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Trends in cancer mortality in the European Union and accession countries, 1980–2000

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Cancer mortality rates and trends over the period 1980–2000 for accession countries to the European Union (EU) in May 2004, which include a total of 75 million inhabitants, were abstracted from the World Health Organization (WHO) database, together with, for comparative purposes, those of the current EU. Total cancer mortality for men was 166/100 000 in the EU, but ranged between 195 (Lithuania) and 269/100 000 (Hungary) in central and eastern European accession countries. This excess related to most cancer sites, including lung and other tobacco-related neoplasms, but also stomach, intestines and liver, and a few neoplasms amenable to treatment, such as testis, Hodgkin's disease and leukaemias. Overall cancer mortality for women was 95/100 000 in the EU, and ranged between 100 and 110/100 000 in several central and eastern European countries, and up to 120/100 000 in the Czech Republic and 138/100 000 in Hungary. The latter two countries had a substantial excess in female mortality for lung cancer, but also for several other sites. Furthermore, for stomach and especially (cervix) uteri, female rates were substantially higher in central and eastern European accession countries. Over the last two decades, trends in mortality were systematically less favourable in accession countries than in the EU. Most of the unfavourable patterns and trends in cancer mortality in accession countries are due to recognised, and hence potentially avoidable, causes of cancer, including tobacco, alcohol, dietary habits, pollution and hepatitis B, plus inadequate screening, diagnosis and treatment. Consequently, the application of available knowledge on cancer prevention, diagnosis and treatment may substantially reduce the disadvantage now registered in the cancer mortality of central and eastern European accession countries.

Key words: cancer, Europe, mortality, time trends

Introduction

In the 15 member states of the EU in 2003, overall cancer mortality rates were rising up to 1988, but a reversal of trends has been observed since, with a fall of ~10% in both sexes between 1988 and 1999, corresponding to the avoidance of over 90 000 deaths per year compared with the rates in the late 1980s [1]. The overall favourable pattern of EU cancer mortality over recent years has been largely driven by the decline of lung and other tobacco-related cancer mortality in men [2], but important components of these trends are also the persistent and substantial fall in gastric cancer [3], the recent declines in intestinal cancer [4] and of breast cancer in women [5], together with the long-term falls in cervical cancer [6], leukaemias [7], Hodgkin's disease [8], testicular cancer [9, 10] and other neoplasms that benefit from the advancements in diagnosis and treatment [1]. Over the last few years, for the first time, some levelling of cancer mortality was observed also in the Czech Republic, Poland, Hungary and other central and eastern European countries [1].

In May 2004, 10 additional countries joined the EU, which include a total of ~75 million inhabitants. Of these, eight are central and eastern European countries (the Czech Republic, 10.3 million; Estonia, 1.4 million; Hungary, 10.2 million; Latvia, 2.4 million; Lithuania, 3.5 million; Poland, 38.6 million; Slovakia, 5.4 million; Slovenia, 7 million), and two are mediterranean countries (Cyprus, 0.8 million; Malta, 0.4 million). Since cancer rates in most central and eastern European countries are comparatively high, the inclusion of these countries may unfavourably and appreciably influence future trends in cancer mortality in the EU [11–13]. It is therefore important that recent trends in mortality from major cancer sites in accession countries are considered [1, 14].

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Materials and methods

Official death certification numbers for nine accession countries to the EU (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) were derived from the World Health Organization (WHO) database as available on electronic support [15]. Data for Cyprus were not available. For comparative purposes, data were also abstracted for the 15 member states of the EU in 2003 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the UK).

During the calendar period considered (1980–2000), four different revisions of the International Classification of Diseases (ICD) were used. Classification of cancer deaths was re-coded, for all calendar periods and countries, according to the Ninth Revision (for further details see [1]). To improve validity and comparability of data throughout different countries, we pooled together all intestinal sites including rectum, all uterine cancers (cervix and endometrium) and all non-Hodgkin's lymphomas.

Estimates of the resident population, generally based on official censuses, were obtained from the same WHO database. From the matrices of certified deaths and resident populations, age-specific rates for each 5-year age group (0–4 to 80–84 and ≥85 years) and calendar period were computed. Age-standardised rates per 100 000 population, at all ages and truncated 35–64 years, were computed using the direct method, on the basis of the world standard population.

Results

Total cancer mortality for men was 165.6/100 000 in the EU. Malta had a rate of 157/100 000, whereas the eight central and eastern European accession countries had rates of total cancer mortality ranging between 194.5 in Lithuania and 269.3/100 000 in Hungary (Table 1). The excess mortality in accession countries is related to most cancer sites, including lung (43.7/100 000 for the EU, between 50 and 60/100 000 in most central and eastern European countries, up to 83.1/100 000 in Hungary) and other tobacco-related neoplasms (oral cavity and pharynx, oesophagus, larynx, pancreas, kidney, bladder), but also stomach, intestines (in most countries), liver, gallbladder and prostate (in some, but not all accession countries). There was also an excess mortality for a number of neoplasms for which there have been advances in treatment, including testis, Hodgkin's disease and leukaemias, but not for non-Hodgkin's lymphomas.

Overall cancer mortality for women was 94.5/100 000 in the EU (Table 2). Total cancer mortality rates were similar to that of the EU in Latvia, Lithuania and Malta, but between 100 and 110/100 000 in several other central and eastern European countries, up to 119.7 in the Czech Republic and 138.4/100 000 in Hungary. The pattern was more heterogeneous than for men across sites. In fact, the Czech Republic and Hungary had high female mortality rates for lung, but also for most other cancer sites, whereas other countries showed a more complex pattern. The only sites showing systematically higher mortality in central and eastern European accession countries were stomach, and especially uterus (mainly cervix).

Overall cancer mortality has declined steadily since the mid-1980s in males in the EU, but was still increasing up to the mid-1990s in accession countries, where the most recent overall rates were about one-third higher than in the EU; the trend in men aged 35–64 years, however, appears to have levelled off in the late 1990s (Figure 1). Likewise, total cancer

Table 1. Overall directly age-standardised (world population) death certification rates per 100 000 males from selected cancer or groups of cancer in European Union (EU) accession countries and in the EU in the year 2000 (unless otherwise indicated in parentheses)

	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Malta (1999)	Poland	Slovakia	Slovenia (1999)	EU (1999)
Mouth or pharynx	6.8	9.3	21.2	7.9	9.9	7.2	5.9	16.5	9.1	5.6
Oesophagus	4.8	4.4	8.9	5.5	5.7	3.0	4.8	7.5	7.2	5.7
Stomach	12.0	22.5	17.1	20.5	22.0	12.3	16.1	16.0	17.8	9.5
Intestines	35.8	18.1	35.1	17.6	19.0	17.0	19.5	34.3	25.1	18.8
Liver	7.6	6.0	7.7	5.1	3.7	4.9	4.2	6.5	5.8	5.3
Gallbladder	4.2	0.8	3.6	1.0	1.6	0.3	2.0	2.4	3.0	1.4
Pancreas	10.6	9.9	11.2	10.6	9.7	9.1	8.1	9.9	8.1	7.3
Larynx	3.6	3.6	7.6	5.4	5.8	2.7	6.4	6.2	3.7	3.0
Lung	61.6	62.1	83.1	55.5	52.7	39.0	67.9	60.8	54.6	43.7
Prostate	16.8	19.3	17.9	14.6	16.8	14.7	12.6	15.6	17.2	14.6
Testis	0.9	0.5	0.9	0.9	0.6	0.6	0.6	0.6	0.4	0.3
Bladder	7.0	5.7	8.1	8.9	7.6	6.3	8.3	5.4	5.6	6.2
Kidney	10.3	7.5	6.6	7.6	8.3	2.9	6.2	6.5	4.6	4.0
Hodgkin's disease	0.8	0.3	0.9	0.9	0.8	0.3	0.9	0.9	0.5	0.5
Non-Hodgkin's lymphomas	3.6	3.5	3.9	3.7	2.8	6.0	3.1	3.0	2.9	4.4
Leukaemias	7.1	5.3	7.7	6.7	6.4	5.6	5.3	6.0	4.4	5.3
Total cancer mortality	217.0	202.3	269.3	195.9	194.5	157.0	206.4	221.3	198.7	165.6

Table 2. Overall directly age-standardised (world population) death certification rates per 100 000 females from selected cancer or groups of cancer in European Union (EU) accession countries and in the EU in the year 2000 (unless otherwise indicated in parentheses)

	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Malta (1999)	Poland	Slovakia	Slovenia (1999)	EU (1999)
Mouth or pharynx	1.1	1.2	3.1	0.6	1.1	1.6	1.0	1.1	0.6	1.1
Oesophagus	0.6	0.2	1.4	0.3	0.6	0.7	0.8	0.5	1.0	1.3
Stomach	5.7	9.5	7.5	9.3	8.9	3.7	5.8	5.9	7.7	4.4
Intestines	17.7	11.9	20.4	11.5	10.1	12.6	12.1	16.0	13.3	11.7
Liver	3.3	2.5	3.3	1.7	1.4	0.9	2.9	3.0	2.2	1.6
Gallbladder	5.3	1.3	4.7	1.1	2.0	0.3	3.9	4.1	3.2	1.4
Pancreas	6.9	5.1	6.6	5.5	4.4	7.0	5.1	5.4	4.6	4.8
Larynx	0.2	0.2	0.6	0.2	0.1	0.3	0.5	0.3	0.4	0.2
Lung	12.5	7.1	21.8	5.8	4.9	4.9	12.5	8.0	11.2	10.3
Breast	18.7	22.3	23.4	18.0	17.1	23.7	15.0	18.3	21.7	19.0
Uterus, total	9.5	9.5	9.7	10.3	12.8	4.0	10.5	10.8	7.2	4.6
Ovary	7.4	7.9	6.4	6.2	8.9	4.8	6.7	7.0	6.2	5.6
Bladder	1.7	1.3	1.7	1.3	1.1	0.8	1.2	1.0	1.1	1.3
Kidney	4.7	3.0	3.1	2.6	3.5	1.6	2.5	3.2	2.3	1.8
Hodgkin's disease	0.6	0.3	0.6	0.4	0.6	0.7	0.5	0.7	0.5	0.3
Non-Hodgkin's lymphomas	2.5	2.7	2.5	1.6	1.2	3.4	1.6	1.8	2.7	2.8
Leukaemias	4.3	3.6	4.2	3.9	3.7	3.0	3.2	3.4	2.9	3.3
Total cancer mortality	119.7	104.6	138.4	96.7	97.8	93.5	110.5	106.9	107.2	94.5

mortality has been steadily falling in EU women, but not in accession countries, which now have, as for men, appreciably higher total mortality rates than the EU (113.4 compared with 94.5/100 000 in the EU at all ages).

Figure 2 gives trends in age-standardised mortality rates for men (at all ages and at age 35–64 years) for 12 major cancer sites in accession countries and, for comparative purposes, the EU between 1980 and 2000. Oral and oesophageal cancer rates levelled off and then declined in EU men from the late 1980s onwards, whereas they were still rising appreciably in accession countries, mostly in middle-aged men. Stomach cancer rates declined in both the EU and accession countries. The fall was greater in absolute, but not in relative, terms in accession countries. Intestinal cancer rates in the early 1980s were lower in accession countries than in the EU; however, trends tended to decline in the EU but to increase in accession countries over the last two decades. Consequently, in the late 1990s, intestinal cancer rates were much higher in accession countries than in the EU. Although earlier rising trends appear to have stabilised, pancreatic cancer mortality was also appreciably higher in accession countries than in the EU. Laryngeal and lung cancer rates have been steadily declining in EU men since the early and mid-1980s, respectively, but have been rising in accession countries up until the early 1990s. Consequently, laryngeal

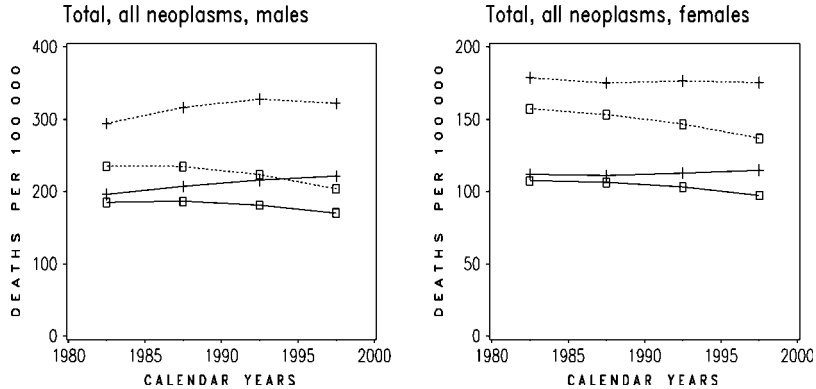

Figure 1. Trends in directly age-standardised (world population) death certification rates per 100 000 males and females from all cancers in accession countries and the European Union (EU) from 1980 to 2000. Solid lines, all ages; dashed lines, 35–64 years; +, accession countries; squares, EU. Note: vertical scales are different for males and females.

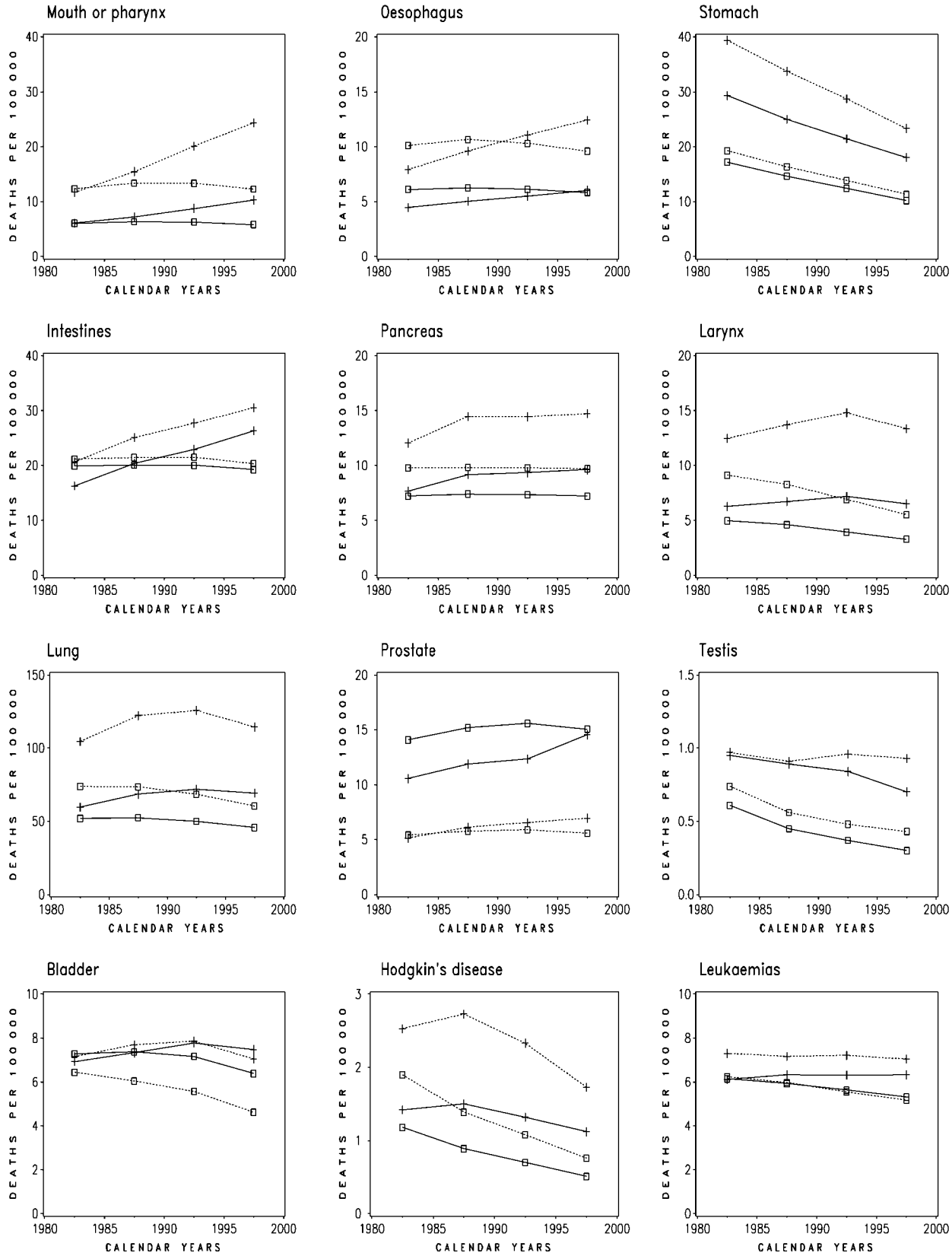

Figure 2. Trends in directly age-standardised (world population) death certification rates per 100 000 males from 12 major cancers in accession countries and the European Union (EU) from 1980 to 2000. Solid lines, all ages; dashed lines, 35–64 years; +, accession countries; squares, EU.

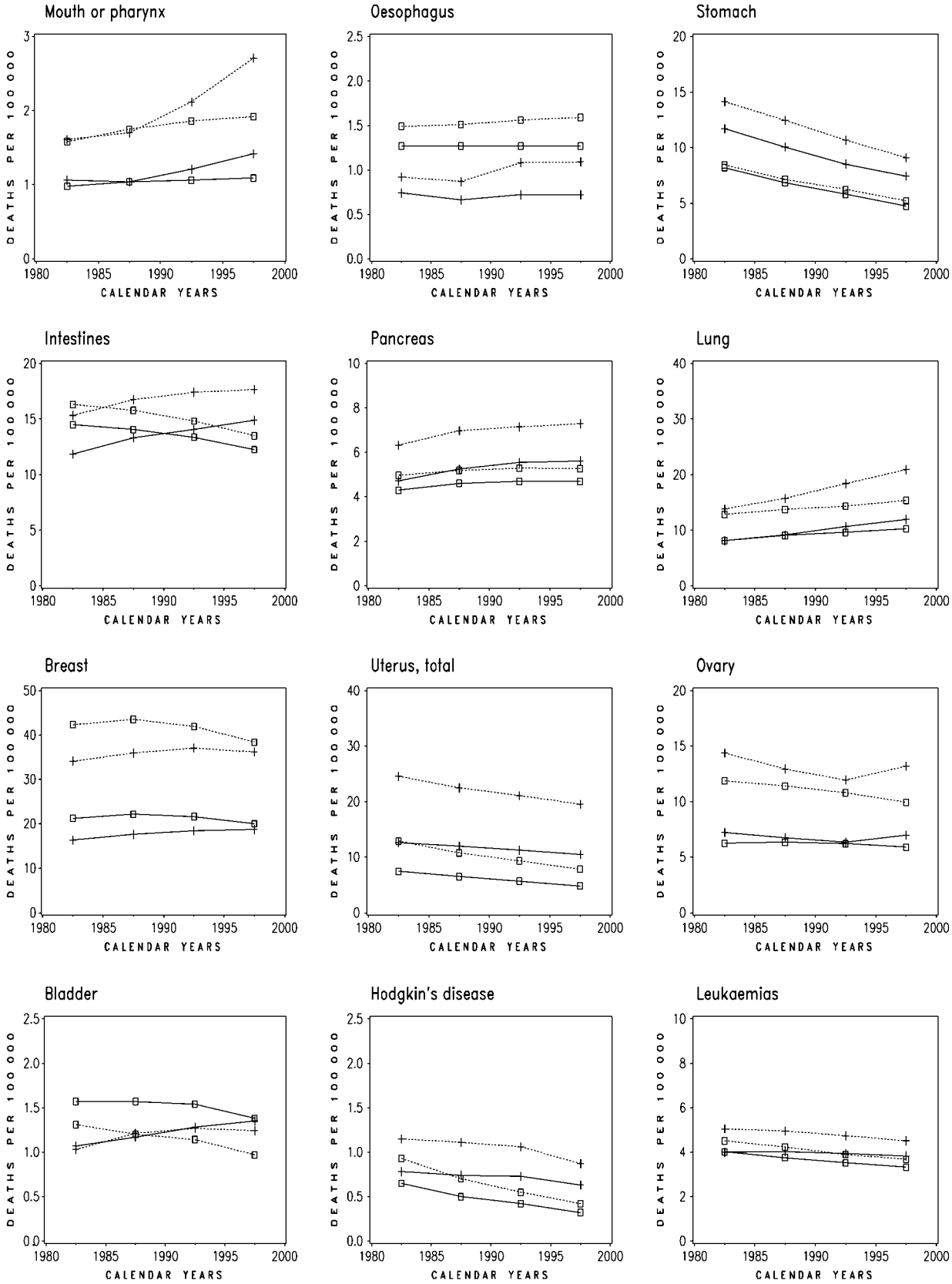

Figure 3. Trends in directly age-standardised (world population) death certification rates per 100 000 females from 12 major cancers in accession countries and the European Union (EU) from 1980 to 2000. Solid lines, all ages; dashed lines, 35–64 years; +, accession countries; squares, EU.

and lung cancer rates in the late 1990s were substantially higher in accession countries than in the EU, particularly in the middle-aged. Prostate cancer rates have been declining in males in the EU since the early 1990s, but rising in accession countries, and in the late 1990s rates for men aged 35–64 years were almost as high as in the EU. Bladder cancer mortality rates have been declining markedly in the EU, but not in accession countries. Likewise, mortality trends for testicular cancer, Hodgkin's disease and leukaemias were less favourable, and consequently rates much higher, in the accession countries (as noted above).

Comparable data for women are given in Figure 3. While the pattern of trends was similar to that described for men for major digestive sites, lung cancer rates have been rising in women in both the EU and accession countries, although to a greater extent in the latter. Breast and ovarian cancer mortality have been declining over the last decade in the EU but not in accession countries, and rates are now comparable in accession countries and the EU for breast cancer, and higher for ovarian cancer in accession countries. Mortality from cancer of the uterus (including mainly cervical cancer) fell both in the accession countries and in the EU, but in the late 1990s the rate in accession countries was over twice as high as in the EU at age 35–64 years.

Discussion

The accession of 10 additional countries to the EU in 2004, including eight central and eastern European contries with high mortality from several major cancer sites, will lead to an increase in overall cancer mortality rates in the EU, as well as contribute to unfavourable trends over time [11, 12].

The overall analyses by groups of countries, defined essentially on historical and political grounds, are necessarily simplistic in order to convey the message of overall disparity between EU and accession countries, since important variations in cancer mortality rates and trends are observed in both groups of countries, as addressed in detail in a separate paper [1].

It is unlikely that cancer mortality data for the major sites considered have substantial problems in terms of reliability and validity that may have falsely given rise to any appreciable trends over time in any of the countries considered, although minor influences due to changes in classification and coding remain possible [1, 16–18].

Most of the unfavourable patterns and trends in cancer mortality are due to recognised, and hence largely avoidable, causes of cancer. These include the exceedingly high rates of lung and other tobacco-related cancers—for Hungarian men probably the highest ever registered in any developed country [1, 2, 19]—but also the high rates of gastric and intestinal cancer, related to poorer and unfavourable dietary patterns [1, 20, 21].

Alcohol drinking is also responsible for the gross excess and the consequent unfavourable trends in oral cavity, oesophageal and laryngeal cancers, mostly in Hungary but also in other central European countries. While the role of type of alcoholic beverage in cancer risk remains open to discussion, with a possibly higher risk of fruit-derived ethanol in Hungary [22–24], the control of alcohol consumption as a whole in these areas of the continent remains a public health priority for cancer as well as for several other major diseases [22, 25].

The elevated liver cancer rates seen were largely due to high hepatitis B and C prevalence [26–29]. Alcohol and tobacco consumption, however, may also contribute to the high mortality from liver cancer in Hungary, the Czech Republic and other countries of central and eastern Europe [30].

Furthermore, there are high mortality rates for neoplasms related to inadequate screening, diagnosis and treatment, mainly uterine cervical cancer, with the lack of adoption of effective screening programs [6, 31], but also breast [5] and ovarian [32] cancers, as well as testicular cancer [9, 10], Hodgkin's disease [8] and leukaemias [7]. Mortality for these neoplasms in western European countries has been substantially influenced by advancements in integrated chemo- and radiotherapy approaches [7]. The excess mortality from these same neoplasms in eastern European accession countries could therefore be reduced if adequate ressources, training and logistics to deliver adequate diagnosis and treatment were implemented [9, 10, 12, 14].

Thus, application of available knowledge on prevention, diagnosis and treatment of several cancers may substantially reduce, over the next few years, the major disadvantages now evident in cancer mortality rates and trends in central and eastern European accession countries, compared with those in the 15 EU countries as of 2003 [33].

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