

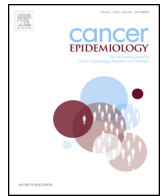


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Trends in mortality after cancer diagnosis: A nationwide cohort study over 45 years of follow-up in Sweden by country of birth

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ABSTRACT

Background: Survival has steadily improved for major cancer types in most parts of the world. We compared all-cause mortality between foreign-born and Sweden-born residents of Sweden who were diagnosed with cancer of the colon, lung, stomach, prostate, breast, cervix, and all site.

Methods: We used Swedish national vital status and health registers to follow a cohort of 1,556,108 patients 45 years of age and older diagnosed with cancer between 1961 and 2009 in Sweden. Among them, 109,915 were born abroad. We estimated hazard ratios (HR) and 95% confidence interval (CI) using multivariable Cox proportional hazard models.

Results: We identified 604,035 and 540,138 deaths among men and women, respectively. Among them 33,595 men and 34,174 women were born abroad. At the time of diagnosis, patients born abroad were on average 4 years younger than patients born in Sweden. All-cause mortality was generally lower in the former than in the latter group of patients before 1990 but higher after 2000. The mortality trend was similar for prostate and breast cancer.

Conclusions: Whilst national policy in Sweden aims at achieving equal access to health care, the mortality trend observed among cancer patients born in Sweden was different from that observed among patients born elsewhere. Mortality after diagnosis of major types of cancer has worsened among foreign-born after the year 2000. The possible determinants of disparities need be identified and investigated.

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1. Background

Survival among cancer patients has increased substantially over time in many countries [1–4], although clear differences have been observed within and between countries [2,5]. Sweden has high survival rates in both men and women diagnosed with cancer [6]. A national cancer strategy for Sweden was established in 2009 aiming at improving survival and quality of life among cancer patients and reducing geographical differences [2]. Though several studies have recently investigated the issue of cancer and migration [7–15], the major focus has so far been placed on comparing incident data. We evaluated equality with respect to access to health care and treatment by measuring mortality rates by year of diagnosis,

age at diagnosis, sex, and time since immigration into Sweden using several national demographic and health registers. We evaluated cancers at any site and at the leading sites in Sweden, namely colon, lung, stomach, prostate, female breast, and cervix. We considered the years between 1961 and 2009.

2. Materials and methods

2.1. Data

We used the Migration and Health Cohort (M&H Co) data for 1961–2009. We constructed the M&H Co by linking several of the Swedish national vital status and health registers through the 10-digit unique Swedish personal identification number. The M&H Co was created to specifically address the health status among immigrants and their offspring in Sweden. The data used in this study were retrieved from M&H Co and included information from the following five registers: (1) The Total Population Register

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encompasses demographic characteristics, country of birth and data on emigration and immigration. This register was officially initiated in 1968 and is updated continuously [16]. (2) The Cancer Register contains data on all diagnosis of cancer since 1958. Malignant diseases are coded using the International Classification of Diseases (ICD), 7th, 9th and 10th revisions. The completeness of this registry regarding verified cases is considered to be close to 100% [17]. (3) The Cause of Death Register contains yearly updated data on the date and the main cause of death from 1961 onwards [18]. This register is based on ICD of 7th, 8th, 9th, and 10th revisions [19]. The non-reporting rate has been estimated as to be less than 2% [4,20]. (4) The Swedish Population and Housing Censuses comprise socio-demographic data including education from 1960 to 1990. (5) Finally, the longitudinal integration database for health insurance and labor market studies provides information on the highest attained level of education since 1990 [19,21]. The level of education is updated annually from many different sources, most of which are the other registers at Statistics Sweden or at other authorities. Since 2000, a questionnaire has been sent to foreign-born residents with an unknown level of education to request this information [22].

This study was approved by the Regional Board of The Ethics Committee of Stockholm (Dnr. 2009/2033-32).

2.2. Study cohort

The study cohort consisted of all cancer patients (787,751 men and 768,357 women), ages 45 or older living in Sweden at any time

between January 1961 and December 2009. Cohort members born outside Sweden are referred to as “foreign-born” individuals, and those born in Sweden, are referred to as “Sweden-born” individuals. We excluded foreign-born patients with duration of residency in Sweden less than 5 years before diagnosis for two reasons: to avoid including patients that have been diagnosed with cancer prior to immigration, and to minimize detection bias as a result of limited access to health care due to language barriers among other barriers. The final cohort thus, consisted of 109,915 foreign-born (7.06%) and 1,446,193 Sweden-born (92.94%) patients.

2.3. Follow-up

The cohort members were followed from the date of cancer diagnosis (ICD-7 codes: all-site 140-209; Lung 162-163; Colon 153; Stomach 151; Breast 170; Cervical 171; Prostate 177), until the date of death due to any causes, the date of first emigration, or to the end of follow-up (December 31, 2009), whichever occurred first.

2.4. Statistical methods

We calculated all-cause mortality rates (MRs) for patients diagnosed with cancer by cancer-site during the study period (1961-2009) as a result of dividing the number of cases by the observed person-years. We report MRs per 100,000 person-years.

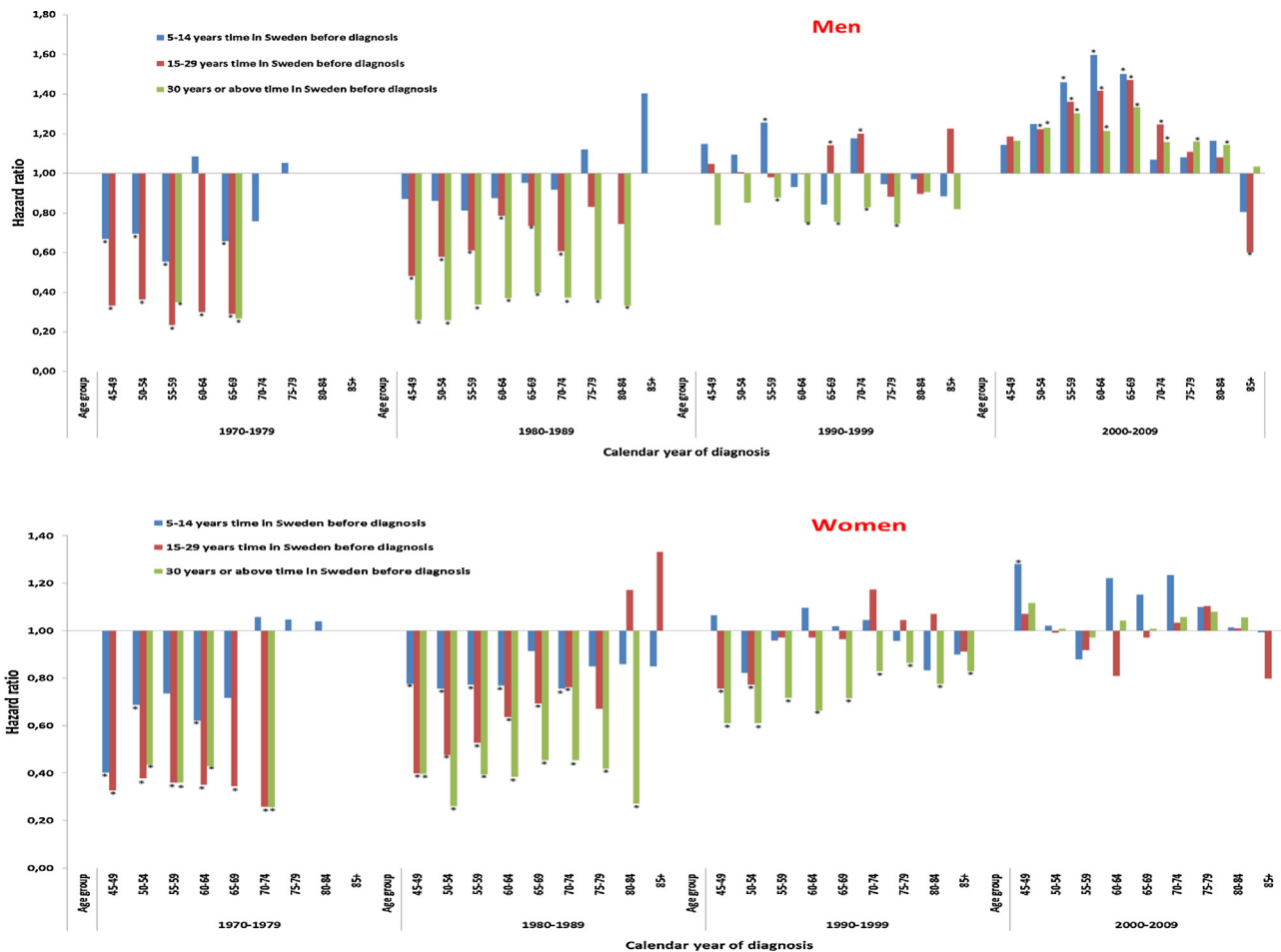


Fig. 1. Education-adjusted hazard ratios of all-cause mortality in cancer patients by duration of residence in Sweden before diagnosis, age at diagnosis, calendar year at diagnosis; the referent group (HR = 1) are patients born in Sweden. *P-value < 0.05.

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