

# Declining mortality from kidney cancer in Europe

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Mortality rates from kidney cancer increased throughout Europe up until the late 1980s or early 1990s. Trends in western European countries, the European Union (EU) and selected central and eastern European countries have been updated using official death certification data for kidney cancer abstracted from the World Health Organisation (WHO) database over the period 1980–1999. In EU men, death rates increased from 3.92 per 100 000 (age standardised, world standard) in 1980–81 to 4.63 in 1994–95, and levelled off at 4.15 thereafter. In women, corresponding values were 1.86 in 1980–81, 2.04 in 1994–95 and 1.80 in 1998–99. Thus, the fall in kidney cancer mortality over the last 5 years was over 10% for both sexes in the EU. The largest falls were in countries with highest mortality in the early 1990s, such as Germany, Denmark and the Netherlands. Kidney cancer rates levelled off, but remained very high, in the Czech Republic, Baltic countries, Hungary, Poland and other central European countries. Thus, in the late 1990s, a greater than three-fold difference in kidney cancer mortality was observed between the highest rates in the Czech Republic, the Baltic Republics and Hungary, and the lowest ones in Romania, Portugal and Greece. Tobacco smoking is the best recognised risk factor for kidney cancer, and the recent trends in men, mainly in western Europe, can be related to a reduced prevalence of smoking among men. Tobacco, however, cannot account for the recent trends registered in women.

## Introduction

Kidney cancer includes renal cell carcinomas, which account for about two-thirds of cases, transitional cell carcinomas of renal pelvis and a few rarer neoplasms, such as nephroblastomas in children [1].

Tobacco smoking is strongly related to renal pelvis carcinomas, but also—although less strongly—to renal cell carcinomas [2–5]. Obesity is another major recognised risk factor for renal cell carcinomas [1, 3, 4, 6]. The role of other factors, including phenacetin, diuretics and calcium channel blockers [7, 8], diet (i.e. a protective role of vegetables and fruit, and an association with meat, fats and protein) [1, 9, 10], alcohol drinking [11–13] and selected occupations (i.e. cadmium, dry cleaning workers [1, 4]) has also been reported, but quantification of its impact on national mortality rates remains undefined [14, 15].

Between the mid-1950s and the late 1980s, mortality from kidney cancer increased substantially across Europe. The average rise between 1955 and 1989 was 73% in men and 48% in women, and corresponding figures in the late 1980s were 17%

in men and 16% in women [16]. Incidence of renal cell cancer also rose between 1975 and 1990 in the USA [17, 18].

In the early 1990s, however, some levelling or decline in kidney cancer rates has been observed in Sweden and other Scandinavian countries, France and Switzerland, mostly in men [19–21].

To further monitor recent trends in Europe, we examined the trends in mortality observed in various European countries over the last two decades.

## Patients and methods

Official death certification numbers for kidney cancer were derived from the World Health Organisation (WHO) database over the period 1980–1999, whenever available. Estimates of the resident population, generally based on official censuses, were based on the same WHO database (<http://www3.who.int/whsis/menu.cfm>).

For this analysis we considered recent trends in mortality from kidney cancer for 27 individual European countries and the 15 countries of the European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the UK). Since, up to 1989, data were only available for former Yugoslavia as a whole, it was not possible to provide long-term trends for Croatia, Slovenia and other former Yugoslavia countries.

In the 1980s most countries used the ninth revision of the International Classification of Diseases (ICD), although some were still using the eighth

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revision, and from 1995 onwards some countries had adopted the tenth revision. Since differences between various revisions were minor, kidney cancer deaths were re-coded for all countries according to the ninth revision of the ICD (ICD-9: 189 [22]).

From the matrices of certified deaths and resident population, age-standardised rates (in 5-year age groups) at all ages and at ages 35–64 years were computed, on the basis of the world standard population.

## Results

Figure 1 shows the trends in kidney cancer mortality in the EU between 1980 and 1999. In men, overall age-standardised rates increased from 3.92 in 1980–81 to 4.63 per 100 000 in 1994–95, and levelled off thereafter to 4.15 per 100 000 in 1998–99. In women, corresponding values were 1.86 in 1980–81, 2.04 in 1994–95 and 1.80 in 1998–99. Thus, the fall in the last five calendar years was over 10% in both sexes.

Table 1 gives overall age-standardised rates in 27 separate European countries and the EU in 1990, 1995 and 1999. Corresponding trends in 20 selected major European countries are given in Figure 2. Substantial falls were observed in western and northern European countries, with highest rates in the early 1990s, such as Germany (–24% in men and –21% in women, over the last 5 years), Denmark and the Netherlands. Kidney cancer mortality declined by 8% in men and 15% in women, but remained very high in the Czech Republic (9.9 per 100 000 men, 4.4 per 100 000 women), and was high in Hungary, the Baltic countries and other central European countries. In southern Europe (Portugal, Spain, Greece), kidney cancer mortality was low in the early 1990s, but tended to rise until the mid-1990s and to decline only in more recent years. The diverging trends in different European geographic

areas led to a levelling of kidney cancer mortality rates across Europe.

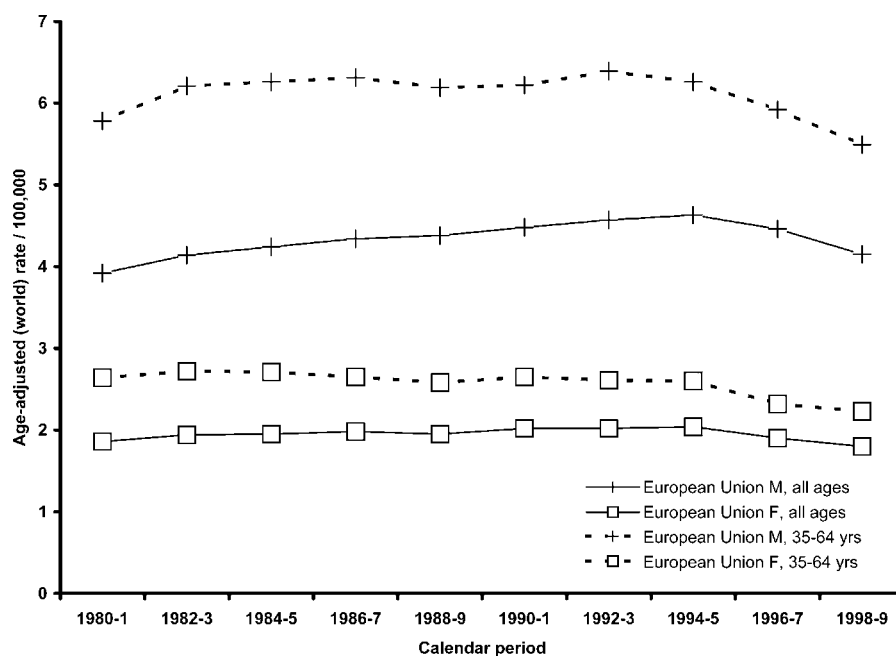
Still, in the late 1990s, a greater than three-fold difference was observed between the highest rates in the Czech Republic, the Baltic Republics and Hungary, and the lowest ones in Romania, Portugal and Greece (Figure 3).

Table 2 gives corresponding values for truncated rates between the ages 35 and 64 years. In the overall EU truncated rate, the fall started earlier (–6% in men and –3% in women, between 1990 and 1995), and was similar for men (–9%) and somewhat larger for women (–16%) over the last 5-year calendar period. Also, in those central European countries with high rates that provided data (Czech Republic, Hungary), trends in the early 1990s were somewhat more favourable in middle age, indicating a cohort pattern in kidney cancer mortality.

## Discussion

The present update of kidney cancer mortality in Europe shows a clear change in trends, with an end to the long-term rise observed up to the early 1990s [16], and the start of a decline in rates, not only in Scandinavian countries, but also in most of western Europe. Consequently, kidney cancer mortality in the EU declined by over 10% over the last 5 years. The falls started earlier in the middle aged (35–64 years) population. Similar trends were observed in the USA, where kidney cancer mortality rates have increased for both sexes among both Whites and Blacks up until the early 1990s, and stabilized afterwards [16, 18, 23].

Tobacco smoking is the single best recognised risk factor for kidney cancer, and particularly for renal pelvis neoplasms,



**Figure 1.** Trends in overall and at age 35–64 years age-standardised (world population) death certification rates (per 100 000) from kidney cancer in men and women in the EU, between 1980 and 1999. M, male; F, Female; yrs, years.

**Table 1.** Overall age-adjusted (world population) mortality rates from kidney cancer per 100 000 men and women in separate European countries in 1990, 1995 and 1999, and corresponding change in rates

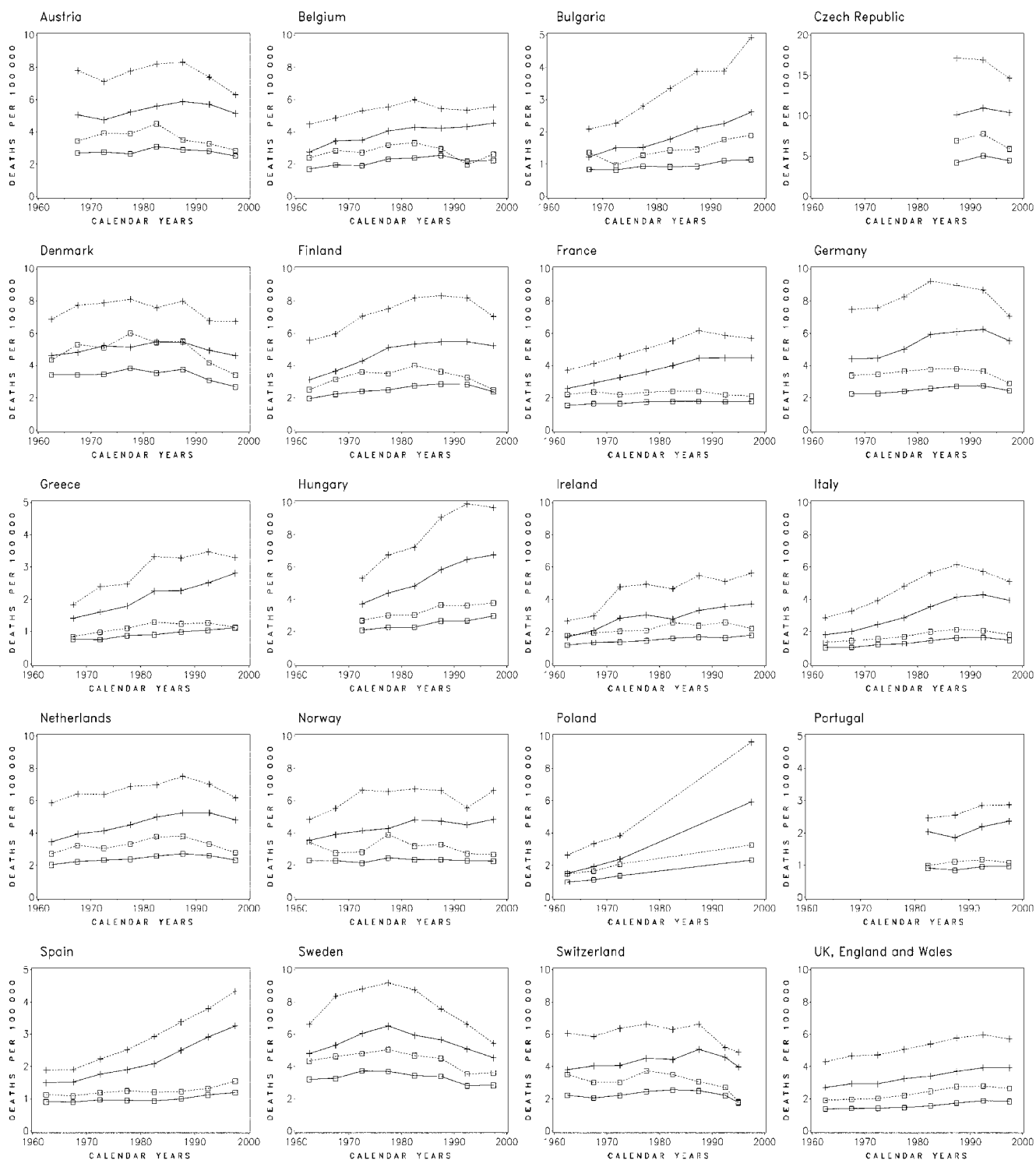
	Men					Women				
	1990	1995	1999	Change, % 1995/90	Change, % 1999/95	1990	1995	1999	Change, % 1995/90	Change, % 1999/95
Austria	5.79	5.03	4.91	-13.13	-2.39	2.58	2.46	2.45	-4.65	-0.41
Belgium (1992)	4.32	4.51	-	4.40	-	2.19	2.35	-	7.31	-
Bulgaria	2.06	2.28	3.05	10.68	33.77	1.02	1.06	1.05	3.92	-0.94
Croatia	3.37	4.65	5.54	37.98	19.14	2.07	1.87	1.87	-9.66	0.00
Czech Republic	10.22	10.75	9.89	5.19	-8.00	4.73	4.94	4.20	4.44	-14.98
Denmark (1998)	5.26	5.02	4.30	-4.56	-14.34	3.61	2.84	2.73	-21.33	-3.87
Estonia	-	7.51	8.52	-	13.45	-	3.46	3.27	-	-5.49
Finland	6.17	4.98	5.04	-19.29	1.20	3.10	2.71	2.31	-12.58	-14.76
France	4.60	4.44	4.42	-3.48	-0.45	1.79	1.83	1.80	2.23	-1.64
Germany	6.14	-	4.63	-1.30	-23.60	2.76	2.70	2.14	-2.17	-20.74
Greece	2.18	2.68	2.82	22.94	5.22	0.86	0.95	1.14	10.47	20.00
Hungary	6.19	6.53	6.90	5.49	5.67	2.60	3.03	3.07	16.54	1.32
Ireland	2.85	2.97	3.78	4.21	27.27	1.58	1.64	1.87	16.54	1.32
Italy	4.21	3.99	3.82	-5.23	-4.26	1.62	1.52	1.39	-6.17	-8.55
Lithuania	-	8.03	7.06	-	-12.08	-	3.24	3.19	-	-1.54
Luxembourg	2.69	4.90	2.83	-	-42.24	2.30	1.74	1.29	-	-25.86
Macedonia	-	1.08	2.27	-	110.19	-	0.41	1.06	-	158.54
Malta	4.10	6.13	2.90	49.51	-52.69	2.20	1.83	1.60	-16.82	-12.57
Netherlands	5.39	5.32	4.60	-1.30	-13.53	2.37	2.56	2.35	8.02	-8.20
Norway	4.78	5.03	4.98	5.23	-0.99	2.69	2.23	2.10	-17.10	-5.83
Portugal	1.95	2.46	2.18	26.15	-11.38	1.19	0.91	0.86	-23.53	-5.49
Slovakia	-	7.30	6.28	-	-13.97	-	2.88	2.95	-	2.43
Slovenia	3.28	3.46	4.58	5.49	32.37	1.62	2.34	2.25	44.44	-3.85
Spain	2.71	3.15	2.90	16.24	-7.94	0.99	1.25	1.20	26.26	-4.00
Sweden	5.07	4.20	4.06	-17.16	-3.33	3.12	2.86	2.79	-8.33	-2.45
Switzerland	4.77	3.93	-	-17.61	-	2.19	1.74	-	-20.55	-
UK	3.96	4.03	4.07	1.77	0.99	1.80	1.94	1.78	7.78	-8.25
European Union	4.50	4.45	4.04	-1.11	-9.21	1.99	2.00	1.76	0.50	-12.00

the RR being over 2 for smoking, with a proportional attributable risk of about one-quarter of cancer in men and 10% in women in developed countries [1, 14–16, 24]. Thus, the decline in smoking prevalence in men over the last few decades [25] in most of western Europe may explain, at least in part, the decline in kidney cancer rates. The pattern of tobacco consumption across Europe can also explain the less favourable trends registered in central and eastern European countries, with rising smoking prevalence and consumption and, consequently, rates of tobacco-related diseases have remained higher than in western Europe over the last decade [26]. Tobacco, however, cannot account for the trends observed in women.

Obesity, the second best recognised risk factor for kidney cancer [1, 6, 14, 15], accounted for >20% of cases in a population from Minnesota [15]. The prevalence of overweight and obesity is lower in Europe than in the USA [5, 27], but

overweight and obesity have tended to increase throughout Europe during the last decades, and thus cannot explain the favourable trends observed in mortality from kidney cancer.

Dietary factors may play some role but their influence on renal carcinogenesis remains unclear. Still, a diet poor in fruit and vegetables, and hence in  $\beta$ -carotene, accounts for 17% of cases in an Italian dataset [14], and several studies found an inverse relation between a diet rich in vegetables and fruit, and kidney cancer [1, 4, 9–11]. A wider availability of fruit and vegetables across Europe over the last few decades may therefore have contributed to the favourable trend in kidney cancer mortality. It is also conceivable that declined exposure to occupational carcinogens has played some role, although the impact of occupational exposures on kidney cancer risk remains unquantified [4, 28]. Likewise, better control of urinary tract infections may have favourably influenced kidney cancer rates [1, 4, 29].

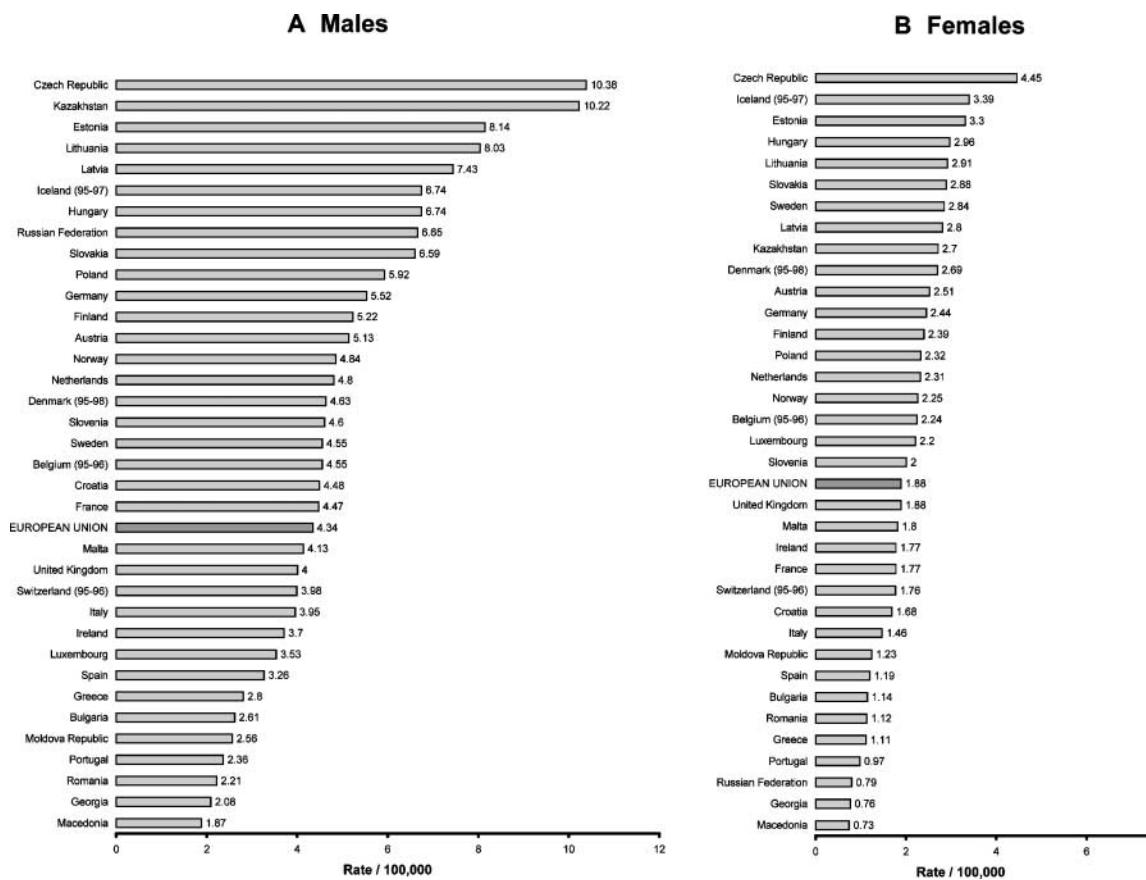


**Figure 2.** Trends in age-standardised (world population) death certification rates per 100 000 from kidney cancer in 20 selected European countries, 1960–99. +—+, males all ages; □—□, females, all ages; + - - + males, 35–64 years; □ - - □, females, 35–64 years.

At least part of the upward trends observed until the early 1990s may be related to improved diagnosis and certification of the disease, following the introduction of ultrasound, computed tomography and other newer diagnostic techniques. However, the similar pattern of trends in middle age (35–64 years) and in the elderly weighs against a major role of changed diagnosis and certification criteria on kidney

cancer risk, at least in major eastern and central European countries.

In conclusion, therefore, the present update analysis of kidney cancer in Europe documents and quantifies an appreciable reduction in mortality. The decline in tobacco smoking in men has played a role in these favourable trends, but the potential influence of other factors remains undefined.



**Figure 3.** Overall age-standardised (world population) death certification rates per 100 000 (A) males and (B) females from kidney cancer in 1995–99 (unless otherwise specified in parentheses) in 35 selected European countries, and the European Union.

**Table 2.** Age-adjusted (world population) mortality rates from kidney cancer per 100 000 men and women aged from 35 to 64 years in separate European countries in 1990, 1995 and 1999, and corresponding change in rates

	Men					Women				
	1990	1995	1999	Change, % 1995/90	Change, % 1999/95	1990	1995	1999	Change, % 1995/90	Change, % 1995/95
Austria	7.97	6.14	6.03	-22.96	-1.79	3.02	2.25	2.83	-25.50	25.78
Belgium (1992)	5.35	5.71	-	6.73	-	1.96	2.79	-	42.35	-
Bulgaria	2.93	4.88	6.38	66.55	30.74	1.69	1.98	1.91	17.16	-3.54
Croatia	5.04	7.03	6.86	39.48	-2.42	2.75	2.17	2.17	-21.09	0.00
Czech Republic	17.10	14.53	14.18	-15.03	-2.41	7.09	6.76	5.15	-4.65	-23.82
Denmark (1998)	7.66	6.99	6.74	-8.75	-3.58	4.77	3.61	3.08	-24.32	-14.68
Estonia	-	12.00	10.03	-	-16.42	-	5.00	3.97	-	-20.60
Finland	9.16	7.17	6.10	-21.72	-14.92	4.38	3.08	2.40	-29.68	-22.08
France	6.01	5.45	5.64	-9.32	3.49	2.37	2.27	2.23	-4.22	-1.76
Germany	8.60	8.11	6.02	-5.70	-25.77	3.87	3.42	2.36	-11.63	-30.99
Greece	3.15	3.26	3.27	3.49	0.31	1.25	0.98	1.07	-21.60	9.18
Hungary	10.10	9.05	9.60	-10.40	6.08	3.79	3.92	4.16	3.43	6.12
Ireland	3.30	3.81	5.96	15.45	56.43	2.15	1.97	2.31	-8.37	17.26
Italy	5.83	5.34	4.81	-8.40	-9.93	2.17	1.88	1.68	-13.36	-10.64
Lithuania	-	14.35	10.44	-	-27.25	-	4.48	4.14	-	-7.59
Luxembourg	5.05	4.93	4.74	-2.38	-3.85	3.72	1.19	0.00	-68.01	-100.00

Table 2. (Continued)

	Men					Women				
	1990	1995	1999	Change, % 1995/90	Change, % 1999/95	1990	1995	1999	Change, % 1995/90	Change, % 1999/95
Macedonia	–	0.89	3.49	–	292.13	–	0.32	1.37	–	328.13
Malta	3.70	8.20	5.06	121.62	–38.29	2.95	1.55	1.39	–47.46	–10.32
Netherlands	7.51	6.39	6.16	–14.91	–3.60	2.61	3.45	2.96	32.18	–14.20
Norway	6.20	7.05	7.24	13.71	2.70	4.03	2.28	2.04	–43.42	–10.53
Portugal	2.49	3.57	2.71	43.37	–24.09	1.48	1.14	1.03	–22.97	–9.65
Slovakia	–	10.87	9.69	–	–10.86	–	3.93	4.39	–	11.70
Slovenia	5.11	6.25	7.09	22.31	13.44	2.52	3.25	1.48	28.97	–54.46
Spain	3.42	3.97	4.12	16.08	3.78	1.08	1.64	1.70	51.85	3.66
Sweden	6.79	4.65	4.65	–31.52	0.00	4.21	3.64	3.69	–13.54	1.37
Switzerland	5.58	5.44	–	–2.51	–	2.71	1.71	–	–36.90	–
UK	6.16	5.78	6.00	–6.17	3.81	2.59	2.92	2.26	12.74	–22.60
European Union	6.34	5.94	5.38	–6.31	–9.43	2.64	2.56	2.14	–3.03	–16.41

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