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Reduction of socioeconomic inequality in cancer incidence in the South of the Netherlands during 1996–2008

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ABSTRACT

Background: Cancer incidence varies according to socioeconomic status (SES) and time trends. SES category may thus point to differential effects of lifestyle changes but early detection may also affect this.

Patients and methods: We studied patients diagnosed in 1996–2008 and registered in the South Netherlands Cancer registry. Incidence rates and estimated annual percentage changes were calculated according to SES category, age group (25–44, 45–64 and ≥65) and sex.

Results: People with a low SES exhibited elevated incidence rates of cancer of the head and neck, upper airways (both sexes), gastro-intestinal tract, squamous cell skin cancer, breast (≥65) and all female genital, bladder, kidney and mature B-cells (all in females only), whereas prostate cancer, basal cell skin cancer (BCC) and melanoma (both except in older females) were most common among those with a high SES. Due to the greater increase in prostate cancer and melanoma in high SES males and the larger reduction of lung cancer in low SES males, incidence of all cancers combined became more elevated among males of ≥45 years with a high and intermediate SES, and approached rates for low SES men aged 45–64. In spite of more marked increases in the incidence of colon, rectal and lung cancer in high SES women, the incidence of all cancers combined remained highest for low SES women of ≥45 years. However, at age 25–44 years, the highest incidence of cancer of the breast and melanoma was observed among high SES females. During 1996–2008 inequalities increased unfavourably among higher SES people for prostate cancer, BCC (except in older women) and melanoma (at middle age), while decreasing favourably among low SES people for cancers of the oesophagus, stomach, pancreas and kidney (both in females only), breast (≥65 years), corpus uteri and ovary.

Conclusions: Although those with a low SES exhibited the highest incidence rates of the most common cancers, higher risks were observed among those with high SES for melanoma and BCC (both except older females) and for prostate and breast (young females) cancer. Altogether this might also have contributed to the recent higher cancer awareness in Dutch society which is usually promoted more by patients of high SES and those who know or surround them.

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1. Introduction

More or less consistent excess risks for tobacco-related and other lifestyle-related cancers (i.e. respiratory cancers, cancers of the head and neck and upper gastro-intestinal (GI) tract, liver and cervix uteri) have been reported for people from the lower social strata, while their risks for cancers of the colon, breast and ovary and malignant melanoma are generally reduced.^{1–12}

Studies of time trends in cancer incidence according to the socioeconomic class in Finland from 1971 to 1995 showed decreases in relative differences among socioeconomic status (SES) categories, (albeit not quantified) for cancers of the colon, female breast, vulva, vagina and testis, while such inequalities remained for cancers of the upper GI tract and rectum, liver, gallbladder and pancreas, female genital organs, prostate and penis.^{13–15} Socioeconomic inequalities in oral cancer have perhaps been declining over recent decades in a few countries.¹⁶ In contrast, older data from England and Wales suggested such inequalities to be increasing among males for all cancers combined and for cancers of the lung, larynx and stomach and among females for all cancers combined and for cervical cancer.¹ More recently, increased inequalities from 1995 to 2004 were reported for melanoma, prostate and female breast and kidney cancers.¹²

Although health care in the Netherlands is accessible for everyone, also through obligatory health insurance since 2006 (and social insurance for the 70% with a lower income before then) and through broad availability of well trained general practitioners (one per 2000 people on average), social inequalities in cancer incidence have been reported for cancers of the cervix, lung, stomach, oropharynx, oesophagus and breast, being more common in people with a low SES,^{17–20} contrasting breast²⁰ and colon cancer, albeit inconsistently.²¹

None of the Dutch studies was population-based and took information into account on SES of the complete population, which is typically known in Denmark, Sweden and Finland. Without this information, incidence rates of a specific SES group could not be calculated, and reporting proportions of patients with a specific SES group does not necessarily reflect true incidence. The SES of the population according to postal code has recently been made available by Statistics Netherlands and thus enable correct analyses of incidence according to SES. In addition, these previous studies were conducted on a selected sample and were thus not representative of a geographical area. No studies have yet been done of time trends in the association of incidence and SES in the Netherlands, which are likely to be affected by the various mass screening campaigns.²² This information is also useful to understand potential changes in awareness of cancer, usually elevated in people of higher SES and to assess the need for specific preventive interventions. Therefore we aimed to detect patterns in time trends in the incidence of the major cancers according to SES in the South of the Netherlands.

2. Patients and methods

2.1. Study population

The South Netherlands or Eindhoven Cancer Registry records data on all patients newly diagnosed with invasive cancer in the south-eastern part of the Netherlands, an area with 2.4 million inhabitants (about 15% of the Dutch population) and served by about 10 general hospitals and two large radiotherapy institutes. Trained registry personnel actively collect data on diagnosis, staging, treatment and survival from the medical records after notification by pathologists and medical registration offices. We included all patients newly diagnosed between 1996 and 2008 with invasive cancers including those amenable to lifestyle,^{23–25} i.e. cancers of the oesophagus (including cardia of the stomach); larynx; oropharynx; urinary bladder; lung; corpus uteri; kidney; stomach (non-cardia); colon; rectum; pancreas; breast; cervix uteri; acute and precursor leukaemia and lymphomas; melanoma; basal cell carcinomas (BCC) (for which there is a unique registration at the Eindhoven cancer registry²⁶) and squamous cell cancers of the skin (including lip, SCC); as well as prostate; ovary; mature B-cell (including Hodgkin's lymphoma). In addition, we conducted analyses of all cancers combined, i.e. including those above plus all other cancers diagnosed, but excluding BCC.

2.2. Socioeconomic status

An indicator for SES developed by Statistics Netherlands was used.²⁷ SES of the patient was defined at the neighbourhood level (based on six-digit postal code of residence area) combining mean household income (in 1998) and mean economic value of the house/apartment (in 2000), derived from individual fiscal data provided at an aggregated level. On average, each postal code area contains 17 households, thus covering a very small geographical area. The use of routinely collected income fiscal data assures the reliability of the estimates of household incomes. Postal codes were assigned to three SES categories: low (1st–3rd deciles), intermediate (4th–7th deciles) and high (8th–10th deciles). This SES measure is assumed to be valid for 10 years before and after the base year (2000).²⁷ A separate SES category was made for postal codes of care-providing institutions but these were excluded from the analyses because assigning SES to those living in a nursing home or other care-providing institution is very difficult.

For the year 2004, population data at the level of a six-digit postal code, i.e. according to SES, age and sex, were available from Statistics Netherlands, enabling calculation of specific incidence rates for each SES category. Since these source population data were not available for the other years, we corrected the SES-specific population for the changes in the general population (age distribution, sexes). This method appears to be valid because during 1996–2008 the sum of the specific SES populations never deviated more than 10% from the general population. Absolute inequalities, not relative

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