Sports demography: Demographic analysis applied to sporting populations

What is Sports demography? Boyden and J. Carey from the Max Planck Institute tried to answer this question in their work “Sports demography - Concepts and Methodologies Applied to Sporting Populations”, where they indicate that the Sports demography is the application of demographic models, tools and concepts to sporting populations (that is the population of athletes). The authors show that inflow and outflow of members of sports clubs can be compared to emigration and migration into the country. They also report that thanks to a frequent fluctuation is confirmed usefulness of demographic analysis in this issue (Bruyn, Bringe, 2006 in: Boyden, Carey, 2008).

F. De Bruyn and A. Bringe in their article entitled "An extension of sports demography: Duration Analysis Applied to Populations of sports federation members" also correspond to the question, why to deal with Sports demography. They draw attention to excellent quality and availability of athlete´s records and therefore the quality of possible data base for research. They also indicate to the fact that athletes are a suitable object for the study of the natural population aging (Bruyn, Bringe, 2006).

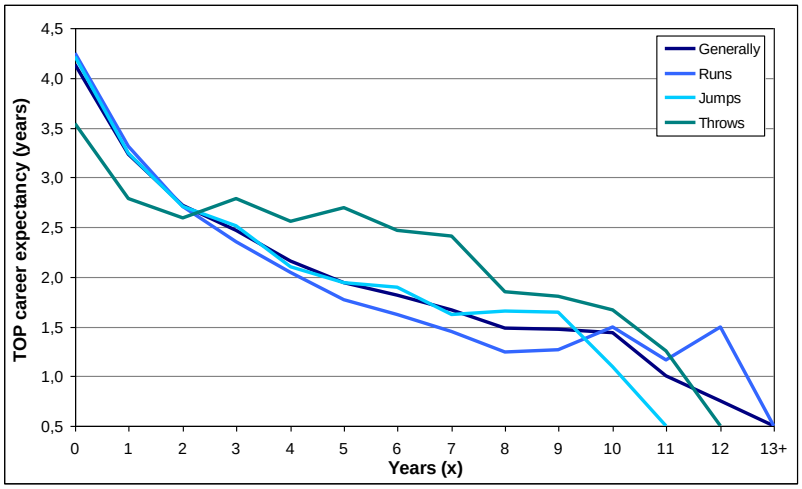
This paper briefly introduces selected demographic methods and their application in sports, namely athletics. In this work we divide athletic disciplines into three groups: runs, jumps and throws. Athletes who run are called runners. Competitors who are dedicated to jumping disciplines are called jumpers and those who are dedicated to throwing disciplines are called throwers. At the same time there is a new provision of the concept "TOP career." As a “TOP career” we called the top ten performances in a career of each athlete.

As a method for calculation, survival analysis is mainly used. Survival analysis is a set of statistical methods for examination of the duration to the occurrence of the studied (observed) events. In this case it will capture the best performance in the TOP career or termination of TOP career. Analysis is applied to data describing the length of the TOP career rather than length of life of the individual. This means that the calculation of life tables showing the length of the

TOP careers of men and women in various disciplines, increase of the TOP careers of men and women, and the rest of the TOP careers of men and women by age at the best performance.

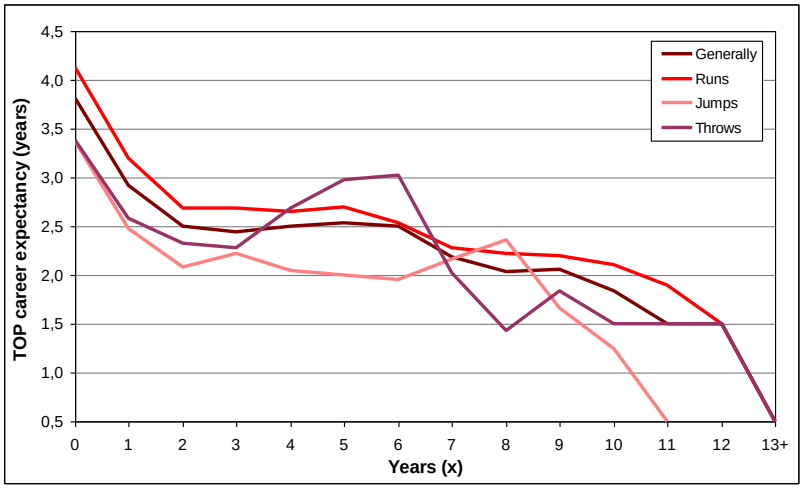
The analysis showed that women reach the TOP ten performances of their careers at a younger age compare to the men (on average 1.6 years earlier). Men throwers differ from most other in the each group. We compared the variability in the age at which throwers, runners and jumpers reach their TOP level careers. Sports "life table" demonstrated that men in the early years after the TOP level expected a little longer career than women. After about three years of TOP level change occurs and in subsequent years women have recorded longer career (Dupalová, 2013). The longest TOP career can be generally expected for runners, while the shortest TOP career for throwers. (See Fig. 1 and 2.)

Fig. 1: The length of the TOP careers of men



Source: Own calculations

Fig. 2: The length of the TOP careers of women



Source: Own calculations

The results of survival function confirmed that the performance of men and women in various age groups and in individual disciplines are different. Duration of TOP careers among various groups of athletes differs as well.

Gabriele Doblhammer and James W. Vaupel in their article entitled "Lifespan depends on month of birth" came up with a finding that month of birth influences adult life expectancy at ages 50+. They argue for example that in two countries of the Northern Hemisphere (Austria and Denmark) people born in autumn (October-December) live longer than those born in spring (April–June) (Doblhammer, Vaupel, 2001). Therefore we have decided to test, whether the month of birth can affect the length of the athlete's TOP career. We tested the impact of the annual period (spring/summer/autumn/winter) in which the athlete was born on the length of his/her TOP career using the method of survival analysis. However, the hypothesis has not been confirmed.

However the results achieved have confirmed that the methods of demographic analysis are applicable in other areas. These methods and analyzes showed a demographic options as the wider discipline used to analyze other than those standard populations, such as in newly developing Sports demography.

Keywords: Sports Demography, Athletics, Survival Analysis, TOP career

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