**Title: The increase in lifespan inequality in inter-war female cohorts in Denmark?**

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**Classification:** Social Sciences, Public Health – Demography

**Keywords:** Demography, life expectancy, lifespan variability, aging, mortality.

**Abstract [250 words]**

**Background**

**Methods**

**Results**

**Conclusions**

**Introduction [aimed to IJE] [3000 words]**

Female life expectancy in Denmark has followed atypical patterns since the second half of the 20th century. Periods of improvements were followed by large periods of stagnation (1-3). The stagnation of life expectancy at a low level compared to Denmark’s Scandinavian counterparts resulted mainly from increased mortality of those born between the two World Wars (3). Such increase in mortality has been linked to health behaviors. In particular, evidence suggests that smoking prevalence was higher in these particular cohorts (1), and it has been shown that the absolute effect of smoking on mortality caused the stagnation in adult life expectancy (2).

Although the overall health status of a population is commonly measured by life expectancy, inequality in life expectancy can be of material interest too. First, because low inequality is often a policy goal in itself, and therefore an indicator of success of health care and social systems (4). Second, because low inequality often seems to drive high life expectancy (5,6).

Since lifespan inequality addresses the growing interest in health inequalities and its linkage with health and social behaviors (5), we analyzed if the stagnation of Danish female life expectancy in the second half of the 20th century, and the most recent improvements in mortality, were accompanied by higher levels of lifespan inequality during the period of stagnation, and lowering levels thereafter. In this article, we analyze trends in lifespan inequality above age (15,30,50)? since the 1960’s. We disentangled the effect of causes of death (external, cardiovascular, neoplasm, other) on the unpredictability of life, before, during and after the stagnation of female life expectancy in Denmark using demographic decomposition techniques. We hypothesized that when life expectancy stagnated between the mid-1970’s and the mid-1990’s, lifespan inequality increased, probably due to smoking**.**

**Data and Methods**

We use publicly available period lifetables from the Human Mortality Database (6) for Denmark since 1960. These data contain high quality information on lifetable’s measures, such as the death distribution, survival function and life expectancy, by single age and sex. Cause-of-death data come from the World Health Organization Mortality Database (7). [a short description of these data and ICD codes] .

***Cause-of-death classification***

Originally, data on deaths were classified according to the International Classification of Diseases (ICD), revision 9 for years x and revision 10 for y. We classify deaths as…

***Dispersion measure***

Several dispersion measures have been proposed to analyze lifespan inequality (8). Here, we use the coefficient of variation, which is the standard deviation weighted by the average. In lifetable notation it is:

Where and denote the age at death density function, life expectancy at age x (to be defined), and the open-aged interval (110+ in our case), respectively. [some advantages of this indicator and its interpretation]. The strong correlation between lifespan inequality indicators suggests that main conclusions and results would not differ regardless of the which one is used (8-10).

***Decomposition techniques***

Lifespan inequality may increase or decrease while life expectancy is stagnating, depending on the balance between reducing mortality at early ages, which compresses lifespan inequality, and saving lives at older ages, which increases inequality in lifespans (11, 12). To get a better interpretations of the reasons behind changes in lifespan inequality over time, we decompose lifespan inequality differences before, during, and after the stagnation of life expectancy by age and causes of death using standard decomposition techniques (13).

**Results**

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