520-577, 444.2*
43	Ulcer of stomach, duodenum and jejunum	K25-K28	531-534	531-534
44	Chronic liver disease	K70, K73-K74	571.0-571.9	571.0-571.9
45	*Diseases of the skin and subcutaneous tissue*	*L00-L99*	*680-709*	*680-709*
46	*Diseases of the musculoskeletal system/connective tissue*	*M00-M99*	*710-739*	*710-738*
47	Rheumatoid arthritis and osteoarthritis	M05-M06, M1-5-M19	714-715	712-713
48	*Diseases of the genitourinary system*	*N00-N99*	*580-629*	*580-629, 792*
49	Diseases of kidney and ureter	N00-N29	580-594	580-594
50	*Complications of pregnancy, childbirth and puerperium*	*O00-O99*	*630-676*	*630-678*
51	*Certain conditions originating in the perinatal period*	*P00-P96*	*760-779*	*760-779*
52	*Congenital malformations and chromosomal abnormalities*	*Q00-Q99*	*740-759*	*740-759*
53	Congenital malformations of the nervous system	Q00-Q07	740-742	740-743
54	Congenital malformations of the circulatory system	Q20-Q28	745-747	746-747
55	*Symptoms, signs, abnormal findings, ill-defined causes*	*R00-R99*	*780-799*	*780-782.3, 782.5-791, 793-796*
56	Sudden infant death syndrome	R95	798.0	-
57	Unknown and unspecified causes	R96-R99	798.1-9, 799	795-796
58	*External causes of injury and poisoning*	*V01-Y89*	*E800-E999*	*E800-E999*
59	Accidents	V01-X59	E800-E929	E800-E929, E940-E942
60	of which Transport accidents	V01-V99	E800-E848	E800-E845
61	of which accidental falls	W00-W19	E880-E888	E880-E887
62	of which accidental poisoning	X40-X49	E850-E869	E850-E877
63	Suicide and intentional self-harm	X60-X84	E950-E959	E950-E959
64	Homicide, assault	X85-Y09	E960-E969	E960-E969
65	Events of undetermined intent	Y10-Y34	E980-E989	E980-E989

3. ICD revisions and updates

Country	2002 ICD revision	2002 ICD updates	2003 ICD revision	2003 ICD updates	2004 ICD revision	2004 ICD updates
Belgium: Flanders and Brussels	ICD-10	2002	ICD-10	2003	ICD-10	2004
Belgium: Communauté française (Wallonie)	ICD-10	unknown	ICD-10	unknown	ICD-10	unknown
Bulgaria	ICD-9	-	ICD-9	-	ICD-9	-
Czech Republic	ICD-10	1994	ICD-10	1994	ICD-10	1994
Denmark	-	-	-	-	-	-
Germany	ICD-10	2002	ICD-10	2003	ICD-10	2004
Estonia	ICD-10	2002	ICD-10	2002	ICD-10	2002
Ireland	ICD-9	-	ICD-9	-	ICD-9	-
Greece	ICD-9	-	ICD-9	-	ICD-9	-
Spain	ICD-10	1995	ICD-10	2003	ICD-10	2003
France	ICD-10	2002	ICD-10	2003	ICD-10	2004
Italy	ICD-9	-	ICD-10	2005	-	-
Cyprus	Shortlist	-	Shortlist	-	ICD-10	2004
Latvia	ICD-10	-	ICD-10	-	ICD-10	-
Lithuania	ICD-10	1992	ICD-10	2001	ICD-10	2001
Luxembourg	ICD-10	-	ICD-10	-	ICD-10	-
Hungary	ICD-10	1994	ICD-10	1994	ICD10	1994
Malta	ICD-10	-	ICD-10	-	ICD-10	-
Netherlands	ICD-10	1992	ICD-10	1992	ICD-10	1992
Austria	ICD-10	1999	ICD-10	1999	ICD-10	1999
Poland	ICD-10	1994	ICD-10	1994	ICD-10	1994
Portugal	ICD-10	2002	ICD-10	2002	ICD-10	2002
Romania	ICD-10	-	ICD-10	-	ICD-10	-
Slovenia	-	-	-	-	-	-
Slovakia	ICD-10	-	ICD-10	-	ICD-10	-
Finland	-	-	-	-	-	-
Sweden	ICD-10	2001	ICD-10	2005	ICD-10	2006
United Kingdom (England & Wales)	ICD-10	2001	ICD-10	2001	ICD-10	2001
Croatia	ICD-10	-	ICD-10	-	ICD-10	2004
Macedonia	ICD-9	-	ICD-9	-	ICD-9	-
Turkey	-	-	-	-	-	-
Iceland	ICD-10	-	ICD-10	-	ICD-10	-
Norway	ICD-10	1994	ICD-10	1994	ICD-10	1994
Switzerland	ICD-10	1999	ICD-10	1999	ICD-10	1999
Albania	-	-	-	-	-	-

Source: http://circa.europa.eu/public/irc/dsis/health/library

4. List of NUTS 2 regions

Code	Country or region name
AT	ÖSTERREICH (Austria)
AT11	Burgenland (A)
AT12	Niederösterreich
AT13	Wien
AT21	Kärnten
AT22	Steiermark
AT31	Oberösterreich
AT32	Salzburg
AT33	Tirol
AT34	Vorarlberg
BE	BELGIQUE-BELGIË (Belgium)
BE10	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest
BE21	Prov. Antwerpen
BE22	Prov. Limburg (B)
BE23	Prov. Oost-Vlaanderen
BE24	Prov. Vlaams-Brabant
BE25	Prov. West-Vlaanderen
BE31	Prov. Brabant Wallon
BE32	Prov. Hainaut
BE33	Prov. Liège
BE34	Prov. Luxembourg (B)
BE35	Prov. Namur
BG	BULGARIA
BG31	Severozapaden
BG32	Severen tsentralen
BG33	Severoiztochen
BG34	Yugoiztochen
BG41	Yugozapaden
BG42	Yuzhen tsentralen
CY	KYPROS / KIBRIS (Cyprus)
CY00	Kypros / Kibris
CZ	CESKA REPUBLIKA (Czech Republic)
CZ01	Praha
CZ02	Stredni Cechy
CZ03	Jihozapad
CZ04	Severozapad
CZ05	Severovychod
CZ06	Jihovychod
CZ07	Stredni Morava
CZ08	Moravskoslezsko

Code	Country or region name
DE	DEUTSCHLAND (Germany)
DE11	Stuttgart
DE12	Karlsruhe
DE13	Freiburg
DE14	Tübingen
DE21	Oberbayern
DE22	Niederbayern
DE23	Oberpfalz
DE24	Oberfranken
DE25	Mittelfranken
DE26	Unterfranken
DE27	Schwaben
DE30	Berlin
DE41	Brandenburg - Nordost
DE42	Brandenburg - Südwest
DE50	Bremen
DE60	Hamburg
DE71	Darmstadt
DE72	Gießen
DE73	Kassel
DE80	Mecklenburg-Vorpommern
DE91	Braunschweig
DE92	Hannover
DE93	Lüneburg
DE94	Weser-Ems
DEA1	Düsseldorf
DEA2	Köln
DEA3	Münster
DEA4	Detmold
DEA5	Arnsberg
DEB1	Koblenz
DEB2	Trier
DEB3	Rheinhessen-Pfalz
DEC0	Saarland
DED1	Chemnitz
DED2	Dresden
DED3	Leipzig
DEE0	Sachsen-Anhalt
DEF0	Schleswig-Holstein
DEG0	Thüringen

Code	Country or region name
DK	DANMARK (Denmark)
DK01	Hovedstaden
DK02	Sjælland
DK03	Syddanmark
DK04	Midtjylland
DK05	Nordjylland
EE	EESTI (Estonia)
EE00	Eesti
ES	ESPAÑA (Spain)
ES11	Galicia
ES12	Principado de Asturias
ES13	Cantabria
ES21	País Vasco
ES22	Comunidad Foral de Navarra
ES23	La Rioja
ES24	Aragón
ES30	Comunidad de Madrid
ES41	Castilla y León
ES42	Castilla-La Mancha
ES43	Extremadura
ES51	Cataluña
ES52	Comunidad Valenciana
ES53	Illes Balears
ES61	Andalucía
ES62	Región de Murcia
ES63	Ciudad Autónoma de Ceuta
ES64	Ciudad Autónoma de Melilla
ES70	Canarias
FI	SUOMI / FINLAND
FI13	Itä-Suomi
FI18	Etelä-Suomi
FI19	Länsi-Suomi
FI1A	Pohjois-Suomi
FI20	Åland
FR	FRANCE
FR10	Île de France
FR21	Champagne-Ardenne
FR22	Picardie
FR23	Haute-Normandie
FR24	Centre
FR25	Basse-Normandie
FR26	Bourgogne
FR30	Nord - Pas-de-Calais

Code	Country or region name
FR41	Lorraine
FR42	Alsace
FR43	Franche-Comté
FR51	Pays de la Loire
FR52	Bretagne
FR53	Poitou-Charentes
FR61	Aquitaine
FR62	Midi-Pyrénées
FR63	Limousin
FR71	Rhône-Alpes
FR72	Auvergne
FR81	Languedoc-Roussillon
FR82	Provence-Alpes-Côte d'Azur
FR83	Corse
FR91	Guadeloupe
FR92	Martinique
FR93	Guyane
FR94	Réunion
GR	ELLADA (Greece)
GR11	Anatoliki Makedonia, Thraki
GR12	Kentriki Makedonia
GR13	Dytiki Makedonia
GR14	Thessalia
GR21	Ipeiros
GR22	Ionia Nisia
GR23	Dytiki Ellada
GR24	Sterea Ellada
GR25	Peloponnisos
GR30	Attiki
GR41	Voreio Aigaio
GR42	Notio Aigaio
GR43	Kriti
HU	MAGYARORSZAG (Hungary)
HU10	Kozep-Magyarorszag
HU21	Kozep-Dunantul
HU22	Nyugat-Dunantul
HU23	Del-Dunantul
HU31	Eszak-Magyarorszag
HU32	Eszak-Alfold
HU33	Del-Alfold
IE	IRELAND
IE01	Border, Midland and Western
IE02	Southern and Eastern

Code	Country or region name
IT	ITALIA (Italy)
ITC1	Piemonte
ITC2	Valle d'Aosta/Vallée d'Aoste
ITC3	Liguria
ITC4	Lombardia
ITD1	Provincia Autonoma Bolzano/Bozen
ITD2	Provincia Autonoma Trento
ITD3	Veneto
ITD4	Friuli-Venezia Giulia
ITD5	Emilia-Romagna
ITE1	Toscana
ITE2	Umbria
ITE3	Marche
ITE4	Lazio
ITF1	Abruzzo
ITF2	Molise
ITF3	Campania
ITF4	Puglia
ITF5	Basilicata
ITF6	Calabria
ITG1	Sicilia
ITG2	Sardegna
LT	LIETUVA (Lithuania)
LT00	Lietuva
LU	LUXEMBOURG (GRAND-DUCHÉ)
LU00	Luxembourg (Grand-Duché)
LV	LATVIJA (Latvia)
LV00	Latvija
MT	MALTA
MT00	Malta
NL	NEDERLAND (Netherlands)
NL11	Groningen
NL12	Friesland (NL)
NL13	Drenthe
NL21	Overijssel
NL22	Gelderland
NL23	Flevoland
NL31	Utrecht
NL32	Noord-Holland
NL33	Zuid-Holland
NL34	Zeeland
NL41	Noord-Brabant
NL42	Limburg (NL)

Code	Country or region name
PL	POLSKA (Poland)
PL11	Lodzkie
PL12	Mazowieckie
PL21	Malopolskie
PL22	Slaskie
PL31	Lubelskie
PL32	Podkarpackie
PL33	Swietokrzyskie
PL34	Podlaskie
PL41	Wielkopolskie
PL42	Zachodniopomorskie
PL43	Lubuskie
PL51	Dolnoslaskie
PL52	Opolskie
PL61	Kujawsko-Pomorskie
PL62	Warminsko-Mazurskie
PL63	Pomorskie
PT	PORTUGAL
PT11	Norte
PT15	Algarve
PT16	Centro (P)
PT17	Lisboa
PT18	Alentejo
PT20	Região Autónoma dos Açores
PT30	Região Autónoma da Madeira
RO	ROMÂNIA
RO11	Nord-Vest
RO12	Centru
RO21	Nord-Est
RO22	Sud-Est
RO31	Sud - Muntenia
RO32	Bucuresti - Ilfov
RO41	Sud-Vest Oltenia
RO42	Vest
SE	SVERIGE (Sweden)
SE11	Stockholm
SE12	Östra Mellansverige
SE21	Småland med öarna
SE22	Sydsverige
SE23	Västsverige
SE31	Norra Mellansverige
SE32	Mellersta Norrland
SE33	Övre Norrland

Code	Country or region name	
SI	SLOVENIJA (Slovenia)	
SI01		Vzhodna Slovenija
SI02		Zahodna Slovenija
SK	SLOVENSKA REPUBLIKA (Slovak Republic)	
SK01		Bratislavsky kraj
SK02		Zapadne Slovensko
SK03		Stredne Slovensko
SK04		Vychodne Slovensko
UK	UNITED KINGDOM	
UKC1		Tees Valley and Durham
UKC2		Northumberland and Tyne and Wear
UKD1		Cumbria
UKD2		Cheshire
UKD3		Greater Manchester
UKD4		Lancashire
UKD5		Merseyside
UKE1		East Yorkshire and Northern Lincolnshire
UKE2		North Yorkshire
UKE3		South Yorkshire
UKE4		West Yorkshire
UKF1		Derbyshire and Nottinghamshire
UKF2		Leicestershire, Rutland and Northamptonshire
UKF3		Lincolnshire
UKG1		Herefordshire, Worcestershire and Warwickshire
UKG2		Shropshire and Staffordshire
UKG3		West Midlands
UKH1		East Anglia
UKH2		Bedfordshire and Hertfordshire
UKH3		Essex
UKI1		Inner London
UKI2		Outer London
UKJ1		Berkshire, Buckinghamshire and Oxfordshire
UKJ2		Surrey, East and West Sussex
UKJ3		Hampshire and Isle of Wight
UKJ4		Kent
UKK1		Gloucestershire, Wiltshire and Bristol/Bath area
UKK2		Dorset and Somerset
UKK3		Cornwall and Isles of Scilly
UKK4		Devon
UKL1		West Wales and The Valleys

Code	Country or region name	
UKL2		East Wales
UKM2		Eastern Scotland
UKM3		South Western Scotland
UKM5		North Eastern Scotland
UKM6		Highlands and Islands
UKN0		Northern Ireland
Candidate Countries		
HR	HRVATSKA (Croatia)	
HR01		Sjeverozapadna Hrvatska
HR02		Sredisnja i Istocna (Panonska) Hrvatska
HR03		Jadranska Hrvatska
EFTA countries		
CH	SCHWEIZ/SUISSE/SVIZZERA (Switserland)	
CH01		Région lémanique
CH02		Espace Mittelland
CH03		Nordwestschweiz
CH04		Zürich
CH05		Ostschweiz
CH06		Zentralschweiz
CH07		Ticino
IS	ÍSLAND (Iceland)	
IS00		Ísland
NO	NORGE (Norway)	
NO01		Oslo og Akershus
NO02		Hedmark og Oppland
NO03		Sør-Østlandet
NO04		Agder og Rogaland
NO05		Vestlandet
NO06		Trøndelag
NO07		Nord-Norge

5. Life tables for EU-15 in 2003, for men and women

Male life table

Age group	$_nD_x$	$_nN_x$	x	n	$_nm_x$	$_na_x$	$_nq_x$	l_x	$_nL_x$	T_x	e_x
0	9855	2044407	0	1	0.0048	0.058	0.0048	100000	99548	7591244	75.9
1-4	2108	8212603	1	4	0.0003	1.637	0.0010	99520	397839	7491697	75.3
5-9	1361	10421393	5	5	0.0001	2.5	0.0007	99418	496928	7093857	71.4
10-14	1838	11240918	10	5	0.0002	2.5	0.0008	99353	496563	6596929	66.4
15-19	6459	11459807	15	5	0.0006	2.5	0.0028	99272	495661	6100367	61.5
20-24	10384	12030439	20	5	0.0009	2.5	0.0043	98993	493897	5604706	56.6
25-29	11217	12625183	25	5	0.0009	2.5	0.0044	98566	491739	5110809	51.9
30-34	14867	14318212	30	5	0.0010	2.5	0.0052	98129	489376	4619070	47.1
35-39	21788	15349808	35	5	0.0014	2.5	0.0071	97621	486380	4129693	42.3
40-44	31869	14434521	40	5	0.0022	2.5	0.0110	96931	481994	3643313	37.6
45-49	46511	12966153	45	5	0.0036	2.5	0.0178	95867	475073	3161319	33.0
50-54	67880	12274339	50	5	0.0055	2.5	0.0273	94163	464392	2686246	28.5
55-59	92797	11105669	55	5	0.0084	2.5	0.0409	91594	448601	2221854	24.3
60-64	128372	9893405	60	5	0.0130	2.5	0.0628	87846	425429	1773253	20.2
65-69	180526	8732040	65	5	0.0207	2.5	0.0983	82326	391399	1347824	16.4
70-74	245868	7210544	70	5	0.0341	2.5	0.1571	74234	342015	956424	12.9
75-79	300020	5316903	75	5	0.0564	2.5	0.2473	62572	274181	614410	9.8
80-84	300262	3206034	80	5	0.0937	2.5	0.3794	47100	190823	340229	7.2
85+	367416	1878080	85	-	0.1956	-	1.0000	29229	149406	149406	5.1

The calculations of the Years of life lost (YLL) need a standard life table. As a standard life table, the life table for the total of EU-15 countries was used, separately for men and women. These standard life tables are given in this annex.

Another option could have been to use the EU-27 life tables instead of the EU-15 life tables. However, comparing each country to this EU-27 life table is not very useful as this is the average of countries with rather heterogeneous mortality patterns. The difference between the mortality pattern in the EU-15 countries and most Central and Eastern European Member States is that big that comparing age patterns of mortality of each country to the EU-27 average is not very meaningful. For example, in 2004 the average life expectancy at birth of men in the EU-15 countries equalled 77 years compared with 70 years in the 12 Central and Eastern European EU-27 countries. This big difference would imply that life expectancies of all EU-15 countries for all (or almost all) ages are higher than the EU average and that of most other EU-27 countries would be below this average. The fact that life expectancies in EU-15 countries are higher than the EU average would not imply that those countries are performing well, but rather that the EU average has become low due to the fact that life expectancies in Central and Eastern European Member States are relatively low.

Comparing mortality of each country to the EU-15 average is much more meaningful, both for the EU-15 countries themselves and for 12 Central and Eastern European EU countries. For the EU-15 countries comparisons with the EU-15 average show at which ages each country has relatively low death rates and at which age death rates are relatively high. The comparison with the EU-15 average shows clearly the comparative strengths and weaknesses of each country. A comparison with the EU-27 average would give a less balanced picture. Since the EU-27 average is lower than the EU-15 average, a comparison with the EU-27 average could lead to biased conclusions. The relative strengths of each EU-15 country would be overestimated and the relative weaknesses would be underestimated.

For Central and Eastern European Member States a comparison with the EU-15 average is useful as it shows how much death rates would have to decline to achieve the same life expectancy as EU-15 countries.

Female life table

Age group	$_nD_x$	$_nN_x$	x	n	$_nm_x$	$_na_x$	$_nq_x$	l_x	$_nL_x$	T_x	e_x
0	7746	1942123	0	1	0.0040	0.064	0.0040	100000	99628	8160236	81.6
1-4	1701	7812675	1	4	0.0002	1.516	0.0009	99603	398195	8060608	80.9
5-9	998	9905726	5	5	0.0001	2.5	0.0005	99516	497454	7662413	77.0
10-14	1223	10677422	10	5	0.0001	2.5	0.0006	99466	497187	7164958	72.0
15-19	2573	10890436	15	5	0.0002	2.5	0.0012	99409	496751	6667771	67.1
20-24	3326	11678103	20	5	0.0003	2.5	0.0014	99292	496104	6171020	62.2
25-29	4069	12320008	25	5	0.0003	2.5	0.0017	99150	495342	5674916	57.2
30-34	6247	14021803	30	5	0.0005	2.5	0.0022	98987	494382	5179574	52.3
35-39	10566	15057929	35	5	0.0007	2.5	0.0035	98766	492967	4685192	47.4
40-44	16627	14323842	40	5	0.0012	2.5	0.0058	98420	490678	4192224	42.6
45-49	24711	13012992	45	5	0.0019	2.5	0.0095	97851	486943	3701546	37.8
50-54	35531	12410935	50	5	0.0029	2.5	0.0142	96926	481187	3214603	33.2
55-59	47602	11334109	55	5	0.0042	2.5	0.0208	95549	472779	2733416	28.6
60-64	65590	10431737	60	5	0.0063	2.5	0.0310	93563	460575	2260637	24.2
65-69	99003	9782923	65	5	0.0101	2.5	0.0494	90667	442149	1800062	19.9
70-74	158727	8934251	70	5	0.0178	2.5	0.0851	86193	412636	1357913	15.8
75-79	259460	7905347	75	5	0.0328	2.5	0.1517	78862	364408	945277	12.0
80-84	366528	5919216	80	5	0.0619	2.5	0.2681	66901	289666	580870	8.7
85+	820639	4880502	85	-	0.1682	-	1.0000	48965	291204	291204	6.0

6. Glossary of terms

AIDS	Acquired immune deficiency syndrome
AMI or MI	Acute myocardial infarction
BMI	Body mass index
CDR	Crude death rate
COD	Causes of death
DALY	Disability adjusted life years
e_x	Life expectancy at age x
HDL	High density lipoprotein
HIV	Human immunodeficiency virus
HPV	Human papillomavirus
HRT	Hormone replacement therapy
ICD	International statistical classification of diseases and related health problems, a classification maintained by WHO
IHD	Ischaemic heart disease
IMR	Infant mortality rate
LDL	Low density lipoprotein
MDR-TB	Multidrug-resistant tuberculosis
MRSA	Methicillin resistant Staphylococcus aureus
NUTS	Nomenclature of territorial units for statistics, for details please see http://ec.europa.eu/comm/eurostat/mon/nuts/splash_regions.html
PAP smears	A screening test detected by the Greek doctor Georgis Papnicola
PYLL	Potential years of life lost
RNA	Ribonucleic acid
RTAs	Road traffic accidents
SDR	Age standardised death rate
TB	Tuberculosis
WHO	World health organization
YLL	Years of life lost

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