Abstract

The idea that human lifespan is limited by our own biological condition seems to be very well accepted in all cultures, but this belief has not stopped human beings from trying to push the limits to extend life as much as possible. In this sense, the natural human desire to fight death has seen tangible results, changing throughout history the way humans live and die. Because of this, human intervention through science has led mortality to become a very dynamic phenomenon that is re-shaping societies and the challenges they face.

In this context, the main objective of this work is to create more knowledge on the dynamics behind longevity changes. France, Czech Republic and the United States haven been chosen as case studies. This knowledge focuses not only on quantifying the changes but also on estimating the attributable contributions for different age groups and mortality chapters, as defined by the International Classification of Diseases (ICD). In order to achieve this, an actuarial analysis of mortality data is carried out by making use of algorithms developed by Andreev (2002) and Arriaga (1984,1989) that allow to transform raw information into answers about the origin of the longevity changes experienced in these three countries.

Since this work is linked to a project developed by the author for the Society of Actuaries - the creation of the Mortality Analysis Calculator (MAC) – the following pages depict some of the questions that can be answered using MAC for every country with information available in the Human Mortality Database and the Cause of Death Mortality Database.

After providing all general details to understand the problem and the methodology used, an extensive analysis of results, separated in three chapters, is presented for the time period going from 1970 to 2012. Firstly, the estimated decomposition of changes in life expectancy at birth is analyzed for each country. After this, attention will be placed on the gender gap in life expectancy at birth: its evolution in time, and origin in terms of age groups and mortality chapters. Finally, in order to understand longevity evolution at a more senior age, the emerging concept of life preparancy is introduced and analyzed for the 25th percentile and age 60.

Keywords: mortality, longevity, life expectancy, life preparancy, gender gap, mortality chapter, Human Mortality Database, MAC (Mortality Analysis Calculator).