SSM - Population Health 3 (2017) 99–110

Contents lists available at ScienceDirect

SSM – Population Health

journal homepage: www.elsevier.com/locate/ssmph

Article

# In sickness and in health: The role of marital partners in cancer survival

Astri Syse[a,*], Torkild Hovde Lyngstad[b]

[a] Statistics Norway, Dep. of Research, P.O. Box 8131 Dep., N-0033 Oslo, Norway
[b] University of Oslo, Department of Sociology and Human Geography, P.O. Box 1096 Blindern, N-0317 Oslo, Norway

ARTICLE INFO

*Keywords:*
Norway
Cancer
Education
Married
Partner
Socioeconomic
Spouse
Survival

ABSTRACT

Married cancer patients enjoy a survival advantage, potentially attributable to better health at diagnosis, earlier contact with health personnel, and/or access to resources to ensure more optimal treatment. These mechanisms only invoke the mere presence of a partner, but partners bring varying amounts of resources into the household. It is likely that also spousal resources contribute to differentials in survival net of own resources, as gradients in survival by the latter are well documented. Our aim is to examine the combined roles of own and spouses' socioeconomic characteristics (SES) and age for cancer survival.

Almost 268,000 married patients diagnosed with a first cancer after age 50 during 1975–2007 were identified from the Norwegian Cancer Registry and other national registers. In a sequence of hazard models, differences in survival by patients' own education, income and age and the role of spouses' characteristics were assessed. Furthermore, we also assessed the importance of homogamy/heterogamy along the same dimensions.

Partners' characteristics clearly matter for survival. The relative survival of patients with highly educated partners, net of their own education, is significantly higher than that of patients with lesser-educated partners. Somewhat similar effects are observed for income, net of education. A less consistent pattern is observed for age, although non-normative heterogamy patterns in age and income appear to be associated with a survival disadvantage.

The naïve perspective of only considering the presence of partners may thus conceal important differences in cancer survival. Health personnel may take advantage of such knowledge in interactions with patients and their families, and gather information on resources in immediate networks that may impact prognosis favorable and/or unfavorable and help patients utilize these resources to improve prognosis.

## 1. Introduction

Cancer survival is associated with marital status, with married persons having a survival advantage (Kravdal, 2001; Pinquart & Duberstein, 2010; Fossa et al., 2011). Some evidence suggests that this improved survival primarily stems from selection mechanisms, i.e. that healthy or resourceful individuals select one another for marriage. The extant literature also suggests, however, that protection mechanisms are at play (Goldman, 1993, 1994). Individuals with partners may have healthier lifestyles and behaviors (Monden, van Lenthe, Dirk De Graaf, & Kraaykamp, 2003), and therefore better general health at diagnosis, which is favorable for tolerating cancer treatment and thus prolonging survival. Having a partner may also promote earlier contact with health personnel in general and perhaps especially when one suspects disease (Seo & Lee, 2010). This may result in married patients presenting with an earlier stage at diagnosis and thus a more favorable prognosis (Nayeri, Pitaro, & Feldman, 1992; Osborne, Ostir, Du, Peek, & Goodwin, 2005; Lai & Stotler, 2010). Finally, having a partner at diagnosis may help ensure more optimal treatment and follow-up care, which in turn affects survival (Kravdal, 2000; DiMatteo, 2004).

Importantly, all these suggested mechanisms invoke the mere presence of partners and do not consider the partners' own characteristics that are indirectly or directly relevant for cancer survival. In a related literature, a large number of studies have documented survival advantages for those who hold various types of resources, including long educations and high incomes. Educational inequalities in cancer survival have been documented across a wide range of countries (Kinsey, Jemal, Liff, Ward, & Thun, 2008; Elstad, Torstensrud, Lyngstad, & Kravdal, 2012; Aarts, Koldewijn, Poortmans, Coebergh, & Louwman, 2013). These differences are obviously shaped by lifestyles and health behaviors, but possibly also by quality of cancer treatment and care. Highly educated individuals may take more effective advantage of available health inputs and have a better under-

* Corresponding author.
*E-mail addresses:* sya@ssb.no (A. Syse), t.h.lyngstad@sosgeo.uio.no (T.H. Lyngstad).

http://dx.doi.org/10.1016/j.ssmph.2016.12.007
Received 21 January 2016; Received in revised form 2 May 2016; Accepted 12 December 2016
2352-8273/ 

standing of the relationship between health behaviors, treatment and outcomes (e.g. Kenkel, 1991; Cutler & Lleras-Muney, 2012). Patient-provider communication and use of specialist care is known to vary with patients' SES, with the level of education being of particular importance (see e.g. Bago d'Uva & Jones, 2009; Smith, Dixon, Trevena, Nutbeam, & McCaffery, 2009; Marks, Ok, Joung, & Allegrante, 2010; Bowen, Hannon, Harris, & Martin, 2011). Access to and utilization of highly specialized treatment has been shown to affect survival after cancer, and relates to both the level and type of educational attainment (Fiva, Haegeland, Ronning, & Syse, 2014). It may thus be argued that better educated persons have a better understanding of the healthcare system, and thus are better at navigating their way through the health bureaucracy, claiming their rights, acquiring relevant information, and communicating their symptoms.

Further, income, net of education, has been shown to influence general health and mortality positively (Elo, 2009), and also cancer survival specifically (Woods, Rachet, & Coleman, 2006; Lejeune et al., 2010). Most commonly, individuals' own income has been used, but also household income and husbands' incomes in studies of women as a proxy for social class have been applied, along with neighborhood deprivation characteristics (Quaglia, Lillini, Mamo, Ivaldi, & Vercelli, 2013).

Lastly, age plays an important role for cancer survival. Age is a prognostic factor for most cancer forms, with younger individuals in general having better survival (Syse, Veenstra, Aagnes, & Tretli, 2012). However, net of individuals' own age, the age of a spouse may play a role through many of the same mechanisms operating through education: Younger partners may be better at seeking information and navigating the healthcare system, may have less respect for authorities and thus gain access to better treatment and care with implications for survival.

When these literatures are considered in combination, partners' resources emerge as a factor that may help produce and modify the marital survival advantage. Partners are different, and bring varying amounts of resources into the household. These resources may contribute to differentials in survival, net of the patient's own resources. A handful of studies have showed variations in mortality or self-reported health by various measures of spouses' SES, reporting somewhat mixed results (Jaffe, Eisenbach, Neumark, & Manor, 2006; Torssander & Erikson, 2009; Brown, Hummer, & Hayward, 2014; Spoerri, Schmidlin, Richter, Egger, & Clough-Gorr, 2014). A Norwegian study found small effects of spouses' SES on cancer mortality relative to overall and CVD mortality (Skalicka & Kunst, 2008).

Notably, the term cancer refers to more than hundred different forms of disease (Adami, Hunter, & Trichopoulos, 2008). Almost every tissue in the body can spawn malignancies, and each cancer has unique features. This extends to signs, symptoms, treatment options, prognosis and long-term effects. However, for many, cancer as a term is associated with certain connotations and life changes, almost regardless of the uniqueness of the specific cancer in question. Cancer may thus be considered an overarching, broad-spanning disease.

Most of the literature that explicitly include measures of spouses' resources examine mortality and do not account for the fact that illnesses may affect couples differently depending on spouses' resources, cf. Monden et al. (2003) and Monden (2007). Our contribution to the literature is thus threefold: First, we examine differences in cancer survival by patients' and their spouses' educations, incomes and ages. Second, we assess the importance of homogamy and heterogamy along these dimensions by combining information patents and their spouses (Martikainen, 1995). Finally, we test whether or not differentials by SES and/or age homogamy can be attributed to early diagnosis or cancer form.

## 2. Material and methods

Our data were obtained from various population-wide longitudinal administrative registers. A licensure to link data from the registers was provided by the National Data Inspectorate in Norway after ethical review by the Norwegian Board of Medical Ethics.

As all cancer cases in Norway have been registered by the Norwegian Cancer Registry from 1953 onwards, high quality data at a population level is available (Larsen et al., 2009). Our data include basic demographic information, cancer stage and form, and annually (and in some cases monthly) updated information on persons' children, marital status, income, and educational level. The data were linked by means of a unique personal identification number assigned all residents in Norway. Identical data on the patients' spouses at time of diagnosis were linked through unique family ID numbers. A spouse at time of diagnosis was identified for 99.2% of the married cancer patients, and the 0.8% for which no spouse could be identified was excluded. The data set for analysis thus encompasses the entire population of married persons with a first diagnosis of cancer after age 50, resident in Norway during the period 1975–2007. Altogether 267,946 married individuals were followed from time of diagnosis for an average of 4.3 years. 158,745 deaths occurred during the observation period, of which 87% were due to cancer. A sub-analysis where only cancer deaths were included as events and observations were censored if non-cancer deaths occurred, gave virtually identical results. However, as cause-of-death registration is difficult in older cancer patients with several comorbidities (Mackenbach, Kunst, Lautenbach, Oei, & Bijlsma, 1997), we only report results from all-cause models.

For each individual, a series of one-month observations was created, starting at the time of diagnosis and ending at the end of 2007 or when the person died, experienced a marital status change, had lived ten years since diagnosis (an observation window commonly used when studying cancer survival), were diagnosed with a second cancer or emigrated, whichever came first. Each observation included a number of variables that referred to the situation at the beginning of the one-month period. Our analysis consists of three steps: First, we modeled survival after a cancer diagnosis, within a discrete-time hazard framework (Allison, 1995), as a function of patients' own education and income and controls (Model I). Educational level for both patient and spouse was categorized as having a college-level education or not. Income was measured differently for patients in different age groups at diagnosis. For patients age 50–67 at time of diagnosis, we used income the year prior to diagnosis to avoid issues of reverse causation, as cancer has been shown to affect earnings (Syse, Tretli, & Kravdal, 2008). For patients age 68 and older, we used income at age 67. The income of spouses was assessed the same year as that of their partners, regardless of age, as cancer impacts also on spouses' incomes (Syse, Tretli, & Kravdal, 2009). The income measure was diverted into quintiles for men and women diagnosed at similar ages during the same calendar year. Similarly was done for spouses' incomes.

A set of controls were included in all models. Calendar year was categorized as 1975–79, 1980–84, 1985–89, 1990–94, 1995–99, 2000–04 and 2005–07. Time since diagnosis was grouped into ten one-year intervals. Age of patients and spouses was grouped into five-year categories. Parental status was defined as no, one, two, three or four or more children.

The second step in the analysis was to add a corresponding set of measures of spouses' SES characteristics (Model II). Subsequently we assessed the importance of homogamy/heterogamy in age, education and income (Model III). Patients' and spouses' SES and age were combined in measures of homogamy. Educational homogamy was measured by combining patients' and spouses' high vs low levels into a categorical variable. Differences in age between spouses were categorized in three groups with differences of ± five years. To measure income homogamy, an indicator of the patient's share of the household