

# **Cause specific mortality trends in Hungary in the light of the theory of the epidemiological transition**

**By Katalin Kovács and László Hablicsek**

## **Background and aim of study**

Hungary, within the classic theoretical framework of the epidemiological transition theory represents a “semi western” transitional model. In the latest communication of Omran, Hungary, just as many other countries of Central-Eastern and Eastern Europe, was classified to the “slow variant” of the “semi-western” model. Changes in the cause-specific mortality pattern in countries belonging to this model-variant have rarely been investigated for longer time periods.

This paper aims to investigate the applicability of the epidemiological transition theory to the mortality developments of the last four decades in Hungary with special attention to that element of the theory, if the onset of the first phase of the transition can be identified.

This research focuses on the dynamics of cause-of-death patterns rather than addressing the entire theory. Although the original formulation of the epidemiological transition theory, even in its latest form, is rather vague about the exact causes, which indicate the onset of the fourth phase, some general guidelines are provided. Apart from falling cardiovascular mortality, the fourth phase in general is thought to appear in societies already having adopted a “healthy lifestyle”. Life-style related causes of death, therefore, are expected to diminish. At the same time, both the re-emergence of “old” infectious diseases (in various forms, including infection-related cancers) and the emergence of “new” infectious diseases have been visualised, especially in the most vulnerable social groups.

In the course of our research, we set up multiply tasks. The first goal is to test the above mentioned expectations on Hungarian mortality data for the period between 1971 and 2007.

We also aimed to broaden our knowledge on differences of epidemiological transition experienced by population subgroups. Within-country or within-population investigations are rare, and are usually confined to male-female, ethnic or geographical differences. In this study we added the dimension of education in order to observe possible differences of mortality patterns by educational classes.

Later on we also intend to compare the changes of causes of death patterns experienced in Hungary with the changes found in Western countries earlier. Time trends of mortality by detailed causes of death are available for some county for the period 1950-1980, among which we intend to pay special attention to the French and the Dutch time series.

## **Material and methods**

First we created cause-specific mortality trends for the period between 1971 and 2007. Absolute numbers of death with respect to sex, age, educational level and cause of death were provided by the Population Register of the Hungarian Central Statistical Office. Population data have been achieved by interpolation and forecasting based on the data of the censuses in 1970, 1980, 1990 and 2001.

For the sake of comparability with analyses made in other countries, we examined all causes of death, which have been included in the “European Shortlist” issued by EUROSTAT. To these 65 causes, a few more were added, which were considered important from the point of view of comparison with the results of similar investigation from the Netherlands and France.

For the studied period, three different ICD coding systems were used: ICD-8 for the years before 1978, ICD-9 from 1979 to 1995 and ICD-10 for the subsequent years. The European Shortlist was defined by ICD-10 codes. In order to have identical or quasi-identical cause-of-death categories for the earlier periods, we used 4 digit codes. From the series of sex, age and cause-specific death rates standardized mortality ratios were calculated. Continuity between the periods with different coding schemes was checked, and in case of serious discontinuity we fitted the series by simple discounting.

## **Results**

In the classic form of the theory, “overlapping” is likely to take place in countries belonging to the “semi-western slow type”, meaning that diseases characterising the previous epidemiological transition state (e. g. infectious diseases) may still be present in the current one. Our results do not support this assumption. Among the causes of death traditionally considered to be infectious, only a few were measurable in the beginning of the observed period. Among these causes the most notable were respiratory tuberculosis, Hepatitis A and syphilis. Respiratory tuberculosis sharply decreased over the whole period, except for a few years between 1988 and 1993, when it was stagnating in males. No increase was found in the most vulnerable less educated elderly people: their tuberculosis mortality was continuously falling during the whole study period, just like that of the whole population. Hepatitis A as cause of death was present at a low level at the beginning of the period, but it practically disappeared after 1981. The results for syphilis are quite similar. Neither HIV nor any other new infectious disease gained considerable importance during the studied period. No sign of serious increase could be detected among causes connected to pulmonary infections either for the entire population or for the elderly.

As infections might be important in connection with certain cancers, we checked those types of cancers for increasing tendencies, which are known to have infectious origins. Stomach cancer continuously declined both in men and women during the whole period under observation. After an increase ending in 1981, cervical cancer slowly decreased. Liver cancer trends, however, were different for males and females. While in the later it was continuously declining, the corresponding male mortality modestly increased, probably because the role of alcohol tends to be higher in male than in female liver cancer mortality.

As for life-style related causes of death, we overviewed only of the most important trends. Lung cancer mortality, which is closely linked to smoking, rose considerably among men until 1994 and stagnated afterwards. Among women, lung cancer continuously rose throughout the whole period. The tendency of “alcohol abuse and alcoholic psychosis” also failed to show the expected pattern: it rose considerably between 1980 and 1994 then sharply fell.

Cardiovascular mortality, as a major determinant of overall mortality is of utmost importance. Among males the diminishing tendency of cardiovascular mortality appeared in 1994, but it is worth to note that female cardiovascular mortality has been falling since 1986 (with a stagnating period between 1989 and 1994). Improvement in male cardiovascular mortality is

obviously due to falling ischaemic heart disease (25% reduction between 1993 and 2007), while the same improvement among women is almost entirely due to improvement in cerebrovascular mortality. Women's mortality due to the later cause has been falling since 1980, while ischaemic heart disease mortality is still growing.

Finally, external causes, which were all expected to grow according to the original theory of epidemiological transition, showed a declining tendency, just like in many other countries studied by other researchers. Road accidents, disregarding the temporary peak between 1988 and 1993, by 2005 dropped to a lower level than in the 1970's and 1980's, both for men and women. Homicide mortality, which was on the rise from as early on as the early 1980's, started to decline in 1994. Suicide mortality, strikingly high and growing for long, started to decline in 1985 among men and in 1981 among women and it continues to do so.

### **Conclusions**

According to the detailed examination of long-term cause-specific mortality trends, a new chapter started in the history of Hungarian mortality in the mid 1990's. The turn of cardiovascular mortality resulted in an overall decrease in all-cause mortality, but the detailed cause-specific mortality trends are very different from what could have been predicted on the basis of the classic theory of epidemiological transition.

We could not find evidence of survival or re-emergence of infections. There was no sign of improvement in causes of death strongly related to the major life-style domains. Finally, external causes, which were all expected to grow, showed the opposite tendency.

In cases of several causes of death, trends among those with lower education "follow" the trends found in the most educated (e.g. ischaemic heart disease, cerebrovascular diseases, hepatitis, suicide). In cases where a definite change of direction of trend appeared we found the "lag-time" between educational classes being rather different by cause of death and ranging between 0 and 13 years. In cases of several other diseases, mortality trends of the different educational classes were not "following" each other over time but converging (e.g. stomach cancer, tuberculosis). Other patterns also appeared.