

Original article

Changed trends of cancer mortality in the elderly

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Summary

Background: Trends in cancer mortality for the elderly have long been unfavourable.

Materials and methods: Mortality from 12 major cancer sites, plus total cancer mortality at age 65–84 in 23 European countries, the US and Japan was analyzed.

Results: Between the late 1980s and the late 1990s total cancer mortality at age 65 to 84 has been declining in the European Union (EU) (–5.5% in males, –4.5% in females), in United States (US) males (–2.3%), but not females (+4.4%), and in Japanese females (–5.6%), but not males (+6.3%). Cancer mortality in the elderly rose for both sexes in eastern Europe. Gastric cancer mortality declined in all the areas. Lung cancer rates declined over the last decade by 8.5% in males in the EU, and by 0.9% in the US. Rates were still increasing in eastern Europe, in Japanese males and in females in all areas. Pancreatic mortality rates were increasing in both sexes in the EU and Japan up to the late 1980s, and in eastern

Europe up to the 1990s, whereas rates for US males have been declining over recent years. Breast cancer mortality has declined over the last decade by 8% in the US and by 3% in the EU, while it has risen in eastern Europe and in Japan. Mortality from breast and prostate as well as ovarian cancer remained however low in elderly Japanese. Prostate cancer mortality declined in the EU and in the US, whereas it rose in eastern Europe and in Japan. Mortality from lymphomas and multiple myeloma rose in both sexes and various geographic areas, but improved diagnosis and certification may have played a role in these trends. Mortality from leukemia in the elderly increased in eastern Europe and Japan, but was stable in the US and the EU.

Conclusions: Cancer mortality in the elderly has stopped systematically rising, and is on the decline in males since the late 1980s.

Key words: cancer, elderly, age, mortality, time-trends

From the late 1970s onwards, some decline in cancer mortality has been reported in the United States (US) [1–4] and western Europe [5–7]. However, trends in the elderly population up to the early 1990s tended systematically to be less favourable [8–11]. This may be due to a different cohort pattern of cancer mortality across various generations and hence age groups [12], to more substantial changes in diagnosis and certification accuracy of the elderly [11, 13], to a lower impact of earlier diagnosis and improved treatment in the elderly [14, 15], or to a contribution of various factors.

It is therefore important that recent trends in cancer mortality in the elderly are monitored. Along this line, we considered the mortality rate from cancers at 12 major sites up to 1998, plus the total cancer mortality rate at age 65–84 in Europe, the US and Japan.

Materials and methods

Official death certification numbers for 23 European countries (the 15 countries of the European Union, plus eight others, but excluding

Albania and a few countries such as Andorra on Lichtenstein with a population of <1 million, the US and Japan were derived from the World Health Organization (WHO) database. During the period considered (1960–1998), three different Revisions of the International Classification of Diseases (ICD) were used [16–18]. The classification of cancer deaths were thus re-coded, for the entire period, according to the Ninth Revision (ICD-9 [17]). Data were considered for total cancer mortality, plus the specific data for 12 cancers which have specific relevance for the elderly (i.e. mouth or pharynx, stomach, intestines, pancreas, lung, female breast, ovary, prostate, kidney, non-Hodgkin's lymphomas, multiple myeloma, and leukemias). To improve comparability of data throughout different countries and periods, we pooled together all intestinal sites including rectum.

In graphical form, trends are presented for the European Union, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, and the United Kingdom, six eastern European countries providing meaningful and comparable data since 1960 (Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia), the US and Japan.

Estimates of the resident population, generally based on official censuses, were obtained from the same WHO databank. From the matrices of certified deaths and resident populations, age-specific rates for each five-year age group considered (65–69 to 80–84) and period were computed. Age-standardized rates were based on the world standard population [19].

Results

Figure 1 indicates the trends in age-standardized mortality at age 65 to 84 from all cancers and those occurring at the 12 selected cancer sites in the EU, eastern European countries, the US and Japan over the period 1960–1997. Most of the following comments, however, refer to the trends observed over the last decade, i.e. between 1985–1989 and 1995–1998.

After earlier increases, total cancer mortality at age 65 to 84 has been declining in the EU (from 1457 of 100,000 in 1985–1989 to 1378/100,000 males in 1995–1998, -5.5% ; from 712 to 690/100,000 females, -4.5%), in US males (from 1266 to 1237, -2.3%), but not females (from 732 to 764, $+4.4\%$), and in Japanese females (from 557 to 526/100,000, -5.6%), but not males (from 1218 to 1295, $+6.3\%$). Cancer mortality in the elderly rose for both sexes in eastern Europe (from 1294 to 1359 for males, $+5.1\%$; from 669 to 688 for females, $+2.7\%$).

Oral cancer mortality in the elderly was approximately stable in the EU, with rates around 30/100,000 males and 5/100,000 females. Rates steadily rose for males in eastern Europe, to reach 32/100,000 in the late 1990s. In the US, rates have been moving downwards for males since the late 1970s, and moderately upwards for females up to the late 1990s. An appreciable rise was observed for Japanese males over the last few years.

Gastric cancer mortality steadily declined in all the areas considered, and the fall was proportionally larger in the EU (about 30% in both sexes) as compared to eastern Europe (23%), the US (-19% in males, -17% in females) or Japan (-19% in males, -31% in females). Rates in Japan, moreover, were six to eight times higher than in the US, whereas those in Europe were intermediate.

Colorectal cancer rates in the elderly, after earlier increases, declined over the last decade in both sexes in the EU (-11% for males, -20% for females), and the US (-16% for males, -18% for females), but rose in eastern Europe ($+16\%$ in males; $+4\%$ in females), and in Japan, mostly in males ($+23\%$ for males, $+4\%$ for females). In 1995–1998 intestinal cancer rates for Japanese males (135/100,000) were higher than in the US (124/100,000), while the rate in the EU was 152/100,000, and that in eastern Europe 175/100,000.

Pancreatic cancer mortality rose in the elderly of both sexes in the EU and Japan up to the late 1980s and levelled off thereafter – at higher levels (70/100,000) for males in Japan. Rates have been moving steadily upwards for both sexes in eastern Europe, and moderately upwards in women, but downwards in males in the USA.

After substantial rises between 1960 and 1985, lung cancer rates at age 65 to 84 for the first time declined over the last decade, by 8.5% in males in the EU, and by 0.9% in the US. Rates were still increasing in eastern European ($+6\%$) and Japanese males ($+12\%$) and in females in all areas ($+16\%$ in the EU, $+24\%$ in eastern Europe, $+36\%$ in the US, but only $+1.2\%$ in Japan).

While in elderly men the differences in lung cancer rates across broad geographic areas were relatively limited, in women an approximately three-fold difference was still evident between the rates of 67–77/100,000 in Japan and Europe, and the rates of 212/100,000 in the US.

Again after earlier rises in most areas, breast cancer mortality in women aged 65 to 84 declined by 8% in the US and by 3% in the EU, to reach 106/100,000 in both areas, while rose from 80 to 90/100,000 in eastern Europe, and from 19 to 24/100,000 in Japan.

Ovarian cancer mortality in elderly women has been steadily increasing both in the EU and in eastern European countries. Trends tended in contrast to level off in the US and Japan over the last few years, although mortality rates were higher in the USA and much lower in Japan.

Prostate cancer mortality in males aged 65 to 84 declined by 4% in the EU and 6% in the US, to reach the same value of 149/100,000 for both areas. In eastern Europe, prostate cancer mortality rose from 113 to 127/100,000 ($+13\%$). In Japan, prostate cancer mortality started from appreciably lower levels and over the last decade rose by 33%, from 36 to 48/100,000.

Kidney cancer mortality in the elderly of both sexes steadily and appreciably increased in all geographic areas considered. Absolute rates, however, were considerably higher in Europe, and particularly eastern Europe (48.4/100,000 males, 23.1/100,000 females), than in the USA and, for the most part, in Japan.

Mortality from non-Hodgkin's lymphoma in the elderly showed an upward trend in all the geographic areas considered, although the absolute rates were different and the presence of major changes in the slopes suggests that the criteria of diagnosis and classification for this heterogeneous group of neoplasms have probably changed over time. In the late 1990s, absolute rates were higher in the US (47/100,000 males, 33/100,000 females) than in the EU (31/100,000), and even lower in Japan and eastern Europe.

Mortality from multiple myeloma at age 65 to 84 steadily rose by 10% to 20% in both sexes in all geographic areas considered.

Up to the last few years, mortality from leukemia in the elderly tended to rise in Japan and eastern Europe, but has become relatively stable, although at high values (45/100,000 males; 20/100,000 females) in the EU and the USA (around 45/100,000 males; 23/100,000 females). Some indication of a reversal in the trends has become apparent in the EU in recent years.

Tables 1 (for males) and 2 (for females) give the mortality rates from total cancer mortality and six major cancer sites in 21 European countries (data were not available for Belgium after 1994, and Luxembourg was not included due to low absolute numbers), and additionally for the US and Japan. Declines, though to a different degree, were observed in France, Germany, Italy and the UK for total cancer mortality in both sexes, whereas rates were upwards in most eastern European countries, and showed no consistent pattern in Spain,

(a)

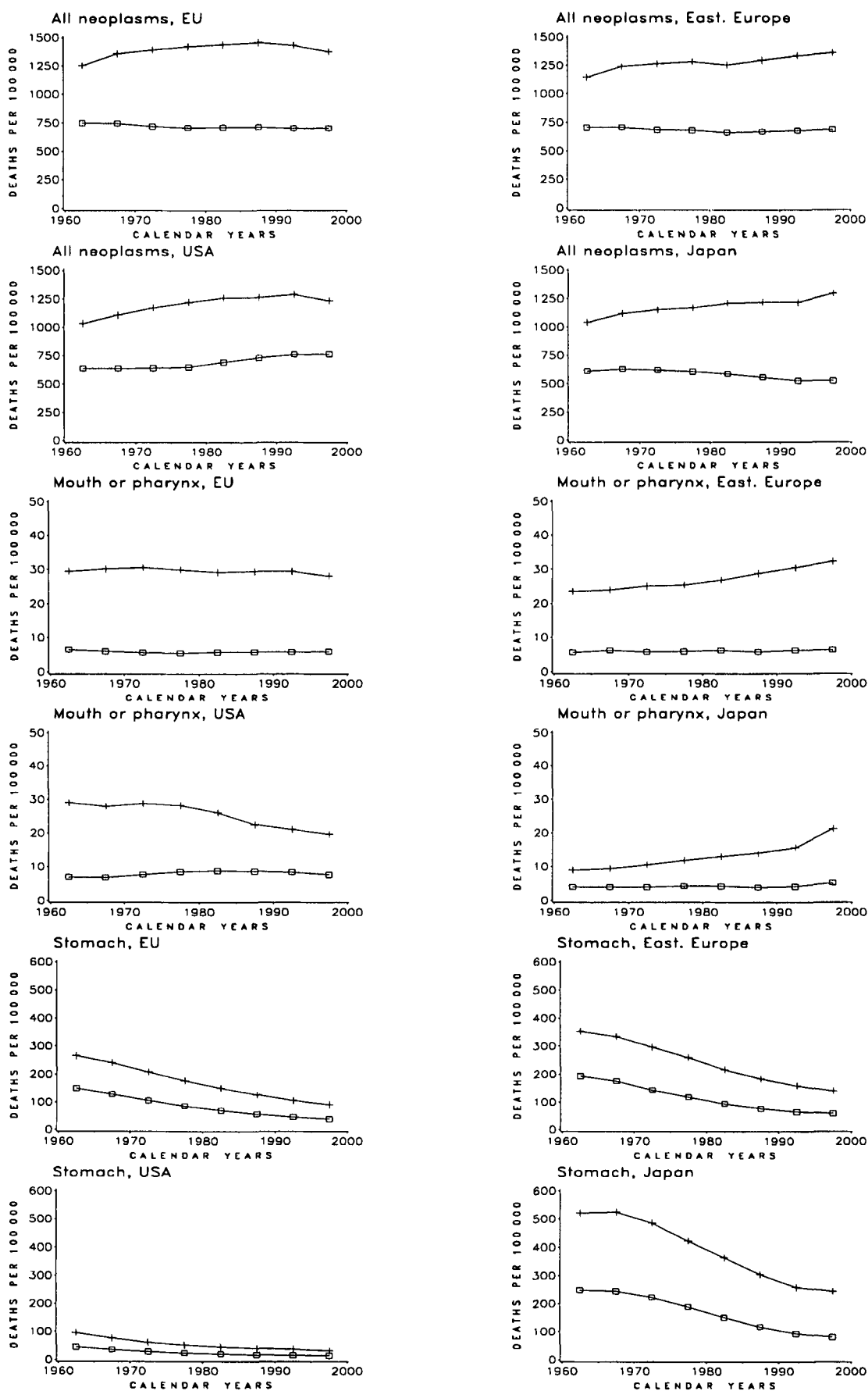


Figure 1 Trends in age-standardized (at age 65 to 84, world standard) death certification rates per 100.000 population from selected cancers or groups of cancers in the EU, selected eastern European countries, USA and Japan, 1960–1997.

(b)

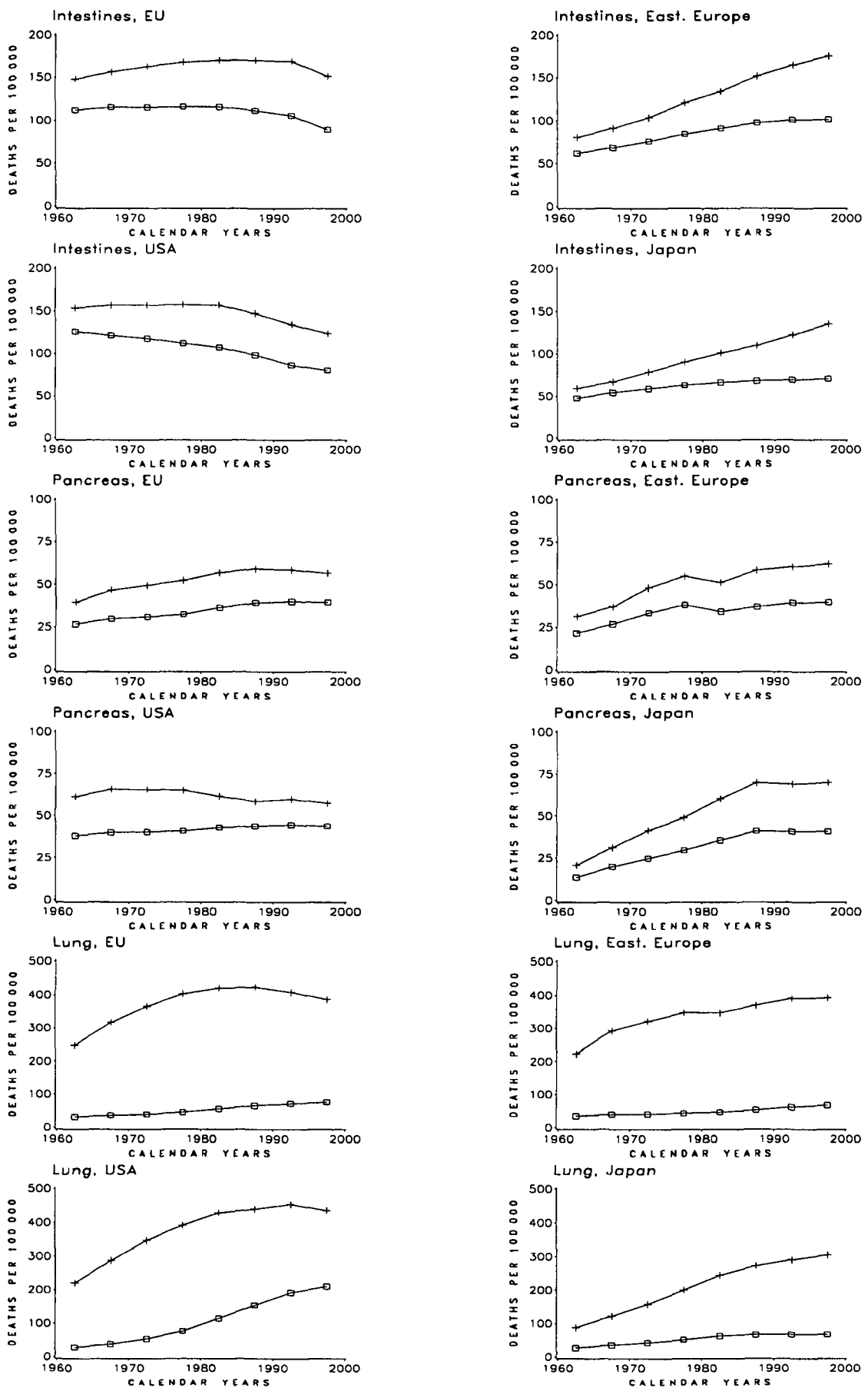


Figure 1 Continued.

(c)

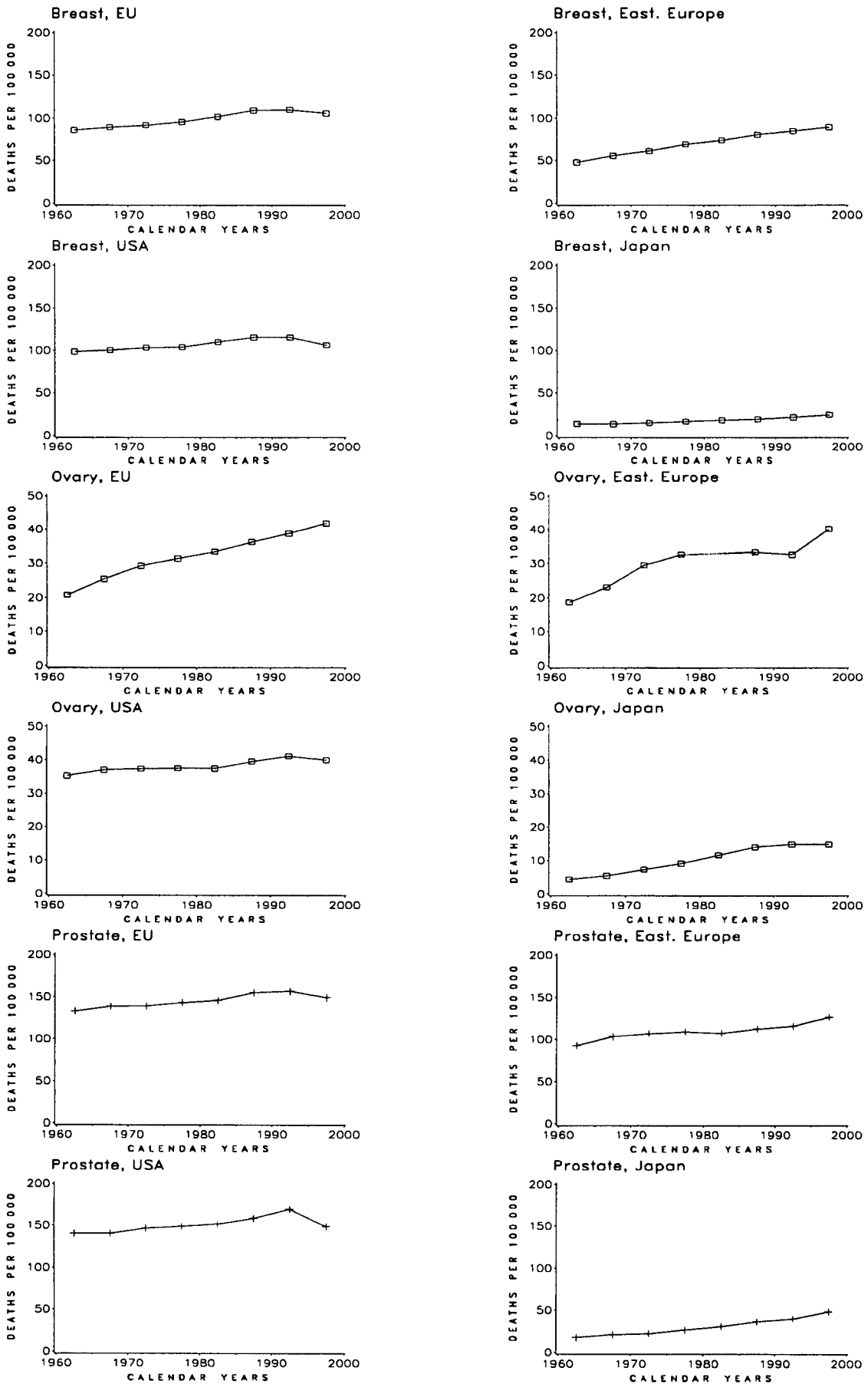


Figure 1. Continued.

(d)

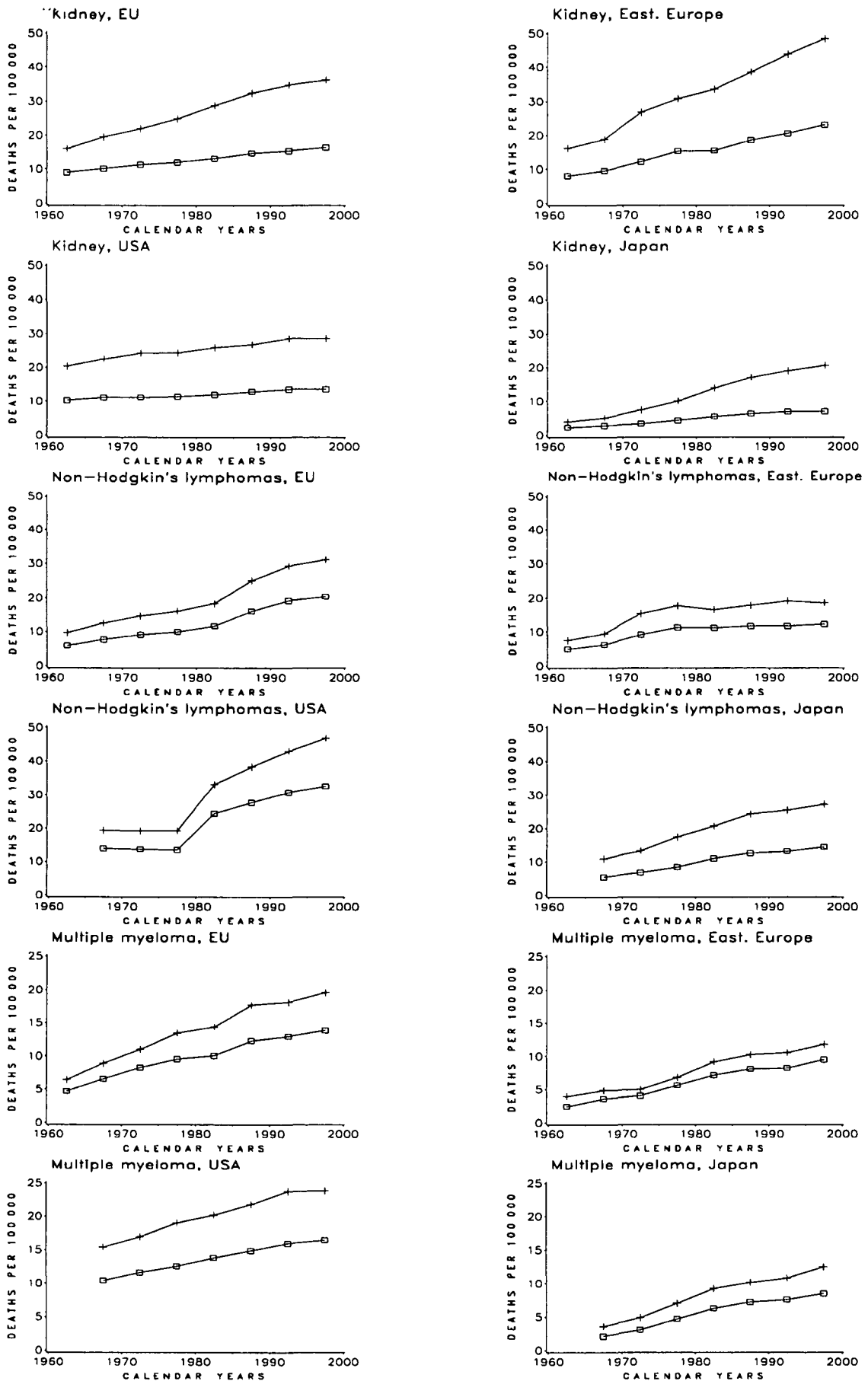


Figure 1. Continued.

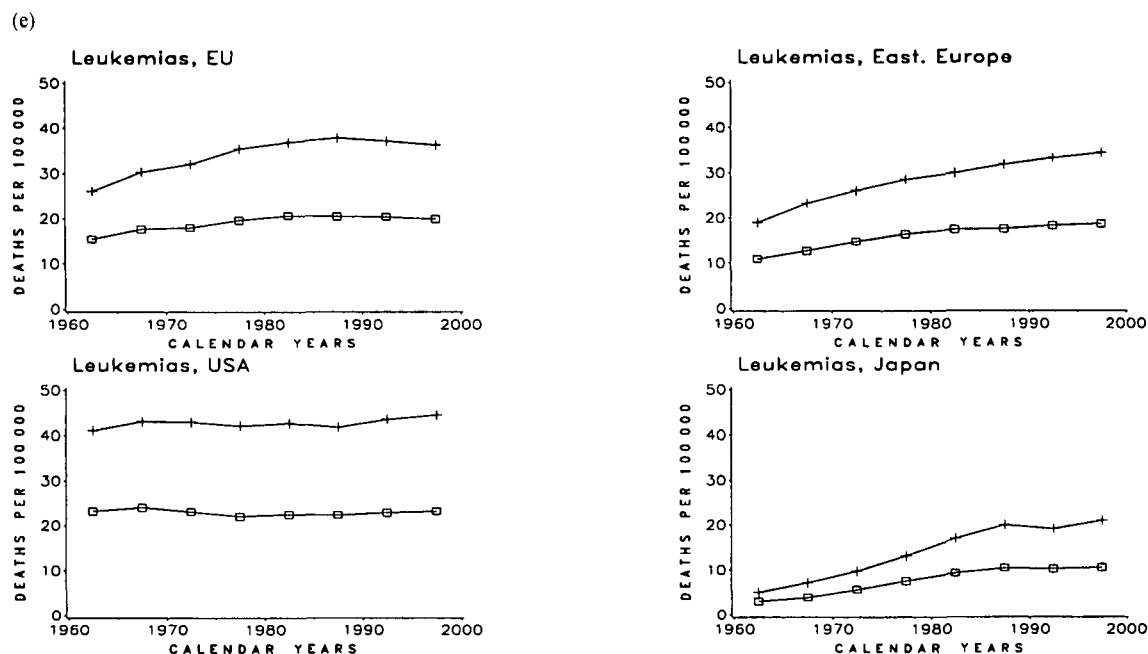


Figure 1 Continued.

Portugal and Greece. Lung cancer trends in elderly males varied appreciably from country to country, with a 25% fall in the UK, but not in other major European countries. Lung cancer mortality was generally increasing, though to varying degrees, for elderly females. A substantial decline in breast cancer mortality (-14%) was observed in the UK, whose rates were originally higher, but not in other major European countries. Prostate cancer rates moved downwards in France and Italy, but upwards in most other countries. Mortality from multiple myeloma was consistently upwards in most European countries, except the UK, Finland, The Netherlands and Norway. The Russian Federation had the highest total cancer (1532/100,000) mortality in elderly males, and some of the highest rates for most sites, except breast and prostate. Over the last decade, cancer mortality rates increased in elderly Russian by 7.4% in males and 5.5% in females.

Discussion

The main finding of this updated analysis of cancer mortality in the elderly is the observation of a change in the trends for males in the US and for both sexes in the EU, with the consequent end of a long-term rise, and the beginning of a measurable declining trend in males. Some decline in total cancer mortality was observed also for females in Japan. This is a new observation, since declines in total cancer mortality have been registered in young [20, 21] and middle age, as well as in overall age-standardized rates, but rates in the elderly had longer been rising, and have been described as a particularly unfavourable indicator of cancer mortality [8-10].

In all the geographic areas considered, a component of the falling rate has been the steady decline in gastric cancer [22]. However, in the EU, and, more importantly, in the US, gastric cancer rates were already low in the 1980s, and consequently this was a relatively minor component of the global trends.

Of major relevance are the changing trends in lung and other tobacco-related neoplasms, including pancreas, in the two sexes and various geographic areas. Thus, lung cancer mortality rates in elderly males have started levelling off in the EU (and substantially in the UK [23] and in the US [3]). This reflects the decreased prevalence of smoking in subsequent generations of elderly males [24, 25], and the increased numbers of people who have quit smoking. Lung cancer rates, in contrast, have increased by 36% in US females, reaching a rate of over 210/100,000, i.e. twice that of breast cancer. The rise was 16% in the EU, with a rate of 77/100,000. These unfavourable trends reflect the increased prevalence of smoking in elderly women in the US [3] and, to a lesser degree, Europe. Within Europe, female rates in Denmark, Iceland and the UK approached 200/100,000, as well [26]. Trends in mortality from oral cancer reflect the pattern not only of tobacco but also of alcohol consumption in the two sexes and various areas of the world [12, 13].

An 8% fall in breast cancer mortality for elderly women was registered in the US, and a 3% decrease in the EU. These favourable trends reflect advancements in screening, early diagnosis, and treatment of breast cancer [27-30], although the declines are smaller than the 15% to 20% reported for younger women (aged 50 to 70 [31]), thus raising questions about modifying the diagnosis and treatment approaches to breast cancer in elderly women.

Table 1 Trends in age-standardized (65–84 years, world standard) death certification rates per 100,000 men from five major cancers plus total mortality in various countries between 1985–1989 and 1995–1998 (unless otherwise mentioned in parenthesis).

Country	Stomach			Intestines			Lung			Prostate			Multiple myeloma			Total, all sites		
	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change
Austria	162.1	103.9	-35.9	195.5	178.6	-8.6	353.8	321.2	-9.2	165.9	157.3	-5.2	13.2	17.0	28.8	1373.0	1263.8	8.0
Bulgaria	163.0	117.9	-27.7	119.0	140.5	18.1	219.4	211.8	-3.5	81.0	91.6	13.1	2.8	2.1	-25.0	870.7	884.4	1.6
Czech Republic	170.7	111.6	-34.6	305.5	292.8	-4.2	520.9	468.1	-10.1	162.9	166.9	2.5	15.2	18.9	24.3	1749.2	1674.8	4.3
Denmark (1995–1996)	70.1	49.5	-29.4	202.4	198.9	-1.7	464.8	440.4	-5.2	182.7	209.1	14.4	21.7	26.3	21.2	1500.9	1516.5	1.0
Finland (1995–1996)	124.2	78.9	-36.5	113.0	101.1	-10.5	457.3	385.9	-15.6	162.7	181.1	11.3	25.6	20.5	19.9	1330.0	1234.0	7.2
France (1995–1997)	81.9	56.2	-31.4	187.5	143.6	-23.4	323.6	326.6	0.9	170.1	142.3	-16.3	17.2	17.7	2.9	1479.2	1370.2	7.4
Germany	137.7	95.2	-30.9	187.9	175.9	-6.4	387.4	368.0	-5.0	158.5	155.9	1.6	16.4	19.6	19.5	1420.1	1345.3	-5.3
Greece (1995–1997)	78.4	66.5	-15.2	72.4	71.5	-1.2	381.6	392.3	2.8	81.8	96.5	18.0	10.4	12.1	16.3	1128.7	1160.0	2.8
Hungary	204.4	156.6	-23.4	229.6	293.3	27.7	460.6	534.3	16.0	164.5	177.5	7.9	11.2	15.6	39.3	1636.8	1835.1	12.1
Ireland (1995–1996)	117.2	84.5	-27.9	209.4	188.9	-9.8	424.7	389.3	-8.3	176.0	197.3	12.1	27.1	27.0	0.4	1434.2	1427.4	0.5
Italy (1995–1996)	163.0	113.0	-30.7	160.6	137.3	-14.5	439.2	441.0	0.4	121.2	107.2	-11.6	16.2	18.1	11.7	1498.5	1437.9	-4.0
The Netherlands (1995–1997)	119.9	81.8	-31.8	175.1	161.5	-7.8	678.1	548.4	-19.1	168.8	177.4	5.1	25.2	25.4	0.8	1679.9	1535.9	-8.6
Norway (1995–1996)	104.0	76.8	-26.2	169.1	168.6	-0.3	251.2	278.6	10.9	218.7	229.9	5.1	31.7	28.8	-9.1	1230.2	1251.6	1.7
Poland (1995–1996)	205.2	151.9	-26.0	115.2	143.4	24.5	435.5	508.9	16.9	102.3	120.8	18.1				1380.5	1511.6	9.5
Portugal	197.1	159.8	-18.9	143.7	156.3	8.8	178.2	217.3	21.9	137.5	172.7	25.6	9.7	15.8	62.9	1035.4	1171.9	13.2
Romania	143.5	123.7	-13.8	72.6	96.0	32.2	175.9	226.5	28.8	76.8	91.2	18.8				792.8	917.7	15.8
Russian Federation (1995–1997)	309.2	247.9	-19.8	135.3	153.1	13.2	445.3	457.3	2.7	66.1	78.0	18.0				1426.5	1531.6	7.4
Spain (1995–1997)	123.8	95.3	-23.0	119.7	139.1	16.2	328.6	365.5	11.2	131.5	131.5	0.0	13.4	17.2	28.4	1258.1	1306.7	3.9
Sweden (1995–1996)	84.7	55.8	-34.1	131.4	123.4	-6.1	199.2	191.8	-3.7	199.4	221.1	10.9	22.1	23.2	5.0	1082.3	1051.6	-2.8
Switzerland (1990–1994)	88.3	73.6	-16.6	167.4	154.8	-7.5	384.3	358.2	-6.8	217.4	220.7	1.5	21.7	24.8	14.3	1434.8	1365.2	-4.9
United Kingdom (1995–1997)	122.2	80.5	-34.1	178.6	151.7	-15.1	550.8	414.5	-24.7	160.6	161.5	0.6	21.8	21.1	-3.2	1536.5	1375.3	-10.5
European Union (1995–1997)	126.9	90.1	-29.0	170.5	151.7	-11.0	423.8	387.6	-8.5	155.1	149.5	-3.6	17.8	19.6	10.1	1457.2	1377.5	-5.5
USA (1995–1997)	40.6	32.7	-19.5	147.8	123.9	-16.2	440.6	436.7	-0.9	158.4	148.9	-6.0	21.8	23.9	9.6	1265.5	1236.7	-2.3
Japan (1995–1997)	304.5	245.9	-19.2	109.6	135.1	23.3	273.4	305.2	11.6	36.3	48.1	32.5	10.2	12.5	22.5	1218.0	1294.7	6.3

Table 2. Trends in age-standardized (65–84 years, world standard) death certification rates per 100,000 women from five major cancers plus total mortality in various countries between 1985–1989 and 1995–1998 (unless otherwise mentioned in parenthesis).

Country	Stomach			Intestines			Lung			Breast			Multiple myeloma			Total, all sites		
	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change	1985–1989	1995–1998	% change
Austria	91.4	61.2	-33.0	119.1	98.3	-17.5	60.6	70.5	16.3	117.0	106.5	-9.0	11.1	14.7	32.4	762.7	687.0	-9.9
Bulgaria	91.3	62.9	-31.1	76.3	84.1	10.2	42.6	41.9	-1.6	66.9	71.3	6.6	1.5	1.7	13.3	497.1	492.9	-0.8
Czech Republic	81.4	52.8	-35.1	167.8	140.9	-16.0	54.9	78.4	42.8	115.3	116.6	1.1	11.7	12.9	10.3	871.9	851.5	-2.3
Denmark (1995–1996)	32.4	21.4	-34.0	140.9	131.0	-7.0	137.3	197.9	44.1	139.5	151.5	8.6	14.7	16.5	12.2	906.3	980.4	8.2
Finland (1995–1996)	63.3	40.4	-36.2	78.0	67.6	-13.3	50.2	54.5	8.6	84.8	79.1	-6.7	17.4	19.3	10.9	654.1	611.6	-6.5
France (1995–1997)	32.0	20.1	-37.2	101.1	74.6	-26.2	32.4	41.0	26.5	99.0	98.9	-0.1	12.2	12.3	0.8	602.7	567.2	-5.9
Germany	66.0	45.9	-30.5	135.9	113.3	-16.6	50.3	66.8	32.8	109.5	110.3	0.7	11.0	13.8	25.5	767.4	722.5	-5.9
Greece (1995–1997)	43.0	34.4	-20.0	59.7	48.7	-18.4	48.5	51.1	5.4	69.3	83.5	20.5	7.9	8.8	11.4	521.7	535.4	2.6
Hungary	86.0	65.8	-23.5	151.3	154.9	2.4	80.3	113.7	41.6	111.7	122.5	9.7	9.3	11.9	28.0	855.3	900.7	5.3
Ireland (1995–1996)	52.5	37.9	-27.8	128.4	103.1	-19.7	144.0	160.4	11.4	122.8	129.7	5.6	18.4	16.8	-8.7	839.3	853.5	1.7
Italy (1995–1996)	74.3	54.9	-26.1	102.4	75.5	-26.3	52.7	60.8	15.4	100.2	100.0	-0.2	11.7	13.0	11.1	682.3	646.2	-5.3
The Netherlands (1995–1997)	44.0	30.3	-31.1	119.3	103.0	-13.7	50.7	89.3	76.1	136.1	133.4	-2.0	16.2	17.0	4.9	724.1	729.9	0.8
Norway (1995–1996)	43.9	32.8	-25.3	110.9	113.5	2.3	57.5	95.6	66.3	99.7	98.8	-0.9	19.0	18.4	-3.2	667.8	709.7	6.3
Poland (1995–1996)	74.3	56.9	-23.4	79.6	92.3	16.0	57.2	71.8	25.5	70.3	77.8	10.7				674.7	706.2	4.7
Portugal	95.2	71.4	-25.0	91.5	79.8	-12.8	26.6	28.5	7.1	71.9	81.9	13.9	7.3	11.9	63.0	531.6	544.9	2.5
Romania	60.7	51.4	-15.3	53.6	61.8	15.3	35.7	45.2	26.6	59.9	70.9	18.4				460.3	497.9	8.2
Russian Federation (1995–1997)	141.8	108.4	-23.6	87.2	94.9	8.8	52.3	49.3	-5.7	50.0	67.7	35.4				605.7	639.3	5.5
Spain (1995–1997)	58.8	40.0	-32.0	78.3	74.9	-4.3	25.5	25.7	0.8	71.7	77.3	7.8	9.8	12.8	30.6	540.9	522.0	-3.5
Sweden (1995–1996)	37.6	26.4	-29.8	89.0	83.5	-6.2	60.0	82.9	38.2	93.1	89.0	-4.4	15.7	17.2	9.6	673.5	685.9	1.8
Switzerland (1990–1994)	37.3	30.1	-19.3	94.2	85.0	-9.8	45.8	53.9	17.7	138.0	131.1	-5.0	15.4	15.7	1.9	695.0	669.4	-3.7
United Kingdom (1995–1997)	48.7	31.7	-34.9	117.1	91.7	-21.7	158.1	180.7	14.3	144.0	123.4	-14.3	14.9	14.5	-2.7	850.9	835.7	-1.8
European Union (1995–1997)	57.0	39.2	-31.2	112.0	89.9	-19.7	66.5	77.4	16.4	109.6	106.0	-3.3	12.3	13.9	13.0	712.2	680.0	-4.5
USA (1995–1997)	17.7	14.7	-16.9	98.6	80.7	-18.2	155.1	211.6	36.4	115.7	106.2	-8.2	14.9	16.5	10.7	731.8	764.1	4.4
Japan (1995–1997)	118.3	81.3	-31.3	67.9	70.4	3.7	66.3	67.1	1.2	19.0	24.4	28.4	7.2	8.5	18.1	557.2	525.9	-5.6

A similar line of reasoning applies to prostate cancer in the EU and US [32, 33]. The decrease in prostate cancer mortality may at least in part be attributed to a favourable influence of prostate specific antigen (PSA) testing. This was introduced in Western Europe a few years later than in the USA, and the proportion of men aged 65 or over who have undergone PSA testing is probably much lower in Europe than in several areas of the US [32, 33]. This is compatible with the smaller decline in mortality in the EU than in the USA. In any case, the first observation of favourable changes in trends for mortality from these common cancers in the elderly is extremely encouraging. Mortality from breast and prostate cancer in the elderly was still rising in Japan, but absolute rates remained comparatively low [34].

In addition, ovarian cancer rates were low in Japan, and showed only a moderate tendency to rise over the last few years, whereas a steady upward trend was still evident in Europe. The leveling off in the US may also reflect the favorable impact of oral contraceptives on the risk of ovarian cancer in the elderly [35].

It is more difficult to explain the levelling trends and the declines in colorectal cancer mortality, particularly in elderly women. These tendencies may also be due, at least in part, to earlier diagnosis, but a more favourable pattern of risk factor exposure (including diet and perhaps hormones for women [36, 37] has probably played some role as well.

Mortality from kidney cancer and, more importantly, from multiple myeloma has, in contrast, been steadily rising in most countries considered, with the notable exceptions of some northern European countries (i.e., Finland, Norway and Sweden). Diagnostic improvements still partly or largely account for these trends, but it is also possible that some real increase has occurred in incidence and mortality from myelomas [38], as well as for lymphomas [39], which have also been increasing in most areas, without there being any obvious explanations and consistent patterns. Brain cancer is another form of the disease that has risen in the elderly, but the WHO database did not provide enough information to understand and evaluate brain cancer trends in various countries [40, 41]. Mortality from leukemia in the elderly, in contrast, tended to remain at the same level over the last decade, possibly reflecting improvements in management and treatment of the disease in the elderly, though to a lower degree than has occurred in younger aged patients [42].

In general, it is important to stress the limitations and uncertainties of cancer death certification for the elderly and their trends over time. Although the exact influence of increasingly more accurate certification on cancer rates remains undefined, almost certainly this has caused some systematic upward trends over time, following the generalized improvement in diagnosis and certification of selected cancer sites, especially prostate and multiple myeloma [11, 13, 40].

Within Europe, a substantial variation in mortality

from several major cancer sites can still be observed in the elderly, although for other neoplasms – such as breast or prostate – tendencies towards stabilizing were also apparent [43]. Most trends remain unfavourable for the elderly population of both sexes in eastern Europe, reflecting both rising trends in underlying incidence – due to unfavourable patterns in smoking, characteristics of diet and exposures to other risk factors, and to systematic delay in the adoption of improved diagnosis and treatment methods. Thus, while stomach cancer rates remain high in these areas of the continent, lung cancer rates in males have reached some of the highest rates observed (over 500/100,000 in Hungary or Poland), and breast or prostate cancer rates were still moving upwards. Comprehensive intervention for cancer control among elderly, particularly in eastern Europe, is therefore a public health priority [44–47].

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