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The reversed social gradient: Higher breast cancer mortality in the higher educated compared to lower educated. A comparison of 11 European populations during the 1990s

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ABSTRACT

Higher socioeconomic position has been reported to be associated with increased risk of breast cancer mortality. Our aim was to see if this is consistently observed within 11 European populations in the 1990s. Longitudinal data on breast cancer mortality by educational level and marital status were obtained for Finland, Norway, Denmark, England and Wales, Belgium, France, Switzerland, Austria, Turin, Barcelona and Madrid. The relationship between breast cancer mortality and education was summarised by means of the relative index of inequality. A positive association was found in all populations, except for Finland, France and Barcelona. Overall, women with a higher educational level had approximately 15% greater risk of dying from breast cancer than those with lower education. This was observed both among never- and ever-married women. The greater risk of breast cancer mortality among women with a higher level of education was a persistent and generalised phenomenon in Europe in the 1990s.

1. Introduction

Socioeconomic differences in breast cancer mortality are of interest for several reasons. Firstly, the cancer site by far most prevalent in adult women in both developed and developing countries is cancer of the breast.[1] Secondly, breast cancer is the only major cause of death with a consistently positive social gradient, and this has been reported in several countries,

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Table 1 – Characteristics of the study populations, for women aged 30–69 years

Population	Follow-up period	Number of women	Percentage of women with		No. of breast cancer deaths	No. of person-years	Rate per 100,000 person-years*
			High/middle education	High education			
Finland	1991–1995	1,296,959	51	12	2309	6,414,832	35.99
Norway	1990–1995	987,441	18	8	1989	4,857,298	40.95
Denmark	1991–1995	1,274,530	46	13	3831	6,242,145	61.37
England and Wales	1991–1996	129,074	16	5	384	723,576	53.07
Belgium	1991–1995	2,530,405	32	14	6923	12,030,270	57.55
France	1990–1995	123,237	39	10	363	731,626	49.62
Austria	1991–1992	1,957,865	28	8	792	1,954,072	40.53
Switzerland	1991–1995	1,096,329	65	8	2563	5,435,184	47.16
Turin	1991–1996	265,095	26	7	723	1,255,406	57.59
Barcelona	1992–1996	437,104	26	15	1086	2,137,516	50.81
Madrid	1996–1997	1,251,541	32	15	525	1,978,308	37.95**

* Mortality rates are not age-adjusted.
** Multiplied by the factor 1/0.7 = 1.43 due to incomplete data.

including Brazil,[2] Denmark,[3,4] Czech Republic,[5] Finland,[6] France,[7] Italy,[8,9] Norway,[10,11] Spain,[12,13] Sweden[14] and the USA.[15,16] It is suggested that this positive educational gradient is mainly because the higher educated are older at the time of first childbirth.[4,11] Thirdly, breast cancer survival is higher among higher educated women,[17] and this is partly explained by stage at diagnosis,[18] but possibly also by access to screening and other factors.

Comparison of breast cancer mortality by socioeconomic position (SEP) in different populations with similar follow-up times has been done in one previous study.[19] For all populations together, a significant positive gradient in breast cancer by educational level was found for women younger than 75 years, but not for older women.

We used the same longitudinal data as Huisman et al.[19] but extended the analysis in the following ways: First, we included two additional populations (Denmark and France). Second, we looked specifically at variations between countries in educational inequalities in breast cancer mortality. Third, we distinguished between women aged 30–49 years and 50–69 years, and between married and non-married women.

We hypothesised that lower educational level is associated with decreased breast cancer mortality across all European populations. However, we expect variations between age groups (reflecting cohort effects, with smaller inequalities in younger age groups) and between marital status groups (with smaller inequalities among non-married, where the role of birth history is strongly attenuated).

2. Materials and methods

We used mortality data from an international study,[20] which obtained longitudinal data on mortality by educational level, marital position, and 5-year age groups for 11 European populations: Finland, Norway, Denmark, England and Wales, Belgium, France, Switzerland, Austria, Turin, Barcelona and Madrid. Participants were enumerated during censuses in the early 1990s and followed up for different periods (Table 1). Most data sets covered the entire national population, except France (data from the Echantillon Démographique Permanent, a 1% representative sample of the French population), Madrid (regional), Barcelona (urban), Switzerland (population living in predominantly German-speaking areas), England and Wales (data from the ONS Longitudinal Study, a 1% representative sample of the population), and Turin. For France, subjects born overseas were excluded. The present study includes women aged 30–69 years at the start of the follow-up (except the life-table calculations in Table 4, where the age range is 30+). The data sets used were described in Huisman et al.[20]

Educational level was used as a measure of socioeconomic position, and was chosen because of its wide availability across the relevant data sets, and because it has been found to be a reliable measure of socioeconomic position in European countries.[21] Education was first coded according to national classification categories. The number of educational categories ranged from 4 (in most populations) to 13 in Belgium. On the basis of the contents of these educational categories, they were converted into categories of the International Standard Classification of Education (ISCED-97).[22] In our analyses, we distinguished between three broad groups of educational categories. These groups approximately corresponded to ISCED levels 0–2 (pre-primary, primary, and lower secondary education), 3 (upper secondary education), and 4–6 (postsecondary education). Barcelona, Madrid and Belgium had the highest share of women with high education, while England and Wales and Turin had the lowest share (Table 1). Some populations had missing values for education: Denmark 11% missing, Madrid and Norway 3%, Barcelona and Switzerland 2%, while the other studies had no missing values for education.[k] Subjects with missing education were excluded from the analyses.

[k] For England and Wales information on the level of education lower than A level was not available from the census. For those with 'missing' level of education there were the following possibilities: they had received no qualifications whatsoever, they had received qualifications lower that A level, or they had received a qualification of A level or higher, but had not filled in the question at the census. We assigned those with 'missing' information to the lowest educational level for England and Wales. The possibility that this group contained some records of people with higher education that did not fill in the question cannot be excluded.