



Workshop for Ageing and Independent Living

Quantitative methods

Data: 22 de Fevereiro de 2017

Local: Sala de Seminários, Edifício VII, 2º Piso

Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa

Programa provisório

-
- 10h00 Boas vindas
- 10h10 **Ana Maria Rodrigues** - Nova Medical School, UNL
"Portuguese elderly: sociodemographic characteristics, lifestyles and physical and mental health"
- Paula Broeiro-Gonçalves** - Escola Nacional de Saúde Pública, UNL
"Morbilidade em idosos dependentes ao cuidado das equipas domiciliárias da Rede Nacional de Cuidados Integrados na região de Lisboa e Vale do Tejo: estudo transversal observacional"
- Hugo Lopes** - Escola Nacional de Saúde Pública, UNL
"Portuguese long-term care populations: measuring the dependence levels at discharge and mortality risk"
- Paula Simões** – Faculdade de Ciências e Tecnologia, UNL
(título a anunciar)
- 12h15 Almoço
- 14h00 **Pedro Pita Barros** - School of Business and Economics, UNL
"Understanding health and health care demand"
- Lourdes Afonso** – Faculdade de Ciências e Tecnologia, UNL
"Is There a Market for Reverse Mortgage in Portugal?"
- Manuel L. Esquível** – Faculdade de Ciências e Tecnologia, UNL
A Five State Non-Homogeneous Continuous Time Markov Chain Model for Long-Term Care: Calibration
- Judite Gonçalves** - School of Business and Economics, UNL
"Selfie Ageing Index: um indicador para (auto-) avaliação do processo de bem envelhecer"

15h30 Leg stretching with a coffee or tea

16h00 **Matilde Oliveira** – Faculdade de Ciências e Tecnologia, UNL

“Determinação de Prémios de um Produto de Long-Term Care por Simulação de Cadeias de Markov não Homogéneas a Tempo Contínuo”

Raquel Aguiar – Instituto Superior Técnico, UL

“Planning home health care services – a routing and scheduling problem”

Teresa Cardoso-Grilo – ISCTE, Instituto Universitário de Lisboa

“Tool to support the planning of Long-Term Care networks: Accounting for the impact of multiple objectives, uncertainty and policy strategies”

17h10 Farewell with coffee and cookies

PORTUGUESE ELDERLY: SOCIODEMOGRAPHIC CHARACTERISTICS, LIFESTYLES AND PHYSICAL AND MENTAL HEALTH

Ana Maria Rodrigues^{1,2}, Maria João Gregório^{1,3,4}, Rute de Sousa¹, Sara Dias^{1,4}, Jaime da Cunha Branco^{1,2}, Helena Canhão^{1,2}

¹EpiDoC Unit, CEDOC, Nova Medical School, Universidade Nova de Lisboa, Lisboa, Portugal

²Sociedade Portuguesa de Reumatologia, Lisboa, Portugal

³Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto, Porto, Portugal

⁴Escola Superior de Saúde – Instituto Politécnico de Leiria

✉ rute.sousa@nms.unl.pt

Abstract

Background: The world is facing a situation without precedent: soon it will have more older people than children and more people at extreme old age than ever before (1). In fact, by 2025 more than 20% of Europeans will be 65 or over, with a particularly rapid increase in the number of over 80s (1). Actually, Portugal has a high proportion of elderly and is one of the European countries with the lowest birth rate (2). As both the proportion of older people and the length of life increase throughout the world, some key questions arise. Will population aging be accompanied by a longer period of good health, a sustained sense of well-being, and extended periods of social engagement and productivity, or will it be associated with more illness, disability, and dependency?

Aim: To analyse Portuguese elderly population in terms of sociodemographic characteristics, lifestyles and physical and mental health.

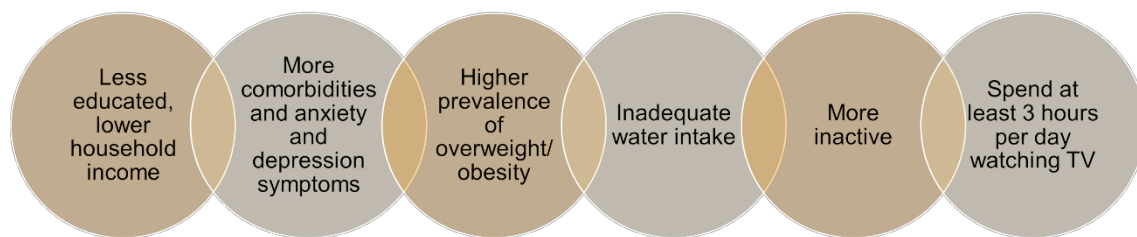
Methods: A random sample representative of the adult Portuguese population recruited in the EpiDoC 1 study⁽³⁾ (Sept 2011 – Dec 2013) was followed and a second evaluation was done (EpiDoC 2, 2013-2015). Data collection was performed from March 26th 2013 to July 27th 2015 and include socioeconomic, demographic, lifestyles and health information. For this study, we selected all participants who were 65+ years old (n=2,393). Absolute frequencies and weighted proportions were used to summarize categorical variables. Continuous variables were described by weighted mean values and standard deviations.

Results: Of 2,393 participants, 1,539 (55.8%) were females. The participants were mostly Caucasian (n=2372; 98.4%), married (n=1,480; 65.8%) or widow(er) (n=705; 25.9%). With respect to educational level, a high proportion of participants (n=1,831; 77.3%) had less or equal to 4 years of education. The average of years of education is 4.75 ± 3.99 years. Most people above 65 years of age reported to live on a household income of less than 1000€ per month; in particular, 32.1% reported the lowest income level of 500€/month. Moreover, the elderly tend to live in households composed by only one (24.4% vs 8.3% in the younger

population) or two persons (58.3% vs 24.6% in the 18-64 age group). Most individuals in this group were retired (88.6%) and 8.0% worked as a domestic worker.

Conclusions: Our study showed that Portuguese elderly have very low income, low literacy and live alone. More than 69% of the elderly are overweighted or obese. Also to stress that a high proportion of Portuguese elderly have depressive symptoms and other chronic diseases.

Regarding their lifestyles, the results confirm a high rate of inactivity in this population. The majority of Portuguese elderly watch at least 3h/day and do not use computer.



References:

1. Lutz W, Sanderson W, Scherbov S (2008) The coming acceleration of global population ageing. *Nature* 451, 716–719.
2. European Commission, Employment, Social Affairs & Inclusion Eurostat (2015) Demograph Report - Short Analytical Web Note 3/2015. Luxembourg.
3. Rodrigues AM, Gouveia N, da Costa LP *et al.* (2015) EpiReumaPt- the study of rheumatic and musculoskeletal diseases in Portugal: a detailed view of the methodology. *Acta reumatologica portuguesa* 40, 110-124.

The present project was granted by the Public Health Initiatives Programme (PT06), financed by EEA Grants Financial Mechanism 2009-2014.

Morbilidade em idosos dependentes ao cuidado das equipas domiciliárias da Rede Nacional de Cuidados Integrados na região de Lisboa e Vale do Tejo: estudo transversal observacional

Morbidity in the dependent elderly cared by home-teams of the National Network of Integrated Care in the Lisbon and Tagus Valley: cross-sectional study

Autora

Paula Broeiro-Gonçalves

Médica

Assistente Graduada de Medicina Geral e Familiar

Assistente convidada da Faculdade de Medicina de Lisboa

Aluna do 5º Programa de doutoramento em Saúde Pública – Escola Nacional de Saúde Pública – Universidade Nova de Lisboa

Orientador

Prof. Doutor Pedro Aguiar

Escola Nacional de Saúde Pública – Universidade Nova de Lisboa

RESUMO

Introdução: Em Portugal, a Rede Nacional de Cuidados Continuados Integrados tem como missão dar resposta às novas necessidades de saúde e sociais. Importa conhecer a carga de morbilidade dos doentes, com 75 e mais anos, definindo-se como objetivos caracterizar: morbilidade, determinantes de incapacidade, duração e grau de dependência nas atividades de vida diária (Escala de Barthel). Verificar se existe associação entre multimorbilidade e dependência ou fragilidade no grande idoso.

Material e Métodos: Estudo descritivo transversal, numa amostra de 230 participantes, distribuídos por 25 Equipas de Cuidados Continuados Integrados, aleatoriamente selecionadas. As variáveis estudadas foram as sociodemográficas, os determinantes de incapacidade reconhecidos pelo cuidador, o grau e duração de dependência e a morbilidade (número, diagnósticos e índice de Charlson). A análise estatística descritiva fez-se através de proporções e médias e a inferencial pelo intervalo de confiança para um erro alfa de 5% ou aplicação de testes [Qui-quadrado de Pearson, correlação de Spearman ou regressão logística binária].

Resultados: A população em estudo tinha: idade média de 83,59 anos [IC95%: 82,83-84,34], escolaridade baixa ou ausente (88,7%), um número médio de problemas por pessoa 9,5 [IC95%: 9,1-9,9], um índice de Charlson de 8,48 [IC95%: 8,14-8,83] e com dependência grave a total, segundo a escala de Barthel, em 65,2%. A duração média de dependência foi de 42 meses [IC95%: 33,57-50,41] e os determinantes de incapacidade mais frequentes foram: demência, acidente vascular cerebral e fratura do fémur. Os diagnósticos mais frequentes foram: osteoartrose, hipertensão e demência. A dependência esteve associada à idade e não ao número de problemas. Os diagnósticos mais frequentemente associados à dependência foram: doença cerebrovascular, coronariopatia isquémica, demência e doença de Parkinson. Decorrentes dos problemas os aparelhos e sistemas mais frequentemente

associados a dependência foram o circulatório, Psicológico e Neurológico.

Discussão: Os resultados revelaram a elevada carga de doença e de dependência da população idosa ao cuidado das equipas domiciliárias. A dependência esteve associada à idade e não ao número de problemas o que poderá levar a questionar o uso da idade como *proxy* de morbilidade. Apesar da coerência externa e interna dos resultados, identificaram-se limitações como a dimensão amostral ou a idade dos doentes incluídos. Poderá justificar-se a realização de outros estudos de âmbito Nacional que incluam doentes menos idosos e menos dependentes.

Palavras-chave: Visita domiciliária; Idosos frágeis; Morbilidade; Multimorbidade; Pessoa com deficiência

**Portuguese long-term care populations: measuring the dependence levels at discharge
and mortality risk**

Hugo Lopes¹, Céu Mateus², Nicoletta Rosati³

¹ National School of Public Health (*Escola Nacional de Saúde Pública*), Avenida Padre Cruz, 1600-560 Lisbon, Portugal.

² Health Economics Group, Division of Health Research, Lancaster University, Furness College, LA1 4YG UK

³ Department of Mathematics, Lisbon School of Economics and Management (*Instituto Superior de Economia e Gestão*), University of Lisbon, and CEMAPRE, Rua do Quelhas 6, 1200-781 Lisbon, Portugal.

Corresponding author: Hugo Lopes, e-mail: hugo.ramalheira.lopes@gmail.com Tel.: (+351) 919968241

Conflict of Interest statement

Nothing to declare.

ABSTRACT

Background

The Portuguese long-term care sector is organized in community (HCBS) and three nursing homes typologies (NH): Short, Medium and Long term units. We aimed to identify the survival time and the mortality risk factors in each setting, and the individuals' characteristics independently associated with cognitive and physical status at discharge.

Methods

We analysed 20,984 individuals (≥ 60 years), admitted and discharged in 2015. The Kaplan-Meier survival analysis and the Cox Proportional Hazards Models were used to assess the mortality. Then, we used Wilcoxon signed-rank test to quantify the number of individuals with cognitive and physical changes between admission and discharge and two cumulative odds ordinal logistic regressions to determine the effect of several variables, on the ability to predict the cognitive (Model 1) and physical (Model 2) dependence levels at discharge.

Results

The global mortality rate of 30% at HCBS and 17% at the NH, with a median survival time 173 and 200 days ($X^2 = 173.3$, $p < 0.001$), respectively. The main mortality risk factors were older age, male gender, family/neighbour support, neoplasms and cognitive/physical dependence at admission. While in NH/HCBS, 26%/18% of individuals improve their cognitive status, in physical status the proportion was 38%/27%, ($p < 0.001$), respectively. Finally, older age (Model 1: OR=0.957; Model 2: OR=0.967), be married (Model 1: OR=0.892; Model 2: OR=0.885), be illiterate (Model 1: OR=0.917; Model 2: OR=0.918) and be classified at the lowest cognitive (Model 1: OR=0.088; Model 2: OR=0.359) and physical status (Model 1: OR=0.433; Model 2: OR=0.018) at admission, decrease the likelihood of achieving a higher level of cognitive and physical independence at discharge.

Conclusions

The outcomes assessment result from a complex interplay among different individuals' characteristics, care environment and type of services provided, being important to include supply characteristics in order to study the effect of this features on the cognitive and physical recovery of this population.

Keywords: Portuguese long-term care; nursing homes; home and community-based services; outcomes assessment.

Understanding health and health care demand

Pedro Pita Barros

School of Business and Economics, UNL

Health systems bring together the needs of people in terms of health care and the supply of services and products to improve (or restore) people's health. Understanding demand for health care and how public policies and health system design interact with such demand requires statistical analysis. Numerous challenges exist. Often what is available as measure is a proxy to the underlying variable of interest. Sequentially and/or simultaneity of decisions need to be accounted for in the design of the statistical model to minimize biases. Understanding who benefits and who loses from particular policies requires individual data (anonymous micro data), bringing different challenges. An example of some of these issues is provided. To assess the role of ADSE (civil servants double health insurance coverage), a distinction between effects that operate through access to health care and effects that operate more directly (say, prevention) is made.

The analysis has a three-equation model with endogenous latent variables as well as endogenous dummy variables. One equation is related to health status (self-reported health) and the other two related to use of health care (pharmaceuticals and visits to the doctor). The health equation and the pharmaceutical use equation contain latent variables. Use of pharmaceutical products is subject to prescription (for the most important treatments), and we see it as reflecting physicians' moral hazard while visits to the doctor are mostly patient initiated. We estimate the model by a purpose-built Full Information Maximum Likelihood procedure.

Is There a Market for Reverse Mortgage in Portugal?

Afonso, L.B.¹, Corte Real, P.²,

¹*CMA and FCT, Universidade Nova de Lisboa*
lbafonso@fct.unl.pt

²*FCT, Universidade Nova de Lisboa*
parcr@fct.unl.pt

Abstract

The expected reduction in the Net Pension Replacement Rates, in Portugal, are relatively high for European standards. The low medium net value of the old age pensions associated to the legal framework for the yearly pension's actualization supports the thesis that retirees will need to complement their income. In this work we try to explore how the reverse mortgage market can be another solution for complementing the retirees' income.

In the authors opinion the reverse mortgage needs to be revisited. In a worldwide environment of very low interest rates, even for long-term maturities, it is not expected that a substantial increase of income could come from savings, at least for the majority of population. Also, it is not expected that the Social Security could, in its various forms, complement beyond extreme cases as poverty, the pensioners income.

Considering that in countries where the pensioners own not very liquid assets, as it is the case for homes and Portugal, reverse mortgages should be considered by all parties, namely government, pensioners and the insurance industry as a more common solution for a long-term problem that needs preparation to be dealt with.

We try to show that in the presence of an adequate legal and fiscal framework, with the adequate product architecture, in a country with the demographic, old age pensions and savings perspectives like Portugal, could be a viable solution if both the borrowers (home owners) and lenders (insurance companies) feel protected.

keywords: Net Pension Replacement Rates, Reverse Mortgage, Public Old Age Pension, Health Care Costs, Portugal.

A Five State Non-Homogeneous Continuous Time Markov Chain Model for Long-Term Care: Calibration

Manuel L. Esquível

Centro de Matemática e Aplicações, FCT, UNL

We consider a non-homogeneous continuous time Markov chain model for Long-Term Care with five states, the healthy state, three dependent states of low, intermediate and high dependence and one exit state. The three dependence states choice is based on a short Bartel classification scheme. In the model we allow for non null intensities for returns from a higher dependence state to a immediately lesser dependence state, that is, high to intermediate and intermediate to low; of course, low dependence to healthy is also allowed. We address the problem of calibration of the intensities with real data.

SELFIE AGEING INDEX

um indicador para (auto-) avaliação do processo de bem envelhecer

Judite Gonçalves¹, M. Amália Botelho², Miguel Fonseca³,
M Isabel Gomes³, Pedro Pita Barros¹

¹School of Business and Economics, UNL

²Nova Medical School, UNL

³Faculdade de Ciências e Tecnologia, UNL

Por vezes ouvimos ou colocamo-nos nós mesmos a pergunta “Será que estou a envelhecer bem?”. Com este projeto pretende-se desenvolver um *Selfie ageing index*, ou seja, um indicador de envelhecimento baseado na auto-avaliação que tem em conta três vertentes do envelhecimento: biológica, psicológica, e social. O *Selfie ageing index* contrasta com os índices de envelhecimento atualmente utilizados, que são de natureza societal, colocando o foco no indivíduo. A contribuição principal deste projeto vai para além do conhecimento científico, e passará pela disponibilização do *Selfie ageing index* através de uma *App* e/ou plataforma *Web*, para que cada pessoa possa conhecer e lidar com o seu próprio processo de envelhecimento.

Através de perguntas como “Tem dificuldades em andar em casa?”, ou “Ultimamente tem-se sentido desanimado?”, baseadas no Modelo de Avaliação Bio-psico-social, desenvolvido por Botelho¹, avalia-se o estado físico, mental e social do indivíduo, não necessitando de informação clínica. O conjunto de perguntas relevantes é validado com dados de inquéritos de referência (*Survey of Health, Ageing and Retirement in Europe*, SHARE, para Portugal e Estudo do Perfil de Envelhecimento da População Portuguesa, EPEPP). Relacionando as respostas às perguntas com o estado de saúde auto-reportado, atribui-se a cada indivíduo um *score*. Comparando esse *score* individual com o *score* para indivíduos do mesmo grupo etário, por exemplo, o indivíduo obtém o seu indicador *Selfie ageing*, que lhe permite perceber o seu estado de envelhecimento em relação aos seus pares. O resultado será algo como ilustrado na Figura 1, que usa as observações dos inquéritos mencionados para fazer o ponto de comparação. Um indivíduo de 60

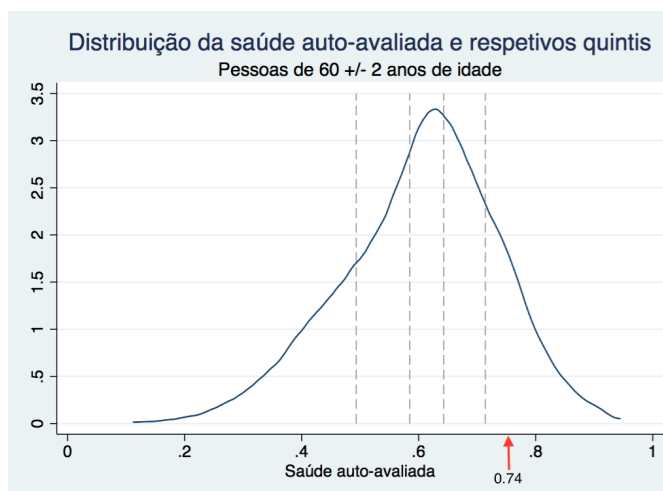


Figura 1 Selfie ageing index para um indivíduo de 60 anos, casado, com confidente, com 4 anos de escolaridade e uma profissão manual, de peso adequado, sem dificuldades para andar em casa ou nas atividades básicas da vida diária, sem sintomas a nível de estado emocional, com boa orientação no tempo, fumador e que pratica alguma atividade física.

¹ Botelho MA (2000) “Autonomia Funcional em Idosos, Caracterização multidimensional em idosos utentes de um centro de saúde urbano”, Edição Bial, Porto

anos, casado, sem dificuldades em andar em casa ou sintomas a nível do estado emocional tem um score de 0,74 na escala 0-1, situando-se no quinto quintil em relação a todas as pessoas da amostra com 58-62 anos (características detalhadas na legenda).

Esta ferramenta permitirá que cada um possa tirar uma *selfie* do seu estado de envelhecimento, sem necessitar de um profissional de saúde para operar a máquina fotográfica.

Determinação de Prémios de um Produto de Long-Term Care por Simulação de Cadeias de Markov não Homogéneas a Tempo Contínuo

Matilde Castro de Oliveira

Mestrado em Matemática Aplicada, FCT, UNL

Este trabalho tem como objectivo o estudo e análise de modelos de Cadeias de Markov não homogéneas, com retorno, a tempo contínuo e aplicados a seguros de dependência.

Na primeira parte, faz-se a contextualização do problema com a apresentação de algumas definições de Cadeias de Markov não homogéneas a tempo contínuo e com retornos, dos pressupostos do modelo de estados múltiplos e sua definição, e por fim de uma abordagem ao seguro Long-Term Care (LTC).

Na segunda parte do trabalho, faz-se uma simulação das trajectórias e o cálculo dos prémios. Para tal, é feita a resolução de equações numericamente, a apresentação dos requisitos do seguro e, por fim, é feita uma análise aos resultados obtidos, com o objectivo de saber o quão sensível são os valores dos prémios a alterações dos parâmetros iniciais.

Planning home health care services – a routing and scheduling problem

Raquel Aguiar^a, Maria Isabel Gomes^b and Tânia Rodrigues Pereira Ramos^a

(a.raquel.aguiar@ist.utl.pt) (mirg@fct.unl.pt) (tania.p.ramos@tecnico.ulisboa.pt)

^aCEG_IST – Instituto Superior Técnico, Universidade de Lisboa, Portugal

^bCMA, FCT – Universidade Nova de Lisboa, Monte da Caparica, Portugal

The aging of population alongside the reduction in the availability for informal care has increased in the need of assisted living support. As a result, several home healthcare service providers have appeared. Both public-based and private institutions struggle with either lowering public expenditures or trying to compete in the market, respectively. From the various optimization problems that arise, routing and scheduling seems to be the most tackled over the past few years. In general, these problems address the allocation of a caregiver to several patients, which have several requirements and preferences, and should take into consideration some regulations (such as continuity of care or workload balance). The services are frequently time-dependent, adding complexity to the problem.

This work is motivated by a real case study of a Portuguese Home Social Care Service, aiming to plan the daily work schedule for each caregiver at that solidarity institution. With a group of 36 patients with different levels of care necessities (bedridden and semi-dependent), the objective is to define the schedule for the two types of teams (composed of one or two caregivers), so that all patient's requests are met. The requests vary from four times a day to one day per week, which may be of activities of the daily living (such as bathing, dressing, medication assistance, home cleaning) and/or transportation to (and from) the day care center. A mathematical model is proposed which addresses real-world features such as lunch breaks, meal delivery, patient visit frequency, time-windows and loyalty between caregiver and patient within the day. Two objective functions are considered: (i) minimize the traveled time, and (2) workload balance among teams. In this talk, we will present the MILP formulation developed to address the characteristics mentioned above and the results achieved for the real case study.

Tool to support the planning of Long-Term Care networks: Accounting for the impact of multiple objectives, uncertainty and policy strategies

T Cardoso-Grilo^{1,2}, M D Oliveira², A Barbosa-Póvoa²

¹ Instituto Universitário de Lisboa (ISCTE-IUL)

² Centre for Management Studies, Instituto Superior Técnico, Universidade de Lisboa

Multiple economic, demographic, epidemiologic and social changes are currently affecting European countries, posing extra challenges to the health care sector in general, and to the delivery of formal and informal Long-Term Care (LTC) in particular. Accordingly, policy-makers need to ensure that networks of LTC are responsive to population ageing and to an increasing prevalence of chronic diseases, as well as to make sure that scarce resources are adequately spent in LTC and that many policy objectives in the sector are pursued. This requires proper planning of LTC resources, which is specifically relevant for countries based on a National Health Service (NHS) that have been facing annual reductions in public health care spending. Planning of networks of LTC services is however a complex task, since the delivery of care is multi-service (comprising a combination of institutional, home-based and ambulatory services) and it is affected by health policies outside the LTC sector. Additionally, it is subject to uncertainty associated with the demand and the supply of care, and multiple objectives are to be attained by the delivery of care. Within this context, this study aims at building a comprehensive tool to aid policy-makers and health care planners making informed decisions on how to plan a network of LTC services under such a complex environment.

A planning tool based on optimization models is then developed so as to inform the planning of multi-service networks of LTC in the medium term, in terms of where to locate LTC services, how to plan capacities and to which patients deliver services. The tool is comprehensive by modelling the extent to which a LTC network accomplishes multiple, and often conflicting, policy objectives that are typically relevant for planners in the LTC sector, such as the maximization of health and wellbeing, the maximization of equity objectives (including equity of access, socioeconomic equity, geographical equity and equity of utilization), and the minimization of costs. The developed tool also considers how uncertainty in the demand and the delivery of care (for instance, in the number of individuals needing care and in the length of stay of institutional services) and policy strategies outside the LTC sector (for instance, opting for institutionalized or community-based models of care) may influence the network of LTC services. Depending on the user of the tool: different objectives may be selected, the relative importance of these objectives may be defined; and alternative policy strategies may be set.

The applicability of the proposed tool is illustrated with a case study in the Great Lisbon region in Portugal, where a National Health Service (NHS) is in place. The obtained results allow for multiple analysis with the help of visual aids, including i) how and when to dimension existing and new services when different objectives are set, ii) which equity, health and wellbeing improvements can be obtained, and at which costs, and iii) how cost-effective may be different configurations of networks of care.