Trends and disparities in premature mortality and health expectancy in Belgium. Exploiting mortality data to support public health.

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Abstract

Mortality patterns, especially if the death occurs prematurely, have a lot to tell to policymakers. Changes in mortality trends can warn for public health threats or bring positive news. The ranking of the specific causes of deaths by their burden expressed in years of life lost can help defining priorities, setting up and assessing policies. Even more instrumental is the study of disparities in mortality, being either spatial or socioeconomic, since they inform on health needs in specific places or among specific population groups. Indeed, socio-economic health inequalities have become an important concern in developed countries, and the objective of eliminating or at least reducing them is high on political agendas. It is therefore of key importance to monitor them carefully.

At the time this thesis was conceived, the production of the cause of deaths statistics had resumed after discontinuation of about 12 years. In addition, the construction of the National Mortality database – linking the census 2001 with the National registry and the causes of deaths database – was well advanced. At that point, this hope of newly available data provided the opportunity to revisit the cause-specific mortality analysis in Belgium.

The aim of this thesis was therefore to study the patterns of premature mortality in Belgium and to contribute to methodological developments in interpreting health inequality changes. Part 1 presents the **patterns, trends and spatial disparities** in all-cause and cause-specific premature mortality. In Part 2, the **socioeconomic inequalities in cause-specific premature mortality and health expectancy** are studied. Part 3 addresses some methodological issues related to the **interpretation of inequality changes**.

THE RESEARCH QUESTIONS HAVE BEEN ANSWERED AS FOLLOW:

Question 1: What are the patterns and the spatial disparities in cause-specific premature mortality in Belgium around the turn of the 21th century?

Despite a steady decrease of the premature mortality over time, Belgium ranks poor for this health outcome among the EU15 countries. Causes of death with the highest burden of premature mortality (measured in years of life lost) were suicide, lung cancer, road accidents and ischemic heart diseases in men, and breast cancer, suicide, lung cancer and remaining circulatory diseases in women.

An important decrease of the premature mortality rates was observed for most causes of death, with ischemic heart diseases decreasing by more 50% over the last 15 years. In the

same period, the most remarkable and worrying observation was a 50.2% increase in the lung cancer death rate in women.

The regional disparities in premature mortality are substantial. Premature mortality rates in Wallonia and Brussels respectively exceed by 40% and 20% the rates observed in Flanders among men, and exceed by 30% and 20% the rates observed in Flanders among women. The mortality disparities are even higher at the district level, with an excess of premature mortality of 80% among men in the districts with the highest mortality compared to the districts with the lowest mortality. This geographic pattern of mortality progressively emerged after World War II, with an order-of-magnitude increase when measured on the relative scale.

After controlling for the individual socio-economic variables, the regional disparities in mortality halved, which is in line with previous findings (145;146). The remaining regional variation in mortality suggests the role of either macro-level risk factors (for instance economic, environmental, or cultural), either individual variables that we could not capture in our model.

The maps reveal interesting geographic patterns. First, a clear-cut South-North divide is observed for all-cause mortality, at the only exception of Nivelles, an economically favoured district, and the only one in Wallonia to present lower than average mortality rates. While the same pattern is observed for many specific causes, the maps also reveal some other patterns, like a gradient parallel to the French border for the "head and neck" cancers, cancers that used to be frequent in France, suggesting a cross-border share for some risk factors.

Question 2: What are the patterns and the changes of educational inequalities in cause-specific premature mortality around the turn of the 21th century?

In the 2000s, the low-versus- high educational level (EL) rate ratios for all-cause premature mortality were as high as 1.88 and 1.59 respectively in men and women.

Looking at the specific causes of death shows that the relative and absolute inequalities were higher for potentially avoidable causes than for non-avoidable causes in men. In women, only absolute inequalities were higher for avoidable causes. The decomposition of the population-attributable fractions (PAFs) revealed which causes of deaths have the larger contribution to mortality inequalities at population level, namely lung cancer, IHD and COPD (in both sexes), followed by suicide in men and stroke in women.

Larger absolute inequalities were observed in Brussels and Wallonia than in Flanders, with few regional differences for the relative inequalities.

Between the 1990s and the 2000s, the educational rate ratios for most of the specific causes of death increased in both genders. At the same time, educational absolute rate differences decreased for most specific causes of death in men, but increased in women (except for the cardiovascular diseases mortality). The PAFs (that account for the EL-shifts) increased by 7% in men and 28% in women.

Question 3: What are the levels and the changes in educational inequalities in disability-free life expectancy in the early 21th century?

The low-versus-high EL gaps in life expectancy at 25 years (LE_{25}) were 5.2 and 3.8 years in 2001 respectively in men and women, and rose to 6.1 and 4.6 years respectively on 2011. After accounting for the upwards shift of the educational distribution, the inequality at population-level increased only in men. The gaps in disability-free life expectancy ($DFLE_{25}$) were still higher, reaching 6.5 and 9.3 years in men and women in 2001 and rose to 10.5 and 13.4 years respectively in 2011. The increase in $DFLE_{25}$ inequalities persisted after accounting for the EL shift (but became non-significant in women).

Question 4: Which indicators are best appropriate for the monitoring of health inequality when the composition of the population changes?

We summarized the state of the art in the methods of monitoring inequality changes, highlighting thereby the complexity of the topic. After having described the guidelines and interpretation tools, we identified some pending issues. We contributed to the advances in this topic by elaborating a first step interpretation tool, adapted from a previous typology published by Blakely et al. The thesis also contributed to this topic by analysing the impact of changes in the social structure of the population on three population level inequality indices, concluding that the regression-based indices (namely the RII and the SII) do not translate an improvement in the social structure into an improvement of their value, while the PAF performs better.

SOME RECOMMENDATIONS WERE SUGGESTED FOR PUBLIC HEALTH

Tackling health inequalities requires strategies encompassing multiple areas of intervention. The WHO Commission on Social Determinants of Health recommends three overarching principles to close the gap: improve the daily lives of poor people, tackle the inequitable distribution of money, power and resources, and measure and understand the problem, as well as the impact of the action. In Belgium, important efforts have been made to provide better access to education and universal health care, but the health system can only explain a limited part of the socioeconomic gradient, and more social determinants than education should also be addressed. Although regional and federal commitments have been made to tackle health inequalities, no comprehensive plan has been set up. Our main recommendation for public health would be to set up a comprehensive plan to tackle health inequalities. It is important to involve the authorities of the different levels (federal level and federated entities). It is also crucial, beyond the health sector, to involve the sectors implied in the policies affecting health, as well as experts. A state of play of the health inequalities and potential fields of action in Belgium should first be established. An agenda for research should be set up, with an important focus on health impact assessment. Priorities for actions should then be decided, along with an operational plan.

Regarding the regional disparities in health, even if the macro-economic differences between regions may be difficult to address, a systematic comparison of all regional/local macro-level factors, policies and individual factors that can affect health (including environment, education, and cost for public services) would most likely reveal a place for improvement for the health level in Wallonia.

With respect to the measurement of inequality changes, the analyses presented here warn against the use of the regression-based indices of inequality when the composition of the population changes, since they can provide misleading messages about the achievement of the objectives; the population-attributable fraction performs better.