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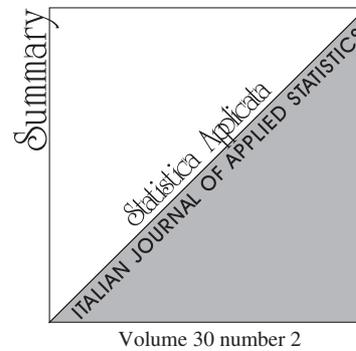
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EDITORIAL: SPORTS AND STATISTICS

“Sports and Statistics” is a combination that is gaining in importance as teams realize the usefulness of analytics. Both the statistical community, and the world of sports have been increasing their interest in the application of statistics to the measurement and the analysis of various aspects of sports.

The first national acknowledgment of this was the organization of the Section on Statistics in Sports of the American Statistical Association in 1992.

The first international acknowledgment of the pairing of sports and statistics was by the International Statistical Institute in 1993 (Florence, 49th ISI Session), when it was established the Sports Statistics Committee.

The purpose of the Committee was to promote both the application of statistical methods to the field of sports and the development of reliable, valid and comparable statistics of the citizens’ participation in sports and related activities in various countries.

Many international organizations and boards were involved in this experience: International Olympic Committee, UNESCO, Council of Europe, Eurostat, American Statistical Association and others.

The importance of the combination of statistics and sports also led to the creation of the *Journal of Quantitative Analysis in Sports*. This journal was established in 2005 and has since become an official publication of the American Statistical Association.

Since the first meetings two approaches have faced researchers who strive to connect statistics and sports:

1. to apply statistical reasoning and methods to case studies in various sports; we can emphasize that measurement is one of the basic components of modern sports; and
2. to study concepts, definitions and indicators to measure the characteristics of Sport Systems, i.e. participation, facilities, organization and so on.

This issue of the Italian Journal of Applied Statistics is mainly devoted to the first approach. Nowadays in almost every sport activity the use of statistics is fundamental to understanding the strategies of training and performing, both in team and individual sports. Moreover, it is useful in analysing the design of tournaments, the managing of gambling, the prediction of results, the strategy in competitions, the analysis of the careers of professional sportsmen, the scoring in the matches, and the evaluation of performances. In a broader sense this involves modelling the sports as they are played.

This issue contains papers on a wide spectrum of sports and statistical methods. The sports include beach volleyball, American football (NFL), basketball (NBA), tennis, and football (soccer to Americans). Statistical methodologies include Bayesian hierarchical models, the Bradley-Terry model for paired comparisons, multiple regression, generalized linear mixed models, Poisson and logistic regression. We hope that the reader finds these papers interesting from both the perspective of a statistician and a sports fan.

We want to take advantage of this preface, now, to spend some words to describe some aspects regarding the second approach: it has a more general interest, especially for policy makers and researchers.

The above mentioned Sport Statistics Committee inspired a research project on this approach named COMPASS (Coordinated Monitoring of Participation in Sports). The project, promoted in 1996 by UK Sport, Sport England and CONI (Italian Olympic Committee), aimed to define the instructions for organising surveys on citizens' participation in sports and related activities in Europe, and for showing cross national comparisons of the levels and the structure of this participation. Many European countries were involved in the project and experts from USA, Japan, New Zealand and Australia were consulted.

The data to analyse, in COMPASS, are those collected in national sports participation surveys, which use questionnaires to collect information on a range of specified sporting activities, over a specified period.

The results of this activity are incomplete and dated (up to 2005), but the important contribution is of methodological kind: to move through a greater harmonization of survey methods and contents. The last example of this harmonization is the case of parallel surveys performed in Italy by Istat (Istituto Nazionale di Statistica) and in Brazil by IBGE (Istituto Brasileiro de Geografia e Estatística), in 2015, using questionnaires with a common core of questions. The analyses are now in progress.

COMPASS proposes recommendations that every survey on this field should follow and that represent methodological challenges for statisticians.

- a) *Which may be the conceptual and operational definition of sport, to be adopted as a common reference?* COMPASS adopts the definition of sport proposed by the European Sports Charter of the Council of Europe, which is the reference point for most countries, and that is truly broader. *“Sport means all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels.”*. This definition allows us to include among participants all citizens practicing sport and physical activities.

- b) *Is there a conceptual and operational model to classify levels of involvement of citizens in sports participation to be adopted as a common reference?* The starting point for the analysis of sports participation is the identification of its major characteristics. There are three basic components that characterize sports participation: quantity (that is, how many times do you practise?); quality (that is, at which level do you practise?); organization (that is, is your practice involved in a club or association?). These may be considered as latent variables, that can be measured through a set of indicators that may be partially different from country to country, in accordance with each country's different traditions and different kind of sports organisation and definition. Following this strategy, participation is measured on a seven-point scale from (1) high intensity, frequent participation (quantity) at a competitive level (quality), being a member of a sports club (organisation), up to (7) no participation at all.
- c) *Which are the statistical and methodological problems that may arise in these surveys?* There are methodological, operational and conceptual problems to face in comparing data from different surveys:
- definition of the questionnaire and its administering channel (CATI, CAPI, proxy respondent, face to face, and so on);
 - definition of the list of sports and physical activities;
 - use of a prompt card, or not;
 - individualization of age limits (3-74?) to eliminate the effect of different age-structure of the countries;
 - sample strategy and size;
 - period of reference;
 - and so on.
- d) *Which may be “minimum package” of national tables and indicators necessary for the comparative data processing?* COMPASS recommends a harmonized national output and appropriate indicators to synthesize the results: global participation rate, regular participation rate; female sports participation rate and so on.

In conclusion, we would like to thank the *Italian Journal of Applied Statistics* for allowing us to edit this special issue. We hope to edit another number, more oriented to present also the second approach: comparing strategies, methodological problems and results!

Antonio Mussino & Steve Rigdon

