

Transitional processes and gender differences in cause-specific mortality and their role in the emergence of mortality inequalities, 1971-2008

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Introduction

In the beginning of the 1970s inequalities in mortality by education were negligible in Hungary. Inequalities started rising in about 1980 and they continued to do so till the early 2000s, then they levelled off. Our previous analysis of the trends of cause specific mortality of this time period had identified emerging inequalities from causes closely connected to the quality of nutrition from about 1980 and a separate set of inequalities in mortality from causes connected to smoking. The onset of inequalities due to the differences in mortality of different educational groups from the latter type of diseases spread across a longer time period between 1975 and 1985. Alcohol related causes produced rising inequalities from the beginning of the period till 1996, then the trend was reversed.

The present study aims to explore the gender specific aspects of these processes. Epidemiological transition theories connect the changes of mortality patterns to large scale economic and societal transitions. Nutritional transition theories indicate that the spread of unhealthy nutritional habits was parallel to the growth of income, then the appearance of healthier food consumption patterns was parallel with further increase of income. Macro-level connections are assumed to work at the individual level, too: unhealthy eating habits are assumed to spread earlier across better-off social groups and later healthier habits would also spread among them first. This process is assumed to work similarly for both genders.

Regarding alcohol consumption the transitional theory is less elaborated, but in a European context high alcohol consumption is associated with disadvantageous social position, it is higher in Eastern Europe and among men. If any transition is taking place regarding alcohol consumption, that is assumed to be strongly gender specific.

The smoking transition is well described, though some theories describe its dependence on gender, others describe its dependence on social position. Integrating the different approaches, one can conclude that in Western Europe smoking spread first across men of higher social standing. The “smoking epidemic” secondly hit less prestigious men, later women with high social position and finally women with lower social position. This transitional model therefore is gender and social position specific.

The precise aim of this study is to test the above mentioned characteristics of transitions for a Central Eastern European country during the time period between 1971 and 2008. For a better understanding,

not only clearly nutrition, smoking and alcohol connected causes of death are examined but also some major characteristics of cause specific mortality by several other causes across education and gender. An additional goal of the study is to assess the effects of these transitional processes in order confirm the overall inequalities of mortality.

Methods

Using an unlinked cross sectional design we examined the trends of mortality from 56 different causes by gender and by education. The source of the mortality data is the mortality register of the Hungarian Statistical Office. Population estimates for the years 1971-2010 and projection for the years 2002-2008 were calculated on the basis of census data. Yearly cause specific standardized mortality ratios were calculated and corrected to changes in the coding system which occurred 3 times between 1971 and 2008. These corrections finally produced estimations for which the further steps of the analysis were employed. Estimated standardized cause-specific mortality ratios formed time series by gender and education.

To break down the time series to phases we used join-point regression analysis with the help of the software provided by the National Cancer Institute of the United States.¹ This regression is for analysing trends and the software fits data the simplest possible sequence of linear trends which are connected by the join-points. First a linear trend for the overall period is fitted, then trends with a growing number of joint-points are also fitted and their significances are tested against the 0-hypothesis (e.g. having 0 join-points). The tests of significance are based on a Monte Carlo permutation test.

Then the sequences of linear (stagnating, increasing, declining) phases were classified and the causes of death were examined if the four trends (well/poorly educated men and well/poorly educated women) fall into the same class of sequences or not.

In order to evaluate the impact of the different processes some routinely used measures of mortality inequalities were calculated by cause, such as the index of dissimilarity and population attributable fraction.

Results

In general the patterns of male and female mortality proved to be largely similar. In the case of some diseases not only the patterns but also the magnitude of mortality were similar (arrhythmia, influenza), while in the case of the majority of the causes male mortality revealed the same pattern but showed

¹ <http://surveillance.cancer.gov/joinpoint/>

much higher level than female mortality (ischemic heart disease, stroke, cirrhosis and some other major diseases). Exceptions were lung cancer, some other smoking related cancers and to some extent diabetes and colorectal cancer. Thus the main drivers of growing mortality inequalities were similar among men and women, with some remarkable exceptions.

In particular, mortality connected to nutrition transition seems to be influenced both by educational attainment and gender. Among strongly nutrition connected causes of death, diabetes and cancer of the colon were examined. Diabetes mortality was growing among both the better and the less educated and among both males and females during the 1970s. Following a peak in about 1980 diabetes mortality started to decline among more educated men and women, though less quickly among men, but continued to increase among less educated men. Mortality of less educated women had slightly decreased between 1980 and 1995, reversed and then increased again till 2005. The pattern of mortality of less educated women includes some elements of mortality both of less educated men and more educated women.

As for alcohol related mortality, the dynamics of changes show no gender specific characteristics. Among all the examined education/gender groups mortality due to cirrhosis of the liver was slowly growing for about the first 13 years of the examined time period, and quickly growing during the next 23 years and diminishing afterwards. Gender played a role only in the magnitude of mortality but not in its dynamics: the same scenario took place for all four groups examined. A similar pattern was found for other strongly alcohol related causes such as cancer of the oral cavity.

Mortality due to the most strongly smoking related cause of death, i.e. lung cancer, is primary patterned by education, not by gender. Lung cancer mortality was growing in all four groups examined during the 1970s and the first part of the 1980s, but started to decrease among highly educated men in 1988 and among highly educated women in 1993. In about 1998-1999 the decline stopped in both groups and some increase appeared again. The mortality of less educated men was constantly rising till 1997, from which time mortality seems to level off at a very high level. Mortality due to lung cancer among less educated women, which was lower in the beginning of the 1970s than that of better educated women, has been constantly rising. Though the magnitude of mortality does differ between genders, the dynamics of mortality is strongly determined by education and not by gender.

Negligible inequalities in overall mortality in the 1970s among men were due to small inequalities in cardiovascular disease and non-existing inequalities in overall cancer mortality. The latter fact can be attributed to the relatively low share of lung cancer mortality generated inequalities and the presence of inequalities generated by colon cancer mortality, favouring the lowly educated in this period. During the 1980s inequalities connected to both cardiovascular disease and cancers grew. The growing

inequalities in cancer mortality can be attributed to the diminishing balancing role of colon cancer and the more and more pronounced contribution of lung cancer generated inequalities. From the end of the 1990s few cancers “balanced” inequalities and even the contribution of colon cancer generated inequalities became positive. The contribution of cancers is one quarter regarding all inequalities, which equals to the contribution of lung cancer generated inequalities.

Among women lung cancer generated inequalities contributed negatively to overall mortality inequalities, in other words they diminished overall mortality inequalities, dominated by cardiovascular disease generated inequalities. Strongly nutrition connected colon cancer played a similar role till the middle of the 1990s, then it also contributed to higher mortality of the less educated “positively”.

Trends in both nutrition related mortality and smoking related mortality predict a further increase of inequalities in the future. Earlier operating “balancing” mechanisms had “died out”, consequently only the reduction of inequalities in cardiovascular diseases would stop further the increase of overall inequalities in Hungary.

Discussion

According to the dynamics of the estimated trends of cause specific mortality nutritional transition was found to be more gender specific and the trend of the smoking epidemic is less gender specific in Hungary than expected. One possible explanation for this phenomenon is the specific nature of emancipation in the Central Easter Region, supplemented by the force of economic constrains.

Women in Central and Eastern Europe entered the labour market massively during the 1960s and 1970s. This new role was an “automatic” emancipation involving a more balanced earning pattern between genders, more and more similar working time schedules, and overall, more and more similar life styles. Women enrolled in higher education first at the same time. Taking up the “male role” was probably more problematic for women with higher education and was associated with the adaptation of elements of “male behaviour”, such as smoking. Anti smoking health messages appeared first in the 1980s in Hungary and in accordance with the social theory of “fundamental causes of mortality” moderated smoking habits only among the better educated. Eating habits were probably strongly formed by the characteristics of the food provision system. From the seventies, more pronouncedly from the 1980s, a more diverse food market was formulated, coupled with rising income. Income inequalities though did not change remarkably till 1990. The course of diabetes mortality among less educated women might demonstrate the intention of the adaptation of healthier eating habits, which was crudely interrupted by the worsening of material conditions of those with lower education.