WP 6
21 April 2010

**UNITED NATIONS STATISTICAL COMMISSION and ECONOMIC COMMISSION FOR EUROPE**

**STATISTICAL OFFICE OF THE EUROPEAN UNION (EUROSTAT)**

**CONFERENCE OF EUROPEAN STATISTICIANS**

Joint Eurostat/UNECE Work Session on Demographic Projections
(28-30 April 2010, Lisbon, Portugal)

**Item 3 – Challenges and use of population projections**

# Essay on Ageing and Health projections in Portugal

Filipa Castro Henriques[1] and Teresa Ferreira Rodrigues[2], Universidade Nova de Lisboa, Portugal

## ABSTRACT

This article has several objectives. Firstly, to present the main characteristics of Portuguese demographic dynamics. Secondly, to analyze the extent to which future changes in demographic structures by age and sex, as well as educational level, will affect the average health status of the Portuguese population. We will consider ageing phenomenon as a global trend and its impact on the future health status. We will point out expected trends in health care support and needs; forecast the impact on the population's health status due to recent demographic changes in age structure; evaluate to what extent educational levels can be considered as predictors of health status and care needs; analyze the consequences of the expected compression of morbidity of most aged groups for the coming decades.

## 1. OVERVIEW

Our aim in this research is to explore different projections methods on ageing and health status with an overview on national and international literature. We intend to measure the extent and implications of these links for Portugal until 2021, crossing theoretical presupposition and demographic and econometrical techniques, which we believe will allow a multidisciplinary overview on the possible impacts of ageing in Portuguese society for the next decades.

Studies[3] have proved a strong relationship between health status and educational levels[4], in a context of ageing process. Today population ageing phenomenon is recognised a global issue and its impacts are known, as well as its consequences on health care and other areas of social policies. Although the economic impacts of those changes are not consensual, changes are inevitable. Individuals are living longer and disability is declining in many countries. This is a very positive achievement, but the problem is the decrease in the ratio of young to old persons.

In 2005, Henriques[5] studied the impacts of socioeconomic inequalities in Portugal and its consequences in future health of elderly populations. The authors' purpose was to analyze to what extent future changes in demographic structures by age, sex and educational level would affect average health status of Portuguese population. Results suggest that in Portugal, as in other European countries, there is a significant relationship between health status and educational level[6]. This is particularly relevant in a country where the educational level attained by older population is still very low. Main conclusions confirm 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.

[1] Invited Professor, Department of Political Studies, FCSH – Universidade Nova de Lisboa. Email: filipahenriques@fcsh.unl.pt.
[2] Associated Professor, Department of Political Studies, FCSH – Universidade Nova de Lisboa. Email: trodrigues@fcsh.unl.pt.
[3] Lutz *et al.*, 2007
[4] Joung *et al.*, 2000
[5] Henriques, 2005
[6] Gaymu *et al.*, 2008

In methodological terms, the authors tried to incorporate econometric and demographic techniques. In both cases the possible conclusions where limited by major difficulties with data, mostly due to impossibility of crosschecking the information. This paper must be considered as an initial essay in applying possible methodologies, according to availability on Portuguese information systems on health status and demographic dynamics. We propose an essay on these new methodologies for Portuguese reality and comparison between results, using national data on Census, demographic annual data reports on births and deaths, deaths certificates, Heath National Surveys. Alternative demographic scenarios up until 2021 will be presented, based on projections of Portuguese population dynamics (fertility, mortality and international migrations) using Cohort Component Method. On education projections applied a simple ratio method to project age structure to education of Portuguese reality[7]. We know that microssimulation methodology, has been used on projections by age structure, health and education for several countries[8] including Portugal. But death rates were not estimated from Portuguese reality but from a proxy from Wales.

## 2. DATA AND METHODOLOGY

### Data

The present study used two data sets. First Census and Demographic data from Portuguese Institute of Statistics and second National Health Survey[9] (NHS) conducted by Portuguese Institute of Statistics and the National Institute of Health.

We used Census data from 1900 until 2001 to make a forecast for Portuguese population from 2001-2021. Data was provided by, sex, age and educational level. In what concerns Demographic data we used them to provide data from birth and death certificate, by sex.

The second one concerns data from the National Health Survey, which is representative of Portuguese population. Our sample of the NHS provides information of 21,640 individuals aged 25 or more, on selected variables[10]. In our 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 level[11] 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 countries regarding educational attainment.[12] 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%).

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.

### Methodology

To attain our main objectives, we used a three-step approach. First, we estimated the relationship between health status and socio-economic conditions, using data from the NHS. Secondly, using the Portuguese Census data for 2001 and developing Cohort survivors by sex and age for 2021 and finally estimating proportions of educational levels based on Census of 2001 and crossing with the ageing scenarios already foreseen in the previous step.

Before demographic projections we studied population dynamics based on Demographic Bookkeeping (or balancing) equation:

$$P^{t+a} = P^{t} + N^{t,t+a} - D^{t,t+a} + I^{t,t+a} - E^{t,t+a}$$

[7] A first synthesis was recently published on this issue: Henriques *et al.*, 2009
[8] FELICIE, PROJECT www.felicie.org
[9] National Health Survey, 1999. For this present study we haven't been able to have the recent 2005/2006 Survey.
[10] Selected variables: Age, Sex, Marital Status, Level Education, Self reported health, Chronic diseases and Smoking.
[11] This is a total of the first four academic years ($4^{th}$ year, $1^{st}$ cycle, Primary School)
[12] OECD, 2007

Where,

$P^t$ represents the population in moment *t*

$P^{t+a}$ represents the population in moment *t+a*

$N^{t,t+a}$ births occurred between *t* and *t+a*

$D^{t,t+a}$ deaths occurred between *t* and *t+a*

$I^{t,t+a}$ immigrants arriving between *t* and *t+a*

$E^{t,t+a}$ emigrants leaving between *t* and *t+a*

Then to obtain future population 2001-2021, 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.[13] Once the population age groups by each 5 years have been forecast, we added future projections on education, and calculated future proportions by age and sex for the years 2006, 2011, 2016 and 2021(5x5).

Based on NHS we determined the current differences in health by age and educational level using logistic regression models.[14] This model considered 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)as our dependent variable (the variable to be explained). The explanatory variables are age, educational level and the existence of certain disease. We considered two separate models[15] for men and women.

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.[16] On the other hand, evidence for ten European countries[17] also conclude that socioeconomic inequalities in self-assessed health showed a higher degree of stability over time.

In methodological terms, we have tried to incorporate both econometric and demographic techniques. In both cases, the possible conclusions where 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.

## 3. FROM REGIONAL DIFFERENCES TO A GLOBAL AGEING SOCIETY

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 2009, about 8 percent of the world's population was aged 65 years and over.[18] 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. The average world 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.[19] 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.

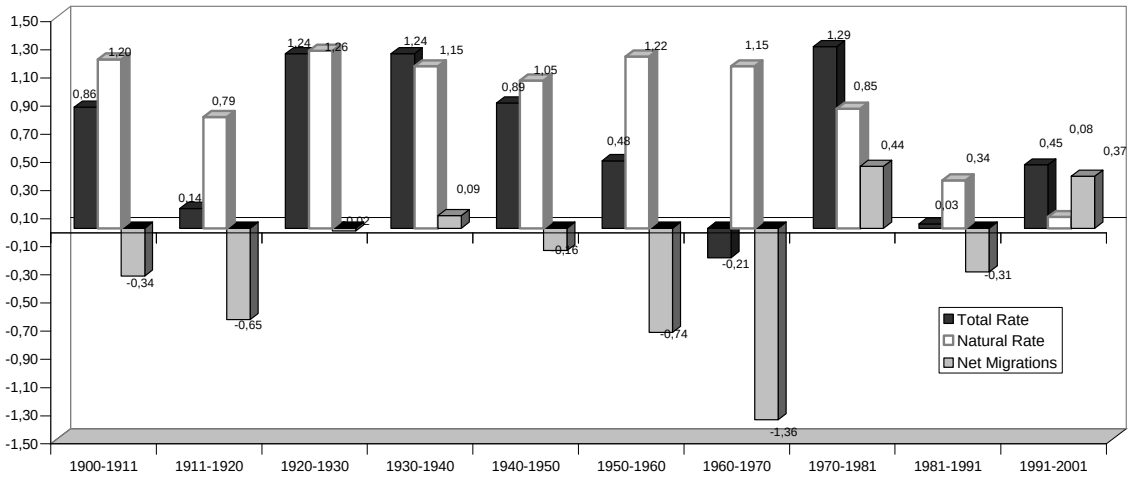
[13] Caselli *et al.*, 2004
[14] as in Joung *et. al*, 2000.
[15] More details on the estimation method can be found in Henriques which is available upon request (2005).
[16] Martins *et al.*, 2008
[17] Kunst *et al.*, 2004
[18] PRB, 2009
[19] United Nations , 2008

## 4. PORTUGAL IN AN AGEING PROCESS: PAST REALITY AND FUTURE TRENDS

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[20]. Portuguese demographic model[21] 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.[22] The main characteristics of morbidity and mortality rates didn't change until the second half of the 20th century, in spite of a slight reduction after 1890 which led to a slight increase of life expectancy at birth. 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.[23] Mortality by ages presented a unique model, according to different survival probabilities.[24]

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.[25] 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 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 (Figure 1) makes it clear that Portugal's total growth rates depended on the intensity of migration fluxes (especially emigration).[26] After 1970 internal migration levels increased, reinforcing a new pattern vis-à-vis fertility and mortality ratios.[27] This new pattern partly explains the population's demographic dynamic to urban coastal areas.[28]

**Figure 1.**Global Demographic Trends Portugal 1900 to 2001



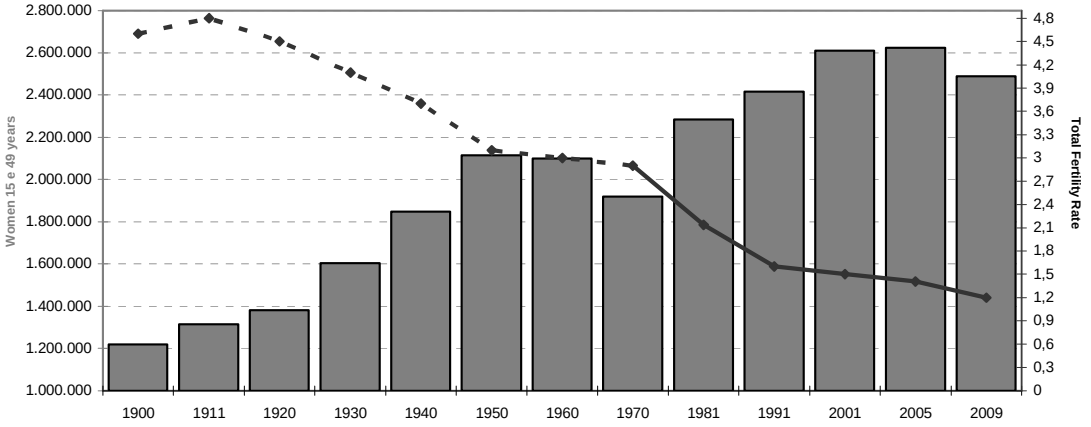

NR: Natural annual growth; TR: Total annual growth; NM: Net Migration growth.

*Source: Henriques, 2009. Estatísticas Demográficas, 1968, p. LXX, 1970-2001 e XIº a XIVº Recenseamento Geral da População Portuguesa, 1970,1981,1991 e 2001.*

Both mortality and fertility behaviours have changed. In what concerns births, in yearly 20th women had almost 5 children and in the 21st century women hardly have one! This proceeding will strongly influence age structure as we will find in this study.

[20] Henriques e Rodrigues, in Rodrigues *et al.*, 2009
[21] Veiga, 2003
[22] The last one occurred in 1918; it was caused by a pneumonic flu epidemic. (Rodrigues *et al.*, 2009)
[23] Veiga, 2004
[24] Veiga, 2005
[25] Rodrigues *et al.*, 2009
[26] Baganha, 1998
[27] Nazareth, 1988
[28] 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)

**Figure 2.** Portuguese changes in Fertility pattern 1900-2009. Women aged 15-49 years and Total Fertility Rate




*Source: 1900 -1960 authors' estimation.INE, IVº- XIVº Recenseamento Geral da População Português and PRB, World Population Datasheet, 2009.*

General demographic trends on past decade are threatening Portuguese capability to sustain population growth above zero! Natural annual growth, in 2007, was negative for the first time, since Pneumonia flu, in 1918. This means that in this particular year there were more deaths than births (103,512 deaths and 102,492 newborn). In 2008, there were more 314 births than deaths! Clearly not enough when net migration is decreasing over past decade. See Table 1 for our projections, based on latest data from INE and on own calculations[29].

**Table 1.** Net Migration Variants for 2001-2021

| Net Migrations *5 years* | Low Scenario | Medium Scenario | High Scenario |
|---|---|---|---|
| 2001-2005* | 284.140 | 284.140 | 284.140 |
| 2006-2010** | *63.961* | *72.961* | *100.000* |
| 2011-2015** | *-30.000* | *72.961* | *150.000* |
| 2016-2020** | *-30.000* | *72.961* | *284.140* |

* INE - Revista de Estudos Demográficos, nº 46, CARRILHO E PATRÍCIO 2009

** FCH - Author's Projections

[29] Carrilho e Patrício, 2009

| Net Migrations 5 years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** |
| 65000 | 70000 | 63500 | 47240 | 38400 | 26.100 | 19.500 | 9.361 | *9000*** | *9000*** |
| | | | | **284140** | | | | | **72.961** |
| | | | | | 26.100 | 19.500 | 9.361 | *4500*** | *4500*** |
| | | | | | | | | | **63.961** |
| | | | | | 26.100 | 19.500 | 9.361 | *22520*** | *22519*** |
| | | | | | | | | | **100.000** |

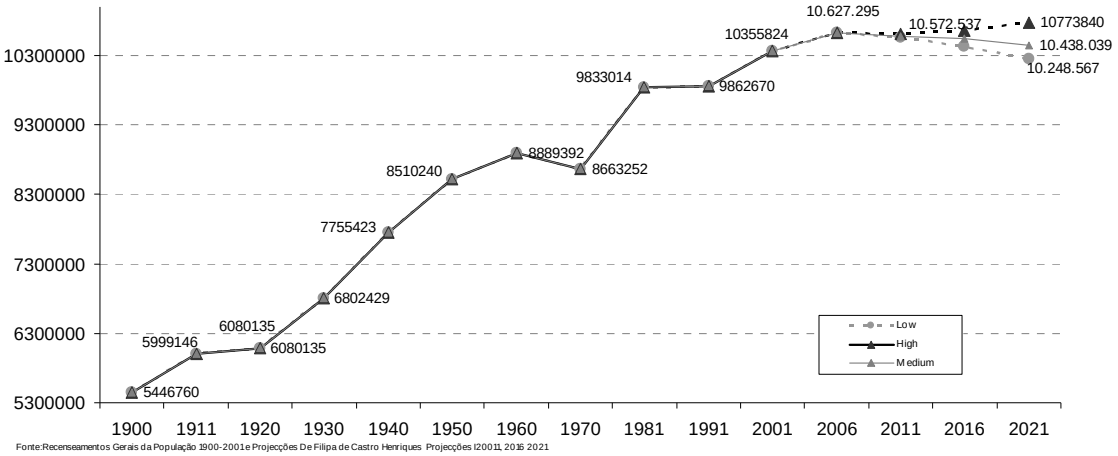
INE - Revista de Estudos Demográficos, nº 46, CARRILHO E PATRÍCIO 2009

** FCH - Author's Projections

Net Migrations Projections presented in this study are much lower than the ones showed by INE in their latest Projections[30]. The reason for our low performance in migrations is mainly due to International Financial and Economic Crises that outbreak in the summer of 2007. This major fact changed economic growth in all over the world and particularly in our small domestic economy. By this fact, Portugal is no longer an attractive country for migrations, as it used to be. Immigration is mainly from portuguese spoken language countries and people are generally low educated and come to work in construction activities or hotel, cleaning and restaurant services. Otherwise emigrants to developed countries have decreased, especially to Spain. So, in 2008, net migration is the lowest since 1993 (8.000 net migration). And we believe that due to socio-economic situation and with a decrease in private and public investment foreseen by recent PEC[31] immigration has a bigger chance to slower down and probably emigration can increase up until the 2021.

Combining decreasing fertility and slowing net migrations we believe that in 2021 portuguese population can range between 10,248,567, less than 2001, but not higher than 10,773,840 (see Figure 3).

**Figure 3.** Portuguese population and future trends. 1900-2021.



Fonte:Recenseamentos Gerais da População 1900-2001e Projecções De Filipa de Castro Henriques Projecções I20011 2016 2021

In a long term analysis, Portuguese population needed a hundred year to double its population, and we believe that this beginning of 21st century we are stabilizing and decrease is announced…but when? No one knows. We strongly give explanation for this decrease, in this coming decade, it will occur based on present reality. But recent projections made by INE, are delaying a decade in this population break (see Figure 4).

[30] INE, 2009

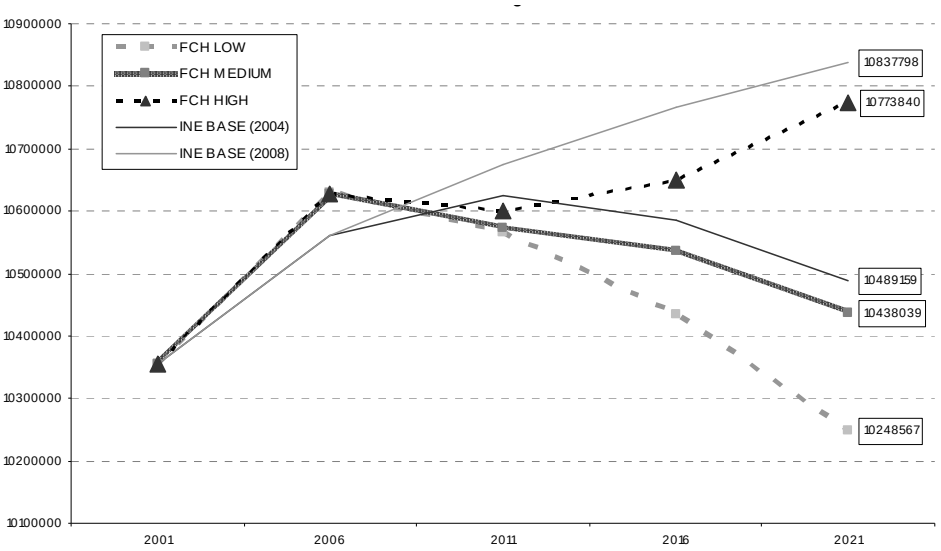
**Net Migrations projected by INE 2008-2020**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2006-2010 | 2011-2015 | 2016-2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ligh Scenari | *22.778* | *26.054* | *29.332* | *32.885* | *35.885* | *39.162* | *42.439* | *45.716* | *48.993* | *52.269* | *55.547* | *55.547* | *55.547* | *123.764* | *196.087* | *267.903* |
| derate Scen | *21.053* | *22.606* | *24.160* | *25.712* | *27.265* | *28.818* | *30.371* | *31.925* | *33.477* | *35.030* | *36.584* | *36.584* | *36.584* | *113.419* | *144.091* | *178.259* |
| ow Scenari | *19.330* | *19.159* | *18.989* | *18.818* | *18.647* | *18.476* | *18.306* | *18.135* | *17.964* | *17.794* | *17.623* | *17.623* | *17.623* | *103.078* | *92.382* | *88.627* |

INE - Projecções da população residente em Portugal 2008-2060

[31] PEC – Programa de Estabilidade e Crescimento, Ministério das Finanças, 2010.

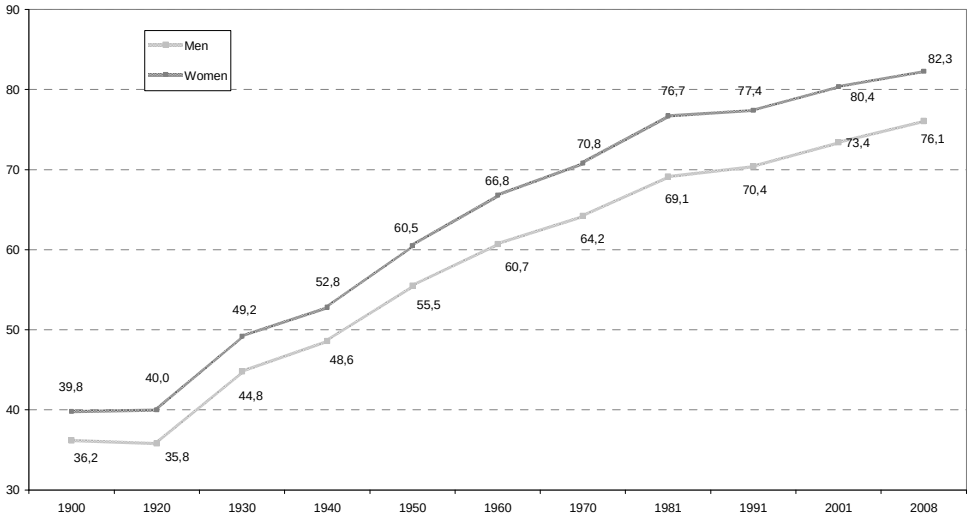
**Figure 4.** Authors' and INE's Scenarios for Portuguese population. Portugal 2001– 2021.




Fonte: Projecções De Filipa de Castro Henriques 2006-2021e INE (2004 e 2008)

Life expectancy grew throughout without ceasing since 1920, (Figure 5) and stands at 76 years for men and 82.3 for women in 2008[32]. This is a result of the positive effects of the generalization of efficient means of treatment and the expansion of public and personal hygiene and health care. Life expectancy at birth doubled during last century. Men and women are now leaving *a second extra life*…The main beneficiaries were the most vulnerable groups: firstly, young people, children under a year old and then the aged. Infant Mortality rate decrease from values around 136 for a thousand births in yearly 20th century, for 3.4 per thousand births, in 2009[33], by far one of the best results in all world.

**Figure 5.** Life Expectancy in Portugal by sex .1900- 2008

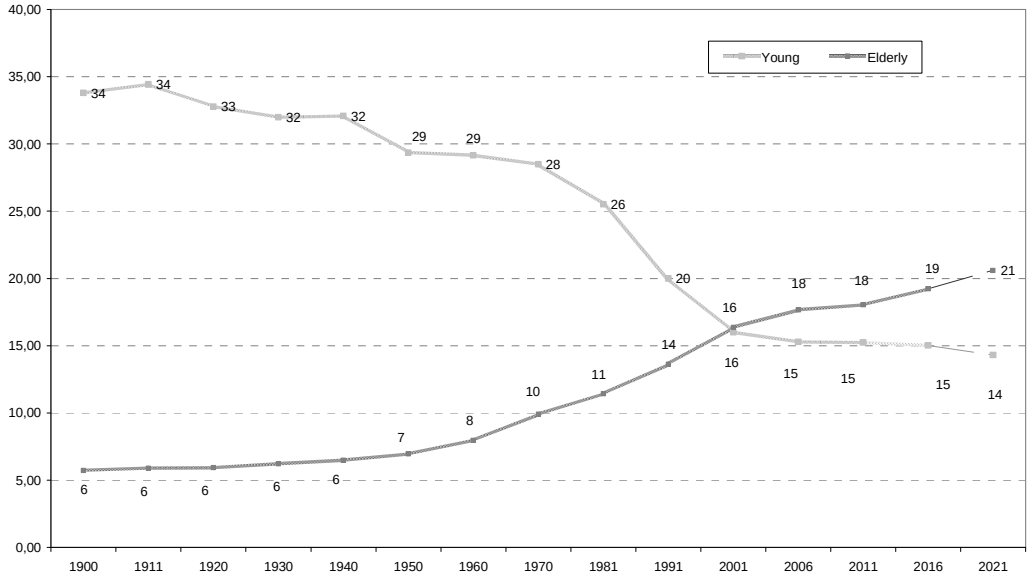



*Source: Estatísticas Demográficas, INE.*

Today, Portugal ranks 8th in the world's ageing process. The turning point came during the 70's.[34] Changes in collective behaviours and new migration trends characterized the last decades of the 20th century.[35]

[32] Carrilho and Patrício, 2009
[33] PRB, 2009
[34] Veiga, 2003
[35] Carrilho et al., 2007

**Figure 6.** Age distribution of young and elderly people in Portugal. 1900- 2021.

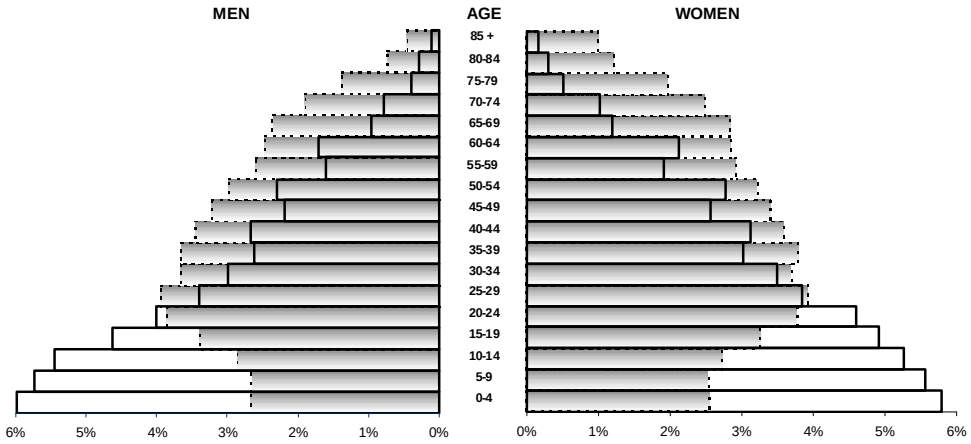



***Source:*** *INE Recenseamentos Gerais da População Portuguesa and Análise Prospectiva Demográfica da População Portuguesa. Filipa de Castro Henriques: 2011, 2016 e 2021*

In the last century, the youngest age groups were reduced by 46 per cent, while people aged 65+ increased by 300 per cent. Today this last group exceeds the first by more than 190.000 people and in 2021 this difference will be more than 700.000 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.[36]

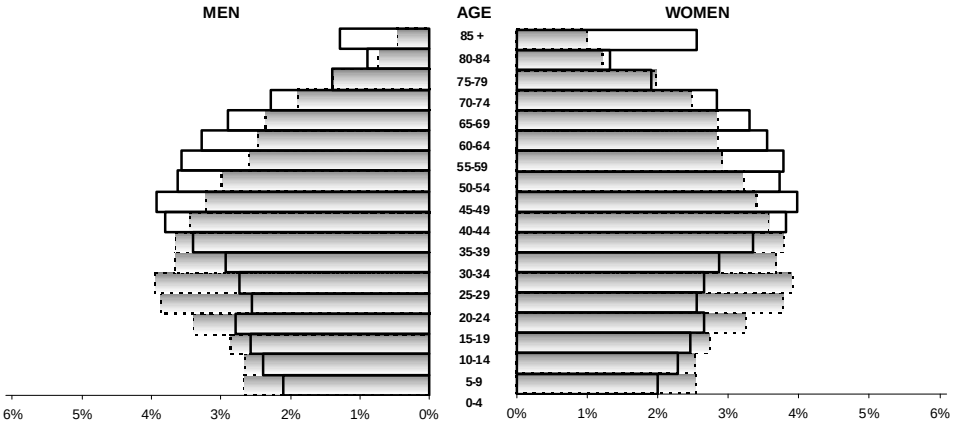
**Figure 7. Portuguese Demographic Age Structure. 1900 - 2001**




*Source: INE, IVº and XIVº Recenseamento Geral da População Portuguesa*

[36] INE; INSRJ, 2000

**Figure 8. Portuguese Demographic Age Structure. 2001- 2021**




*Source: Henriques, 2005*

Apart from any migration scenario, forecasts confirm a double ageing process, with life expectancies greater than 76 years for men and 83 for women by 2021. By then, the younger generations will represent no more than 14 per cent, whilst old people will exceed 21 per cent. For every 10 youngsters there will be 15 people aged 65 years or more.

## 5. AGEING, SOCIO-ECONOMIC CONDITIONS AND HEALTH

The Portuguese mortality model shows a clear concentration of death amongst older age groups.[37] 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 differences[38] 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.[39] Different exposures to specific risks partially explain the differences found in health profiles.[40] We can confidently state that socio-demographic factors, like gender, age, marital status, education level and socio-economic status, among many others, constitute powerful determinants for morbidity and mortality.[41]

Many studies have attempted to determine how individuals' socio-economic characteristics are related to health status[42]. Some major findings emerged from these studies: firstly, there exists a significant association between factors like educational level, age and income, and self assessed health status. Secondly, the impact of each of these variables on health status depends to some extent on the region/country considered in the study. Finally, there exists some evidence showing that the magnitude of these associations probably did not change over time.

Populations' age and its educational attainments appear to be, within this context, two particularly important determinants of self reported health status. In one hand, older people, when compared with younger, report a worse health status. On the other hand, more educated individuals, when compared with lesser educated ones, reveal an enhanced health status. Since we expect a forthcoming population older but also better educated, the effect of ageing on heath status is ambiguous. Some studies[43] go more in profundity and make an attempt to evaluate the impact of ageing on health care expenditures. The findings obtained by this line of research are not conclusive. The study by Zweifel *et al.* (1999) proposed that proximity to death has a more important influence on health care costs than age, suggesting that demographic changes, *per si*, will not have a large impact on future aggregate health expenditures. These findings have been criticized namely by the studies

[37] Veiga, 2005
[38] Huisman, *et al.*, 2004
[39] Henriques *et al.*, 2009
[40] Casey *et al.*, 2003
[41] Fernandes *et al.*, 2008; Godinho *et al.*, 1987
[42] Smith *et al.*, 2007; Fernandez-Olano *et al.*, 2006; Joung *et al.*, 2000
[43] Seshamani, 2004; Zweifel *et al.*, 1999

developed by Seshamani, 2004. Using an hospital data set for the UK and projection of the population by age and sex, the authors concluded that both population ageing and time of death are important determinants of health care costs.

The study by Joung *et al.* take another point of view and argued that future changes in the composition of the population by educational level will also affect the health of the population and this might counterbalance some of the effects of ageing. 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 when morbidity and health forecasting is concerned. Our work is based on this perspective of interaction of health, education and ageing.

Namely for Portugal few studies[44] had been developed regarding this 3 perspectives. More usual are demographic projections departed from other variables. Henriques and Rodrigues[45] have developed a work with Gaymus *et al.* (2008) involving Portugal and other European countries. Although 9 countries were involved main conclusions for Portugal, were based on static projections by socioeconomic variables, a) using volume estimations, b) assuming England and Wales fertility and mortality models and c) excluding a direct cross projection with data from educational level. This result is a consequence of general nature of death certificates in Portugal.

Up until these studies were developed, death certificate didn't cross level of education of the deceased but included his parents education! It's impossible to determine survivors by sex, age and level of education in Portugal, using this data. So in Gaymus *et al.* we used a proxy of other countries with similar reality; in Henriques (2005) we used separated estimations: demographic (cohort), education and health, as the first studies in this field developed for Dutch people by Joung *et al.*. Main conclusions comparing both methods revealed that studies using separated projections present a higher prevalence for lower range of health status than with a combining method. These last studies had more optimistic results in what concerns elderly survivors by health status.

We think that is particularly important to develop this studies in Portugal, for the following reasons: firstly, there are few published studies on this subject for Portugal, both as a hole on mainly taking into account regional diversity and European context; secondly, because ageing phenomena is particularly pronounced in Portugal, although with major internal differences; thirdly education attainment is strongly different between nowadays old generations and future old generations; and at last because there is a need to reduce the actual health care burden, namely the public expenses with health care use.

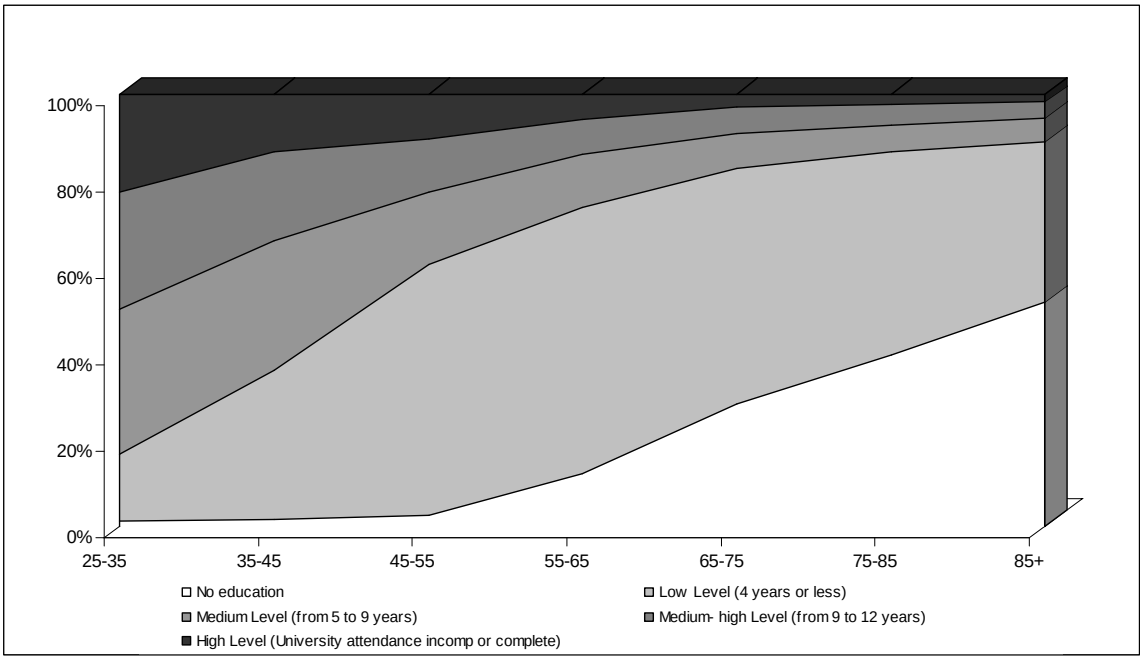
## 6. PORTUGUESE EDUCATIONAL LEVEL: THE ROLE OF EDUCATIONAL POLICIES

The educational policies implemented by European countries all over the 20th century have a general positive effect, with a progressive fall in the percentage of illiteracy and low-educated people. Comparing cohorts all over Europe46 differences over time come up due to variation in their educational policies. Nowadays more people are studying, and for longer when comparing to yearly 20th century.

Portugal can be namely, as a late transition country, it has a slow decline in the proportion of low-educated people. Rates of illiteracy among the current older population are very high. More than 50 per cent of oldest old (85+ years) don't know how to write or read! One of the highest proportions among European countries.

[44] Henriques, 2005; Nogueira *et al.*, 2006; Koivusalo *et al.*, 2007; Gaymu *et al.*, 2008
[45] And Fernandes, in Gaymus *et al.*, 2007
[46] Gaymus *et al.*, 2007

**Figure 9.** Portuguese Educational level by Age Structure. 2001




*Source: Authors calculation based data INE, XIVº Recenseamento Geral da População Portuguesa*

Figure 9 represents cohort evolution by educational level. Analyzing deeply this reality: shifts took place between the 1930s and 1960s, during the so-called *Estado Novo*[47]. There are four main educational policy trends reflected by birth cohorts. Three[48] of those took place under this regime. The first group includes cohorts that went to school in the 1930s, educational policies were not favorable and most of women are illiterate. The second group, experienced a slight raise in school attendance, belonging to those who went to school in the 1940s. Many schools were built throughout Portugal. The main goal was to ensure that all children received a moral and ideological education. The third group went to school in the mid-twentieth century; by then, attendance was obligatory for four years. After 1974, further reforms were introduced and education was extended to all, on the basis of equal rights in all areas and for each and every pupil, Portuguese overall education is changing, and future trends in educational levels in general population and within old population in particular.

## 7. AGEING, EDUCATION AND HEALTH IN PORTUGAL

After estimating logistic regression the estimated impacts of each explanatory variable on the probability of an individual declaring himself to be in bad or very bad health, as a whole, the estimation results suggest that, as expected, the educational level is negatively associated with health status. People with higher educational level declare themselves with better health than people with lower educational levels[49]. 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[50] 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.[51] Joung *et al.* and Groot and Van den Brink[52], also found a significant relationship between years of education and health status being more pronounced for men than for women.

Bringing to a closer conclusion, 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 health rate. More than in other European countries,

[47] Estado Novo - fascist regime that came to power in the late 1920s
[48] More information Fernandes, Rodrigues e Henriques, in Gaymus *et al.*, 2007.
[49] Results: 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 reference group).
[50] Results: A women aged 70+ reveals a probability of 4.4 of declaring himself to be in bad or very bad health as compared to a women in the 25-39 age groups.
[51] Joung et al., 2000, Cavelaars et al., 1998, Groot et al,2008
[52] 2008

huge changes in average educational levels of the Portuguese population are expected in the coming decades, as showed in previous chapter. 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 and age and then ratio proportions of educational level, we expect to be able to answer this essential question.

Figures 10 and 11 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 10.** Level of Education by Sex (60- 69 years) in 2001 and 2021

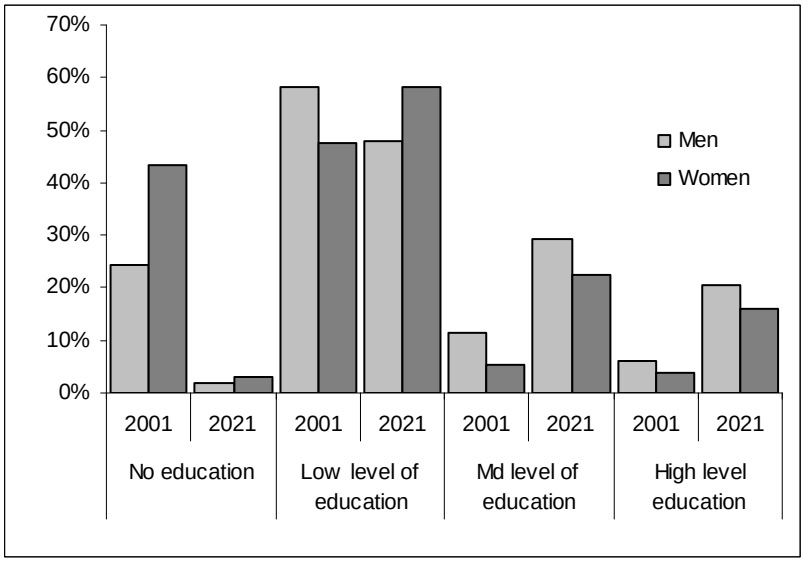
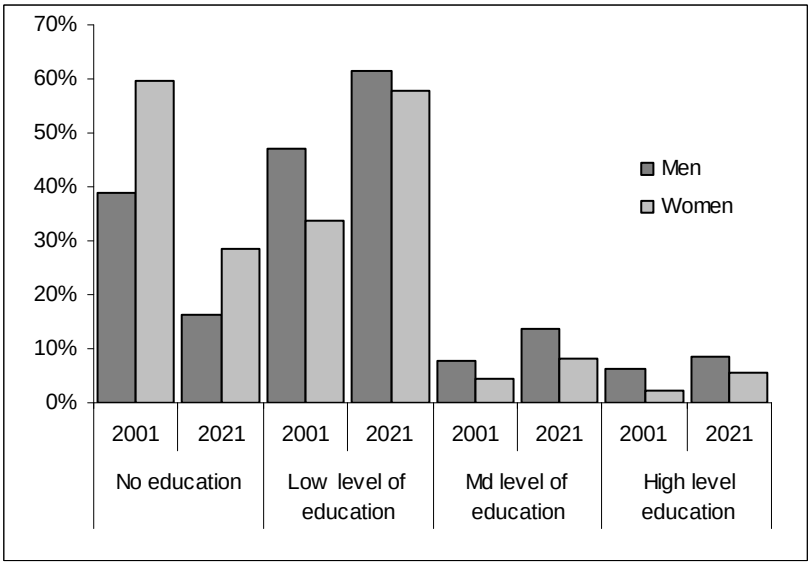



**Figure11.** Educational levels by Sex (70 or more years) in 2001 and 2021




*Source: Henriques et al., 2009*

Among older men and women there are substantial changes in the highest attained education level between 2001 and 2021[53]. 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.

## 8. 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.

As ageing process is unstoppable this is of major concern. Knowing how many years will you live, is not the main question, but in what quality you can achieve them! If you have a higher education level you have a stronger probability to have a healthier old age.

## 9. REFERENCES


Baganha, M.I.(1998) "A emigração atlântica e as migrações internas em Portugal", *Los 98 Ibericos y el mar*, IV, Lisboa, 215-228.

Carrilho, Mª. J., Patrício, L., (2007) "A situação demográfica recente em Portugal", *Revista de Estudos Demográficos* 40, 39-75.

Carrilho, Mª. J., Patrício, L., (2009) "A situação demográfica recente em Portugal", *Revista de Estudos Demográficos* 46, 59-96.

Caselli, G. et al. (2004) *Démographie: analyse et sinthèse. Histoire du peuplement et prévisions*, INED, Paris.

Casey, B., Oxley, H., White House, E., Antolin, P., Duval, R., Leibfritz, W., (2003) "Policies for an ageing society: recent measures and areas for further reform". *Economics Department working papers*, 369 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. (1998) "Differences in self-reported morbidity by educational level: A comparison of 11 Eastern European countries", *J Epidemiological Community Health* 52, 219-227.

EUROSTAT (2008a) EUROPOP2008 (EUROstat POpulation Projections 2008-based), *Convergence scenario, national and regional*.

EUROSTAT (2008b) *Statistics in Focus*, 81.

Fernandes, A.. Veiga, T. R., Henriques, F. de Castro (2008) "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.

Fernandez-Olano, C., Lopez-Torres, H.J.D., Cerda-Diaz, R., Requena-Gallego, M., Urbistondo-Cascales, L., Otero-Puime, A. (2006), "Factors associated with health care utilization by elderly in a public health care system", *Health Policy* 75, 131-139.

Gaymu, J., Festy, P., Beets, G., Poulain, M. (2008) "From elderly population projections to policy implications", *Future Elderly Living Conditions in Europe, L'avenir des conditions de vie des Européens âgés*, INED, Cahier 162, 257-291.


[53] 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%.

Godinho, J. M. and Lucas João S. (1987) "Doença e Morte: Diferenças entre sexos", V *Jornadas de Economia de Saúde*. Lisboa.

Groot, W., Van den Brink, H.M. (2008) "Health- adjusted life expectancy of the British population", *Applied Economics*, 40, 1373-1386.

Henriques, F. de Castro (2005) *Envelhecimento, Educação e Saúde: uma análise prospectiva 2001-2021*. UNL-ISEGI, Lisboa.

Henriques, F. de Castro, Rodrigues, T. Ferreira and Martins, M. Fraga O. (2009) "Ageing, Education and Health in Portugal: Prospective from the 19th to the 21st Century", *Hygiea Internationalis* 8:1, 81–96 http://www.ep.liu.se/ej/hygiea/.

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. (2004) "Socioeconomic inequalities in mortality among elderly people in 11 European populations", *J Epidemiological Community Health,* 58, 468-475.

INE/INSRJ (2000) *Esperança de vida sem incapacidade física de longa duração.* 10, Instituto Nacional de Saúde/ Instituto Nacional de Saúde Dr. Ricardo Jorge. Lisboa.

INE (2009) *Projecções da populaçõa residente em Portugal 2008-2060*.

Joung, I.M.A, Kunst, A.E., Imhoff, E.Van & Mackenbach, J.P. (2000) 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 www.sciencedirect.com.

Koivusalo M., Wyss. K, Santana, P. (2007) Effects of decentralization and recentralization on equity dimensions of health systems , in *Decentralization in Health Care, European Observatory on Health Systems and Policies Series*, 189-205

Lutz, W., Goujon, A., Samir K.C., Sanderson, W. (2007) "Reconstruction of Populations by Age, Sex and Level of Educational Attainment for 120 Countries for 1970-2000", *International Report, International Institute for Applied Systems Analysis Schlossplatz*, Austria.

Kunst, A.E., Bos, V., Lahelma, E., Barthey, 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. (2004) "Trends in Socioeconomic inequalities in self-assessed health in 10 European countries", *International Journal of Epidemiology* 34, 295-305.

Martins, F.O.R., Oliveira, D., Rodrigues, T. (2008) "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.

Nazareth, M. (1988) *Portugal. Os próximos 20 anos*, Vol.III – Unidade e diversidade da demografia portuguesa no final do século XX, Fundação Calouste Gulbenkian, Lisboa.

Nogueira, H., Santana P., Santos, R. (2006) "Impacts of social and material environment on health perception", *Regional Responses to Global Changes a view from the Antipodes*, IGU, Brisbane, Proceedings.

OECD (2007) *Education at a Glance*.

Population Reference Bureau, *Datasheet 2009* http://www.prb.org/pdf09/09wpds_eng.pdf

Rodrigues, T., Moreira, M. J., Henriques, F. (2008) *A população portuguesa. Das longas permanências à conquista da modernidade*, Afrontamento, Porto.

Rodrigues, T., Moreira, M. J. (2008) *As Regionalidades Demográficas no Portugal Contemporâneo*, CEPESE (Working Paper) http://cepese.up.pt/principal.php?IDNivel=77.

Santos, Paula Santana, C., Costa, Fernandes, M., Nogueira, H. (2006) " Indicadores e Metas do Plano Nacional de Saúde", Alto Comissariado da Saúde, Ministério da Saúde, Lisboa.

Seshamani, M. and Gray, A. (2004) "Time to death and health expenditure: an improved model for the impact of demographic change on health care costs", *Age and Ageing* 33, 556-561.

Smith, K. V. and Goldman, N. (2007) "Socioeconomic Differences in Health among older adults in Mexico", *Social Science & Medicine* 65, 1372-1385, ELSEVIER.

Veiga, T., Moreira, M. J., Fernandes, A. (2004) "Health and Social Change – The case of Portugal", *Hygiea Internationalis*, volume 4, nº1, Linköping, 255-276 (www.ep.liu.se/ej/hygiea).

Veiga, T. Rodrigues (2003) "A população portuguesa no último século: permanências e mudanças", *Ler História* 45, 91-101.

Veiga, T. (2004) "A Dinâmica das Populações Humanas e os Modelos de Mortalidade", *Fórum Sociológico*, 11/12, 11-29.

Veiga, T. (2005) "Modelos de Mortalidade em Portugal", *Ler História*, 49, 145-169.

*2008 World Population Data Sheet, PRB, Set.2008* (www.prb.org)

United Nations (2005) *World Population Prospects, the 2008 revision*, New York.

Zweifel, P., Felder, S. and Meiers, M. (1999) "Ageing of Population and health care expenditures: a red herring?", *Health Economics* 8, 485-496.