Social inequality and incidence of and survival from male genital cancer in a population-based study in Denmark, 1994–2003

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ABSTRACT

We investigated the effects of socioeconomic, demographic and health-related indicators on the incidence of and survival from prostate and testicular cancer diagnosed 1994–2003 with follow-up through 2006 in Denmark using information from nationwide registers. The analyses were based on data on 8279 men with prostate cancer and 1770 with testicular cancer in a cohort of 3.22 million persons born between 1925 and 1973 and aged ⩾30 years. We found that men with higher education and the highest disposable income had the highest incidence of prostate cancer. The 1-year and 5-year relative survival after prostate cancer were best amongst men of the highest socioeconomic position. We found no substantial social gradients in the incidence of or survival from testicular cancer.

1. Introduction

Cancers of the prostate and of the testis are the two main types of genital cancer in men. The aetiology, clinical manifestations and therapeutic approaches for the two diseases are very different. Prostate cancer is most prevalent in older men and often remains clinically asymptomatic, whereas testicular cancer is most prevalent amongst younger men and is biologically and clinically aggressive in most cases.[1] The incidence of both cancer types has increased during the period of cancer registration in Denmark.[2]

Prostate cancer is the commonest non-cutaneous cancer and the second commonest cause of cancer-related death amongst men in Western populations.[3] The aetiology of prostate cancer is largely unknown, the only established risk factors being increasing age, race and family history; however, the incidence patterns in various countries and races indicate that the pathogenesis involves an interplay between environmental and genetic factors.[4,5] In the United States, the incidence of prostate cancer has increased markedly during the past few decades because of screening for prostate-specific antigen (PSA), from an age-standardised (United States population in 2000) incidence rate of around 100 per 100,000 person-years in the late 1980s to 165 per 100,000 in 1999–2003.[6] In Denmark, where PSA screening has been limited until recently on the basis of recommendations from the Danish

Urological Society,[7] the incidence of prostate cancer increased only modestly in the same period, to an age-standardised (European standard) incidence rate of 78 per 100,000 in 2003.[2,8] Studies of socioeconomic position and prostate cancer incidence have provided some evidence of higher incidence amongst men of higher socioeconomic position,[9–12] whereas the opposite was reported for the prognosis of prostate cancer, with the poorest survival amongst men of low socioeconomic position.[13–17]

Testicular cancer is the most frequent cancer amongst young men, and its incidence in Denmark is amongst the highest in the world.[2,18] In 2003, the age-standardised (European standard) incidence rate was 10 per 100,000.[2] The risk factors for testicular cancer have not been well established. It is generally considered that malignant transformation is initiated early in life, perhaps in the embryonic stage.[19–21] Hypotheses suggesting the importance of environmental factors have also been explored and are supported by the finding of large differences in incidence amongst countries and in migrants.[21] Studies of socioeconomic position as a risk factor for testicular cancer have yielded diverging results,[11,20,22] although most point to a higher incidence in higher social classes.[22] More consistent findings have been obtained in studies of the influence of socioeconomic position on survival after testicular cancer, including two recent studies in Sweden and the United Kingdom, both of which found poorer survival amongst men of low socioeconomic position.[16,23]

Our aim was to explore associations between various indicators of social inequality and the incidence of and survival from prostate and testicular cancer amongst Danish men, as part of a comprehensive, rigorous analysis of the role of socioeconomic position in cancer incidence and survival.

2. Materials and methods

The materials and methods are described elsewhere.[24] Briefly, the study population comprised all 3.22 million Danish residents born between 1925 and 1973 without a previous diagnosis of cancer and who entered the cohort at age 30 (see Fig. 1 in [24]). Information on socioeconomic, demographic and health-related indicators was obtained from various Danish registers based on administrative data.[24] Crude, age-specific and age-standardised incidence rates are presented for prostate (ICD-10:C61) and testicular cancer (ICD-10:C62) diagnosed in the cohort in 1994–2003. The incidence rates were standardised by age (in 5-year age groups) and period (in two 5-year periods), with the total study population as the standard.[25] Further, we used log-linear Poisson regression to model incidence rate ratios (IRRs), first adjusted for period (in 5-year periods) and age (as two continuous variables: age and age^2 in years) and second by adding education and disposable income to the models. For each level of each indicator, we conducted relative survival analyses, adjusting for population mortality amongst the incident cancer cases in 1994–2003 with follow-up through 2006.[24] Population mortality rates were stratified by age, period and the respective indicators. Except for the analyses of ethnicity, all analyses included only residents born in Denmark to at least one Danish-born parent with Danish citizenship.[24]
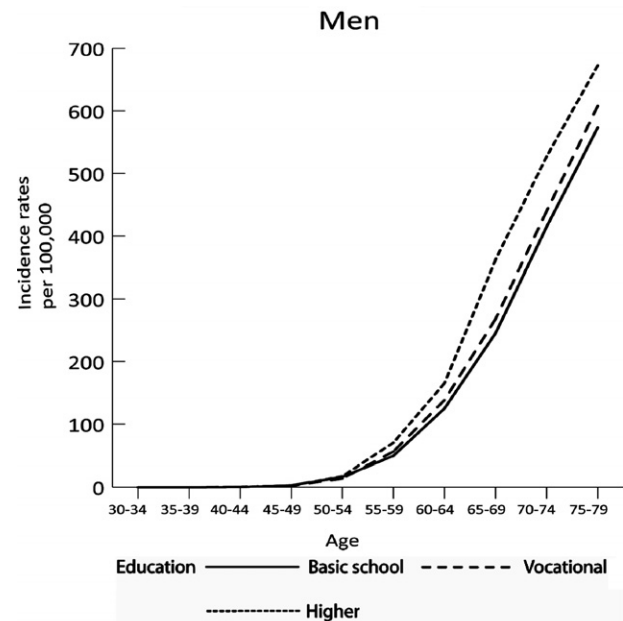
Incidence rate	Basic school (n = 3446)	Vocational (n = 2929)	Higher (n = 1539)
Crude	77	54	60
Standardised	59	63	78
Difference	0	4	19

Persons with unknown level of education not included

Fig. 1 – Age-specific incidence rates per 100,000 person-years for prostate cancer by education amongst persons born in 1925–1973, Denmark, diagnosed in 1994–2003. Supplementary table shows the crude incidence rate and the incidence rate standardised by age (5-year age groups) and period (two 5-year periods) with the total study population as the standard and the incidence rate difference with basic school as the reference.

3. Results

We included 8279 men with prostate cancer and 1770 men with testicular cancer diagnosed during the period 1994–2003, constituting 46% and 63% of the total numbers of prostate and testicular cancer cases, respectively, in Denmark in the same period.[24] The age- and period-standardised incidence rate of prostate cancer amongst Danish men within the study population was 63 per 100,000, and that of testicular cancer was 14 per 100,000.

3.1. Incidence of prostate cancer

Men with higher or vocational education had higher age-standardised incidence rates of prostate cancer than men with basic school education, with an incidence rate difference of 19 per 100,000 between men with higher education and those with basic school education (Fig. 1).

Table 1 – Incidence rate ratios (IRRs) with 95% confidence intervals (95% CIs) for prostate cancer in Danish men born in 1925–1973 and aged ⩾30 years, by socioeconomic, demographic and health-related variables, Denmark, 1994–2003

	Obs	IRR[a] (95% CI)	Adjusted IRR[b] (95% CI)
Level of education			
Basic or high school	3446	1.00	1.00
Vocational education	2929	1.07 (1.02–1.12)	1.05 (1.00–1.10)
Higher education	1539	1.33 (1.25–1.41)	1.24 (1.16–1.32)
Unknown	108	1.03 (0.85–1.24)	1.01 (0.83–1.22)
Disposable income[c]			
Lowest (1st quartile)	2906	0.89 (0.85–0.94)	0.92 (0.87–0.97)
Middle (2nd–3rd quartile)	3249	1.00	1.00
Highest (4th quartile)	1867	1.17 (1.11–1.24)	1.11 (1.05–1.18)
Affiliation to work market[d]			
Working	3568	1.00	1.00
Unemployed or other	771	0.97 (0.89–1.05)	0.99 (0.92–1.07)
Early retirement pensioner	473	0.81 (0.74–0.89)	0.87 (0.79–0.96)
Social class[e]			
Creative core	499	1.38 (1.25–1.52)	1.13 (1.01–1.26)
Creative professional	1371	1.23 (1.15–1.31)	1.09 (1.02–1.18)
Bohemian	44	1.28 (0.95–1.72)	1.12 (0.83–1.52)
Service	1891	1.15 (1.08–1.21)	1.10 (1.04–1.17)
Manual	2928	1.00	1.00
Agricultural	520	1.05 (0.96–1.15)	1.06 (0.96–1.16)
Unknown	769	1.03 (0.95–1.12)	1.02 (0.94–1.10)
Housing tenure			
Owner-occupied	5687	1.00	1.00
Rental	2254	0.95 (0.90–1.00)	0.98 (0.93–1.03)
Unknown	81	0.97 (0.78–1.21)	1.01 (0.81–1.26)
Size of dwelling (m^2)			
0–49	175	0.83 (0.72–0.97)	0.88 (0.76–1.03)
50–99	2605	0.94 (0.90–0.99)	0.97 (0.92–1.03)
100–149	3170	1.00	1.00
⩾150	2072	1.08 (1.02–1.14)	1.03 (0.98–1.09)
Cohabiting status			
Married	6157	1.00	1.00
Cohabiting	386	0.97 (0.87–1.07)	0.98 (0.89–1.09)
Single	409	0.74 (0.67–0.82)	0.79 (0.71–0.87)
Widower	481	0.99 (0.91–1.09)	1.02 (0.93–1.12)
Divorced	589	0.93 (0.85–1.01)	0.97 (0.89–1.05)
Type of district			
Capital area	2577	1.00	1.00
Provincial city	4076	0.90 (0.85–0.94)	0.93 (0.88–0.98)
Rural area	935	0.84 (0.78–0.90)	0.88 (0.82–0.95)
Peripheral rural area[f]	434	0.81 (0.73–0.90)	0.86 (0.78–0.96)
Ethnicity[g]			
Danish	8022	1.00	1.00
Immigrant or descendant from western country	177	1.32 (1.14–1.54)	1.28 (1.10–1.49)
Immigrant or descendant from non-western country	80	0.55 (0.44–0.69)	0.59 (0.47–0.74)
Charlson comorbidity index[h]			
None	5959	1.00	1.00
1	1369	1.07 (1.01–1.13)	1.09 (1.02–1.15)
⩾2	694	1.00 (0.93–1.08)	1.03 (0.95–1.11)
Depression			
No	7877	1.00	1.00
Yes	145	0.92 (0.78–1.09)	0.93 (0.79–1.10)

Table 1 – *continued*			
	Obs	IRR[a] (95% CI)	Adjusted IRR[b] (95% CI)
Schizophrenia or other psychosis			
No	7988	1.00	1.00
Yes	34	0.56 (0.40–0.79)	0.59 (0.42–0.82)

a Adjusted for calendar period (in 5-year intervals) and age modelled as age and age^2 in years.

b Adjusted for calendar period and age (as above) and additionally for level of education and disposable income.

c Household income after taxation and interest, adjusted for number of persons in household; categorised by gender-specific distribution of household disposable income per person.

d For pensioners, work market affiliation before pension date was assigned and follow-up to age 69.

e Based on theory of creative class[26]: the creative core (e.g. researchers, designers and architects), creative professionals (e.g. managers, business and finance, lawyers and doctors), bohemians (e.g. artists and models), the service class (e.g. nurses, hairdressers and caterers), the manual class (e.g. construction workers, transport and production workers) and the agricultural class (e.g. farmers and fishermen).

f More than 40 km to a local centre with adequate possibilities for employment and not sharing a border with a centre municipality.

g Included as a separate indicator, but ethnic groups were excluded from the study population in all other analyses presented in Table 1, e.g. education and income.

h The presence of disorders, as defined in the Charlson index, was defined as an in- or outpatient contact with one of the diagnoses listed in Table 1 in[24] between 1978 and 2 years before the diagnosis of cancer. Grouped according to the accumulated sum of scores.

Analyses on various socioeconomic and demographic characteristics revealed higher incidence rates of prostate cancer amongst men with higher education than those with basic schooling (adjusted IRR, 1.24; 95% confidence interval (CI), 1.16–1.32) and amongst men with the highest disposable income as compared with those with middle income (IRR, 1.11; 95% CI, 1.05–1.18) (Table 1). Men with the lowest disposable income had a slightly lower incidence of prostate cancer than men with middle income (IRR, 0.92; 95% CI, 0.87–0.97). Analyses according to social class[26] revealed higher IRRs for the creative core, professionals, 'bohemians' and men with service jobs than for manual workers. Lower incidences of prostate cancer were found amongst early retirement pensioners than men affiliated to the work market, single men compared to married men and men living in rural or peripheral rural areas compared to men living in capital areas. Men suffering from schizophrenia or psychosis had a lower incidence of prostate cancer than men without these conditions, although the finding was based on small numbers. Finally, male immigrants or descendants from Western countries had a higher incidence of prostate cancer, and those from non-Western countries had a lower incidence than men of Danish ethnicity.

3.2. Relative survival from prostate cancer

The overall 1-year relative survival from prostate cancer was 90%, and the 5-year relative survival was 52%. Fig. 2 shows the age-standardised relative survival according to education, revealing small but clear differences according to the level of education, with approximately 12% better survival after 5 years amongst men with higher education than those with basic schooling. Consistent with these findings, the excess death rate was highest amongst men with basic schooling and lowest amongst men with higher education (Fig. 2).

Both 1-year and 5-year survival after prostate cancer tended to increase with higher socioeconomic position as measured by educational level, disposable income or size of dwelling (Table 2). Better relative survival was also related to being married, living in a capital area and being an immigrant or descendant from a non-Western country.

3.3. Incidence of testicular cancer

No incidence rate differences by educational level were observed for testicular cancer (Fig. 3). Analyses according to socioeconomic and demographic characteristics showed lower incidences of testicular cancer amongst unemployed than employed men (Table 3), men living in small dwellings compared to men living in larger dwellings and male immigrants and descendants from both western and non-western countries compared to men of Danish ethnicity. Otherwise, there were no apparent differences in the risk estimates for testicular cancer by socioeconomic or demographic characteristics.

3.4. Relative survival from testicular cancer

Overall survival from testicular cancer was high during the study period. For patients in whom this cancer was diagnosed during 1994–2003, the 1-year relative survival was 98% and the 5-year survival was 95%. Fig. 4 presents the age-standardised relative survival of testicular cancer patients according to the level of education. The survival curves were flat but indicated slightly better survival of men with higher education. We found no clear association, however, between educational level and excess mortality rate during the 5-year follow-up period (Fig. 4). Notwithstanding the absence of differences in survival from testicular cancer by the level of education and most other socioeconomic characteristics, a few indicators were associated with long-term survival (Table 4). Five-year survival was slightly poorer amongst unemployed men and early retirement pensioners than amongst employed men, single men compared to married or cohabiting
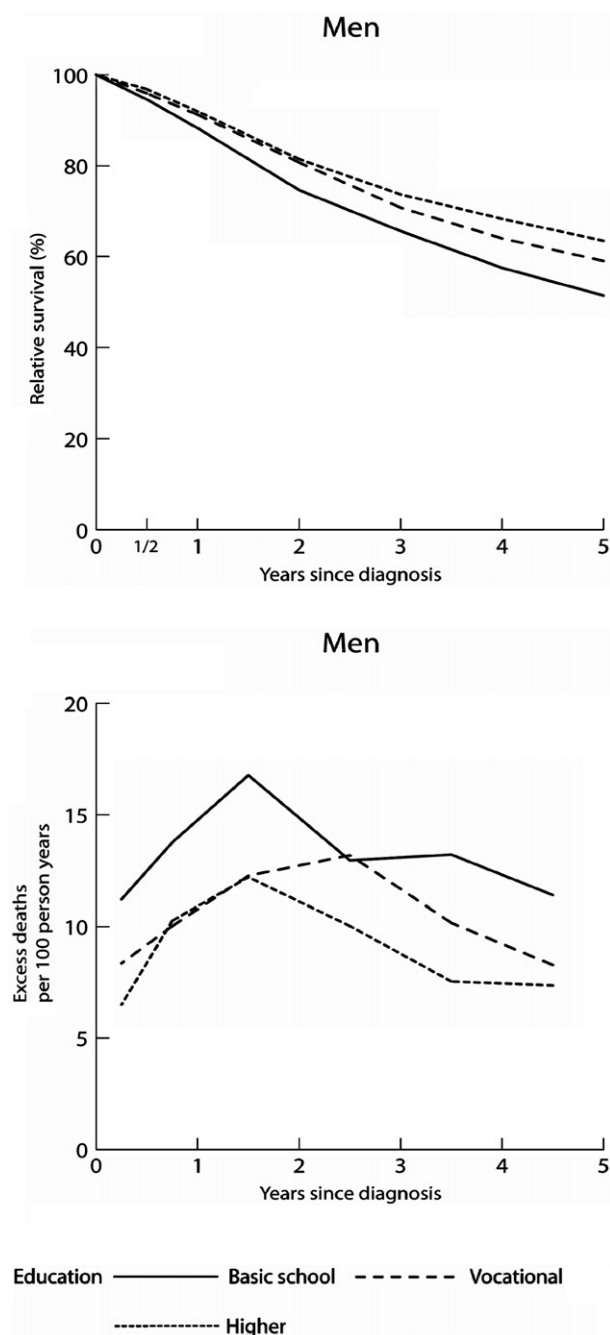
Fig. 2 – Age-standardised relative survival and excess mortality rates per 100 person-years by level of education in patients born in 1925–1973, with prostate cancer diagnosed in Denmark in 1994–2003 and followed through 2006. Relative survival is the ratio of the observed survival of the cancer patients and the survival that would have been expected if the patients had had the same age-, period- and education-specific mortality as the total study population. Excess mortality is excess to the same population mortality and estimated in intervals since diagnosis. Estimates were standardised for age on the basis of the age distribution of all patients with prostate cancer in the study cohort.

men, and amongst men living in small dwellings compared to men living in larger dwellings.

4. Discussion

In agreement with previous reports, we found a higher incidence of prostate cancer amongst men of high socioeconomic position. Even after adjustment for education and disposable income, there were substantial social gradients in the incidence of prostate cancer for a number of indicators. Higher socioeconomic position was associated with up to a 25% increase in the incidence of prostate cancer, as reported previously.[9,12] Survival after prostate cancer during the study period was poorer in Denmark than in other Western countries.[27] In the EUROCARE-4 study of prostate cancer diagnosed in 1995–1999, Denmark, had the lowest 5-year survival (47%) of all 22 contributing countries, the European average being 73.9%.[27] These results reflect differences in diagnostic intensity, primarily PSA screening, in Europe. A recent study of trends in prostate cancer incidence and mortality in five Nordic countries during 1980–2004, based on national registries, showed that the incidence rates in Denmark were half those in the other Nordic countries in the most recent period, consistent with a lower intensity of PSA testing in Denmark, whereas the mortality rates were similar in the five countries.[28]

We found high 5-year relative survival after testicular cancer (95%), similar to the average survival of patients in the EUROCARE-4 study (93.8%).[27] With the huge advances in treatment and prognosis achieved during the 1970s and 1980s, testicular cancer is a model of a curable cancer.[18,29] We found no substantial social gradients in the incidence of or survival from testicular cancer; however, as reported in the few studies available,[23] there was a small gradient in long-term survival by employment status and size of dwelling. A British study of the influence of socioeconomic position on survival from testicular cancer, with a measure of 'deprivation gap' based on indicators such as unemployment and car access, found a deprivation gap for 5-year survival of 6.2% in favour of men of the highest socioeconomic position whose cancers were diagnosed in 1986–1990.[23]

The social gradient in prostate cancer incidence is probably related to differences in diagnostic activity, including PSA screening, although differences in potential risk factors such as dietary and lifestyle factors may also be involved.[9,10] As Danish urologists do not recommend PSA screening for prostate cancer and no formal screening programme has been implemented,[7,8] it is up to patients and their physicians to initiate the appropriate tests. Men with longer education might be better informed and, consequently, may be more aware of symptoms as well as the possibility of asymptomatic (latent) prostate cancer and ask for a PSA test. Furthermore, men with high disposable income might have an extended social network and psychosocial resources, which are likely to affect diagnostic intensity. These potential relations amongst symptoms, disease awareness and diagnostic measures, including PSA screening, might explain our observation of a low incidence of prostate cancer amongst patients with schizophrenia or other psychoses.

The incidences of both prostate and testicular cancer were lower amongst immigrants or descendants from non-Western

Table 2 – 1-year and 5-year relative survival [a] (%) with 95% confidence interval (95% CI) by socioeconomic, demographic and health variables in patients aged ≥30 years born in 1925–1973 with prostate cancer diagnosed in Denmark between 1994 and 2003 and followed through 2006

	Number	1-year survival		5-year survival	
		%	95% CI	%	95% CI
Level of education					
Basic or high school	3431	88	87–89	47	45–49
Vocational education	2918	91	90–92	54	52–56
Higher education	1537	92	90–93	59	56–62
Unknown	109	88	82–95	49	38–63
Disposable income[b]					
Lowest (1st quartile)	2889	88	87–90	47	45–49
Middle (2nd–3rd quartile)	3242	90	89–91	53	51–55
Highest (4th quartile)	1864	93	91–94	56	53–59
Affiliation to work market[c]					
Working	3562	91	90–92	50	49–52
Unemployed or other	767	87	84–91	47	42–52
Early retirement pensioner	468	91	87–94	44	38–51
Social class[d]					
Creative core	498	92	90–95	59	54–64
Creative professional	1368	92	90–93	57	54–60
Bohemian	42	95	87–103	49	34–71
Service	1889	91	90–93	53	51–56
Manual	2915	88	87–89	48	46–50
Agricultural	518	92	89–94	47	43–52
Unknown	765	88	86–91	50	46–55
Housing tenure					
Owner-occupied	5668	91	90–92	52	51–54
Rental	2246	87	86–89	51	48–53
Unknown	81	96	90–102	49	37–64
Size of dwelling (m²)					
0–49	174	80	74–88	38	30–49
50–99	2590	88	86–89	49	47–52
100–149	3164	91	90–92	52	50–54
≥150	2067	92	90–93	55	52–57
Cohabiting status					
Married	6141	91	90–92	53	52–55
Cohabiting	384	86	82–90	47	42–54
Single	405	84	80–88	43	37–49
Widower	479	88	84–91	45	39–52
Divorced	586	87	84–90	48	43–53
Type of district					
Capital area	2567	91	90–93	57	55–60
Provincial city	4062	90	89–91	50	48–52
Rural area	932	89	86–91	48	45–52
Peripheral rural area[e]	434	88	84–91	43	38–48
Ethnicity[f]					
Danish	7995	90	89–91	52	50–53
Immigrant or descendant from western country	176	89	84–94	52	44–61
Immigrant or descendant from non-western country	78	93	88–100	64	52–79
Charlson comorbidity index[g]					
None	5945	90	90–91	52	51–54
1	1358	89	87–91	50	46–53
≥2	692	89	86–92	51	46–56
Depression					
No	7853	90	89–91	52	50–53
Yes	142	88	82–95	54	44–65

(continued on next page)

	Number	1-year survival		5-year survival	
		%	95% CI	%	95% CI
Schizophrenia or other psychosis					
No	7963	90	89–91	52	51–53
Yes	32	80	66–97	40	24–67

Table 2 – continued

a Ratio of observed survival of cancer patients and survival that would have been expected if the patients had had the same age-, period-, socioeconomic, demographic or health-related indicator-specific mortality as the total study population; for 'social class' and 'ethnicity', expected survival is adjusted only for age, not period, because of low power.

b Household income after taxation and interest, adjusted for number of persons in household; categorised by gender-specific distribution of household disposable income per person.
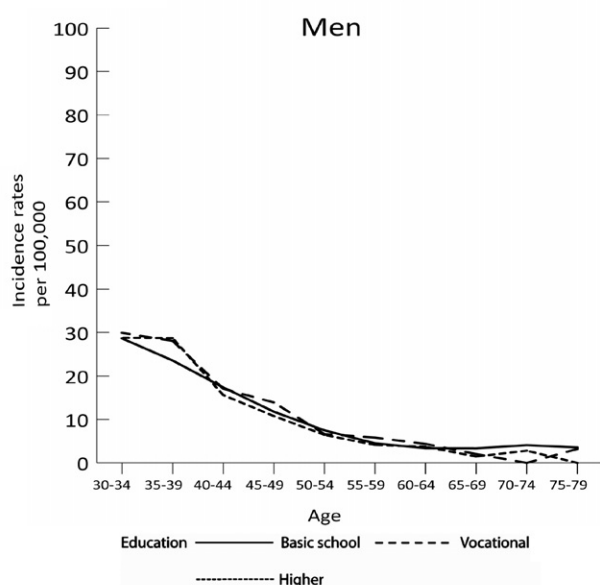
c For pensioners, work market affiliation before pension date was assigned and follow-up to age 69.

d Based on theory of creative class[26]: the creative core (e.g. researchers, designers and architects), creative professionals (e.g. managers, business and finance, lawyers and doctors), bohemians (e.g. artists and models), the service class (e.g. nurses, hairdressers and caterers), the manual class (e.g. construction workers, transport and production workers) and the agricultural class (e.g. farmers and fishermen).

e More than 40 km to a local centre with adequate possibilities for employment and not sharing a border with a centre municipality.

f Excluded from the study population in all other analyses presented in Table 2.

g The presence of disorders, as defined in the Charlson index, was defined as an in- or outpatient contact with one of the diagnoses listed in Table 1 in[24] between 1978 and 2 years before the diagnosis of cancer. Grouped according to the accumulated sum of scores.

Incidence rate	Basic school (n =550)	Vocational (n =792)	Higher (n =361)
Crude	12	15	14
Standardised	13	14	13
Difference	0	1	0

Persons with unknown level of education not included

Fig. 3 – Age-specific incidence rates per 100,000 person-years for testicular cancer by education amongst persons born in 1925–1973, Denmark, diagnosed in 1994–2003. Supplementary table shows the crude incidence rate and the incidence rate standardised by age (5-year age groups) and period (two 5-year periods) with the total study population as the standard and the incidence rate difference with basic school as the reference.

countries than amongst men of Danish ethnicity. Despite the small number of cases and the potential absence of relevant medical histories for these men, the incidence pattern might be related to genetic and environmental factors, as suggested in previous studies of prostate[4,5] and testicular cancer.[21]

The social gradients in survival from prostate and testicular cancer might be due to differences in stage of disease at diagnosis, treatment modalities, treatment compliance or other prognostic factors potentially associated with socioeconomic position.[30,31] It would have been useful to evaluate the stage of disease at diagnosis according to socioeconomic indicators; however, information on staging was not available. Early detection is particularly important for prostate cancer, as treatment with curative intent can be offered only if the disease is localised at the time of diagnosis. For testicular cancer, curative treatment can be achieved even for disseminated disease.[32] It is possible that men of higher socioeconomic position insist more on receiving the best treatment and have more resources to comply with treatment. In Denmark, patients with testicular cancer have been treated uniformly according to stage and prognostic group since the mid-1980s,[18] so that a potential social gradient in survival would more likely be related to stage of disease at diagnosis or compliance. For prostate cancer, the therapeutic approach changed during the study period. Deferred hormonal therapy ('watchful waiting'), regardless of age and stage, was routine treatment in Denmark until the late 1990s,[33,34] and, although treatment with curative intent is now offered, it is not yet known whether this has had a major effect on prognosis.[28] Studies are needed to explore potential social inequalities in treatment and compliance amongst patients with testicular and prostate cancer and how they affect the prognosis of the two diseases.

In conclusion, we found substantial differences in the incidence of prostate cancer by socioeconomic position. We also found social inequalities in survival from prostate cancer and, to a lesser degree, also from testicular cancer. As the prognosis of cancer in male genital organs will probably

	Obs	IRR[a] (95% CI)	Adjusted IRR[b] (95% CI)
Table 3 – Incidence rate ratios (IRRs) with 95% confidence intervals (95% CIs) for testicular cancer in Danish men born 1925–1973 and aged ≥30 years, by socioeconomic, demographic and health-related variables, Denmark, 1994–2003			
Level of education			
Basic or high school	547	1.00	1.00
Vocational education	788	1.06 (0.95–1.19)	1.06 (0.95–1.18)
Higher education	360	1.00 (0.87–1.14)	1.00 (0.88–1.15)
Unknown	29	1.17 (0.81–1.71)	1.18 (0.81–1.71)
Disposable income[c]			
Lowest (1st quartile)	367	0.91 (0.81–1.03)	0.91 (0.81–1.03)
Middle (2nd–3rd quartile)	981	1.00	1.00
Highest (4th quartile)	376	0.91 (0.81–1.02)	0.91 (0.81–1.03)
Affiliation to work market[d]			
Working	1490	1.00	1.00
Unemployed or other	149	0.85 (0.72–1.01)	0.87 (0.73–1.03)
Early retirement pensioner	66	1.09 (0.85–1.40)	1.09 (0.84–1.41)
Social class[e]			
Creative core	125	0.99 (0.82–1.19)	1.04 (0.83–1.30)
Creative professional	238	0.96 (0.83–1.11)	0.99 (0.84–1.16)
Bohemian	8	0.75 (0.37–1.50)	0.78 (0.39–1.58)
Service	434	0.92 (0.81–1.03)	0.93 (0.82–1.05)
Manual	713	1.00	1.00
Agricultural	63	0.91 (0.71–1.18)	0.93 (0.72–1.21)
Unknown	143	0.93 (0.77–1.11)	0.95 (0.79–1.14)
Housing tenure			
Owner-occupied	1089	1.00	1.00
Rental	599	1.09 (0.98–1.20)	1.10 (0.99–1.22)
Unknown	36	0.93 (0.67–1.30)	0.95 (0.68–1.32)
Size of dwelling (m²)			
0–49	71	0.78 (0.61–1.00)	0.79 (0.62–1.02)
50–99	609	0.98 (0.88–1.10)	0.99 (0.88–1.10)
100–149	697	1.00	1.00
≥150	347	0.88 (0.77–1.00)	0.89 (0.78–1.01)
Cohabiting status			
Married	899	1.00	1.00
Cohabiting	348	1.01 (0.89–1.15)	1.02 (0.89–1.16)
Single	384	0.99 (0.87–1.12)	1.00 (0.88–1.14)
Widower	7	0.87 (0.42–1.87)	0.89 (0.42–1.88)
Divorced	86	1.03 (0.82–1.29)	1.04 (0.83–1.30)
Type of district			
Capital area	566	1.00	1.00
Provincial city	891	0.98 (0.88–1.09)	0.97 (0.87–1.08)
Rural area	191	0.92 (0.78–1.09)	0.91 (0.77–1.07)
Peripheral rural area[f]	76	0.90 (0.71–1.15)	0.89 (0.70–1.13)
Ethnicity[g]			
Danish	1724	1.00	1.00
Immigrant or descendant from western country	30	0.76 (0.53–1.10)	0.76 (0.53–1.09)
Immigrant or descendant from non-western country	16	0.18 (0.11–0.30)	0.18 (0.11–0.30)
Charlson comorbidity index[h]			
None	1604	1.00	1.00
1	81	1.07 (0.85–1.34)	1.07 (0.85–1.34)
≥2	39	1.25 (0.91–1.72)	1.25 (0.91–1.72)
Depression			
No	1712	1.00	1.00
Yes	12	0.78 (0.44–1.38)	0.79 (0.45–1.39)

Table 3 – *continued*	Obs	IRR[a] (95% CI)	Adjusted IRR[b] (95% CI)
Schizophrenia or other psychosis			
No	1708	1.00	1.00
Yes	16	0.80 (0.49–1.31)	0.80 (0.49–1.32)

a Adjusted for calendar period (in 5-year intervals) and age modelled as age and age^2 in years.
b Adjusted for calendar period and age (as above) and additionally for level of education and disposable income.
c Household income after taxation and interest, adjusted for number of persons in household; categorised by gender-specific distribution of household disposable income per person.
d For pensioners, work market affiliation before pension date was assigned and follow-up to age 69.
e Based on theory of creative class[26]: the creative core (e.g. researchers, designers and architects), creative professionals (e.g. managers, business and finance, lawyers and doctors), bohemians (e.g. artists and models), the service class (e.g. nurses, hairdressers and caterers), the manual class (e.g. construction workers, transport and production workers) and the agricultural class (e.g. farmers and fishermen).
f More than 40 km to a local centre with adequate possibilities for employment and not sharing a border with a centre municipality.
g Included as a separate indicator, but ethnic groups were excluded from the study population in all other analyses presented in Table 1, e.g. education and income.
h The presence of disorders, as defined in the Charlson index, was defined as an in- or outpatient contact with one of the diagnoses listed in Table 1 in[24] between 1978 and 2 years before the diagnosis of cancer. Grouped according to the accumulated sum of scores.
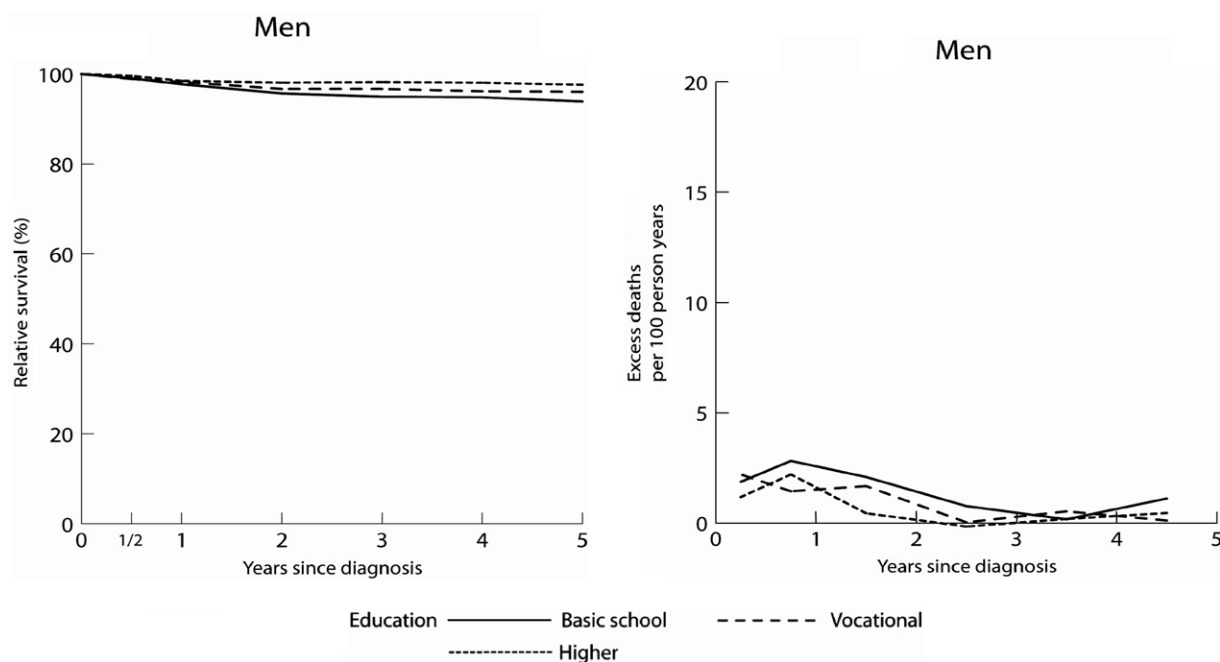

Fig. 4 – Age-standardised relative survival and excess mortality rates per 100 person-years by level of education in patients born in 1925–1973, with testicular cancer diagnosed in Denmark 1994–2003 and followed through 2006. Relative survival is the ratio of the observed survival of the cancer patients and the survival that would have been expected if the patients had had the same age-, period- and education-specific mortality as the total study population. Excess mortality is excess to the same population mortality and estimated in intervals since diagnosis. Estimates were standardised for age on the basis of the age distribution of all patients with testicular cancer in the study cohort.

Table 4 – 1-year and 5-year relative survival[a] (%) with 95% confidence interval (95% CI) by socioeconomic, demographic and health variables in patients aged ≥30 years born in 1925–1973 with testicular cancer diagnosed in Denmark between 1994 and 2003 and followed through 2006

	Number	1-year survival		5-year survival	
		%	95% CI	%	95% CI
Level of education					
Basic or high school	545	98	96–99	93	91–96
Vocational education	787	98	97–99	95	94–97
Higher education	360	99	97–100	97	95–99
Unknown	29	99	96–102	91	79–105
Disposable income[b]					
Lowest (1st quartile)	367	97	95–99	93	90–96
Middle (2nd–3rd quartile)	979	98	97–99	95	93–97
Highest (4th quartile)	375	99	98–100	97	95–99
Affiliation to work market[c]					
Working	1489	99	98–99	96	95–97
Unemployed or other	149	97	94–100	91	86–97
Early retirement pensioner	64	94	87–101	84	73–98
Social class[d]					
Creative core	125	98	96–101	95	92–99
Creative professional	238	98	96–100	96	94–99
Bohemian	8	100	–	101	–
Service	433	98	97–100	96	94–98
Manual	711	98	97–99	94	92–96
Agricultural	63	97	93–101	91	84–99
Unknown	143	98	95–100	93	87–99
Housing tenure					
Owner-occupied	1088	98	98–99	96	95–97
Rental	597	97	96–99	92	89–95
Unknown	36	100	–	92	82–102
Size of dwelling (m^2)					
0–49	70	98	95–102	85	76–96
50–99	608	98	96–99	94	92–96
100–149	696	99	98–100	97	96–99
≥150	347	97	96–99	94	91–97
Cohabiting status					
Married	897	98	98–99	95	94–97
Cohabiting	348	100	99–100	98	95–100
Single	383	96	94–99	89	85–93
Widower	7	99	97–101	101	99–104
Divorced	86	97	93–100	91	84–98
Type of district					
Capital area	563	98	97–99	95	93–97
Provincial city	891	98	97–99	94	93–96
Rural area	191	99	97–100	95	92–99
Peripheral rural area[e]	76	99	96–102	99	95–102
Ethnicity[f]					
Danish	1721	98	97–99	95	94–96
Immigrant or descendant from western country	30	97	91–103	97	91–105
Immigrant or descendant from non-western country	16	100	–	101	–
Charlson comorbidity index[g]					
None	1602	98	98–99	95	94–96
1	80	96	92–100	91	83–99
≥2	39	95	88–104	94	82–107
Depression					
No	1709	98	97–99	95	94–96
Yes	12	89	71–111	92	73–117

Table 4 – _continued_

	Number	1-year survival		5-year survival	
		%	95% CI	%	95% CI
Schizophrenia or other psychosis					
No	1705	98	97–99	95	94–96
Yes	16	101	–	98	85–114

a Ratio of observed survival of cancer patients and survival that would have been expected if the patients had had the same age-, period-, socioeconomic, demographic or health-related indicator-specific mortality as the total study population; for 'social class' and 'ethnicity', expected survival is adjusted only for age, not period, because of low power.

b Household income after taxation and interest, adjusted for number of persons in household; categorised by gender-specific distribution of household disposable income per person.

c For pensioners, work market affiliation before pension date was assigned and follow-up to age 69.

d Based on theory of creative class[26]: the creative core (e.g. researchers, designers and architects), creative professionals (e.g. managers, business and finance, lawyers and doctors), bohemians (e.g. artists and models), the service class (e.g. nurses, hairdressers and caterers), the manual class (e.g. construction workers, transport and production workers) and the agricultural class (e.g. farmers and fishermen).

e More than 40 km to a local centre with adequate possibilities for employment and not sharing a border with a centre municipality.

f Excluded from the study population in all other analyses presented in Table 2.

g The presence of disorders, as defined in the Charlson index, was defined as an in- or outpatient contact with one of the diagnoses listed in Table 1 in[24] between 1978 and 2 years before the diagnosis of cancer. Grouped according to the accumulated sum of scores.

improve in Denmark, as in other European countries, it is important to ensure that men at all socioeconomic levels benefit from such improvement.

Conflict of interest statement

None declared.

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