

Electronic availability of EURO CARE-3 data: a tool for further analysis

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The EURO CARE-3 CD-ROM has been developed to provide more detailed data with respect to those published in the monograph. The CD-ROM provides estimates of age-specific and age-standardised survival figures, cumulative and interval-specific survival, observed and relative survival for 47 cancer sites or combinations of sites, based on >4 million adult cancer patients diagnosed from 1983 to 1994 and reported from 56 European cancer registries. In addition, the CD-ROM provides observed survival proportions for 25 childhood cancer entities based on 23 000 young patients diagnosed from 1990 to 1994. Survival indicators, corresponding standard errors and confidence intervals can be selected according to cancer site, registry or country, sex, age class and disease duration. Basic graphical display and export facilities have also been provided. As an example of how to use this CD-ROM, this paper will report a descriptive analysis of relative survival patterns for all cancers combined, by age, sex and country. The EURO CARE-3 CD-ROM can be ordered free of charge or directly downloaded at <http://www.eurocare.it>.

Introduction

The analysis of survival data from European cancer patients carried out in the framework of EURO CARE-3 has generated a large set of indicators, which was impossible to present extensively in the printed form of a single monograph. Estimates of age-specific and age-standardised survival, cumulative and interval-specific survival, observed and relative survival are instead provided on CD-ROM for each cancer site and each contributing registry. A highly summarised presentation of results is provided in this monograph. The main tables of the core article [1] show only sex- and age-specific survival estimates for the European pool and age-standardised ratios for individual countries and registries, restricted to patients diagnosed in the period 1990–1994. Further, the temporal trends in survival during the period 1983–1994 are briefly presented in the monograph [2] only for a few cancer sites.

One of the reasons for this editorial choice was the desire to provide all the available data in electronic format, the full set of results being made available on the CD-ROM accompanying this issue. The access to the data in electronic format also facilitates the dissemination of complete information on the data analyses performed in EURO CARE-3 and the export of results in a tabulated format so that further analyses may be carried out by use of external statistical and graphical software. The aims of this paper are to describe the contents of the EURO CARE-3 CD-ROM, to give some basic instructions on its use and to provide an elaborate

example of analysing survival data for all cancers in the European population.

Data contained in the CD-ROM

The EURO CARE-3 CD-ROM includes the results of survival analysis with respect to 4.2 million patients diagnosed in Europe from 1983 to 1994, 2 million of whom were diagnosed from 1990 to 1994. Separated sections are provided to present survival data for adult age (15–99 years) and for childhood (0–14 years). General population life tables for the involved cancer registry areas, used for the estimation of relative survival, are also included. The survival data and other statistics are available only at an aggregated level.

A specific analysis run of the EURO CARE database was carried out to provide the information contained in the CD-ROM. The analysis for adult patients has been done using 1-year follow-up intervals, in order to provide yearly interval-specific survival probabilities, particularly useful to derive further analyses, including survival modelling. This causes some minor differences with the data published in the monograph that are based, as for EURO CARE-1 and EURO CARE-2, on 6-month follow-up intervals. Cumulative survival estimates calculated with different follow-up intervals are expected to differ slightly when some cases are censored alive. In practice, these differences usually range between 0.1 and 0.3 percentage units, and do not exceed one percentage unit.

The CD-ROM has been organised into six sections. The first section contains survival data of adult patients for the incidence period 1990–1994 [3], cross-classified according to five descriptor variables: cancer site (47 sites or combinations of sites); population (Europe, 22 countries, 53 registry areas); sex; age (five age

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classes, all ages crude, all ages standardised); and period of follow-up (in years since diagnosis). The sixth descriptor variable, i.e. period of diagnosis, has not been considered in this section because it was kept constant as 1990–1994. The following 16 survival indicators are available for each combination of levels of the above listed descriptor variables.

- 1 Numbers of cases considered in the survival analysis.
- 2 Number of survivors at the start of the considered follow-up interval.
- 3 Number of deaths observed during the considered follow-up interval.
- 4 Number of cases censored alive during the considered follow-up interval.
- 5 Interval-specific observed survival proportions.
- 6 Cumulative observed survival proportions.
- 7 Interval-specific expected survival proportions.
- 8 Cumulative expected survival proportions.
- 8 Interval-specific relative survival ratios.
- 10 Cumulative relative survival ratios.
- 11 Standard error of interval-specific observed survival proportions.
- 12 Standard error of cumulative observed survival proportions.
- 13 Standard error of interval-specific relative survival ratios.
- 14 Standard error of cumulative relative survival ratios.
- 15 Lower bound of 95% confidence intervals of cumulative relative survival ratios.
- 16 Upper bound of 95% confidence intervals of cumulative relative survival ratios.

For all age classes combined, indicators 5, 6 and 9–16 are provided in both crude and age-standardised ways, with two different standard age distributions. The first standard distribution (the EUROCORE-3 standard) is based on the actual number of patients included in the analysis 1990–1994, and is available on the CD-ROM in Section 6. This standard differs according to cancer site, but it remains common for men and women. It is also similar, but not identical, to the previous EUROCORE-1 and EUROCORE-2 standard distributions.

The second standard is a theoretical age distribution [International Cancer Survival Standard (ICSS)] valid for groups of cancer sites, each of which is characterised by a similar age pattern of incidence. Its main purpose is to provide a simple and constant standard distribution for survival comparisons between different studies worldwide. The age-specific proportions of this second standard are also presented in the sixth section of the CD-ROM. The rationale and method for this standard will be reported in detail in a forthcoming article (Corazziari I, Capocaccia R, Quinn M. A theoretical standard population for survival comparisons.). Age-adjusted survival ratios have not been presented when no cases had been observed in one or more age classes. This frequently happens for many registries in less frequent cancer sites.

The second section deals with time trends in adult patients' survival; the data being presented for four incidence periods—1983–1985, 1986–1988, 1989–1991 and 1992–1994—and only for those 35 cancer registries which collected data for all of these periods. This section includes the same indicators as the first, similarly stratified by period of diagnosis, site, population, age, sex

and duration. Due to the longer follow-up for earlier periods, survival indicators have been provided, when available, up to 13 years from diagnosis.

The third section contains page views of the European tables presented in the monograph [1]. Country-specific tables by cancer site, similar to those appearing in previous monographs, may also be displayed.

The fourth section presents the cancer registry population-specific life tables that were collected in the framework of the EUROCORE project and used for the calculation of relative survival ratios [4]. Either mortality rates or annual expected survival probabilities for all causes combined have been presented by registry population, calendar year, sex and 1 year age classes.

The fifth section contains survival data for childhood cancers diagnosed in the incidence period 1990–1994 [5], cross-classified according to five descriptor variables: cancer type (25 major diagnostic entities defined according to site and morphology); population (Europe and 20 countries); sex; age (0, 1–4, 0–4, 5–9, 10–14 and 0–14 years); and follow-up interval (in years since diagnosis). The following three indicators are available for each combination of level of the above listed descriptor variables.

- 1 Numbers of cases considered in the survival analysis.
- 2 Cumulative observed survival proportions.
- 3 Standard error of cumulative observed survival proportions.

Finally, the sixth section allows the user to access three accessory tables:

- 1 Weights: country-specific weights for the calculation of European survival figures.
- 2 Standard: standard age distributions, both EUROCORE-3 and ICSS, for the calculation of age-standardised rates.
- 3 ASRS: age-standardised (5-year) relative survival ratios by cancer site, sex and registry. The file provides a complete set of age-adjusted relative survival ratios by cancer site, sex and registry obtained by means of a modelling approach [3]. These age-adjusted ratios have been estimated by using observed data, whenever available, and model-based estimates to replace missing age-specific relative survival ratios. In any case, age-adjusted ratios have not been calculated for site–registry–sex combinations with three or more missing age-specific values.

Use of the CD-ROM

Sections 1 and 2

The information contained in Sections 1 and 2 of the CD-ROM can be selected by using six descriptor variables: site (47 levels); population (60 levels); period (single level in the first section, four levels in the second section); sex (three levels); age (eight levels); and duration (13 levels). Sixteen output survival indicators, as listed in items 1–16 previously, are available. A survival table may be created by selecting: (i) an appropriate subset of levels for each descriptor variable; and (ii) a subset of survival indicators.

Indicator and descriptor variables are selected in the 'Selection' windows. Multiple levels can be selected for each descriptor. If no level of a given descriptor has been specified, then all levels will be included. Each combination of descriptor variables' levels will

identify a specific subset of patients for which a single line of related survival indicators will be written in the output table. When no data are available for a given combination, the output will be suppressed. The output table thus contains one line for each combination of the selected levels of the descriptor variables for which data are available.

Each subset of indicators can be selected into the output table using the 'Output' window. The output table has been divided into six columns (the number of descriptor variables), plus one additional column for each selected indicator. The rank of the selected descriptor variables can also be defined: higher ranks correspond to slower changing variables in the table.

Either bar charts or line charts can be produced from a given output table using the 'Graph' option. Charts can be produced selecting any pair of x,y variables and, optionally, a grouping variable. The output table can be exported into an external file for further analysis either in a text or spreadsheet format.

Section 3

In this section, selecting any subset of cancer sites and countries, it is possible to access European and country-specific output pages for survival analysis 1990–1994, in PDF format.

Section 4

Population life tables used in EURO-CARE-3 analyses can be accessed selecting registry, period and sex. Age-specific mortality rates and life expectancies have been provided for each of these selections.

Section 5

Childhood cancer survival information in the period 1990–1994 is available in this section and may be selected by five descriptor variables: diagnostic group (25 levels); population (21 levels); sex (three levels); age (six levels); and duration (seven levels). Three indicator variables, as listed above, can be chosen. An output table may be created by selecting an appropriate subset of levels for each descriptor and indicator variables, with the same facilities supplied by Section 1.

Section 6

The three tables previously described can be accessed directly in this window.

Example: age-specific survival for all cancers combined

A survival output table has been generated with the aim of illustrating a very simple application. From Section 1, the following selection has been made:

Descriptor variables:

- Site: all cancers
- Population: 22 countries, and Europe
- Period: 1990–1994 (constrained)

- Sex: men, women
- Age: 15–44, 45–54, 55–64, 65–74, 75–99
- Duration: 5 years

Indicator variables:

- Cumulative relative survival ratios.
- Standard error of cumulative relative survival ratios.

No data are available for Portugal on all cancers combined. The resulting output table consists of $22 \times 2 \times 5 = 220$ lines, one for each combination of descriptors levels, and $6 + 2 = 8$ columns. To simplify the presentation, the data have been rearranged in the form shown in Table 1. The highest survival ratios are observed for the 15–44 year age class. Between-country variation is very high in all age classes.

The age patterns of survival in this output table can be highlighted more expressively in its graphic form. The bar charts given in Figure 1 have been drawn by exporting the output table into Excel. The bars represent country-specific relative survival and corresponding European estimates for the youngest cancer patients. Ninety-five per cent confidence intervals are also illustrated. Northern and eastern countries show systematically higher and lower survival ratios compared with Europe, respectively. Central and southern European countries show survival ratios close to the mean European values. Survival ratios from French and Dutch registries are slightly below the European level for women, and above the corresponding average for men. Differences from the overall analysis were found for Denmark and UK, two countries that presented low age-standardised ratios in Europe. Survival of young men is 7% higher in Denmark and 4% higher in England and Scotland than in Europe. For young women, both countries present instead survival ratios very close to the European average.

Figure 2 illustrates plots of relative survival trends by age group, for patients aged ≥ 45 years. The first 15–44 year age class has not been included because it gives uniformly higher values in all countries, which tends to flatten the trend representation for older ages. Only trends for some selected countries, with relatively low random variability in survival estimates, are represented. The most striking characteristic is the strong difference in the age pattern between the sexes. Relative survival decreases linearly with age in women in all the represented countries. In men, the survival trend with age is flatter and varies much more between countries. This difference is understandable considering that breast cancer is by far the most frequent cancer in young women, while other cancers with less favourable prognoses, e.g. colon and rectum, become progressively more frequent with advancing age, while in men, lung cancer is the most frequent cancer site at all ages >45 years. It is also interesting to note that in some countries (Norway, Denmark, UK and Italy) male all-age cancer survival appears to decrease, even if only slowly, while in others (Sweden, Finland, Slovenia and Estonia) it remains constant at ages >55 years. Separate and similar analyses of site-specific survival ratios, not reported here, show a generally decreasing survival trend with increasing age. This suggests that the different age trends observed in all-cancer survival by country may likely depend on a varying case mix with increasing age.

Table 1. Five-year relative survival ratios by age, class, sex and country. All cancers; period of diagnosis: 1990–1994

Men	15–44		45–54		55–64		65–74		75–99	
	Surv.	s.e	Surv.	s.e	Surv.	s.e	Surv.	s.e	Surv.	s.e
AUSTRIA	78.6	3.9	56.8	4.0	55.4	3.0	54.2	2.8	48.7	3.9
CZECH	50.2	4.1	29.9	2.9	28.6	2.1	27.1	2.2	26.4	4.0
DENMARK	69.1	1.6	43.9	1.5	35.2	1.1	33.1	0.9	29.0	1.1
ENGLAND	64.1	0.7	41.1	0.7	34.8	0.4	32.1	0.3	31.2	0.4
ESTONIA	38.2	3.7	25.0	2.3	24.0	1.6	23.9	1.9	25.4	3.3
FINLAND	66.0	1.9	44.2	1.8	39.5	1.2	40.0	1.1	39.7	1.5
FRANCE	58.3	2.7	41.1	2.3	40.6	1.6	45.5	1.7	44.2	2.6
GERMANY	67.3	3.3	39.2	2.7	42.7	1.9	44.8	2.0	42.0	3.4
ICELAND	71.6	7.9	54.1	8.3	48.7	5.6	50.0	4.7	49.9	6.4
ITALY	63.7	1.3	45.0	1.0	40.4	0.7	37.4	0.6	31.3	0.8
MALTA	52.6	10.6	43.8	9.9	39.7	6.6	31.4	5.9	25.8	8.3
NETHERLAND	58.6	2.0	45.2	1.8	40.2	1.3	40.0	1.1	38.1	1.6
NORWAY	72.5	1.7	50.4	1.8	45.9	1.3	44.0	1.0	40.1	1.3
POLAND	43.7	2.9	24.9	2.0	22.1	1.2	20.8	1.3	15.9	1.9
SCOTLAND	64.5	1.8	37.0	1.5	31.2	1.0	28.9	0.8	26.8	1.1
SLOVAKIA	46.4	1.7	25.8	1.3	23.9	1.0	24.3	1.0	26.9	1.8
SLOVENIA	52.6	2.8	31.0	2.1	24.0	1.4	24.3	1.6	24.9	2.6
SPAIN	53.3	1.9	44.2	1.6	41.3	1.1	41.7	1.1	45.5	1.6
SWEDEN	71.3	1.4	51.5	1.3	47.8	0.9	48.4	0.7	46.7	0.9
SWITZERLAND	62.0	5.6	52.7	4.9	44.4	3.7	47.0	3.6	43.0	4.7
WALES	60.9	2.7	36.8	2.1	31.4	1.3	28.5	1.0	29.0	1.3
EUROPE	61.0	0.8	41.0	0.7	38.5	0.5	38.4	0.5	36.1	0.8

Women	15–44		45–54		55–64		65–74		75–99	
	Surv.	s.e	Surv.	s.e	Surv.	s.e	Surv.	s.e	Surv.	s.e
AUSTRIA	76.9	3.3	71.8	3.2	63.4	3.2	57.5	2.8	45.6	3.4
CZECH	69.9	3.1	57.5	3.1	47.5	2.7	39.5	2.5	32.5	3.7
DENMARK	73.5	1.3	63.6	1.1	52.6	1.0	45.1	0.9	35.9	1.1
ENGLAND	72.0	0.5	65.4	0.5	56.0	0.4	40.8	0.4	33.2	0.4
ESTONIA	56.3	2.9	55.2	2.6	42.2	2.0	35.2	2.0	28.0	2.7
FINLAND	77.8	1.3	74.9	1.1	63.9	1.2	49.4	1.1	35.6	1.3
FRANCE	79.7	2.0	75.8	2.2	66.3	1.9	57.1	2.0	44.4	2.5
GERMANY	70.3	2.9	66.7	2.6	57.7	2.2	54.3	2.0	45.6	2.7
ICELAND	77.6	5.1	67.3	5.5	57.6	5.1	47.2	5.5	38.2	6.2
ITALY	76.9	1.0	71.4	0.9	61.7	0.8	51.2	0.7	36.5	0.8
MALTA	77.0	7.0	75.9	6.8	59.7	6.9	49.9	6.8	33.9	8.9
NETHERLAND	75.7	1.4	68.0	1.4	57.8	1.4	52.2	1.3	43.0	1.5
NORWAY	78.2	1.3	68.9	1.4	57.2	1.3	51.0	1.1	40.9	1.3
POLAND	60.6	2.1	52.1	1.9	42.4	1.5	32.2	1.5	20.6	1.7
SCOTLAND	72.1	1.3	61.9	1.2	50.3	1.0	35.5	0.9	28.6	1.0
SLOVAKIA	66.3	1.4	58.7	1.5	47.0	1.3	38.4	1.3	28.2	1.8
SLOVENIA	68.3	2.2	58.9	2.3	49.6	1.9	39.1	1.8	29.7	2.4
SPAIN	73.8	1.6	70.4	1.6	62.3	1.4	52.8	1.4	46.5	1.7
SWEDEN	77.5	1.0	72.0	0.9	62.8	0.9	54.9	0.7	42.8	0.9
SWITZERLAND	80.5	4.1	72.6	3.8	66.8	3.7	59.0	3.8	38.1	3.7
WALES	67.6	2.0	63.2	1.7	52.0	1.4	37.8	1.2	29.0	1.2
EUROPE	72.9	0.7	67.2	0.6	57.7	0.5	48.5	0.5	38.1	0.6

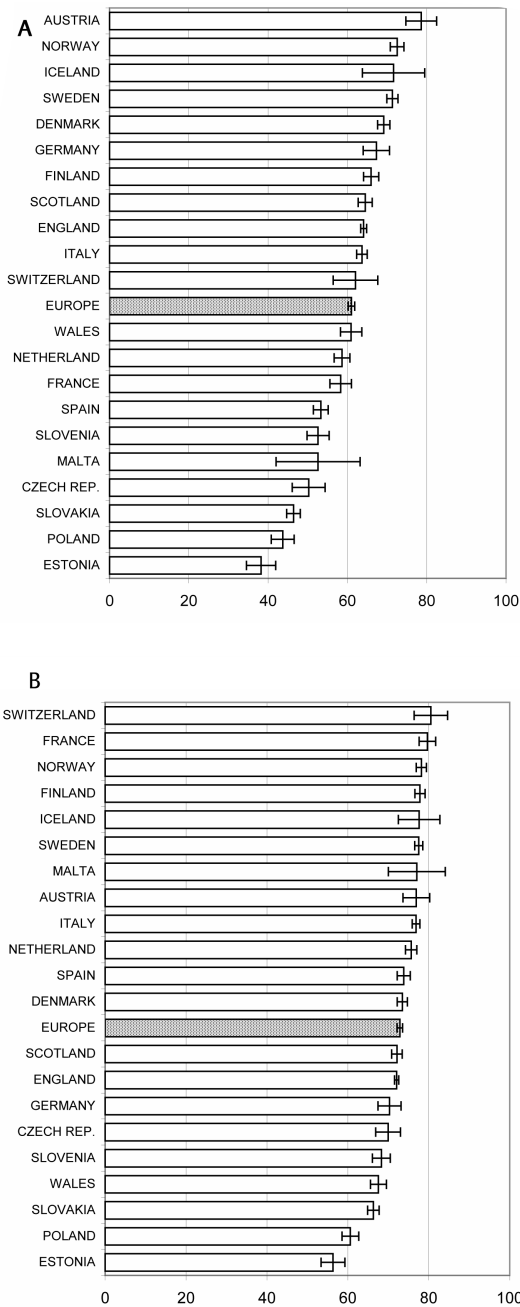


Figure 1. Survival for all cancers at ages 15–44 years: differences between 5-years relative survival ratios in each country and the average European value, with 95% confidence intervals. Analysis of cases diagnosed in the period 1990–1994. (A) Men, (B) women.

Conclusion

The EUROCARE-3 CD-ROM, provides a great quantity of additional data with respect to those published in the monograph. However, the CD-ROM contains no individual data, but only aggregated level survival indicators. A number of graphical and export facilities make the European Cancer Registries' survival data easily accessible to further analyses.

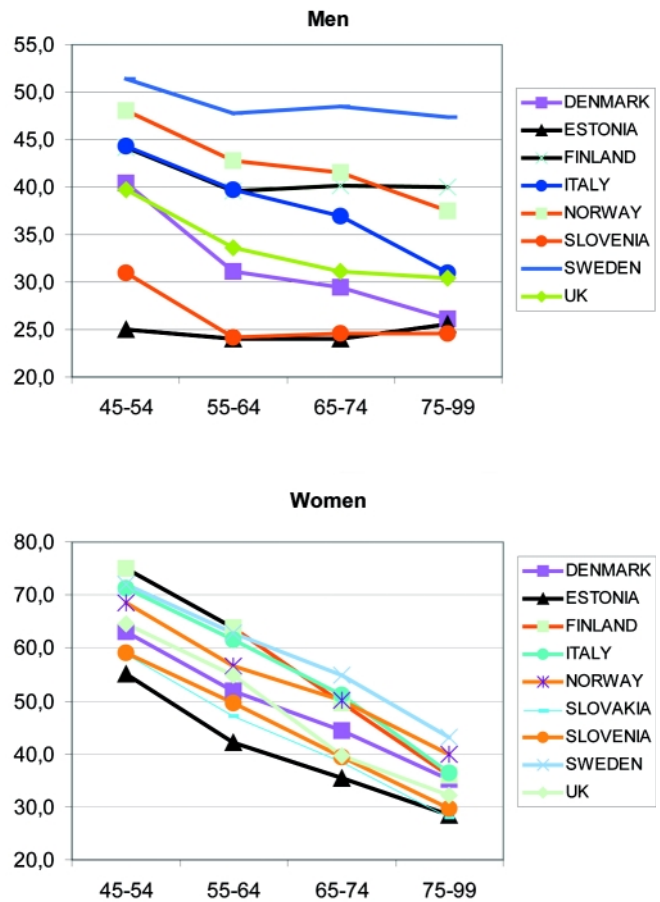


Figure 2. Trends in 'all cancer' relative survival by age. Trends in 5-year relative survival ratios for ages 45–99 years in selected countries. Analysis of cases diagnosed in 1990–1994. (A) Men, (B) women.

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