Sports demography: Demographic analysis applied to populations of athletes

What is Sports demography? The answer to this question can be found, for example, at N. Boyden and J. Carey from the Max Planck Institute, who in their work "Sports demography - Concepts and Methodologies Applied to Sporting Populations" indicate that the Sports demography is the application of demographic models, tools and concepts to sporting populations (i.e. population of athletes). For example, inflow and outflow of members of sports clubs can be compared to emigration and immigration into the country. The authors also report that usefulness of demographic analysis in this issue is confirmed thanks to a frequent fluctuation of athletes (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 the records of athletes and therefore the quality of possible data base for research. They also indicate the fact that athletes are a suitable object for the study of natural population aging (Bruyn, Bringe, 2006).

This poster briefly introduces selected demographic methods and their application in sports, especially in athletics. Athletic disciplines can be divided into three groups of disciplines (runs, jumps and throws). Athletes who run are called runners. Competitors who are dedicated to jumps are called jumpers and those who are dedicated to throw discipline are called throwers. At the same time, there is a new provision the concept of the "TOP career." Top career as defined as reaching the top ten performances of career for every athlete.

Survival analysis is mainly used for calculations. Survival analysis is a set of statistical methods for examination of the time duration of occurrence of the studied (observed) events, which in this case will capture the best performance in the TOP career or termination of TOP career. Analysis is applied to data corresponding with the length of the TOP sports career rather than length of life of the individual. This means 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 were calculated.

The analysis showed that women reach the TOP ten performances of their careers at a younger age than men (on average 1.6 years earlier). Men throwers are different from the majority in the each group. (We compared throwers with runners and jumpers with the greatest variability at the age at where they reach the TOP level careers.) Sports "life tables" are demonstrating that men are in the early years after the TOP level expected to have a little longer career than women. After about three years in the TOP level change occurs and in subsequent years women are recording longer career. The longest TOP career can be generally expected from runners, while the shortest TOP career from throwers (see Fig. 1 and 2).

Fig. 1: The length of the TOP careers of men – survival function

Fig. 2: The length of the TOP careers of women – survival function
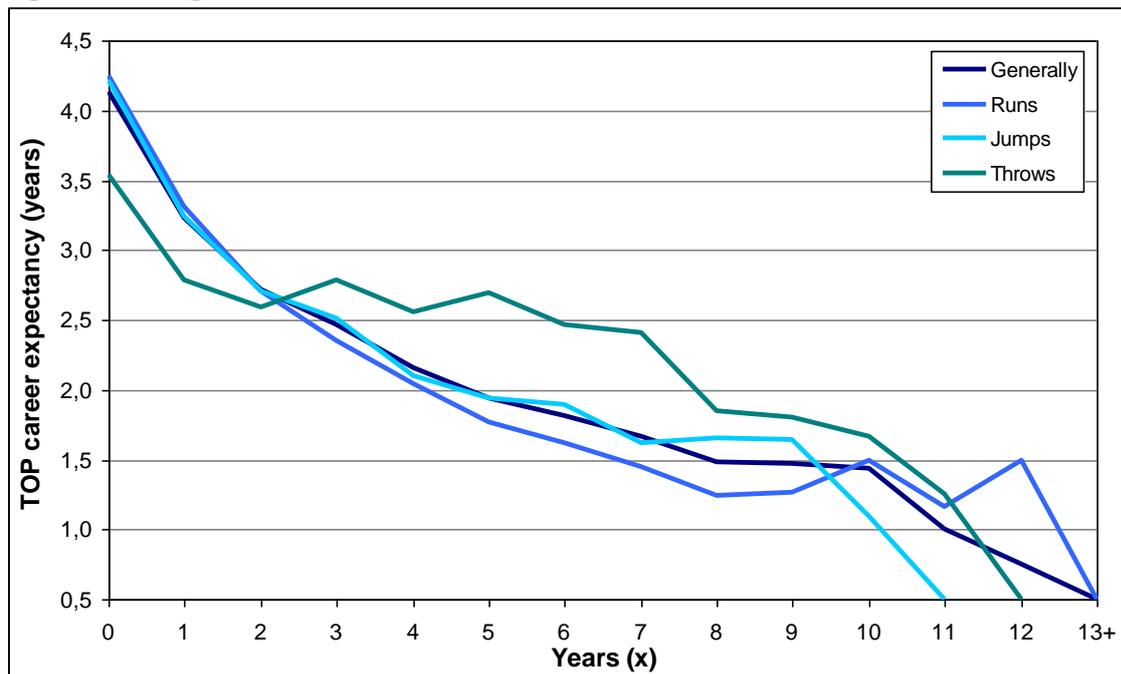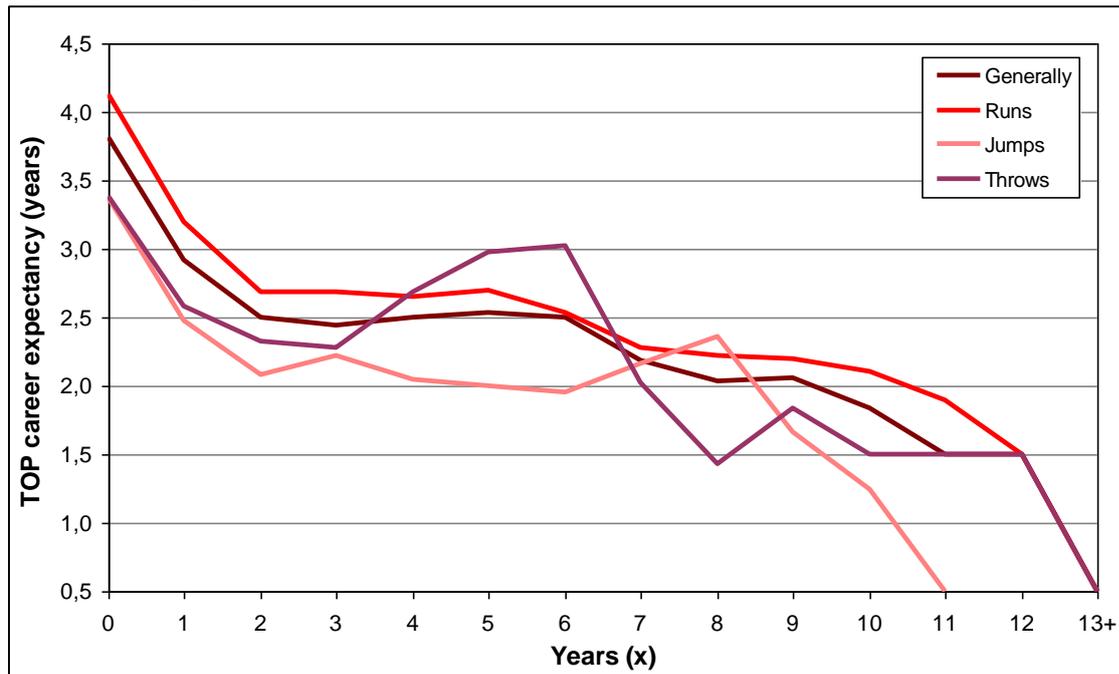
Source: Own calculations

The results of survival function confirmed that the performance of men and women in various age groups and in individual disciplines are different. The TOP careers of individual groups also differ in expected duration.

The results achieved have confirmed that the methods of demographic analysis are applicable in other areas. Presented methods and analyzes showed an option of demography as a wider discipline which can be 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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