PATTERNS AND TRENDS IN SURVIVAL: KAZAKHSTAN AND POST-COMMunist COUNTRIES CONFRONTED WITH LOW MORTALITY POPULATIONS

Summary of Ph.D. Thesis

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Abstract

This research primarily addresses mortality patterns and trends by main causes of death in the post-communist countries of Central Asia, Central Europe and the Baltic region together with low mortality populations such as those of France, Spain and the USA. The aim of this study is to analyze the changes in the mortality levels and its structure by the main causes of death by sex and age, and confronted with low mortality populations between the period of 1985 and 2005, respectively.

The first (and main) part of the work therefore focuses on cause-specific mortality levels and its relative structure by main causes of death in the selected countries. Moreover, the different patterns of excess male mortality were also observed. The second part is concentrated at the age-standardized mortality levels by main causes of death. The research identified several important issues encasing the field of mortality, especially in the cause-specific mortality situation in Central Asian republics.

Keywords: cause of death, Kazakhstan, post-communist countries, low mortality populations, excess male mortality
Introduction

The break up of the Soviet Union was the most important historical event at the end of the 20th century. The sudden integration of the former Soviet Union countries into mainstream capitalism has heightened uncertainties in all facets of life regarding the individuals concerned. In the early 1990s after the fall of the socialist regime, many countries in this region experienced economic and social transformations. Virtually every aspect of life was affected, and a health and mortality crisis was experienced. Following the collapse of the Soviet Union, the changing political and socio-economic systems brought many problems, such as rising unemployment, falling living standards, growing poverty and socio-economic differentiation. These factors contributed to a significant deterioration of the already poor situation of Soviet public health, but their magnitude and impact of crisis mortality varied from country to country (Cockerham 1997). In some countries, this worsening of mortality was short-lived. This was followed by improvements in health, which were rapid in areas such as Central Europe. In contrast, the steady deterioration in Central Asian republics was continuing.

The situation in Central Europe was much better. The reasons for this diversity in patterns of changing mortality are multifaceted, reflecting a complex interplay of factors, ranging from underlying
economic and political circumstances to more proximal risk factors, such as lifestyle related determinants of health. However, we can expect that changes in health care associated with the socio-economic transition also contributed to changes in population health in Central Europe. After the collapse of the Soviet Union the Baltic states started to experience the gradual decline in mortality that had been observed in all of the European nations during the past century. But, as part of the now defunct USSR, they were also subjected to the abrupt changes accompanying the move in and out of Socialism and the policies of the latter. In the low mortality populations, such as France, Spain and the USA the mortality levels showed similarities and it was lower compared with the other selected countries. How these dramatic changes regarding to the collapse of the Soviet Union influenced to the mortality levels in the post-communist countries? Especially, how did these changes in the case of the cause-specific mortality levels in these countries. Nowadays, we have an opportunity to analyze the changes in mortality over time based on the datasets from the international data source, for instance, like in our case from the WHO Mortality Database. The analysis of the mortality rates among the selected countries started from the period of the restructuring of the Soviet political and economic system (perestroika) and pre-dissolution time (1985). The end of the study period is time of relative economic stabilization in these regions (2005).

**Research goal and objectives**

The research contrast the cause-specific mortality levels in selected post-communist countries with those of low mortality populations such as France, Spain and the United States of America between the period of 1985 and 2006, respectively. This include former Soviet Union countries from Central Asia (Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan and Tajikistan), Central Europe (the Czech Republic, Slovakia, Poland and Hungary), and the Baltic states (Estonia, Latvia and Lithuania). The aim of this study is to analyze the changes in the mortality levels and its structure by the main causes of death by sex and age, and confronted with low mortality populations such as those of France, Spain and the United States between the period of 1985 and 2005. Implementation of the aim involves the following objectives:
• to analyze differences in total mortality measured by life expectancy at birth;
• to focus on differences in cause-specific mortality levels by main causes of death;
• to consider relative frequency (in %) of the standardized death rates by main causes of death;
• to analyze excess male mortality by main causes of death;
• to describe age-specific (15–64 and 65+) standardized death rates by main causes of death.

**Materials (data) and methods**

In preparing this thesis, demographic data was taken from different sources. Data on mortality for the selected countries was sourced from the World Health Organization Mortality Database (MDB). The data are included is limited to those countries reporting accurate data properly coded according to the International Classification of Diseases (ICD). The research analyzed mortality data classified according to the 9th and 10th revisions of the ICD, for the years of 1985 and 2005. During the data collection problems were found with the data from countries of the former Soviet Central Asian (Turkmenistan and Tajikistan) and post-socialist Central European area (the Czech Republic and Slovakia). Similarly, in Turkmenistan the last available mortality data was until 1998. In the MDB population data for Tajikistan was until 2004. That is why Tajikistan’s population data for the end of studying period (2005) was taken from the UNDP (UNDP 2005). As is well known from 1918 the Czech Republic and Slovakia were one state—Czechoslovakia, which was separated in 1993. In MDB mortality data for the Czech Republic starts from 1986 and for Slovakia it begins only from 1994. For the analysis, data for the Czech Republic and Slovakia in 1985 was taken from vital statistics.

In order to delimit country groups experiencing homogeneous or similar cause-specific mortality levels, a hierarchical cluster analysis based on Euclidean distance and Ward method in SAS 9.2 software was used. Data were transformed in z-scores (observations were represented by countries and variables by SDR by main causes of death). For measuring the gender gap in mortality patterns, the excess male
mortality ratio by main causes of death was calculated. In order to define age grouping for the mortality analysis by main causes of death factor analysis in SAS 9.2 software was used. The initial data for factor analysis were age-standardize death rates by main causes of death, which were for all ages among the selected countries in years of the 1985 and 2005.

**Standardized death rates by main causes of death of mortality levels**

The analysis was separated for males, females and both sexes in 1985 and 2005, respectively. The selected main causes of death are: all causes, cerebrovascular diseases, other diseases of the circulatory system, malignant neoplasm, external causes of morbidity and mortality, diseases of respiratory system, diseases of the digestive system and the remaining other causes of death.

The highest male cause-specific mortality levels Soviet Central Asian region was observed. In the beginning of studying period (1985) Kazakhstan separated from other Central Asian countries and the cerebrovascular diseases was extremely high among the selected countries. In the end of analyzing period (2005) Kazakhstan and Kyrgyzstan showed a similarity in their mortality pattern. Vulnerable difference between the same time periods in male population was low malignant neoplasm, but by the end of period this value was higher than in 1985. The influence of changes in the politic, socio-economic and other sphere which is experienced post-communist countries after the collapse of the socialist regime and since their independence. In the countries of the former socialist Europe chose a fast and radical reorganization of their economy, the increase in mortality rates was higher than in the states where the transition was more gradual. Between the selected time periods in post-socialist European area improvements was observed, especially in the three Baltic states. In 1985, their cause-specific mortality levels in other diseases of the circulatory system, cancer and external causes of death slightly were improved. The cause-specific mortality condition among males in Central European countries also changed in a positive way.
The female cause-specific mortality pattern among the selected countries analyzed a positive result rather than in males between the period of 1985 and 2005, respectively. Analysis of the mortality levels by main causes of death according to the macro-regions showed the results that mainly highest values was observed in the former Soviet Central Asia. In the countries of this region low values of cancer and external causes over time was observed. Significantly, the other diseases of the circulatory system were rose by the end of analysis. In 1985, Kazakhstan was out of the Central Asian country group, but till the end of selected period it showed similarities with Kyrgyzstan females. Moreover, the mortality due to the cerebrovascular diseases among Kazakhstan females was decreased. In the countries of Central Europe together with the three Baltic states the cause-specific mortality levels were reduced. Outsiders of this country group were Slovakia and Poland in 1985. However, in 2005, in the mortality conditions among these two states slightly was improved. In low mortality countries which are a reference country group in this study mainly the lowest level of cause-specific mortality values was noted during the whole analysis.

The cause-specific mortality pattern for both sexes among the selected countries discussed a heterogeneous result between the period of 1985 and 2005. A short summary of the mortality levels by main causes of death by the macro-regions showed the results that mainly highest values was observed in the former Soviet Central Asia among the other selected countries. In the Central Asian region low values of cancer and external causes (excluding Kazakhstan and Kyrgyzstan) over time was highlighted. Significantly, the all circulatory system diseases and remaining other causes were rose by the end of analysis. In 1985, Kazakhstan was out of the Central Asian country group, but till the end of selected period it showed similarities with Kyrgyzstan, which is a similar pattern what was observed among females. In the beginning of studied period Kazakhstan was with Central European countries, and lower level of cause-specific mortality levels was noted. After the collapse of the Soviet Union, and since independence the mortality levels in this country was changed into negative way. All values of the main causes of death were increased. In the countries of Central Europe together with the three Baltic states the cause-specific mortality levels
were decreased. In 1985, the three Baltic states showed intermediate level of mortality among the other countries. By the end of analysis significantly decrease in other diseases of the circulatory system was observed. Unfortunately, in the malignant neoplasm level opposite situation was obtained. In the selected low mortality populations of this study mainly the lowest level of cause-specific mortality values was noted.

According to the relative structure of the standardized death rates by main causes of death for males among the selected countries between the periods of 1985 and 2005 was analyzed, respectively. Between the pre-dissolution and since their independent time in the former Soviet Central Asian republic the positive changes in mortality structure over time should be highlighted. Especially, among Kazakhstani males the proportion of the all cardiovascular diseases significantly was decreased. If in the beginning of the analysis Kazakhstan was an outsider country, in the end it join into the three Baltic states, and showed improvements in their mortality structure. In the pre-transition period among Kazakhstani males external causes and respiratory system disease were a high, after the collapse of the Soviet Union the proportion of the respiratory system diseases were decreased and the more increase in the values of the external causes was observed.

According to that the changes of mortality structure over time for females among the selected countries can clearly observed. Regarding to the separate cases by macro-regions will be discussed further. Firstly, the mortality conditions Central Asian republics excluding Kazakhstan in the both periods of time were a quite similar. The proportion of the cardiovascular diseases was significantly increased. In essence, a large decline of the percentage was found in respiratory system diseases. In comparison, the proportion of the cancer mortality in this macro-region was a similar in the both selected years. Kazakhstani females mortality structure in the Soviet era were closer to the ex-socialist European area, and by the end of analyzed period Kazakhstan was found in the three Baltic states country group. In 1985, the relative mortality structure of SDR by main causes of death for females an intermediate mortality levels pattern was recorded. In 2005, the proportions of the main causes of death were a higher in cerebrovascular diseases, and significantly
lower in respiratory system and digestive system diseases. The next macro-region which will be summarized according their female mortality structure is Central European area. Slightly increase in the cerebrovascular diseases and cancer mortality structure among the females in 2005 was observed. The proportion of external causes and respiratory system diseases was declined since their independent time. In the countries of the Baltic region female mortality structure by main causes of death was quite improved. In 2005, the percentage of the cerebrovascular diseases was increased, and this disease is more common among the Baltic states females in the both periods of time. Less proportion among females of this region comprises diseases such as other diseases of the circulatory system, cancer and external causes.

Summarizing the mortality structure by main causes of death for both sexes among the selected countries between the periods of 1985 and 2005 was analyzed. In the countries of the former Soviet Central Asia valuable changes over time was observed. The proportion of the cancer, external causes (except Kazakhstan) and other remaining causes was remarkable declined in this macro-region. A vice versa situation was noted in other diseases of the circulatory system and digestive system diseases in 2005. Among the population of Kazakhstan the share of the percentage of external causes of death was increased. The rest of the selected causes slightly changes by the end of studied period. The relative structure of mortality by main causes of death for both sexes of Central European countries the proportion of other diseases of the circulatory system, cancer and digestive system diseases were increased compared with 1985. Also in this region some betterment were noted in 2005. They are the share of the cerebrovascular diseases, respiratory system diseases and other remaining causes of death. After the collapse of the socialist regime a quite positive changes was observed for both sexes in 2005. The three Baltic states the mortality structure by main causes of death for both sexes was observed in the both periods. In 2005, the share of cerebrovascular diseases was dropped. Notably, their level of external causes for both sexes in 2005 extremely increased. Significantly increased were other diseases of the circulatory system rather than in cerebrovascular diseases was analyzed. In the cases of the last diseases can be seen more declined in 2005. In the low mortality
populations the main or top two causes of death was clearly highlighted. They are cancer and other remaining causes of death. Moreover, in 2005, the percentage of digestive system diseases was suddenly increased for both sexes. The cerebrovascular diseases were higher in 2005 rather than in 1985.

**Excess male mortality by main causes of death**

Summarizing excess male mortality pattern in the selected countries between the two periods of time the short summary for each macro-region will be discussed. In the first macro-region of this analysis was represented by the former Soviet Central Asian republics in the both periods. In 1985, Kazakhstan showed a different pattern of excess male mortality and was as outsider of the analysis. In the end of studied period in Kazakhstan was observed quite improvements in excess male mortality by main causes of death. The highest cerebrovascular diseases which were observed in 1985 were significantly decreased. The similar situation was in the case high excess male mortality by other causes of death. In the other countries of this region excess male mortality showed better picture compared with Kazakhstan. By the end of the studied period (2005) the excess male mortality by digestive system diseases was increased. The excess male mortality levels by the rest of selected causes of death were more stable.

In the ex-socialist Central Europe the excess male mortality levels were quite similar between two periods. In 2005, a higher excess male mortality by digestive system diseases and other remaining causes was observed. In comparison with the period of 1985, after the collapse of the socialist regime excess male mortality in the three Baltic states slightly changed. In 2005, a high excess male mortality by all causes, other diseases of the circulatory system and diseases of the respiratory system was noted.

**Conclusions**

The presented analysis of this research showed the result of the cause-specific mortality patterns in the selected countries. Following the collapse of the Soviet Union, countries were hit with an economic crisis. While the research analyzed was taken from this time of economic
uncertainty, it was compared with data from countries where the economic situation was considerably more stable.

It is mainly the socio-economic situation and education which enforces healthy behavior while wealth gives a higher quality of life. Economic affluence permits that the implementation of these factors are influenced by psychosocial stress which may cause excess mortality (Bobak and Marmot 1996). Although unknown at the time, mortality was increasing in the former Soviet Union and stagnating in Central and Eastern Europe, marking the beginning of unprecedented and long-term mortality reversal. This deviance from the general regularity of continuous mortality decline demonstrated that certain combinations of socio-economic and socio-psychological conditions with epidemiological patterns may cause significant mortality reversals in national populations (Nolte, McKee and Gilmore 2004). All selected countries experienced different patterns of demographic development along with changes in socio-economic conditions for individuals. The main differences are associated with different levels of development in their economy, financials, and social services.

Regarding to the overall mortality levels which measured by the life expectancy at birth showed homogeneity within the macro-regions between the years of 1985 and 2005, respectively. Also, slightly improvements in the selected countries were noted. Among the selected macro-regions in the both time periods the Central Asian region were less developed socio-economic and demographic positions. In 1985, the lowest expectation of life belonged to this region where it is less than 66 years for males and less than 72 years for females. Since their independence, mortality levels in these countries small increase was observed (less than 69 years for men and less than 74 years for women). The highest life expectancy at birth was found in the low mortality populations where more than 71 years for males and more than 78 years for females. By end of the study period (2005) their expectation of life slightly increased by around 5 years for men and 4 years for women. The intermediate level of average life span was noted in the post-socialist European area among the other selected countries. A large gender gap in life expectancy was observed in the three Baltic states and the shortest one was in the Central Asian countries.
Regarding to the highest causes-specific mortality levels among the selected countries in the former Soviet Central Asian republics was found. The influence of changes in the politic, socio-economic and other sphere which is experienced post-communist countries after the collapse of the socialist regime and since their independence. The most frequent diseases among the Central Asian men were cerebrovascular diseases, external causes and diseases of the digestive system. In the beginning of study period (1985) Kazakhstan cerebrovascular diseases was extremely high among the countries of this region. In the end of analyzing period (2005) Kazakhstan and Kyrgyzstan showed a similarity in their mortality pattern and most of the highest death rates were found in these countries. The female mortality conditions showed significantly better result compared with males. In the countries of this region low values of cancer and external causes over time was observed. Significantly, the other diseases of the circulatory system were rose by the end of analysis. In 1985, Kazakhstan was out of the Central Asian country group, but till the end of selected period it showed similarities with Kyrgyzstan females. Moreover, the mortality due to the cerebrovascular diseases among Kazakhstan females was decreased.

During the 1990s a decrease in mortality in Central Europe rose due to several factors, one being a reduction of mortality. It seems that Central Europe has become more heterogeneous in repeating historical inequalities in health conditions. During the transition period, the health situation started to improve more rapidly than in the other post-socialist countries. The import of modern medications and medical technologies was accompanied by a change in dietary habits, reduced smoking, decreased alcohol consumption, and increased physical activity. These all play a role in the decrease of male mortality. High mortality populations of former socialist Europe still have a higher risk of cardiovascular mortality than the “West”. The recent favourable development in the “former East” is fragile and can easily be halted by insufficient advances in primary and secondary prevention (Rychtaříková 2004). By looking at the case of Central Europe we can project that in the near future Central Asia will have better results in the mortality level. Between the selected time periods in post-socialist European area improvements was observed, especially in the three
Baltic states. In 1985, their cause-specific mortality levels in other diseases of the circulatory system, cancer and external causes of death slightly were improved. The cause-specific mortality condition among males in Central European countries also changed in a positive way. In the case of female cause-specific mortality levels in the countries of Central Europe together with the three Baltic states were reduced. Outsiders of this country group were Slovakia and Poland in 1985. However, in 2005, in the mortality conditions among these two states slightly was improved.

During the analysis, in low mortality populations which are a reference country group in this study mainly the lowest level of the cause-specific mortality values was noted during the whole analysis. The causes-specific mortality levels form the low mortality populations all other selected causes of death after the twenty years time period mostly were declined. In these countries clear “low mortality” pattern was observed. However, in the values of these country group a few decreases was found. They are in Spain and the USA their death rates by other remaining causes of death were increased. The largest decline was in male’s mortality level of other diseases of the circulatory system where SDR by this disease approximately was halved. In general, the causes-specific mortality levels in low mortality populations were notably decreased compared with other selected countries.

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