

Ageing, Education and Health in Portugal prospective from the 19th to the 21st century

Filipa Castro Henriques, Teresa Ferreira Rodrigues and
Maria Fraga O. Martins

Introduction

The first aim of this study is to present the Portuguese mortality model from a long chronological perspective and discuss the role of educational level as a predictor of health status. By the end of the 19th century, when social and economic changes took place, the short and unstable life cycle model was replaced with a long and stable one, with major changes from 1970's onwards. Today Portugal is a country with low mortality and fertility rates. Having presented this changing process and its consequences to the population's age structure, we will analyze the extent to which future changes in the composition of the population by sex, age and educational level will affect the average health status. It is an important issue, as we know that the ageing phenomena of the Portuguese population will continue and that health care needs will increase significantly in coming decades, although with regional differences.¹ Simultaneously, Portugal will experience significant changes in the educational level of its population. Several studies have reported higher morbidity and mortality levels on people with lower educational level.² Will the effects of ageing be counterbalanced by the anticipated rise in Portuguese educational levels?³

Our study begins with a short diagnosis on the world's global ageing phenomenon and its regional implications on future population's health status and needs. It is essential to discuss the way future societies are (or not) preparing themselves to face significant changes of age structures and the corresponding economic and social implications.⁴

In the second part we analyze the Portuguese demographic situation. We characterize its elderly population by sex, age, educational level and trends from the present

1 Rodrigues et al., 2008.

2 Cavelaars et al. 1998, Joung et.al 2000.

3 Fernandes et al., 2008.

4 To consider these changes in an historical perspective will allow us to better understand nowadays reality and prepare the future (Veiga et al., 2004).

until 2021. Then, we evaluate differences in self reported morbidity between people with high and low educational level, comparing them with other European studies. Understanding the impact of demographic ageing in terms of needs for the next twenty years requires a previous reflection on the input that determines the quality of life of the individuals that are growing old.

In methodological terms we focus on the benefits provided by econometric models that will evaluate the extent of the relation between education standards and health status, through logistic regression model. Next, a demographic forecast analysis is made, using the Cohort Component Method, as well as projections by levels of education, supported on general census data.

Global Ageing Society: Regional Differences and Future Trends

Ageing has become a global phenomenon during the 20th century, as the percentage of people aged 65 and older has grown faster than the total population. In 2008, about 7 percent of the world's population was aged 65 years and over.⁵ Meanwhile, the percentage of people aged 0 to 14 years old has declined.

People are living longer everywhere, but the ageing phenomenon is both a question of increasing rates on life expectancy and the consequence of birth rate decrease. World's average life expectancy at birth rose from 47 years in 1950–1955 to 65 years in 2000–2005 and is expected to continue rising. By 2045–2050 it will be 30 years higher than it was in the middle of the 20th century. Between 1950 and 2008 the world Total Fertility Rate fell from 5.0 to 2.6 and it is expected to reach 1.9 by 2045–2050.⁶ A major consequence of this transition from high to low fertility and mortality rates has been the enormous growth of the world's population during the last few decades and in the next ones.

Portugal and the ageing process

In the long term, the changes in Portuguese mortality reflect different political and economic conjunctures, as well as a late and slow demographic transition process.⁷ Portuguese demographic model shows some idiosyncrasies which are related to the country's recent political and social history. In a long term analysis, national demographic increase rates were small, due to high levels of mortality and fertility and regularly overcoming mortality crises.⁸ The main characteristics of morbidity and mortality rates didn't change until the second half of the 20th century, in spite of a

5 PRB, 2008.

6 United Nations , 2005.

7 Veiga, 2003.

8 The last one occurred in 1918; it was caused by a pneumonic flu epidemic. (Rodrigues et al., 2008).

slight reduction after 1890 which led to a slight increase of life expectancy at birth. (Table 1) Nevertheless, several factors interfered and locally altered these indicators: a) differences between life in rural and in urban areas; b) larger feminine participation in the labor market; c) regionally differing ratios of young or elderly people; d) instability of a political and/or economic nature.⁹ Mortality by ages presented a unique model, according to different survival probabilities.¹⁰

Table 1. Mortality General Rates in the 19th century (‰).

Years	Crude mortality rate
1801	30.3
1838	20.8
1843	20.8
1849	25.0
1850	22.7
1862	23.5
1975	24.1
1890	25.5
1895	20.8
1900	20.5

Source: IV^o Recenseamento Geral da População.

Major changes have occurred during the last hundred years. These can be explained by the industrialization process, urban growth and internal migrations. They functioned as the basis of social changes, influenced collective behaviours and spatial concentration in coastal urban areas.¹¹ In the last decade of the 19th century, the first steps to transition process took place. Mortality levels started to decline mainly amongst youngsters. From that point and up to 1920 global mortality rates reduced by 17% and the population growth would have been significant had migratory movements been less negative. The comparison between the total annual growth and the net migratory rates from 1900 onwards (Table 2) makes it clear that Portugal's total growth rates depended on the intensity of migration fluxes (especially emigration).¹² After 1970 internal migration levels increased, reinforcing a new pattern vis-à-vis fertility and mortality ratios.¹³ This new pattern partly explains the population's demographic dynamic to urban coastal areas.¹⁴

Table 2. Global Demographic Trends.

⁹ Veiga, 2004.

¹⁰ Veiga, 2005.

¹¹ Rodrigues et al., 2008.

¹² Baganha, 1998.

¹³ Nazareth, 1988.

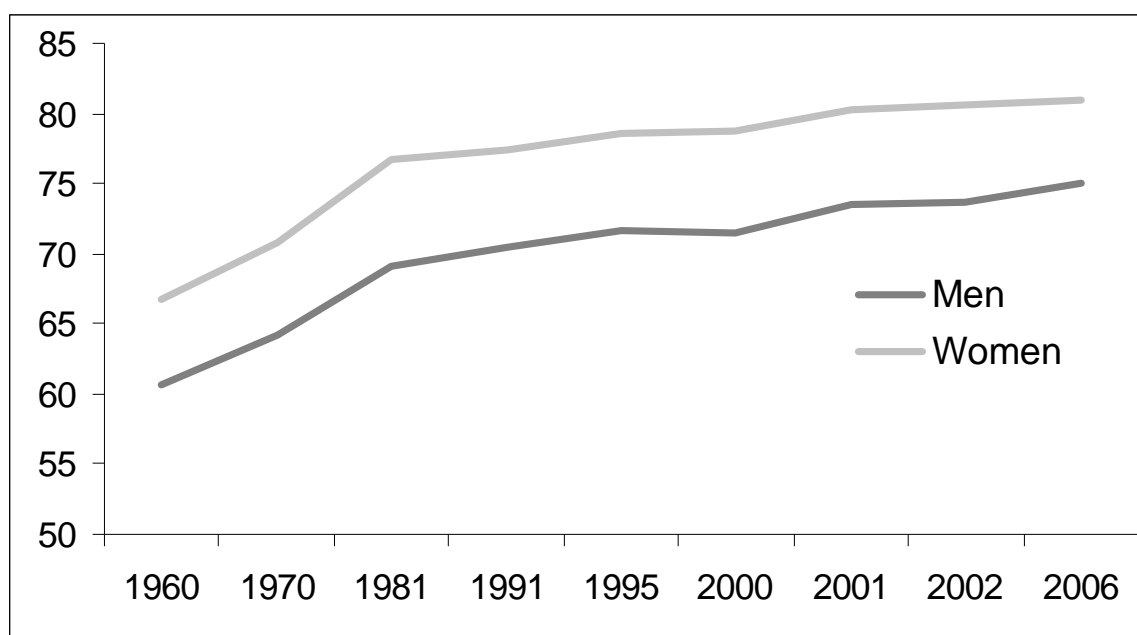
¹⁴ Not considering migrations, the demographic increase would be almost uniform up to the 60's, decaying thereafter and increasing in the 90's due to immigration from Africa, South America (Brazil) and Eastern Europe. After 2007 total growth is only due to migration rates. (EUROSTAT, a) 2008).

Inter-census periods	NR	TR	NM
1900 – 1911	1.20	0.86	-0.34
1911 – 1920	0.79	0.14	-0.65
1920 – 1930	1.26	1.24	-0.02
1930 – 1940	1.15	1.24	0.09
1940 – 1950	1.05	0.89	-0.16
1950 – 1960	1.22	0.48	-0.74
1960 – 1970	1.15	-0.21	-1.36
1970 – 1981	0.85	1.29	0.44
1981 – 1991	0.34	0.03	-0.31
1991 – 2001	0.08	0.45	0.37

Source: *Estatísticas Demográficas*, 1968, p. LXX, 1970–2001 e XIº a XIVº Recenseamento Geral da População Portuguesa, 1970, 1981, 1991 e 2001.

NR: Natural annual growth; TR: Total annual growth; NM: Net Migration.

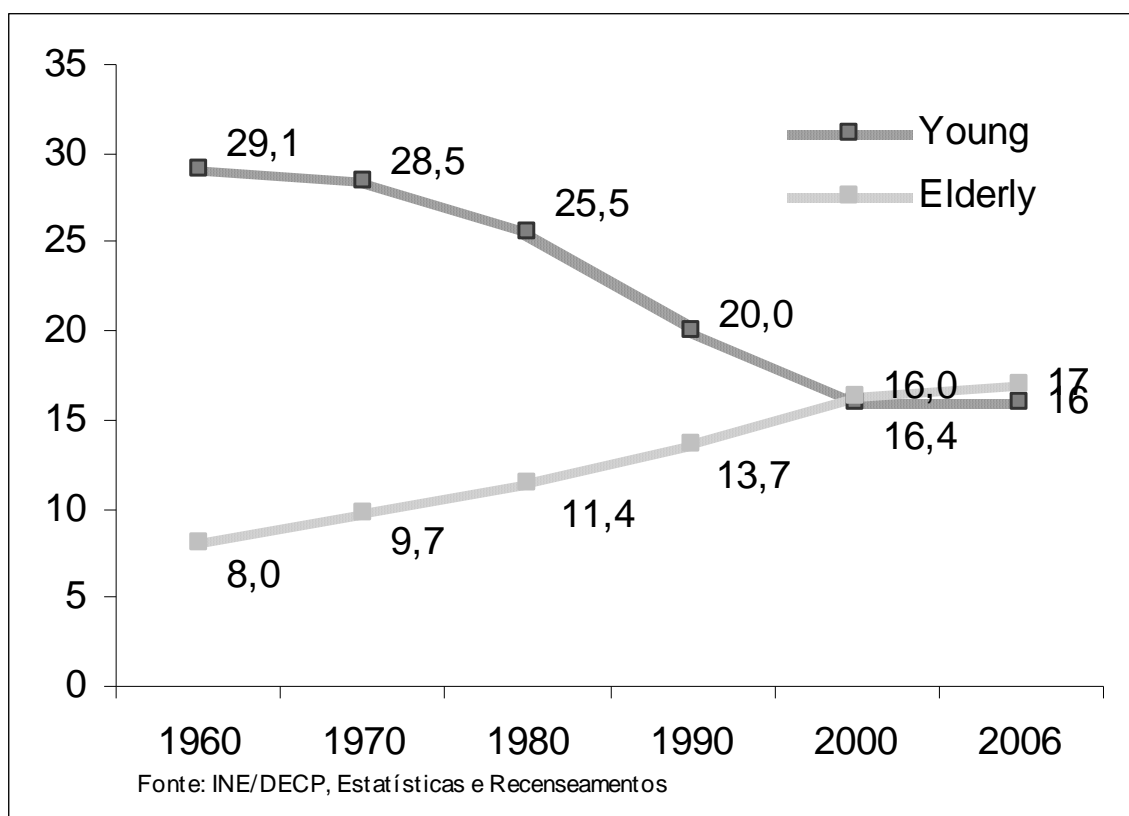
Figure 1. Life Expectancy evolution in Portugal by sex .1890–2006.



Source: INE/DECP, XIIIº and XIVº Recenseamentos Gerais da População Portuguesa.

Life expectancy grew throughout the second part of the century (Figure 1) and stands at 75.2 years for men and 81.6 for women in 2007¹⁵. This is a result of the positive effects of the generalization of efficient means of treatment and the expansion of public and personal hygiene. The main beneficiaries were the most vulnerable groups: firstly, young people, and then the aged. Today, Portugal ranks 8th in the world's ageing process. The turning point came during the 70's.¹⁶ Changes in collective behaviours and new migration trends characterized the last decades of the 20th century.¹⁷

Figure 2. Age distribution of young and elderly people in Portugal, 1960–2006.



Source: INE/DECP, XIII^o and XIV^o Recenseamentos Gerais da População Portuguesa.

In four decades the youngest age groups were reduced by 36 per cent, while people aged 65+ increased by 140 per cent. Today this last group exceeds the first by 76.000 people. Nevertheless, there are both regional and gender differences: old people are more represented in rural areas and are mostly women, although affected by degenerative and chronic diseases. Men live for a shorter time, but in better health.¹⁸

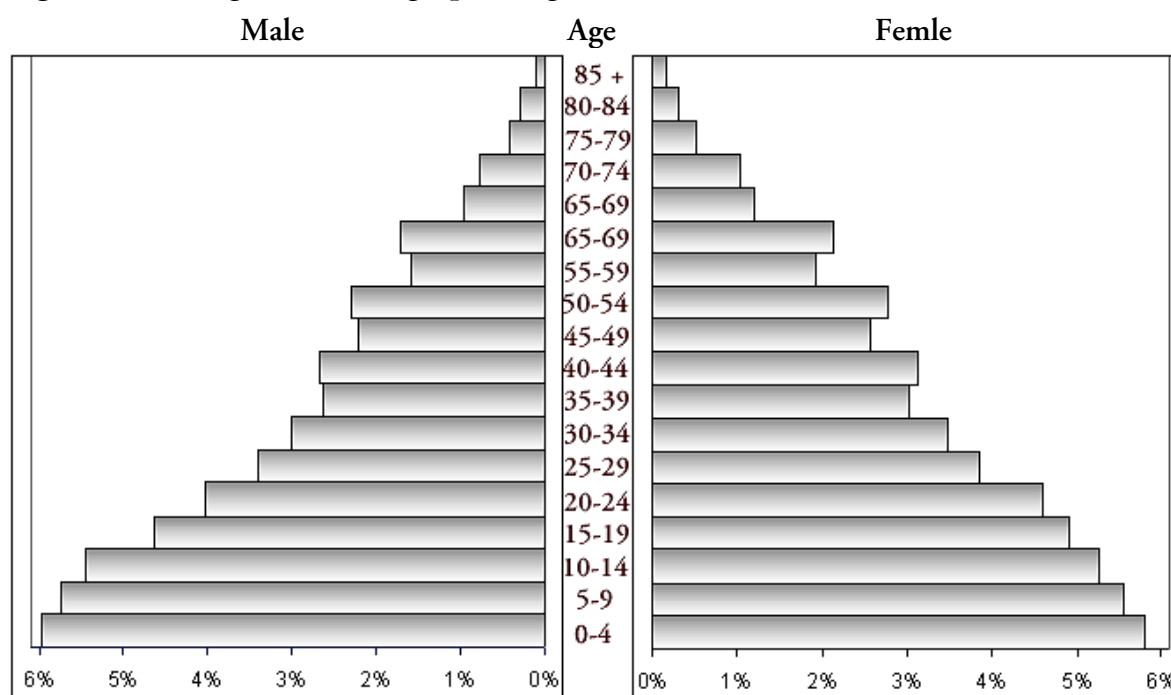
¹⁵ EUROSTAT, b) 2008.

¹⁶ Veiga, 2003.

¹⁷ Carrilho et al., 2007.

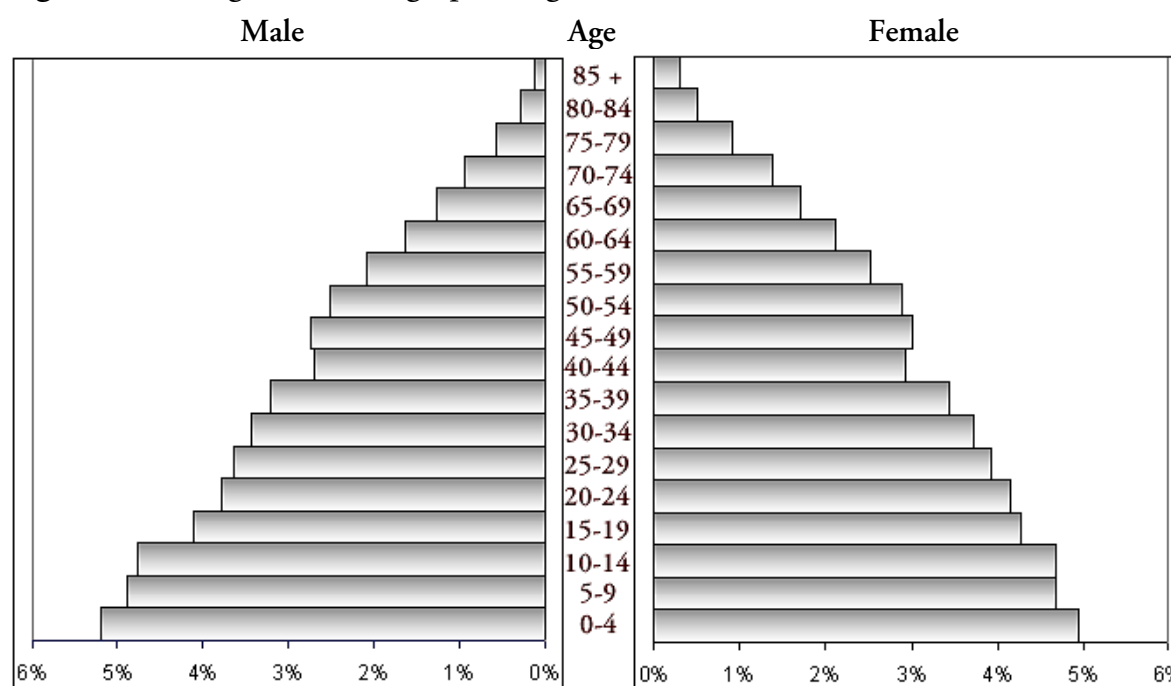
¹⁸ INE; INSRJ, 2000.

Figure 3. Portuguese Demographic Age Structure. 1900.



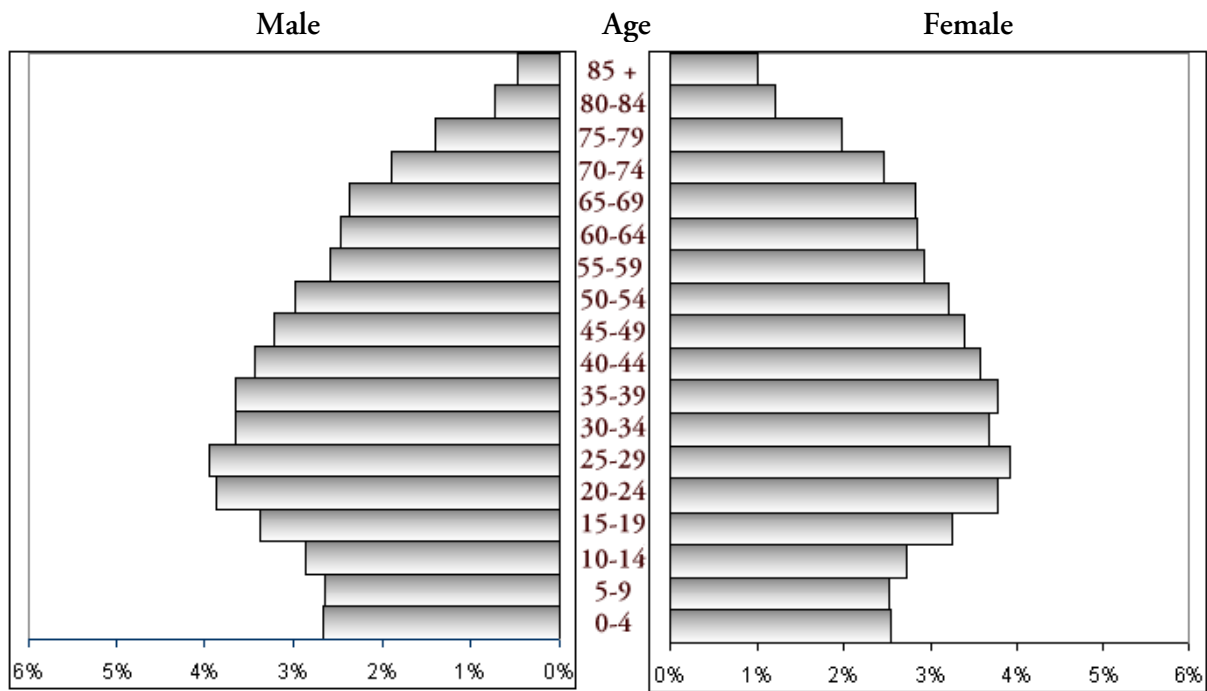
Source: INE, IVº Recenseamento Geral da População Portuguesa.

Figure 4. Portuguese Demographic Age Structure.1960.



Source: INE, Xº Recenseamento Geral da População Portuguesa.

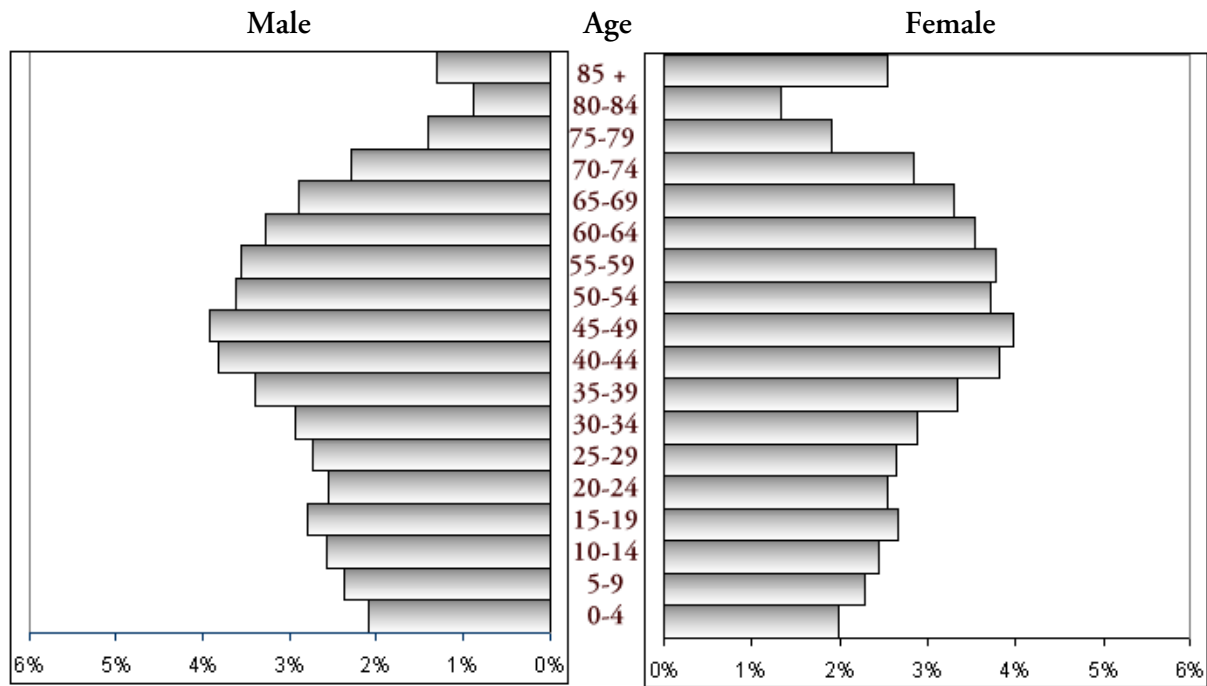
Figure 5. Portuguese Demographic Age Structure.2001.



Source: INE, XIVº Recenseamento Geral da População Portuguesa.

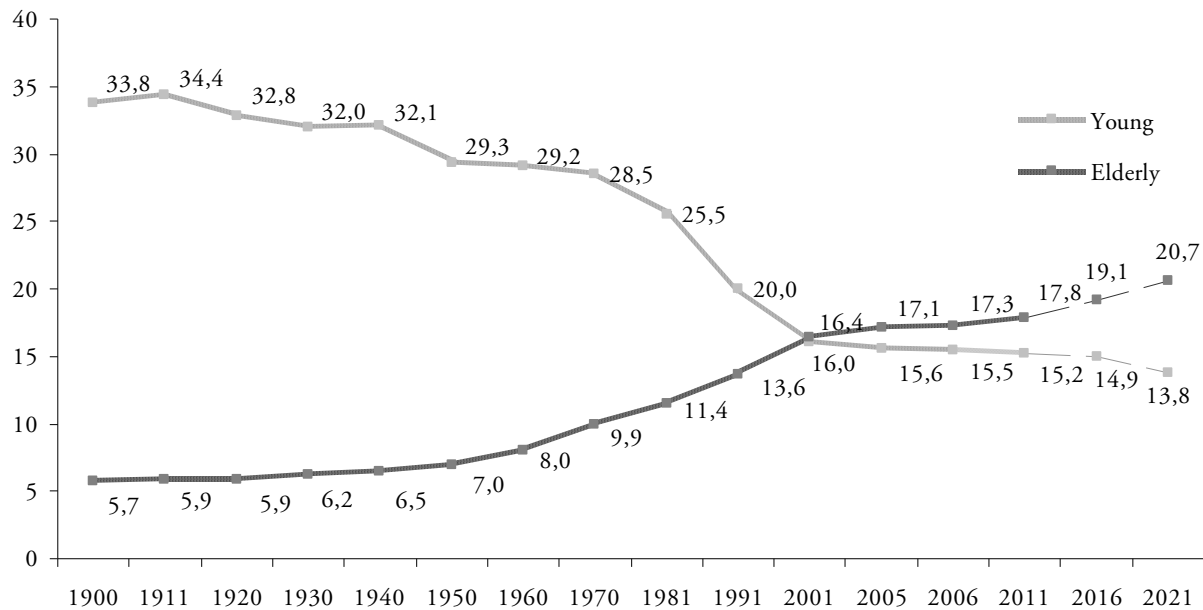
Even allowing for a medium attractive migratory scenario, forecasts confirm a double ageing process, with life expectancies greater than 76 years for men and 83 for women by 2020. By then, the younger generations will represent no more than 13 per cent, whilst old people will exceed 20 per cent. For every 10 youngsters there will be 15 people aged 65 years or more.

Figure 6. Portuguese Demographic Age Structure. 2021.



Source: Henriques, 2005.

Figure 7. Young and Elderly 1900 – 2021.



Source: Henriques, 2005.

Ageing, socio-economic conditions and health

The Portuguese mortality model shows a clear concentration of death amongst older age groups.¹⁹ In such a context growing old in a healthy way has become one of the important goals of policies which aim for a healthy survival. The cumulative effects of adverse inputs, resulting from harmful life styles and food diets have impacts throughout life and will negatively influence older ages. Several chronic pathologies are precociously aggravated inducing morbid irreversible conditions, due to a life style with multiple stress factors, lack of physical exercise, an unbalanced diet or nicotine and alcohol addictions. Socio-economic differences²⁰ and their consequent impact in health unevenness have been studied, discussed and registered for many years under several disciplines. However, we still do not know precisely and clearly the mutual relationship between socio-economic conditions, health status and the supporting needs for the Portuguese population.²¹ Different exposures to specific risks partially explain the differences found in health profiles.²² We can confidently state that socio-demographic factors, like gender, age, marital status, education level and socio-

¹⁹ Veiga, 2005.

²⁰ Huisman, et al, 2004.

²¹ Rodrigues et al., 2008.

²² Casey et al., 2003.

economic status, among many others, constitute powerful determinants for morbidity and mortality.²³

Our work is based on the Joung et al. study²⁴, where, through the analysis of quantitative methods, the extent to which the expected rise in educational levels of the Dutch population could counterbalance the also expected increase in the prevalence of ill-health and health care utilization. In an initial stage, the authors used logistic regression methods to estimate the odds ratio for age and educational level. Separate models were fitted for men and women. In a second step, the estimation results are used to calculate the expected proportion of ill-health for each specific category of sex, age and educational level. The projected proportion of ill-health within the total population was estimated applying these expected proportions to the number of people in the appropriate specific stratum. Their study concluded that the rise in educational level counteracts to a substantial degree the expected increases in ill-health due to population ageing. They prove that changes in educational level must be taken into account where morbidity and health forecasting is concerned.

Data and Methodology

Data

In methodological terms, the present study used two data sets. The first one concerns data from the 1999 National Health Survey, conducted by the Portuguese Institute of Statistics and the National Institute of Health, which is representative of Portuguese population. The National Health Survey provides information of 21,640 individuals aged 25 or more, on the following variables²⁵:

In our INS1999 sample women are relatively overrepresented, standing for 63% of the observations. The distribution of the whole sample by age structure is the following: 21.1 % are aged 25–39; 17.7 % are in the class 40–49; 18.1% are included in the 50–59 aged class; 20.8% in the 60–69 group; and finally 22.1% of the individuals are older than 70. Regarding the educational attainment, in our sample, 21.6 % of the individuals have no education and this percentage is significantly higher for women (24.6%) than for men (16.5%). A significant percentage of the individuals (about 47%) have no more than lowest educational level²⁶ and only a small proportion have attained the highest educational levels (12%). These statistics are in accordance with national figures, which place Portugal in the lowest position within the 15 EU

23 Fernandes et al., 2008; Godinho et al., 1987.

24 2000.

25 INS 1999.

26 This is a total of the first four academic years (4th year, 1st cycle, Primary School).

countries regarding educational attainment.²⁷ As for the health status, 27.8 % of the individuals declared themselves to be in bad health and this prevalence is higher for women (31.5%) than for men (21.6%).

Table 3. National Health Survey: Variables Definition.

Variables	Designation	Code	Categorization
Demography			
Age	Age	Age group	5 Classes: 25–39; 40–49; 50–59; 60–69; 70+
Sex	Sex	Sex	1- Male; 2- Female
Marital Status	Marital Status	Marital Status	1- Married; 2- Widow ; 3- Divorced; 4- Single
Education			
Level of Education	Level of Education	Level of Education	1- No Education; 2- Low level of education (4 years of education); 3- mid level education (6 years + professional training or 9 years of education); 4- High level education (at least 12 years of education)
Health			
Self reported health	Health status	Bad health	0- Good health (Reasonable; Good and Very good); 1- Bad health (Bad or Very bad);
Chronic diseases	Diabetes	Diabetes	0- yes; 1- No
	Bronchitis	Bronchitis	0- yes; 1- No
	Allergies	Allergies	0- yes; 1- No
	High blood pressure	High blood pressure	0- yes; 1- No

Source: 1998/99 National Health Survey.

The second data set is based on the Census 2001 information. It is used to make a forecast for the Portuguese population from 2001–2021. To this purpose, we used the Cohort Component Method. In this framework, components of change are estimated and applied to a base population (present) to form a new population (future). The demographic components (mortality, fecundity and migration) are projected separately and in this order. By projecting each component separately it is possible to assume different future trends for each one, and provide a complete model which we assume to be closer to reality.²⁸ Once the population age groups by each 5 years had been forecasted, we added future projections on education, and calculated future proportions by age and sex for the years 2006, 2011, 2016 and 2021(5x5).

Both methods were used in an independent way. The combination of both data sets was used to infer the future pattern of the Portuguese population health status.

²⁷ OECD, 2007.

²⁸ Caselli et al., 2004.

Methodology

To attain our main objectives, we used a two-step approach. First, we estimated the relationship between health status and socio-economic conditions, using data from the National Health Survey 1999. Then, using the Portuguese demographic forecast analysis by sex, age and educational level, we proposed possible scenarios for future health status.

To determine the current differences in health by age and educational level we used logistic regression models.²⁹ In the model considered in our framework, the dependent variable (the variable to be explained) is health status ($Y=1$ if the individual declares that he is in bad and very bad health and $Y=0$ if he is in good or very good health). The explanatory variables are age, educational level and the existence of certain disease. We considered two separate models for men and women.

In order to analyze the effect of age and education on health status we constructed 5 dummy or binary variables for the explanatory variable Age and 4 dummy variables for the Educational Level. For example, the first dummy variable for Age is a binary variable that is equal to one if the individual's age is within the interval [25, 39] and zero otherwise.³⁰ The estimated probabilities are used, together with the projections of the composition of the future Portuguese population to predict possible scenarios for health status. Contrary to Joung *et al.* (2000), we only used the scenario where it is assumed that the estimated coefficients in the logistic regression remain unchanged over time. This assumption was based on two facts. Firstly, the preliminary estimation results obtained from the 2005/06 National Health Survey suggest that, for Portuguese population, the coefficients (odds ratio) seemed to be stable over time.³¹ On the other hand, evidence for ten European countries (Kunst *et al.* (2004)) also conclude that socioeconomic inequalities in self-assessed health showed a higher degree of stability over time.

Results

The estimated impacts of each explanatory variable on the probability of an individual declaring himself to be in bad or very bad health, in terms of odd ratio (or relative risk), are shown in Table 4.

How can we give an interpretation to the estimated odds-ratio? For example, the value 10.59 that appears in the first line for men's results means that, all other things being constant, a man with no education has a 10.59 greater probability of declaring himself to be in bad or very bad health than a man with a high educational level (the

²⁹ as in Joung *et al.* (2000).

³⁰ More details on the estimation method can be found in Henriques which is available upon request (2005).

³¹ Martins *et al.*, 2008.

reference group). The value 1.515 in line 6 for men's results indicates that, if other things remain constant, a man aged 40–49 reveals a probability of 1.5 of declaring himself to be in bad or very bad health as compared to a man in the 25–39 age groups.

As a whole, the estimation results presented in Table 4 suggest that, as expected, the educational level is positively associated with health status. People with higher educational level declare themselves with better health than people with lower educational levels. Moreover, the estimated impact of education on health status is significantly higher for men than it is for women. As anticipated, our results also suggest that age is associated with health status. Older people have a higher probability of declaring themselves in bad health than younger ones. As for this variable, the results between women and men are not as different as those regarding educational level. These conclusions are analogous to those obtained in other related studies.³² Joung et al. also found that, in general, the odds ratios for men are larger than for women. However, since the increase in educational levels amongst women is expected to be much larger than those of men, taking educational levels into account in the projections has larger consequences for Dutch women than for men. Groot and Van den Brink³³, in their study on health-adjusted life expectancy of the British population, also estimate a significant relationship between the years of education and health status being more pronounced for men than for women.

Table 4. Estimated Odds Ratio for Men and Women.

Dependent Variable: Probability of declaring themselves in bad or very bad health	Estimated Odd Ratio	
Explanatory Variables	Men	Women
Educational Level		
No education	10,6	5,637
Lower level	6,37	3,496
Intermediate	2,48	1,954
Higher	<i>Reference group</i>	
Age		
25–39	<i>Reference group</i>	
40–49	1,52	1,614
50–59	2,71	2,912
65–69	4,99	3,97
70+	5,5	4,444
Others	-	-

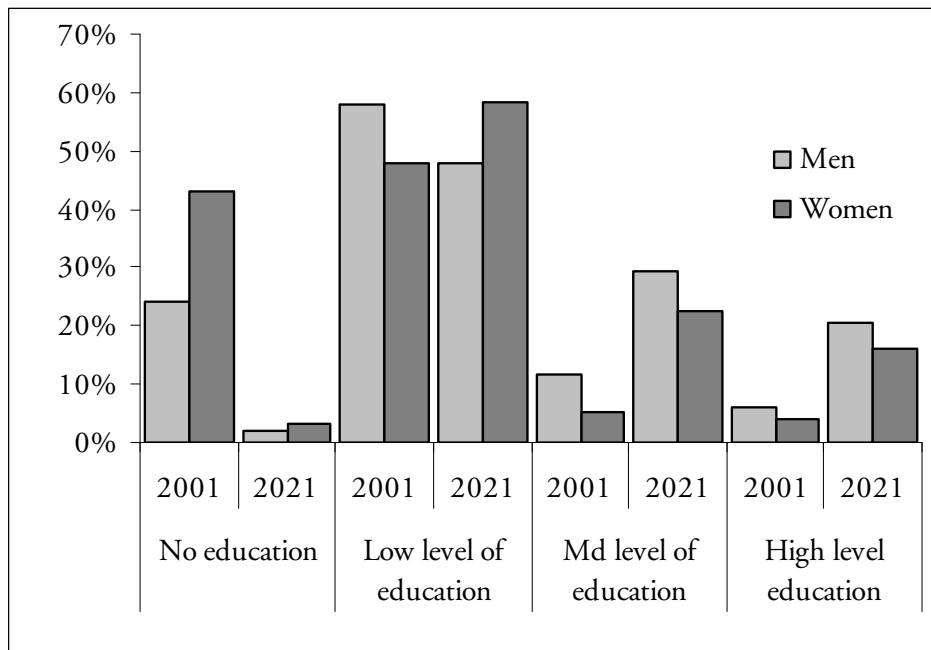
To conclude, our findings corroborate the idea that future changes in the composition of the population by educational level will also affect the population's global average

³² Joung et al., 2000, Cavelaars et al., 1998, Groot et al., 2008.

³³ 2008.

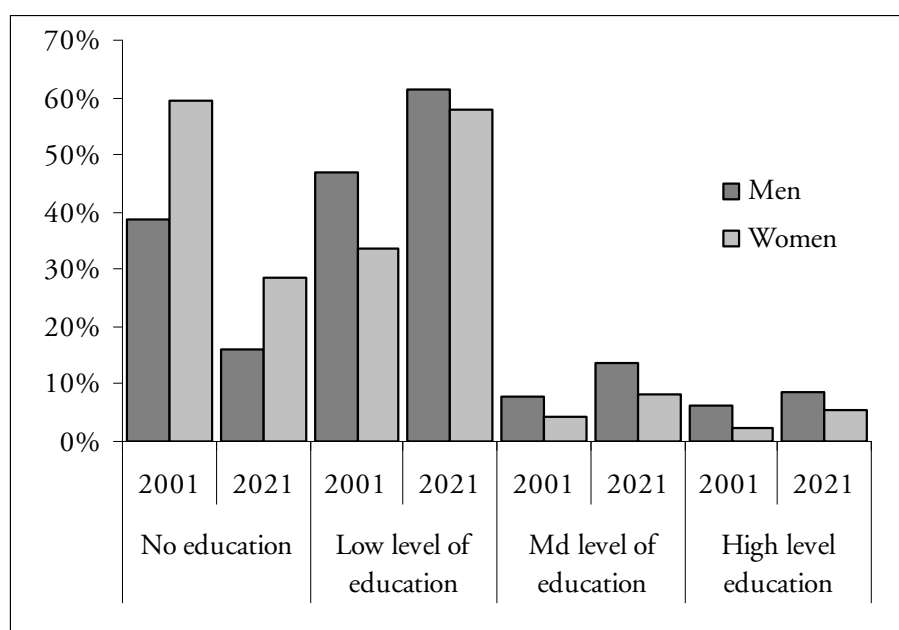
health rate. As in other European countries, huge changes in average educational levels of the Portuguese population are expected in the coming decades. The extent to which the rise in educational levels will counterbalance some of the effects of ageing is as yet unknown. By analyzing the projections of the Portuguese population by sex, age and educational level, we expect to be able to answer this essential question. Figures 8 and 9 present two scenarios on the composition of Portuguese population by educational level, considering people aged 60–69 in 2001 and those who will be over 70 in 2021.

Figure 8. Level of Education by Sex (60–69 years) in 2001 and 2021.



Source: 1998/99 National Health Survey.

Figure 9. Educational levels by Sex (70 or more years) in 2001 and 2021.



Source: 1998/99 National Health Survey.

Among older men and women there are substantial changes in the highest attained education level between 2001 and 2021. As an example, for people aged 60–69, the proportion of women having no education decreases from 41% in 2001 to less than 5% in 2021 and the proportion of women with higher education increases from 4% to 16%. Similar patterns can be found for men, but with a smaller magnitude. These results are in accordance with those found for the Dutch population, and suggest that the negative effect of ageing on health status will be counterbalanced at least partially by higher educational levels. In future research, based on the results from the National Health Survey 2005/06, we intend to measure the impact of the increase in educational levels on the future health care burden associated with ageing phenomena in Portugal.

Conclusions

The purpose of this study was to analyze to what extent future changes in demographic structures by age, sex and educational level will affect the average health status of the Portuguese population. In a demographic global ageing scenario, Portugal stands as a case study with specific interest, due to some major differences related to its historical past. Our estimation results suggest that in Portugal, as in other European countries, there is a significant relationship between health status and educational level. This is particularly relevant in a country as ours, where the educational level attained by older population is still very low. Nevertheless, we have shown that this situation will probably undergo major changes in the near future, due to a successful improvement in educational levels for adult and elderly people. So, the possible negative impact of death concentration on advanced ages, associated to the rise of incapacitating and chronic diseases, can be counterbalanced by the rise in educational levels.

In methodological terms, we have tried to incorporate both econometric and demographic techniques. In both cases, the possible conclusions were limited by major difficulties with data, mostly due to impossibility of crosschecking the information. So, this paper should be considered as an initial essay in applying possible methodologies, according to the available Portuguese information systems on health status and demographic dynamics. The inclusion of education levels on individual death certificates could be of major importance to allow future investigations on this subject, inducing differential trends on morbidity and mortality according to education, as happens elsewhere.

Filipa Castro Henriques is Invited Professor, Department of Political Studies, FCSH – Universidade Nova de Lisboa. *Teresa Rodrigues* is Associated Professor, Department of Political Studies, FCSH – Universidade Nova de Lisboa. *Rosário Fraga O. Martins* is Associated Professor, ISEGI – Universidade Nova de Lisboa.

References

- Baganha, Maria Ioannis, “A emigração atlântica e as migrações internas em Portugal”, *Los 98 Ibericos y el mar*, IV, Lisboa, (1998), 215–228.
- Carrilho, Ma. José, Patrício, Lurdes, “A situação demográfica recente em Portugal”, *Revista de Estudos Demográficos* 40 (2007), 39–75.
- Caselli, Graziella et alii, *Démographie: analyse et synthèse. Histoire du peuplement et prévisions*, INED, Paris (2004).
- Casey, Bernard. Oxley, Howard. White House, Edward. Antolin, Pablo. Duval, Romain, Leibfritz, Willi, “Policies for an ageing society: recent measures and areas for further reform”. *Economics Department working papers*, 369 (2003) <http://www.oecd.org/eco>.
- Cavelaars, A. E. J. M., Kunst, A. E., Geurts, J. J. M., Crialesi, R., Grotvedt, L., Helmert, U., Lahelma, E., Matheson, J., Mielck, A., Mizrahi, A., Mizrahi, A., rasmussen, N. K., Regidor, E., Spuhler, T., Mackenbach, J. P., “Differences in self-reported morbidity by educational level: A comparison of 11 Eastern European countries”, *J Epidemiological Community Health* 52 (1998), 219–227.
- EUROSTAT, a) EUROPOP2008 (EUROstat POPulation Projections 2008-based), *Convergence scenario, national and regional*, 2008.
- EUROSTAT, b) *Statistics in Focus*, 81 (2008).
- Fernandes, Ana. Veiga, Teresa R., Henriques, Filipa de Castro, “Future Trends in Education among older people”, 5, in Joelle Gaymu, Patrick Festy, Michel Poulain, Gijs Beets eds, *Future Elderly Living Conditions in Europe. Quelles conditions de vie pour les Européens âgés de demain?* Paris, 2008.
- Godinho, Joana M. e Lucas João S., “Doença e Morte: Diferenças entre sexos”, V *Jornadas de Economia de Saúde*. Lisboa, 1987.
- Groot, W., Van den Brink, H. M., “Health- adjusted life expectancy of the British population”, *Applied Economics*, 40 (2008), 1373–1386.
- Henriques, Filipa de Castro, *Envelhecimento, Educação e Saúde: uma análise prospectiva 2001–2021*. UNL- ISEGI, Lisboa, 2005.
- Huisman, M., Kunst, A. E., Andersen, O., Bop, M., Borgan, J-K., Borrell, C., Costa, G., Deboosere, P., Desplanques, G., Donkin, A., Gadeyne, S., Minder, C., Regidor, E., Spadea, T., Valkonen, T. & Mackenbach, J. P., “Socioeconomic inequalities in mortality among elderly people in 11 European populations”, *J Epidemiological Community Health*, 58 (2004), 468–475.
- INE/INSRJ, *Esperança de vida sem incapacidade física de longa duração*. 10, Instituto Nacional de Saúde/ Instituto Nacional de Saúde Dr. Ricardo Jorge. Lisboa. 2000.
- Joung, I. M. A, Kunst, A. E., Imhoff, E. Van & Mackenbach, J. P. Education, “Ageing and health, to what extent can the rise in educational level relieve the future health (care) burden associated with population aging in the

- Netherlands?”, *Journal of Clinical Epidemiology* 53 (2000), <http://www.sciencedirect.com>.
- Kunst, A. E., Bos, V., Lahelma, E., Barthélemy, M., Lissau, I., Regidor, E., Mielck, A., Cardano, M., Dalstra, J., Geurts, J., Helmert, U., Lennartsson, C., Ramm, J., Spadea, T., Strnegger, W., Mackenbach, J.P., “Trends in Socioeconomic inequalities in self-assessed health in 10 European countries”, *International Journal of Epidemiology*, 34 (2004), 295–305.
- Nazareth, Manuel, *Portugal. Os próximos 20 anos*, Vol.III – Unidade e diversidade da demografia portuguesa no final do século XX, Fundação Calouste Gulbenkian, Lisboa, 1988.
- OECD, *Education at a Glance*, 2007.
- Martins, F. O. R., Oliveira, D., Rodrigues, T., “Differences in self reported morbidity by educational level: a comparison between the 1998/99 and 2005/06 Portuguese Health Survey Results”, *European Journal of Public Health*, Volume 18, Supplement 1, November 2008.
- Rodrigues, Teresa, Moreira, Maria João, Henriques, Filipa, *A população portuguesa. Das longas permanências à conquista da modernidade*, Afrontamento, Porto, 2008
- Rodrigues, Teresa, Moreira, Maria João, *As Regionalidades Demográficas no Portugal Contemporâneo*, CEPESE (Working Paper), 2008.
<http://cepe.se.up.pt/principal.php?IDNivel=77>
- Veiga, Teresa, Moreira, Maria João, Fernandes, Ana, Social Changes and Better Health Conditions of the Portuguese Population 1974–2000, *Hygiea Internationalis*, 4: 1, (2004), 255–276. DOI: [10.3384/hygica.1403-8668.0441255](https://doi.org/10.3384/hygica.1403-8668.0441255)
- Veiga, Teresa Rodrigues. “A população portuguesa no último século: permanências e mudanças”, *Ler História* 45, Lisboa (2003), 91–101.
- Veiga, Teresa, “A Dinâmica das Populações Humanas e os Modelos de Mortalidade”, *Fórum Sociológico*, 11/12, Lisboa (2004), 11–29.
- Veiga, Teresa, “Modelos de Mortalidade em Portugal”, *Ler História*, 49, Lisboa (2005), 145–169.
- 2008 *World Population Data Sheet*, PRB, Set.2008 (www.prb.org).
- Nações Unidas, *World Population Prospects*, the 2004 revision, Nova Iorque, 2005.