

Title: Early life conditions and cause-specific mortality in Finland

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ABSTRACT

The purpose of this study is to investigate the effects of early life socioeconomic status, place of birth, and household structure on cause-specific mortality in Finland during the latter half of the twentieth century. We base the analyses on a 10% sample of households drawn from the 1950 Finnish Census of Population with the follow-up of household members in subsequent censuses and death records beginning in 1970 through 2005. The results of the proposed project will contribute to the accumulating evidence on the associations of early life conditions on adult mortality. The Finnish data constitute a unique register based data set that does not rely on individual recall of early life conditions, educational attainment, occupations, and other life course trajectories.

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INTRODUCTION

Research in both Europe and the United States has documented persistent socioeconomic (SES) inequalities in adult health and mortality (Moore & Hayward 1990; Preston & Taubman 1994; Smith 2005; Mackenbach et al. 1997). Although the existence of these disparities is well documented, their causes are less well understood. Because most adult mortality is due to chronic diseases, which develop slowly over time, social scientists have become increasingly interested in the potential contribution of early life conditions to observed adult health disparities (Elo & Preston 1992). The evidence from this research suggests that the effects of early life nutritional status and disease load, SES, place of residence and other household characteristics contribute to adult disparities in health and mortality (Preston, Hill & Drevenstedt 1998; Bengtsson & Lindstrom 2000; Blackwell, Hayward, & Crimmins 2001; Kuh et al. 2002; Beebe-Dimmer et al. 2004; Hayward & Gorman 2004; Osler et al. 2005; Laaksonen et al. 2005; Kauhanen et al. 2006).

Most studies of early life conditions on adult outcomes have relied on retrospectively reported data on early life circumstances, which may lead to misleading results regarding the influence of early life conditions and adult health outcomes (e.g., Kauhanen et al. 2006). However, few data sets permit the follow-up of nationally representative samples of children into adulthood (e.g., Kuh et al. 2002). The Finnish data – that are based on the 1950 census records - used in the proposed analyses is unique in that it provides prospective follow-up of children from early childhood into middle age, including information on childhood SES, family structure, and place of residence, factors related to theoretically important measures of social origins of disease (Hayward & Gorman 2004). The linkage of subjects to 1970-2005 censuses provide information on adult circumstances, which make it possible to examine whether the childhood circumstances have long term health consequences, net of adult characteristics, or whether their influence is indirect. In addition, the findings will shed light on the question of whether the associations

between adult characteristics and mortality are overestimated when information on childhood conditions are absent.

DATA

The data set that will be used in this study is based on a sample of families drawn from the 1950 Finnish Census of Population. Approximately 10% of the households in the 1950 Census were sampled by Statistics Finland, whose staff electronically coded all information on the 1950 census form and linked all sampled individuals with the 1970 Census. Subsequently, this linkage has been repeated every five years up until 2000; a linkage to the 2005 census will also be carried out. From the linkage of all members of the original 1950 household to subsequent censuses, information is obtained for all individuals [siblings and parents] who were present in the original family at the time of the 1950 census. Thus all members in the original 1950 sample are subsequently followed in the census records.

The mortality follow-up of the sample begins in 1970 and continues through 2005. This linkage is based on the register of cause of death certificates maintained by Statistics Finland. Death records do not exist in computerized form prior to 1970. The linked death certificate data provide both date of death and cause of death based on 8th, 9th or 10th revision of the International Classification of Diseases and Deaths (ICD). Causes of death have been grouped into leading causes of death for which classification is comparable across the various revisions of the ICD. Individuals who either died or moved out of the country (mainly to Sweden) cannot be linked to the 1970 census. We will examine the characteristics of these individuals and age pattern of non-linkage. After 1970 the Finnish population has been a nearly closed population, and thus after 1970 about 99% of the records have been linked to both census and death records when an individual deceased during the follow-up period.

The Finnish census data linked to death records are a unique register based data source and have been used in various forms to study SES differentials in mortality, living arrangements and mortality as well as the impact of the early 1990's recession on subsequent mortality (e.g.,

Martikainen & Valkonen 1996; Martikainen, Blomgren & Valkonen 2007; Martikainen, Mäki, & Jääntti 2008; Martikainen, Nihtilä, & Moustgaard 2008). The 1950 10% extract and its subsequent record linkage has been underutilized in investigations of early life conditions and familial patterns of all cause and cause-specific mortality (e.g., Notkola, Martelin & Koskinen 2002).

DESIGN AND METHODS

To examine associations between early life conditions, adult characteristics and all cause and cause-specific mortality, we will follow individuals who were ages 0-14 at the time of the 1950 Census. Measures of childhood SES will be based on parents' educational attainment, occupation, and housing characteristics. In addition, we will control for parental marital status and co-residence, the number of co-resident siblings, maternal and/or paternal age at birth, and place of birth. Prior studies have found significant place of birth effects on mortality in Finland (Koskinen 1994). We will obtain individuals' adult characteristics (e.g., educational attainment, occupation, marital status, and number of children) from linkage to the 1970 and subsequent censuses, which will be used to update individual characteristic and record changes in household structure. We will estimate survival models (e.g., Cox proportional hazard models, discrete time hazard models or Poisson models) with time-varying covariates accounting for changes in individual-level covariates. We will also explore the possibility of using fixed-effects models to take advantage of multiple observations on the same individual to study effects of changes in adult characteristics on mortality, which allows us to control for fixed unobserved individual-level attributes.

More specifically, the paper will answer the following questions:

- 1) Do early life household socio-demographic conditions predict cause-specific mortality and do these associations vary by sex?
- 2) Do early-life socio-demographic characteristics retain an independent association with cause-specific mortality controlling for adult characteristics?
- 3) Do early-life socio-demographic characteristics interact in their associations with adult attributes (e.g., adult SES and marital status), and do these interactions vary by sex?

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