

The burden of mortality from smoking: Comparing Sweden with other countries in the European Union

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Abstract. We describe the mortality currently attributable to smoking in the European Union (EU), and the change that would result if all EU countries had the smoking prevalence of Sweden. Almost 500,000 smoking-attributable deaths occur annually among men in the EU; about 200,000 would be

avoided at Swedish smoking rates. In contrast, only 1100 deaths would be avoided if EU women smoked at Swedish rates. The low smoking-related mortality among Swedish men probably is due to their use of snus (Swedish smokeless tobacco).

A major public health problem is posed by the excess mortality among the 100 million adult (15+ years) smokers in the European Union (EU) [1]. This burden of mortality varies considerably among the fifteen member countries but certainly is lowest in Sweden, where smoking is much less prevalent than it is elsewhere in Europe [2]. The exceptional pattern of tobacco use in Sweden, particularly among men, has been the subject of recent commentaries in the medical community [1, 3]. But it is unclear whether low smoking prevalence in Sweden actually translates into low smoking-related mortality as compared to that in other EU countries. These international comparisons are difficult to make because data collection methods rarely are standardized; even the definition of 'smoking' differs among countries. Also, overall smoking prevalence data do not convey the large variation in age-specific smoking rates among countries. For example, two countries might exhibit identical overall prevalence while having entirely different rates among older (45+ years) persons, among whom the majority of smoking-related deaths occur. Similarly, comparing smoking-related mortality rates is problematic, since cause-specific mortality data are not fully comparable among countries.

We describe a systematic approach for estimating both smoking prevalence and its impact on mortality in all EU countries, as well as the mortality that would result if all EU countries had the smoking prevalence of Sweden. First, we constructed a set of age-, gender- and smoking-specific all-cause mortality rates using rate ratios (mortality of current smokers/never smokers) from the American Cancer Society's second Cancer Prevention Study (CPS-II), a prospective study of smoking and mortality among more than one million Americans [4]. We then determined the numbers of smokers in each EU country from

age- and gender-specific 1999 census statistics and standardized 1999 smoking prevalence rates from the Eurobarometer survey series [5]. These surveys employ a multi-stage, random sampling design, conduct uniform fieldwork carried out by national institutes, and produce integrated datasets using marginal and intercellular weighting procedures. The series, conducted on behalf of the European Commission, is designed to provide comparable cross-national social research data throughout the EU.

We estimated smoking-attributable deaths among smokers by subtracting the numbers of deaths that would occur at nonsmokers' mortality rates from those occurring at smokers' mortality rates. We then re-estimated the number of deaths under the assumption that each country had the smoking prevalence of Swedish men and women. We limited our analyses to persons 25+ years old since virtually no smoking-related deaths occur at younger ages.

There are 50 million male smokers in the EU, and almost 500,000 smoking-attributable deaths occur among them each year (Table 1). Sweden has the lowest male smoking prevalence (19%), and it is half that of the EU for all men younger than 65 years of age. In fact, if all EU males smoked at the age-specific prevalence rates of men in Sweden, almost 200,000 smoking-attributable deaths (40%) would be avoided. Reductions would occur in every country, from a 30% decline in France and Finland to a 60% decline in Greece.

There are 35 million women smokers in the EU, and about 105,000 smoking-attributable deaths occur annually among them (Table 2). Smoking prevalence varies from 15% in Portugal to 43% in Denmark. Among Swedish women it is 25%, which is at the mean for the EU. In fact, at ages 45+ years Swedish women smoke more than the EU average. If Swedish

Table 1. Smoking prevalence and smoking-attributable deaths (SAD) among men age 25+ years in the European Union, 1999

Country	Population ^a	At country-specific prevalence		At Swedish prevalence		% SAD reduction ^b
		Smokers ^a (%)	SAD	Smokers ^a	SAD	
Austria	2.75	1.28 (47)	10,897	0.54	5839	46
Belgium	3.45	1.57 (45)	16,227	0.68	8014	51
Denmark	1.81	0.63 (35)	8236	0.36	4041	51
Finland	1.70	0.69 (41)	5293	0.34	3723	30
France	19.16	7.72 (40)	63,153	3.80	43,913	30
Germany	28.77	11.47 (40)	112,274	5.66	63,362	44
Greece	3.60	2.19 (61)	22,131	0.71	8850	60
Ireland	1.10	0.44 (40)	4462	0.22	2293	49
Italy	20.30	7.07 (35)	76,234	3.99	47,797	37
Luxembourg	0.15	0.06 (38)	475	0.03	304	36
Netherlands	5.38	1.99 (37)	17,345	1.07	11,146	36
Portugal	3.16	1.48 (47)	11,082	0.62	7204	35
Spain	13.43	6.30 (47)	53,681	2.65	31,172	42
Sweden	3.01	0.59 (19)	7396	0.59	7396	0
United Kingdom	19.61	6.97 (36)	76,771	3.88	44,739	42
Total	127.38	50.45 (40)	485,657	25.14	289,793	40

^a In millions.^b Total reduction of 195,864 deaths.

women's smoking rates prevailed across the EU, only 1100 lives would be saved annually, about 1% of the current toll. About 14,000 smoking-attributable deaths would be avoided in six countries, most prominently in the UK (10,694) and Denmark (2476). But deaths actually would increase in eight countries. In Germany, Spain and Italy combined, over 9000 additional deaths would occur because these coun-

tries currently have lower smoking rates among older women than does Sweden.

Our overall estimate of smoking-attributable deaths in the EU is consistent with recent WHO data [6], but it still may be low. There are no standardized prevalence data pertaining to former smokers in the EU, so we treated this group, among whom mortality rates are lower than those of smokers but higher than

Table 2. Smoking prevalence and smoking-attributable deaths (SAD) among women age 25+ years in the European Union, 1999

Country	Population ^a	At country-specific prevalence		At Swedish prevalence		% SAD change ^b
		Smokers ^a (%)	SAD	Smokers ^a	SAD	
Austria	3.02	0.86 (29)	2267	0.76	2233	-1
Belgium	3.74	0.98 (26)	2668	0.93	2791	5
Denmark	1.91	0.82 (43)	3905	0.49	1429	-63
Finland	1.86	0.37 (20)	1351	0.47	1422	5
France	21.08	6.38 (30)	13,531	5.32	15,394	14
Germany	31.31	7.74 (25)	22,212	7.80	24,550	11
Greece	3.84	1.15 (30)	2497	0.96	2933	17
Ireland	1.17	0.34 (29)	964	0.31	781	-19
Italy	22.17	4.22 (19)	14,853	5.50	17,016	15
Luxembourg	0.16	0.04 (25)	119	0.04	109	-8
Netherlands	5.63	1.47 (26)	4703	1.48	3944	-16
Portugal	3.62	0.53 (15)	1422	0.92	2704	90
Spain	14.59	3.60 (25)	5858	3.66	10,642	82
Sweden	3.18	0.78 (25)	2486	0.78	2486	0
United Kingdom	21.04	6.62 (31)	26,225	5.32	15,531	-41
Total	138.32	35.90 (26)	105,061	34.74	103,965	-1

^a In millions.^b Total net reduction of 1096 deaths.

those of never smokers, as never smokers. A strength of our study is our use of smoking prevalence statistics from Eurostat that are standardized throughout all EU countries. A limitation is the use of American mortality data, as it may not reproduce exactly the mortality experience of individual EU countries. However, we have focused on smoking-attributable deaths (excess deaths in smokers compared with nonsmokers), a measure that is much less susceptible to mortality rate differences between the US and specific EU countries. This measure is dependent primarily on an accurate description of the difference in mortality between smokers and nonsmokers. CPS-II, the data source we used, provides the best contemporary prospective mortality estimates with regard to the difference in death rates between smokers and nonsmokers.

The low smoking-related mortality among Swedish men is probably due to their use of snus (Swedish smokeless tobacco). A recent study from northern Sweden showed that high prevalence of snus use is strongly associated with low smoking prevalence, the latter a result of both reduced smoking initiation and increased cessation [2]. The prevalence of tobacco use among Swedish men (snus use 20%, smoking 19%) is the same as the prevalence of smoking among men throughout the EU (40%). But, because snus use produces a very low risk for cardiovascular diseases [7] and no risk for pulmonary diseases and for oral or other cancers [8, 9], there is no demonstrable incremental burden of mortality among Swedish men who use snus.

The likely beneficial effect of snus use by men in Sweden raises policy questions, because the sale of snus is prohibited in all other EU countries [1]. In 2002 Britain's Royal College of Physicians described the harm reduction potential of Swedish snus [3], and in 2003 the Action on Smoking and Health (UK) issued a policy paper stating, with reference to snus, that 'it is wrong to deny other Europeans this option for risk-reduction...' and that 'the current ban violates rights of smokers to control their own risks' [1]. Our study shows that the low prevalence of smoking among men in Sweden, if adopted throughout the EU, would result in a 40% reduction in smoking-related mortality.

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References

1. Bates C, Fagerström K, Jarvis M, Kunze M, McNeill A, Ramström L. European Union policy on smokeless tobacco: A statement in favour of evidence-based regulation for public health. Action on Smoking and Health, United Kingdom. Available at: <http://www.ash.org.uk/html/regulation/html/eusmokeless.html>
2. Rodu B, Stegmayr B, Nasic S, Asplund K. Impact of smokeless tobacco use on smoking in northern Sweden. *J Int Med* 2002; 252: 398–404.
3. Tobacco Advisory Group of the Royal College of Physicians. Protecting smokers, saving lives: The case for a tobacco and nicotine regulatory authority. Royal College of Physicians of London, 2002. Available at: <http://www.rcplondon.ac.uk/pubs/books/protsmokers/ProtSmokers.pdf>
4. Changes in cigarette-related disease risks and their implication for prevention and control. Smoking and Tobacco Control Monograph 8. Bethesda, MD: US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute, 1997. NIH Publication No. 97-4213.
5. Available through Eurostat Data Shop, Brussels and Luxembourg, at: <http://www.datashop.org/en/index.html>.
6. World Health Organization. Tobacco or health: A global status report, 1997. Available at: <http://www.cdc.gov/tobacco/who/whofirst.htm>.
7. Asplund K. Smokeless tobacco and cardiovascular disease. *Prog Cardiovasc Dis* 2003; 45: 383–394.
8. Lewin F, Norell SE, Johansson H, et al. Smoking tobacco, oral snuff, and alcohol in the etiology of squamous cell carcinoma of the head and neck: A population based case-referent study in Sweden. *Cancer* 1998; 82: 1367–1375.
9. Schildt E, Eriksson M, Hardell L, Magnuson A. Oral snuff, smoking habits and alcohol consumption in relation to oral cancer in a Swedish case-control study. *Int J Cancer* 1998; 77: 341–346.

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