

## A Bayesian Approach for Health Workforce Planning in Portugal

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**Abstract :** Health professionals are the keystone of any health system, by delivering health services to the population. Given the time and cost involved in training new health professionals, the planning process of the health workforce is particularly important as it ensures a proper balance between the supply and demand of these professionals and it plays a central role on the Health 2020 policy. In the past 40 years, the planning of the health workforce in Portugal has been conducted in a reactive way lacking a prospective vision based on an integrated, comprehensive and valid analysis. This situation may compromise not only the productivity and the overall socio-economic development but the quality of the healthcare services delivered to patients. This is even more critical given the expected shortage of the health workforce in the future. Furthermore, Portugal is facing an aging context of some professional classes (physicians and nurses). In 2015, 54% of physicians in Portugal were over 50 years old, and 30% of all members were over 60 years old. This phenomenon associated to an increasing emigration of young health professionals and a change in the citizens' illness profiles and expectations must be considered when planning resources in healthcare. The perspective of sudden retirement of large groups of professionals in a short time is also a major problem to address. Another challenge to embrace is the health workforce imbalances, in which Portugal has one of the lowest nurse to physician ratio, 1.5, below the European Region and the OECD averages (2.2 and 2.8, respectively). Within the scope of the HEALTH 2040 project - which aims to estimate the 'Future needs of human health resources in Portugal till 2040' - the present study intends to get a comprehensive dynamic approach of the problem, by (i) estimating the needs of physicians and nurses in Portugal, by specialties and by quinquennium till 2040; (ii) identifying the training needs of physicians and nurses, in medium and long term, till 2040, and (iii) estimating the number of students that must be admitted into medicine and nursing training systems, each year, considering the different categories of specialties. The development of such approach is significantly more critical in the context of limited budget resources and changing health care needs. In this context, this study presents the drivers of the healthcare needs' evolution (such as the demographic and technological evolution, the future expectations of the users of the health systems) and it proposes a Bayesian methodology, combining the best available data with experts opinion, to model such evolution. Preliminary results considering different plausible scenarios are presented. The proposed methodology will be integrated in a user-friendly decision support system so it can be used by politicians, with the potential to measure the impact of health policies, both at the regional and the national level.

**Keywords :** bayesian estimation, health economics, health workforce planning, human health resources planning

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