

Demographic and Health Changes in Portugal (1900–2013)

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Introduction

As in other parts of Europe, Portugal experienced great advances during the twentieth century. It started with more than 100 years of monarchy, then a Republic (1910), and a dictatorial regime that lasted more than forty years (until 1974). The dictatorship ended by a peaceful “Revolution of the Carnations”¹, the most decisive event at the end of the century. Alongside these political events, other factors contributed to (re)configure Portuguese society, harmonizing its modernization process with that of other European countries. In fact, improvements in population’s welfare sometimes took place unnoticed while occurring, only intelligible in the long term. It reflected the interdependence between demography, economy, wellbeing and public policy, in particular those implemented in healthcare areas.

At the beginning of the twenty first century, long and stable life cycle emerged, replacing the previous short and instable life cycle. This new life cycle is accompanied by a stagnation in natural growth, more recently in Portugal. Since 2009, a new trend in Portuguese demography break-out, it has been continuously negative. The continuous drop in fertility, the decrease of mortality levels, not only of infant mortality but also in older age groups, contributed to an ageing society.

Ageing has, in fact, become a dominant feature not only in Portugal but worldwide with consequences on support services for the elderly, adaptation of healthcare to new population groups and reformation of the public pension system.

Our aim with this paper is to give an overview of the Portuguese health and demographic change through the twentieth century up until today, with special focus on the 1970’s until 2013, identifying the characteristics and specificities of the demographic and epidemiological transition model as well as the phases of the ageing process in Portugal in order to understand the different impacts on the health system. We base this article on own research; literature in different fields e.g. history,

1 “Revolução dos Cravos”.

demography, health, policies, geography and data available on national and international sources.

This article begins with an introduction of Portugal in a European context, comparing the pre-war world with today, according to several indicators. Secondly, we focus on major demographic features, their chronological progress and relation with health and the epidemiological transition. This relation is discussed in more detail in the third part. Finally, we introduce the ageing process in Portugal and its milestones over time.

Introducing Portuguese Demographic Changes in a European Context

In Portugal, demographic change occurred not only slowly but also belatedly, when compared to Western European countries. While Eastern and Southern Europe struggled with an unequal development, Western Europe was leading in economic, social, health and wellbeing indicators.

In 1900, Western Europe registered a general mortality rate (GMT) of 17‰, Eastern Europe 27‰² and Portugal³, as a southern country, 21‰. This intercontinental asymmetry still remains, though fainter, with GMT at 9‰ in Western, 14‰ in Eastern European and 10‰ in Portugal.

These achievements were even greater when taking into account infant mortality (IMR). In 1900, IMR was around 200‰ in most countries in Eastern and Southern Europe, but only 140‰ in Portugal, although it increased in the 1920's to 160‰, due to the Spanish flu epidemic. Northern countries, such as Sweden and Norway, already reported values below 100‰. Today, Europe is considered the safest place in the world for a new-born, with Sweden at 2.6‰ and Portugal at 3.4‰ (European average in 2012⁴ at 3.8 ‰).

In the early twentieth century, life expectancy at birth (E0) was short. In Europe, in general, a man lived on average 47 years and a woman 50 years. By mid-century, this figure was 66 years for men and 72 years for women. In 2012, it had risen to 77 years for men and 83 years for women. But these figures cover different realities: in 1900, Norwegian women lived on average longest - 59 years; their Russian counterparts had the shortest life expectancy (38 years) and E0 for Portuguese women was also very short (40). In 2012, E0 for French, Swiss and Italian women was 84-86 years, but much lower in Eastern European countries with the lowest E0 in Moldova

2 J.-P. Bardet, J. Dupaquier, *Histoire des populations de l'Europe-II La révolution démographique 1750-1914* (Paris,1999), p.129

3 INE - *General Census of Portuguese Population and Demographic Statistics*, between 1900 and 2011.

4 *World Population Data Sheet 2013* (www.prb.org)

(75 years) and Russia (76 years). Nowadays, Portugal figures have moved towards the top, and women can expect to live almost 84 years.

During this period, fertility behaviour went through a gradual change. Policies that favoured the reduction of the number of children per woman, such as family planning, urban and industrial growth, emancipation, late marriages, and also because children are now seen as a cost rather than workforce. In 1900, Eastern Europe had more born children per thousand inhabitants and year (GFR), about 34, while the West had the lowest GFR (27‰)⁵. At this point, Portugal was close to the highest value (33‰). However, more than a century has passed and realities have changed. The number of born children is no longer sufficient to ensure the renewal of generations into equal sizes. Countries that had the strongest fertility indicators in the past are now struggling with extremely low GFR's. Portugal has one of the lowest GFR (8‰), while Northern countries, such as Sweden with 12‰, are now ranked at the top.

Low GFR and increased emigration reflects today's Portuguese reality. According to the latest data released by the National Institute of Statistics, the Portuguese population decreased by about 145,000 since 2010. This trend is the consequence of accumulated losses of natural growth since 2009, and strong net out-migration growth since 2011 as a result of both increased emigration reduced immigration.

Demographics Trends

At the beginning of the twentieth century Portugal was a monarchy, a kingdom with a vast colonial territory, where nothing seemed to disturb more than 750 years of political history. More than a century has passed since then and gradual changes has led to a democratic country with a smaller territory. But these are not the only important changes.

Comparing an average Portuguese from nowadays with an average Portuguese at the beginning of the twentieth century, in terms of economic, social, educational and demographic indicators tells us the following: In 1900 a Portuguese held a tenth of economic power when compared to today's reality. The population was mainly dedicated to the primary sector⁶ (64% of the workforce), due to a late and weak industrialization. Only 21% of the population were employed in services and 18% in the industry, as a contrast to today when the tertiary sector occupies 64%, agriculture 11% and industry the remaining 25% of the working population. In 1900, 75% of

5 J.-P. Bardet, J. Dupaquier, *Histoire des populations de l'Europe-II La révolution démographique 1750-1914* (Paris,1999), p.129

6 Álvaro Aguiar e Manuel M. F. Martins, "O Crescimento Industrial", in Pedro Lains, Álvaro Ferreira da Silva (org.) *História Económica de Portugal (1700–2000)*, Vol. III, ICS, (Lisboa, 2005) pp. 185–226.

the population was illiterate comparing to today's 5%⁷. Almost all marriages were Catholic, instead of the current 64% non-Catholic marriages; and if previously only 11% of births occurred outside marriage, today this figure can reach 47.6%. In the early twentieth century, Portugal had 5,446,760 inhabitants. Today, it has almost doubled its population, with 10,562,178 residents. During these 100 years, many social and political changes occurred that resulted in today's reality, the most profound after the 1970's.

In 1970, 8,611,125 persons were registered in the Portuguese Census, 278,267, less than in the previous census. The difference was the result of a strong migratory wave that went mainly to the more industrialised parts of Europe. It is estimated that between the mid-1960s and mid-1970s about 1,200,000 Portuguese left the country⁹. This trend was reversed in the next decade due to the Revolution of April 1974, which opened the door to the decolonisation movement in the Portuguese territories in Africa. About 700,000 Portuguese returned from the former colonies plus the return of some migrants (Figure 4). As a result, the number of inhabitants increased by 2.6 percent in 1974 and 4.4 percent the following year¹⁰. The *impact of this return was felt, not only as a demographic change, mitigating the effects of the exodus of thousands of young people at working age in the previous decade, but also in economic and social terms. The effect was, however, not evenly felt throughout the territory. Urban areas and the coastline benefitted rather than the inlands.

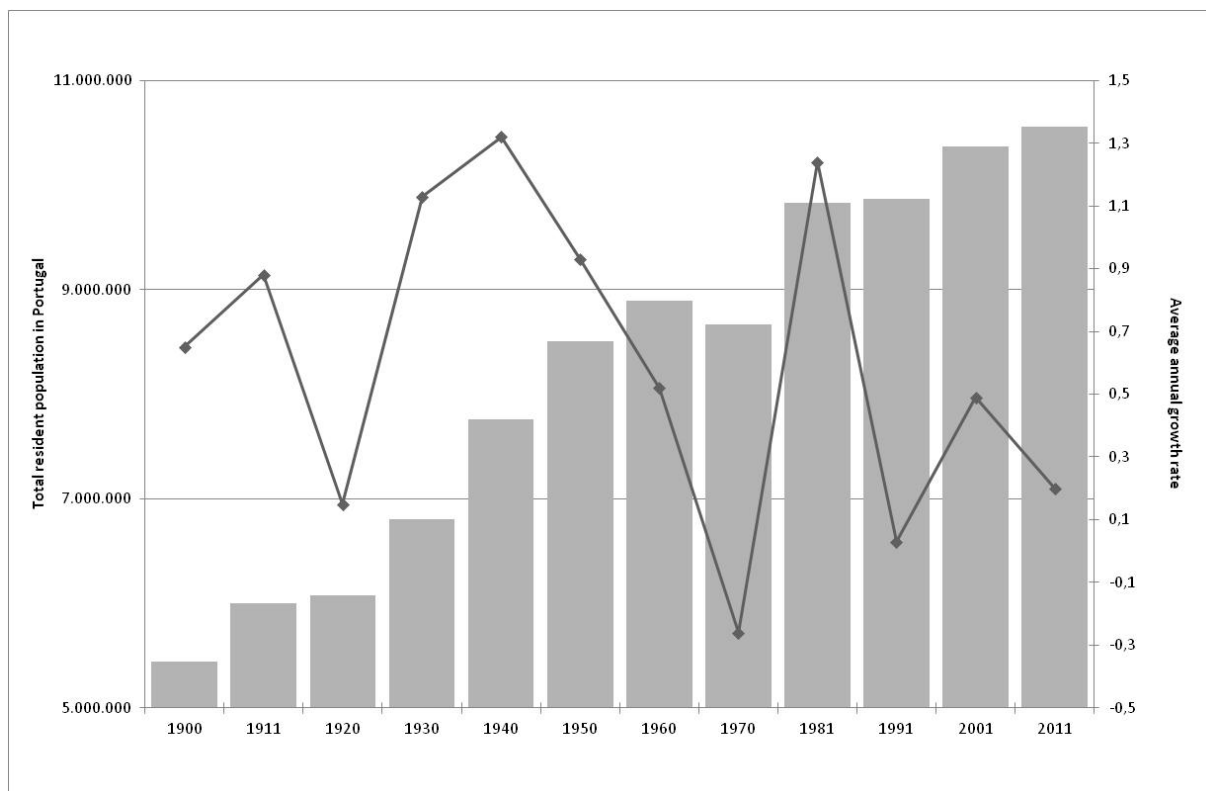
7 PORDATA, www.pordata.pt.

8 INE - *General Census of Portuguese Population*

9 M. I., Baganha, J. C. Marques, "População", in Nuno Valério, (org.). *Estatísticas Históricas Portuguesa*, II, INE (Lisboa, 2001) pp. 33-126; Maria João V. Rosa, P. Chitas, *Portugal: Os Números*, FFMS (Lisboa, 2010).

10 Filipa C. Henriques, Teresa Rodrigues, "O Século XX: a transição", in Rodrigues, Teresa, coord., *História da População Portuguesa*, (Lisboa, 2008) pp. 417-513.

Figure 1. Growth trend of the Portuguese population 1900-2011



Source: INE - General Census of Portuguese Population, between 1900 and 2011.

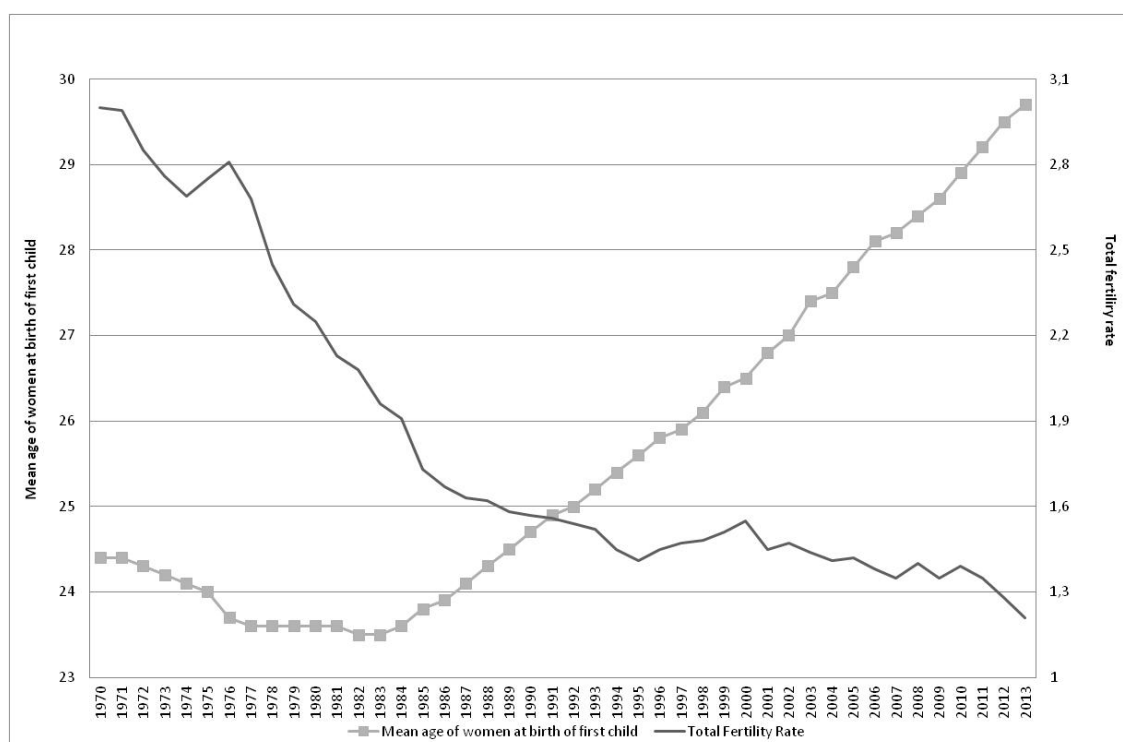
The following censuses registered a modest increase of the population (Figure 1). It was due to rapidly changing attitudes towards fertility and changing mortality patterns characteristic of other European countries. Indeed, the revolution of 1974 not only led to a change in political regime, and a greater openness towards economic development, foreign investment and influences from abroad. It also led to an improvement in the living conditions of the population, the development of a welfare state, the creation of the National Health Service and a system allowing for a gradual increase in the educational level of the Portuguese people. Simultaneously, the concentration of the population in urban areas and along the coastline contributed to a progressively evolving depopulation of the inland regions, especially the rural areas. In 2011, this means that: there has been a decrease in the number of municipalities in the inland. Only eleven of these, excluding the Algarve due to its tourism, have a positive trend in production and work opportunities. It can be compared with the coastline in general and the metropolitan areas of Lisbon and Oporto in particular, hosting around 43 per percent of the Portuguese population.

All these events are interrelated in complex ways and progressively influence individual behaviours, paving the way for new forms of parenthood and conjugal lifestyles. The increase in stepfamilies and single-parent families is a consequence of the increase in divorce, cohabitation without formal marriage, and the growth in the

number of births outside marriage. It also means a greater participation of women in the labour market and changes in the level and timing of fertility.

Such changes indicate a modernisation of the country that will translate into a reduction in fertility levels (Figure 2). In 1900, the total average number of children per women (TFR) was as high as 4.6, increasing even more in 1911 to 4.8. A substantial decline down to 3.7 took place between the 1930's and 1940's and in 1960 TFR was 3.2 children per woman, a figure that has hardly changed in 1970 (3.0). Since 1982 a stable reproduction rate of the population no longer exists, i.e. when TFR is 2.1, the figure necessary for a new generation of the same number of mothers. In 2013, this indicator has reached the lowest level ever, 1.2 children per woman, putting Portugal among the European countries with the lowest fertility rate and a secular downward trend of TFR. This evolution to a low fertility profile occurs, as mentioned, in the context of social changes associated with new family models. However, it also reflects a postponement of the mean age at which women give birth of their first child - in the 1960s 24- 25 years and in 2013 29.7 years of age (Figure 2). The impact of the changes observed in terms of the role and the intervention of women in society could also have been influenced by different reproductive behaviours, particularly when relating the time of motherhood with the mothers' levels of education. Women with higher levels of education tend to delay motherhood, which can be explained by the attendance of a longer school career.

Figure 2. Mean age of women at birth of first child and Total Fertility Rate (TFR) in Portugal 1970–2013



Source: PORDATA, 2014,

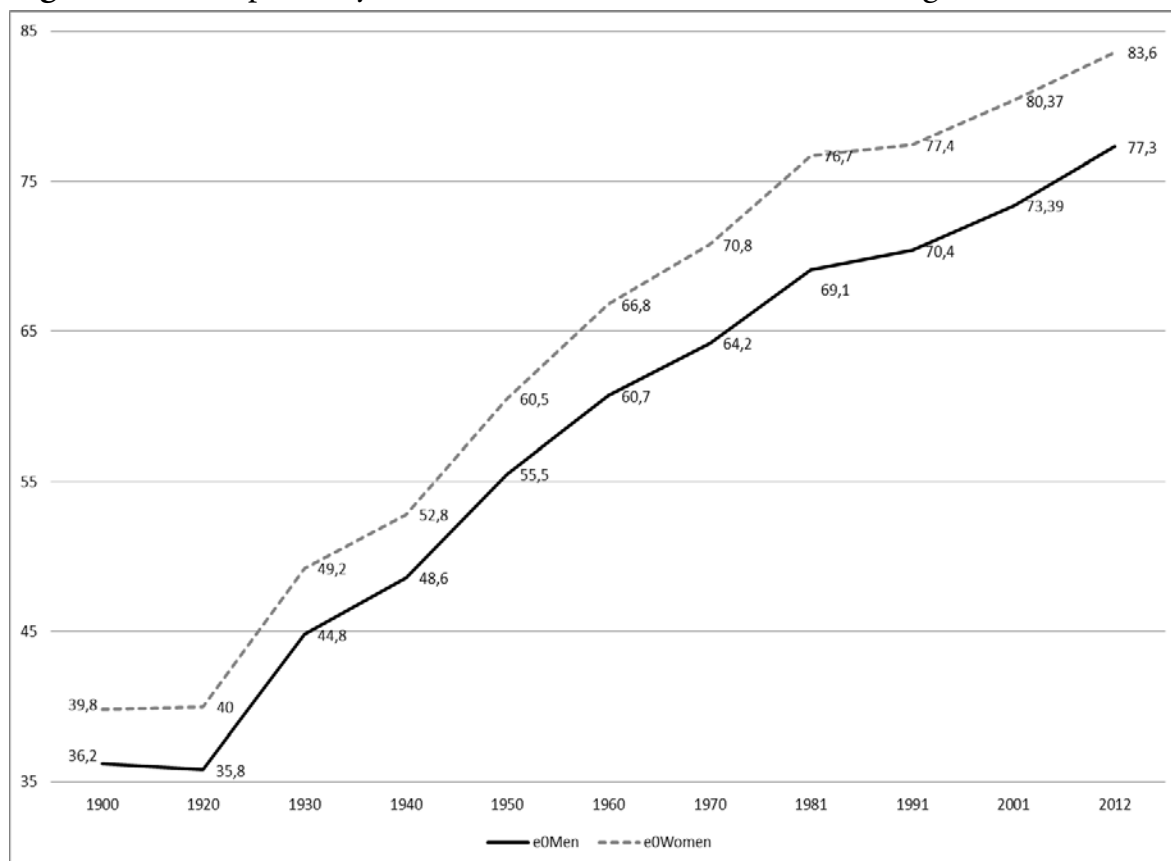
Arising from this trend of declining fertility levels, the number of live births has declined sharply. In 2013 there were 82,787 births, a figure very far from the 180,690 live births in 1970 (Figure 6). The consequence of this trend is the decrease in the number of children and youth, reflected in the progressive narrowing of the base of the age pyramid of the Portuguese population.

Alongside the reduction in fertility, a reduction in mortality rates also contributed to the ageing of the Portuguese population indicating substantial improvements in the quality of life and access of all social groups to the national health system. Throughout the twentieth century, the decline in mortality, which was reflected in the prolonged life expectancy, contributed to the enlargement of the top of the pyramid, causing the progressive increase of the population aged 65 and over. In 1900, life expectancy at birth was about 38 years (about 36.2 for men and 39.8 for women). These values even decreased after the Spanish Flu epidemic. In 1920, men were only expected to live about 35 years. Since 1920, life expectancy increased rapidly, reaching 67 years in 1970 (64.2 for men and 70.8 for women), while the same indicator for life expectancy at the age of 65 (E65) was 13.5 years, with an advantage for women (14.6 years against 12.2 years for men). About forty years later, in 2012, E0 reached the age of 80 for both genders, 77.3 for men and 83.6 for women¹¹. E65 did also show significant gains for the elderly: over 5.5 years for both genders combined, a little less than 5 years for men and about 6 for women (17.1 and 20.4, respectively)¹².

11 PORDATA, www.pordata.pt.

12 PORDATA, www.pordata.pt.

Figure 3. Life expectancy at birth for men and women in Portugal 1900-2012.



Source: INE - General Census of Portuguese Population, between 1900 and 2011.

Table 1. Annual growth average, total, natural and migratory rate in Portugal 1900-2011

Year	Total	Natural	Migratory
1900–1911	0,95%	1,37%	-0,42%
1911–1920	0,09%	0,70%	-0,62%
1920–1930	1,41%	1,42%	-0,01%
1930–1940	1,23%	1,15%	0,08%
1940–1950	0,97%	1,05%	-0,08%
1950–1960	0,47%	1,22%	-0,74%
1960–1970	-0,32%	1,15%	-1,47%
1970–1981	1,34%	0,87%	0,46%
1981–1991	0,03%	0,34%	-0,31%
1991–2001	0,48%	0,09%	0,39%
2001–2011	0,20%	0,02%	0,18%

Source: INE - *General Census of Portuguese Population and Demographic Statistics*, between 1900 and 2011.

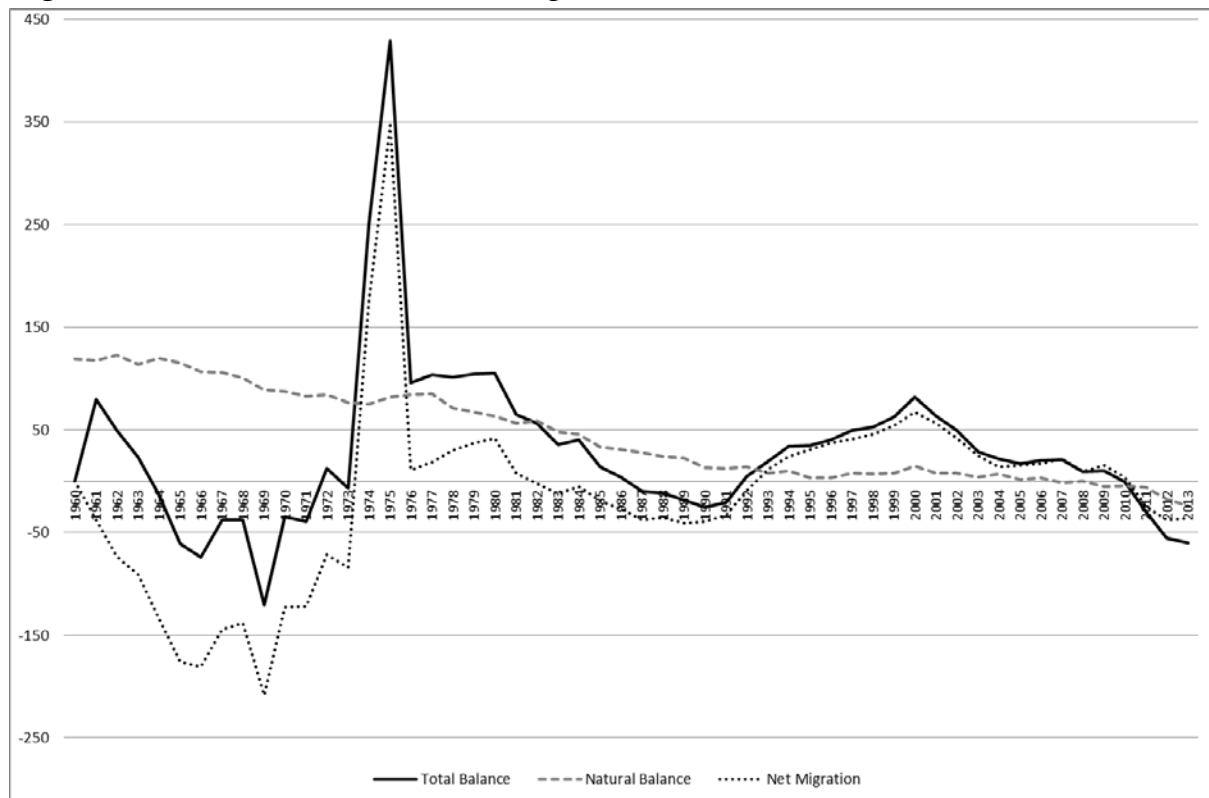
Behind this mortality decline (Figure 6) is the progress of medical science regarding diagnosis and treatment and improvements of socio-economic conditions, such as hygienic practices and the development of public health¹³. The changing pattern of mortality structure was in the recent past caused by a reduction during the first year of life, resulting in a concentration of deaths at older ages. Simultaneously, changes in the profile of causes of death occurred, such as a change from a dominance of infectious and parasitic diseases to chronic and degenerative diseases. These changing patterns of mortality, to which we should add the behaviour of fertility, characterise the demographic and epidemiological transition, to which we will return later.

Between 1970 and 2011, the dynamics of the Portuguese population reflects the trends of natural growth, but also the direction and intensity of migratory movements. Until the 1990s, population growth is mainly due to natural growth. However, from 1991 to 2001 migration becomes the primary determinant (Table 1 and Figure 4). The annual growth rates (total, natural and migratory) highlight the importance of migratory flows in that period. Indeed, emigration is a structural constant since the nineteenth century, although the intense emigration flows of the 1960s and 1970s had the greatest impact on the evolution of the population during the twentieth century.

Along with emigration, internal mobility in the 1960s and 1970s contributed to the geographic redistribution of the population caused by—greater or lesser attractiveness of regions. Hence, the largest population streams went to the urban, coastal areas, the centres of economic, political and administrative activities. Consequently, youth at working ages gradually left the interior rural areas. Thus, the evolution of the Portuguese population, both at a national and regional level, has been conditioned by the intensity and direction of migratory flows. Some areas were penalised twice as origins for both emigration to other counties and migration to urban, coastal areas.

13 Ana A. Fernandes, Maria João G Moreira, Teresa Rodrigues, “Transição demográfica e transição epidemiológica”, *Forum Sociológico*, 11/12 (2) (2004), 75-104; Maria João G Moreira, Teresa Rodrigues, “Os modelos de mortalidade em Portugal”, *Ler História*, 49 (2010), 145–169.

Figure 4. Natural balance and net migration between 1960 and 2011



Source: PORDATA, 2014.

Demographic and Epidemiologic Transition

The relationship between a population's mortality and ageing is an important part of the demographic transition. In Portugal this occurred later than in Northern and Central Europe¹⁴.

Throughout the nineteenth and twentieth centuries, changes in fertility and mortality in Western Europe led to the formulation of demographic transition as a theoretical concept¹⁵. This theory sought to analyse the process of changes in the behaviour on the micro level. It refers to a historical process that led to the transition from an old demographic regime, in which high levels of fertility usually outweighed high mortality levels, to a new regime, in which mortality and fertility declined during economic, social and political transformations during the industrial revolution. In other words, this process allowed the transition from a short and unstable cycle of life, due to morbidity and mortality conditioned by structural

14 Filipa C. Henriques, Teresa Rodrigues, "O Século XX: a transição", in Rodrigues, Teresa, coord., *História da População Portuguesa*, (Lisboa, 2008) pp. 417–513; M. Leston Bandeira, *Demografia e Modernidade. Família e Transição Demográfica em Portugal* (Lisboa, 1996).

15 This theory was first developed in the 1930s by W. S. Thomson and Landry, and later, between the '40s and '50s by Notestein, K. Davis, Blacker, Coale and Hoover (J.M Nazareth, *Explosão Demográfica e Planeamento Familiar*, Presença (Lisboa, 1982)).

conditions of the surrounding environment (nutritional deficiencies, poor health, and sanitary shortages) to a long and stable life cycle. The latter is characterised by low overall levels of mortality, high life expectancy and less dependence on sanitation, factors that changed the traditional profile of causes of death and age-specific mortality¹⁶.

Interest in the transition is often focused on the decline in fertility. We do, however, also need to understand the evolution of mortality levels and the factors behind their sustained decline, linked to theories developed in epidemiology, public health and social sciences. One pioneer in this field is Abdel R., Omran's theory on *epidemiological transition* in the late 1960s¹⁷.

Figure 5. The Demographic Transition - Mortality and Birth rates in Portugal 1801–2011



Source: INE – *Demographic Statistics* between 1801 and 2011.

Portugal remained in the “Old Demographic Regime”, characterized by high mortality and high birth rates, until the last years of the nineteenth century. Between 1900 and 1920, a delayed demographic transition took place in a politically and socially unstable country, with a slow, but persistent, decline in mortality with the exception of the Spanish Flu epidemic in 1918. This caused an increase in life

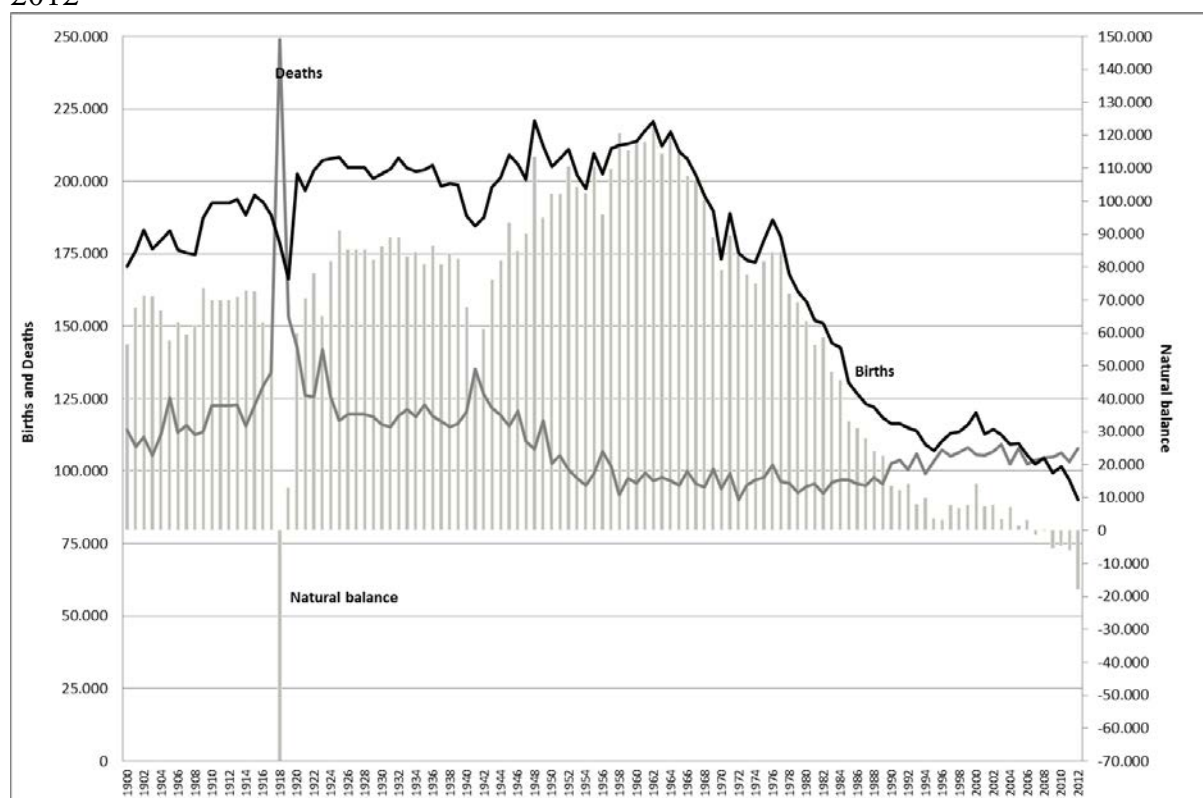
¹⁶ Maria João G Moreira, Teresa Rodrigues, “Os modelos de mortalidade em Portugal”, *Ler História*, 49 (2010), 145–169.

¹⁷ A. R. Onram, “The Epidemiologic Transition: a theory of the epidemiology of population change”, *The Milbank Quarterly*, 83: 4 (2005), 731–57.

expectancy (Figure 3), a decrease of the infant mortality rate (Figure 7) and the crude death rate (Figure 5). Simultaneously, the social-economic instability pressured the population to migrate and look for a better life outside Portugal. This trend intensified and remained until the 1970's. Portugal was a country of emigrants.

Despite this situation, the Portuguese population increased by 3,216,492 inhabitants between 1900 and 1970, due to natural growth. Fertility was high during the early twentieth century compared with European standards.

Figure 6. Births, deaths and natural balance of the population in Portugal .1900–2012



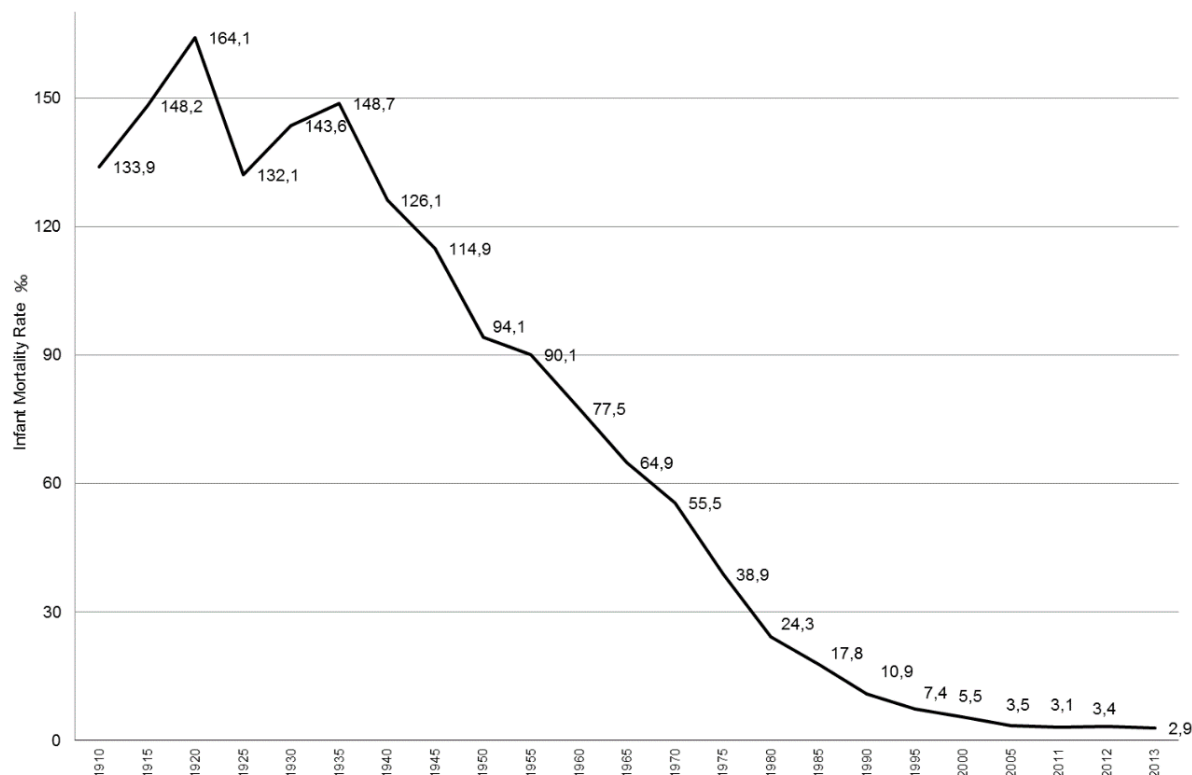
Source: INE – *Demographic Statistics* between 1900 and 2012.

However, after the 1930's a slow but consistent decline started, marking a new phase of the demographic transition, followed by the last phase in the 1980's when the number of births decreased quickly to a level below a positive reproduction rate.

For the first time since 1918, deaths exceeded births in 2007, since then a part of the Portuguese demographic scenario. The trends of mortality and life expectancy at birth refer, however, to the children's chances of survival, especially after the mid-twentieth century, thus highlighting the relationship between the decrease of infant mortality (Figure 7) and overall mortality. The decline of mortality during the first year of life has currently reached some of the lowest levels in the world (2.9 per thousand in 2013). It can be attributed to improvements in general health conditions, arising from the implementation of public health policies, as is the case of development in terms of maternal and child care and primary healthcare, widespread

family planning, and the implementation of the national plan for vaccination in 1965. But improvements in the economic and social conditions of the Portuguese population are also important factors¹⁸.

Figure 7. Infant mortality rate (‰) in Portugal 1910–2013



Source: Filipa C. Henriques, Teresa Rodrigues, “O Século XX: a transição”, in Rodrigues, Teresa, coord., *História da População Portuguesa*, (Lisboa, 2008) p. 426; INE - *General Census of Portuguese Population 2011* and INE, *Demographic Statistics*, 2001–2013.

In the 1970s, the Portuguese population had an average life expectancy of 67 years, which placed Portugal in the third phase of Omran’s transition model, i.e. at the age of degenerative and man-made diseases. According to Morais¹⁹, it means “the loss of expression of infectious and parasitic diseases in the context of epidemiological transition, as well as respiratory infection, paralleled with worsening cardiovascular diseases”.

¹⁸ Teresa R. Veiga, Maria João G Moreira, Ana A. Fernandes, “Social changes and better health conditions of the Portuguese population 1974–2000”, *Hygiea Internationalis*, volume 4, Issue 4 (2004), 255–275

¹⁹ Graça Morais, *Causas de Morte no Século XX: A Transição da Mortalidade e Estruturas de Causa de Morte em Portugal Continental* (Lisboa, 2002), p. 258.

Table 2. Some causes of death in Portugal 1930-2012 (%)

Causes of death	1930	1940	1950	1960	1970	1980	1990	2000	2010	2012
Infectious and parasitic diseases	21.1	20.9	13.5	1.9	1.0	1.5	-	-	-	-
Tuberculosis	11.2	9.8	11.7	4.5	1.6	-	0.3	0.3	0.2	0.2
Disease caused by the human immunodeficiency virus (HIV)	-	-	-	-	-	-	0.1	0.9	0.6	0.5
Diseases of the circulatory system	8.5	11.7	14.2	14.8	17.0	42.8	44.2	38.7	31.8	30.4
Malignant Tumour	2.7	2.9	4.8	9.2	11.7	15.1	17.6	20.3	23.5	23.9
Diseases of the respiratory system	9.6	10.8	8.7	9.8	12.0	7.3	7.2	9.7	11.1	12.9
Diseases of the digestive system	2.1	3.5	3.8	10.1	7.5	4.9	4.5	3.9	4.4	4.2
Diseases of the genitourinary system	2.0	2.5	2.3	2.0	2.0	1.2	1.2	1.5	3.1	2.7
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	16.8	16.4	17.0	15.6	15.3	13.6	11.8	12.4	9.5	9.5
Other causes resulting from diseases	22.9	18.2	20.4	27.6	26.5	6.2	6.6	7.8	11.6	12.1
External causes	3.0	3.3	3.6	4.4	5.5	7.4	6.5	4.5	4.3	3.7

Source: INE, *Annual Statistic*, 1940, 1940, 1950, 1979, 1980, 2011, 2012 (Author's calculations).

As seen in Table 2 deaths caused by infectious and parasitic diseases, usually related to poor social environment and hygiene, only started to decline after the 1950's, then presumably due to improvements in life conditions and the progress of specific therapies²⁰.

The revolution of 25th of April 1974 created favourable conditions for the implementation of a National Health Service, aimed to respond to the need for larger territorial coverage and a more equitable treatment, improving the access for all citizens.

Previously, the health system was very fragmented, integrating state hospitals, hospitals of *Misericórdias* (social organizations), other social medical services, municipal medical doctors, and local centres for support against maternal and child tuberculosis. Since the late nineteenth century, a special hygienist movement was created to combat tuberculosis by prophylaxis. The National League against TB was for example initiated in 1899 by the physician Miguel Bombarda and a National Tuberculosis Association was promoted by Queen D. Amélia.

20 Ana A. Fernandes, Maria João G Moreira, Teresa Rodrigues, "Transição demográfica e transição epidemiológica", *Forum Sociológico*, 11/12 (2) (2004), 75–104.

Table 3. Life expectancy in Portugal at age 65 by gender

Year	Life expectancy at age 65		
	M	F	Differences
1970	12,2	14,7	2,5
1981	14,4	18,0	3,6
1991	14,8	18,4	3,6
2001	15,6	19,0	3,5
2010	16,9	20,2	3,3
2011	16,9	20,3	3,4
2012	17,1	20,4	3,3

Source: Ana A. Fernandes, Maria João G Moreira, Teresa Rodrigues, “Transição demográfica e transição epidemiológica”, *Forum Sociológico*, 11/12 (2) (2004), p. 92; PORDATA (www.pordata.pt)

During the first half of the twentieth century, the nosological framework of infectious and parasite diseases was linked to a social, hygienic and environmental contexts in the Portuguese society, revealing deficiencies in hygienic practices, preventive actions and the health system.

As previously mentioned, progressive decrease of external factors also lead to a change in the mortality profile, more visible after the 1950's. The decrease of these diseases must be related to the progress in therapy (vaccination, more widespread use of antibiotics, extending the screening), improvements of the Portuguese population's wellbeing, and to some reforms in the health system.

The impacts of the health system implemented after the mid 1970's are no doubt one of the causes of an increase in life expectancy at birth for both males and females in the 1970s and 1980s (Figure 3). Positive changes during this period in life expectancy at age 65 (Table 3), may also be related to greater efficiency in the provision of primary healthcare and a more effective and widespread network of hospitals²¹.

Thus, if changes in the profile of mortality and morbidity contributed to a positive evolution of mortality rates, it is also necessary to take into account social and behavioural factors and “answers from society to health status”²². From this

21 Ana A. Fernandes, Maria João G Moreira, Teresa Rodrigues, “Transição demográfica e transição epidemiológica”, *Forum Sociológico*, 11/12 (2) (2004), 75–104; Teresa R. Veiga, Maria João G Moreira, Ana A. Fernandes, “Social changes and better health conditions of the Portuguese population 1974–2000”, *Hygiea Internationalis*, volume 4, Issue 4 (2004), 255–275.

22 In the original: “des réponses de la société à cet état sanitaire” (F Meslé, J. Vallin, “La transition sanitaire: tendances et perspectives”, in G. Caselli, J. Vallin e G. Wunsch. dirs., *Démographie: analyse et synthèse – Les déterminants de la mortalité*, Vol. III, (Paris, 2002), p. 440).

perspective, academics have since the 1980s developed the concept of health transition²³, as a compliment to the epidemiological transition theory, which they considered to be too reductive and only focusing on the determinants of health, whilst the state of health also depends on resources, values and behaviours. Moreover, it is necessary to account for a dynamic perspective, which acknowledges aspects of underlying changes in the health status of populations within a regional dynamic.

However, the concept of health transition does also have limitations, particularly with regard to the definition of health status. Infant mortality, life expectancy and the pattern of mortality by causes of death have traditionally been considered as indicators of health. However, changes in age structures in more developed countries (i.e. a higher proportion of adults and elderly due to the decline in infant mortality), and a new epidemiologic profile (prevalence of chronic and degenerative diseases), require a refocusing of research on mortality and morbidity among adults²⁴. Therefore, the ageing of the population leads to a new set of questions, particularly because the outcomes in life expectancy are no longer the result of a recess in youth mortality but a delay in the mortality of the oldest.

Table 4. Healthy life expectancy in Portugal

Year	At Birth		At the age of 65	
	M	F	M	F
1995	59.6	63.1	8.3	9.9
2001	59.5	62.7	8.2	8.7
2005	58.6	57.1	6.5	5.2
2010	59.3	56.6	7.1	5.7
2011	60.7	58.6	7.8	6.3

Source: Eurostat.²⁵

Although longevity may be considered an achievement, it is not synonymous with health. Living many years does not necessarily mean living them with a good quality of life. On the one hand, healthy survival and ageing has become a main goal for

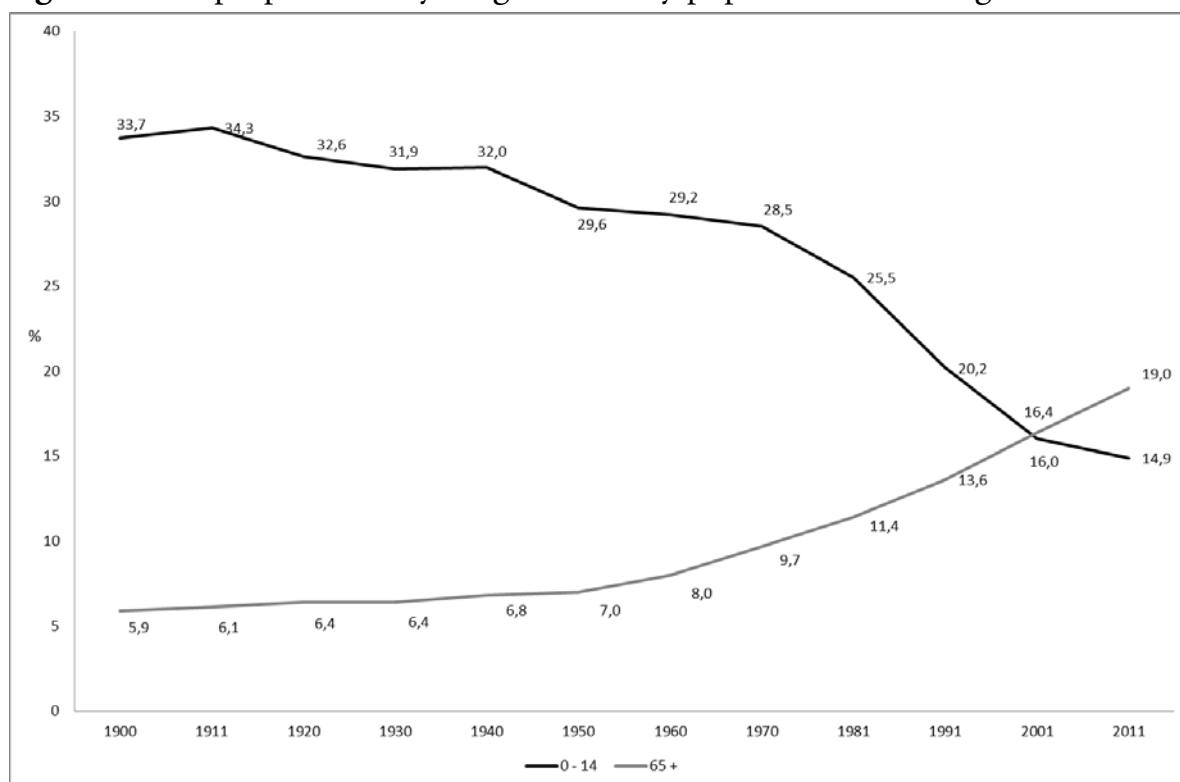
23 This concept was first developed in 1973 by Lerner. However, interest on this concept will only grow from the 1980s on, due to research at the Health Transition Centre, Canberra (Australia) driven by John Caldwell and Julio Frenk (E. R., Gonzalez, J. Bernabeu Mestre, F. G Benavides, “La transición sanitaria. Una revisión conceptual”, *Boletín de la Asociación de Demografía Histórica*, XIV: 1 (1996), 117-144); F Meslé, J. Vallin, “La transition sanitaire: tendances et perspectives”, in G. Caselli, J. Vallin e G. Wunsch. dirs., *Démographie: analyse et synthèse – Les déterminants de la mortalité*, Vol. III, (Paris, 2002), pp. 439–461).

24 E. R., Gonzalez, J. Bernabeu Mestre, F. G Benavides, “La transición sanitaria. Una revisión conceptual”, *Boletín de la Asociación de Demografía Histórica*, XIV: 1 (1996), 117–144

25 The healthy life years are calculated based on mortality tables on the EU and on data collected in surveys about personal perceptions regarding disability.

populations²⁶, linked to the postponement of senescence and death²⁷. On the other hand, it has also become important to know the vectors which determine health status (how the economic, social, cultural, biological, and environmental aspects are interrelated) in order to understand the different survival capacities of men and women. Indeed, the ageing of the population will require policies in the fields of health and social protection, responding to different levels of vulnerability²⁸. Undeniably, the extension of life expectancy is accompanied by increased physical and/or mental dependence causing loss of mobility and autonomy, increasing and chronic illness, which increases the number of consumers of specific healthcare and affects requirements regarding the quality and complexity of care. Some health indicators have therefore been used, which can determine whether the prolonged life expectancy is accompanied or not by an increase of the time lived without disability. ‘Life expectancy with health’ does for instance measure the number of years a person of a certain age can expect to live without any moderate or severe health problem.

Figure 8. The proportion of young and elderly population in Portugal 1900–2011



Source: INE - General Census of Portuguese Population, between 1900 and 2011.

26 Ana A. Fernandes, “Determinantes da mortalidade da longevidade: Portugal numa perspectiva europeia (EU-15, 1991–2001)”, *Análise Social*, XLII (183) (2007), 419–443.

27 J. W., Vaupel, “Biodemography of human aging” *Nature* 464(7288) (2010), 536–542.

28 Ana A. Fernandes, “Determinantes da mortalidade da longevidade: Portugal numa perspectiva europeia (EU-15, 1991–2001)”, *Análise Social*, XLII (183) (2007), 419–443.

Actually, from 1995 to 2011, the average ‘healthy life expectancy’ without disabilities for Portuguese women at birth and at age 65 has diminished, despite the fact that they can expect to live longer (Figure 3 and Table 3)! In 2011 (Table 4), that number of ‘healthy years of life’ at birth, was 60.7 for men and 58.6 for women and at age 65 the same figures were 7.8 and 6.3. This suggests a greater need for healthcare, particularly for females.

The ageing process

The reduction in mortality and fertility during the demographic transition is accompanied by changes in the population’s age structure. In the early twentieth century, Portugal was a young country (about 34 percent of the individuals were under the age of 15), but by the mid of the century this started to change. Thus, the proportion of the age groups at the top of the age pyramid increased gradually with a simultaneous reduction of the proportion of younger age groups (Figure 8) and an increase of the average age of the population. In 1970 the average age was 32.1 years, in 2011 it reached 41.8 years (40.3 for men and 43.3 for women). This process by which the Portuguese society went from young to aged, is one way to frame the outcome of the inter-relationship between trends in mortality and fertility.

Table 5. Deaths according to some causes of death by old age groups - % in Portugal

	1994			2001			2010		
	65-79	80 and +	Total	65-79	80 and +	Total	65-79	80 and +	Total
Infectious and parasitic diseases	0.8	0.4	1.5	1.2	0.6	2.0	2.3	1.9	2.5
Neoplasms	23.7	10.6	19.6	26.5	12.4	21.2	32.1	14.6	24.0
Endocrine, nutritional and metabolic diseases	4.7	3.0	3.5	5.4	3.9	4.2	6.3	5.6	5.3
Diseases of the circulatory system	45.0	54.5	42.9	38.2	49.0	38.6	28.6	39.6	31.8
Diseases of the respiratory system	7.2	8.9	7.1	8.0	11.1	8.5	9.0	14.7	11.1
Diseases of the digestive system	4.6	2.5	4.4	4.5	2.7	4.2	4.6	3.4	4.4
Symptoms, signs, abnormal clinical and laboratory findings, not elsewhere classified	7.7	15.7	11.5	8.5	13.8	11.3	7.3	9.9	9.5
External causes	3.0	1.6	5.7	2.9	1.7	4.9	3.4	2.1	4.3

Source: Eurostat (author’s calculations).

The progressive and continuous decline in fertility is a key to the narrowing of the base of the population pyramid. The total fertility rate, i.e. the average number of

children per woman, is currently well below the level needed for a generational reproduction to the same size (see Figure 2). The analysis of the role of immigration as mitigating or reversing the ageing process indicates that this effect can only be a temporary conjuncture and, the ageing of the Portuguese population will continue, at least in the medium perspective²⁹.

The increased life expectancy of the Portuguese people during the twentieth century has no historical parallel: between 1900 and 2012 it meant an increase of 41 years for men and 44 years for women. In the first stage, this increase depended on the decline of infant mortality³⁰, rejuvenating the age structures. Later, declining levels of mortality for adults³¹, reversed the process into an ageing population³². This meant a new pattern of causes of death, a result of the epidemiological transition.

Today, mortality is dominated by chronic and degenerative diseases, such as cardiovascular diseases or neoplasms that primarily affect the elderly population. Table 5 shows that these are the most common causes, both in the ages 65-79, and 80 years and older. Such a pattern has existed since the mid-1990s and throughout the first decade of the current century. However, diseases of the circulatory system have been decreasing since 1994, overtaken in 2010 by neoplasms in ages 65-79. According to Oliveira and Mendes³³, the decrease in mortality associated with diseases of the circulatory system has been the main factor behind the increase in life expectancy since the 1990s³⁴. Diseases of the respiratory system have increased among 80 years and older, which may have contributed negatively to the prolongation of life expectancy³⁵.

29 Maria João V Rosa, H Seabra, T. Santos, *Contributos dos "Imigrantes" na Demografia Portuguesa: O papel das populações de nacionalidade estrangeira*, (Lisboa, 2004); Maria João V. Rosa, P. Chitas, *Portugal: Os Números*, (Lisboa, 2010).

30 Isabel T. Oliveira, M. F., Mendes, "A diferença de esperança de vida entre homens e mulheres: Portugal de 1940 a 2007" *Análise Social*, XLV (194) (2010), 115–139.

31 Isabel T Oliveira, "Mortalidade: Compressão, Deslocamento e Causas de Morte (Portugal 1950-2005)", *Revista de Estudos Demográficos*, 48 (2010), 35–62.

32 "In short, up to the age of 80, improvements in life expectancy for both men and women are highly dependent on mortality of young people and particularly children up to their 1st birthday. From the '80s on, the evolution of life expectancy depends more significantly on the health of adults and the elderly and by the end of the period [2007] it mainly depends on the mortality of the elderly" (Isabel. T Oliveira, M. F., Mendes, "A diferença de esperança de vida entre homens e mulheres: Portugal de 1940 a 2007" *Análise Social*, XLV (194) (2010), 125).

33 Isabel T. Oliveira, M. F., Mendes, "A diferença de esperança de vida entre homens e mulheres: Portugal de 1940 a 2007" *Análise Social*, XLV (194) (2010), 115–139.

34 See also Felipe Ribeiro, M. F. Mendes, "O contributo das diferentes causas de morte para a diferença na esperança de vida entre Portugal e Espanha" Comunicação apresentada X Congresso da ADEH, 18 A 21 de Junho de 2013, (Albacete, Espanha, 2013).

35 Isabel T. Oliveira, M. F., Mendes, "A diferença de esperança de vida entre homens e mulheres: Portugal de 1940 a 2007" *Análise Social*, XLV (194) (2010), 115–139.

Table 6. Proportion of people aged 80 and over in a. the age group of 65 + years and in b. the total population (%) in Portugal

Year	a. 65 +			b. Total population
	M/F	M	F	
1970	15.2	12.5	16.9	1.5
1981	14.9	11.7	17.1	1.7
1991	19.1	15.5	21.7	2.6
2001	20.9	17.5	23.3	3.4
2011	26.5	22.4	29.4	5.0

Source: INE - General Census of Portuguese Population, between 1970 and 2011.

Increased longevity also seems to be associated with increased gender inequalities in life expectancy³⁶. Therefore, in Portugal, as in other countries, the female advantage has been increasing: in 1900 the female advantage was 3.6 years; in 1981, the largest difference ever was registered - 7.6 years' higher life expectancy for women. Since then this inequality has declined to 5.9 years in 2012.

The gender gap in survival (Table 3) has contributed to a 'feminisation' of ageing, most visible in the population aged 80 years and over (Table 6). In this age group, women have been in majority since 1970. The preponderance of the female population becomes more evident as the population ages. In 2011 the male/female ratio for the total population was 91.5 % but only 72.1 % above 65 years, and no more than number 54.9 % for ages 80 years and above.

The increase in life expectancy has also increases the *number* of very elderly people. In 2011, 532,219 individuals were 80 years old or more, representing 5 percent of the total population. This group was the fastest growing, over 300 percent larger than in 1970.

Besides the decline of *natural* growth, migration has also had an important role in triggering the process of ageing in Portugal. As mentioned earlier, migratory movements are a structural constant in the Portuguese population dynamics and, evidently, the European emigration waves of the mid-twentieth century triggered the ageing process, especially on a regional level. We have seen that the internal mobility and the mobility to Europe that characterised the '1960s and '1970s had a very significant impact on the redistribution of the population and largely explain the regional asymmetries. In the second half of the twentieth century the coastline began to grow, partly at the expense of the inland. Since the typical migrant is usually young, mobility causes a rejuvenation in the areas of destination and ageing in the regions of out-migration.

36 Isabel T. Oliveira, M. F., Mendes, "A diferença de esperança de vida entre homens e mulheres: Portugal de 1940 a 2007" *Análise Social*, XLV (194) (2010), 115–139.

Thus, the combination of internal and external migration with fertility and mortality at different levels and speeds of decline, explain the regional dynamics of ageing. Rates of population change in the age groups 0-14 years and 65 years and over between censuses from 1960 to 2011, provides a chronological image this dynamic³⁷.

First of all the proportion of young people declines across Portugal with some exceptions in municipalities around the metropolitan areas of Lisbon and Oporto and in Algarve in the south. Instead, there is the continuous increase in the share of the elderly population, albeit less intense between 2001 and 2011 than in previous periods.

Cartograms³⁸ representing the rates of change of young people (Figure 9) shows that in 60 years the difference between the coast and the inland starts to emerge, though not continuously. The effects of internal and external population mobility is also seen in the forms of emigration and internal migration from the interior towards urban centres, mostly by the coast.

The positive changes that took place in the next decade was caused by regional net migration, although it should be borne in mind that the 1970s was a time of unusually intensive political and social change. In the following years, regional asymmetries became accentuated, reinforced by lower fertility levels, even in northern regions where they were higher.

Widespread and intense increase in the percentage of the population above 65 years of age can also be observed between 1970 and 1981 (Figure10).

Beside the already mentioned migratory flows, the progressive increase in the probability of survival along with a decline in fertility levels must be remembered, with effects extended to the following years. Indeed, the widespread use of contraception, resulting from the favourable political-social conditions offered by the Revolution of April 1974, led to a progressive standardisation of behaviours, converging regional differences, with consequences on the fertility decline.

37 This methodology was used in Rodrigues, Teresa, Alves, H., Fernandes, O. “Tipologias Regionais do Envelhecimento da População Portuguesa (1900- 2005). O envelhecimento na base”, comunicação apresentada na sessão “Vejez y envejecimiento en la Península Ibérica desde una perspectiva comparada (siglos XVIII-XX)”, no *IX Congresso da ADEH*, 16, 17, 18 e 19 de Junho (São Miguel, Açores, 2010); Moreira, Maria João G., Alves, H., Fernandes, O. 2010. Tipologias Regionais do Envelhecimento da População Portuguesa (1900-2005). O envelhecimento no topo”, comunicação apresentada na sessão “Vejez y envejecimiento en la Península Ibérica desde una perspectiva comparada (siglos XVIII-XX)”, no *IX Congresso da ADEH*, 16, 17, 18 e 19 de Junho de 2010 (São Miguel, Açores, 2010).

38 The authors are grateful to Eng. Natália Roque, from SIG and CAD Laboratories, from the School of Agriculture of the Polytechnic Institute of Castelo Branco, for the preparation of the maps.

Figure 9. Rate of change in the age group 0-14 years (%), in Portugal 1960–2011

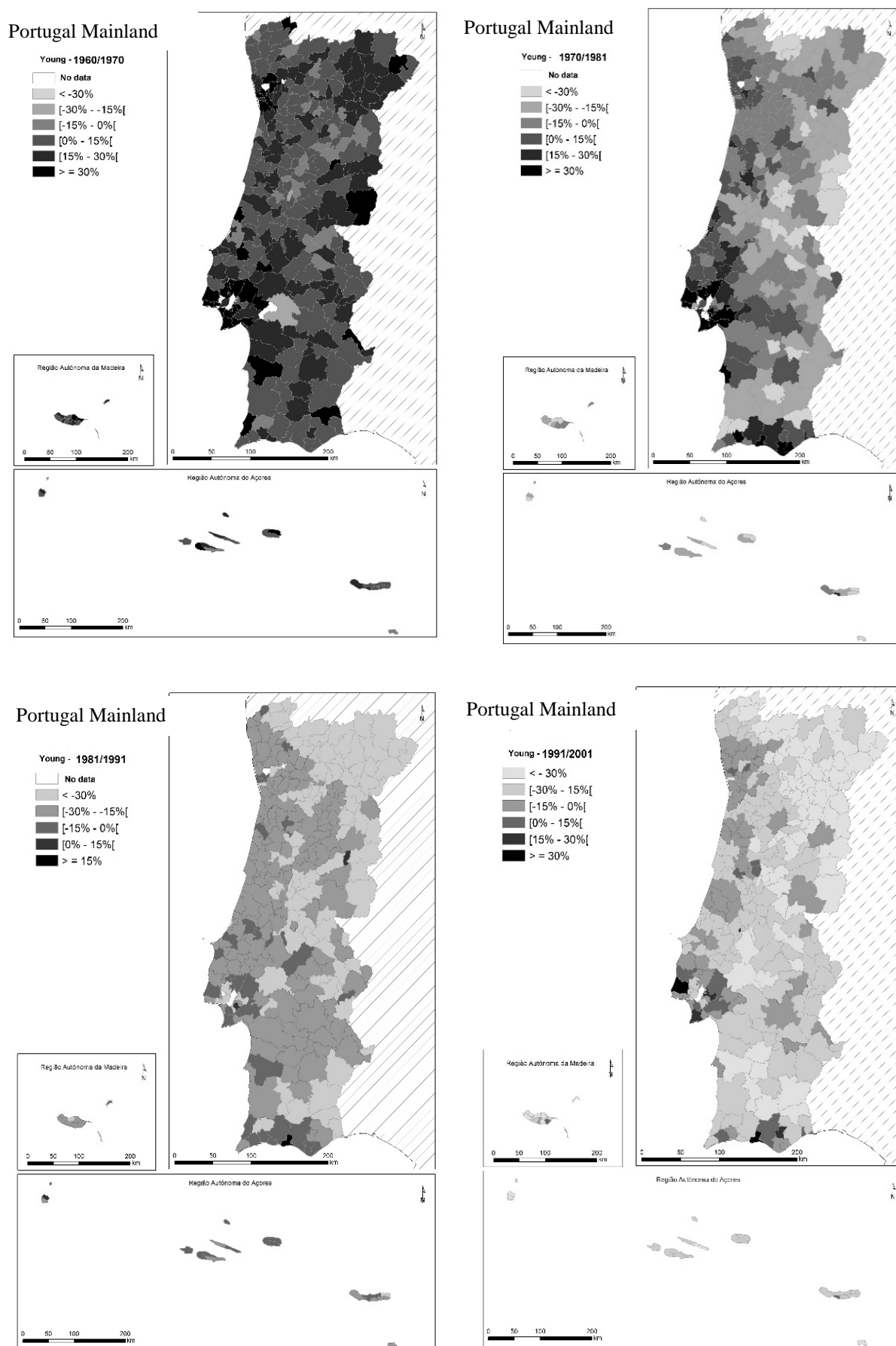
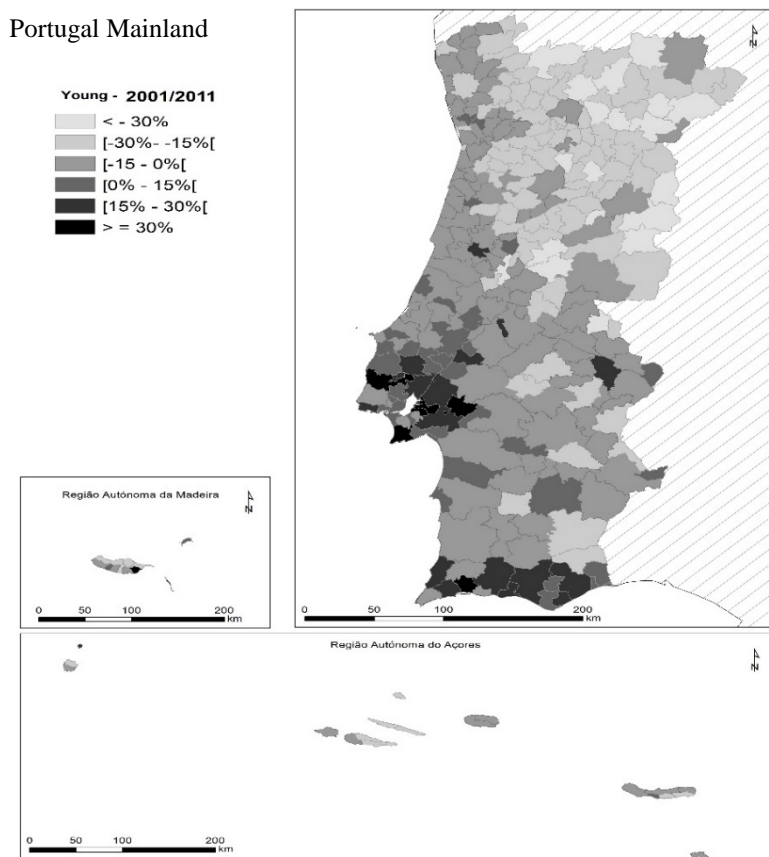


Figure 9. Continued



Source: INE - General Census of Portuguese Population, between 1970 and 2011.

In the 1990s, the ageing process extended regionally, influencing the top or the base of the age pyramid. However, in the last two decades, the municipalities that aged early had smaller variations than those that aged later, particularly visible for rural counties in the interior.

The relationship between youth and the elderly has been changing, as seen in the ageing ratio³⁹. In 1970, only four municipalities had a ratio higher than 100, with the number of elderly exceeding that of the young. The situation reversed in 2011 when only 45 municipalities of the existing 308 reported an ageing ratio of less than 100, i.e. only about 14.6 percent of municipalities still maintain relatively young age structures. The values of this indicator (Figure 11), is strongly contrasting between the highest scores (597.8) and the lowest scores (64.4).

³⁹ The ratio of the number of elderly persons of an age when they are generally economically inactive (aged 65 and over) to the number of young persons (from 0 to 14) (INE).

Figure 10. Rate of change in the age group 65 and over (%) in Portugal 1960–2011

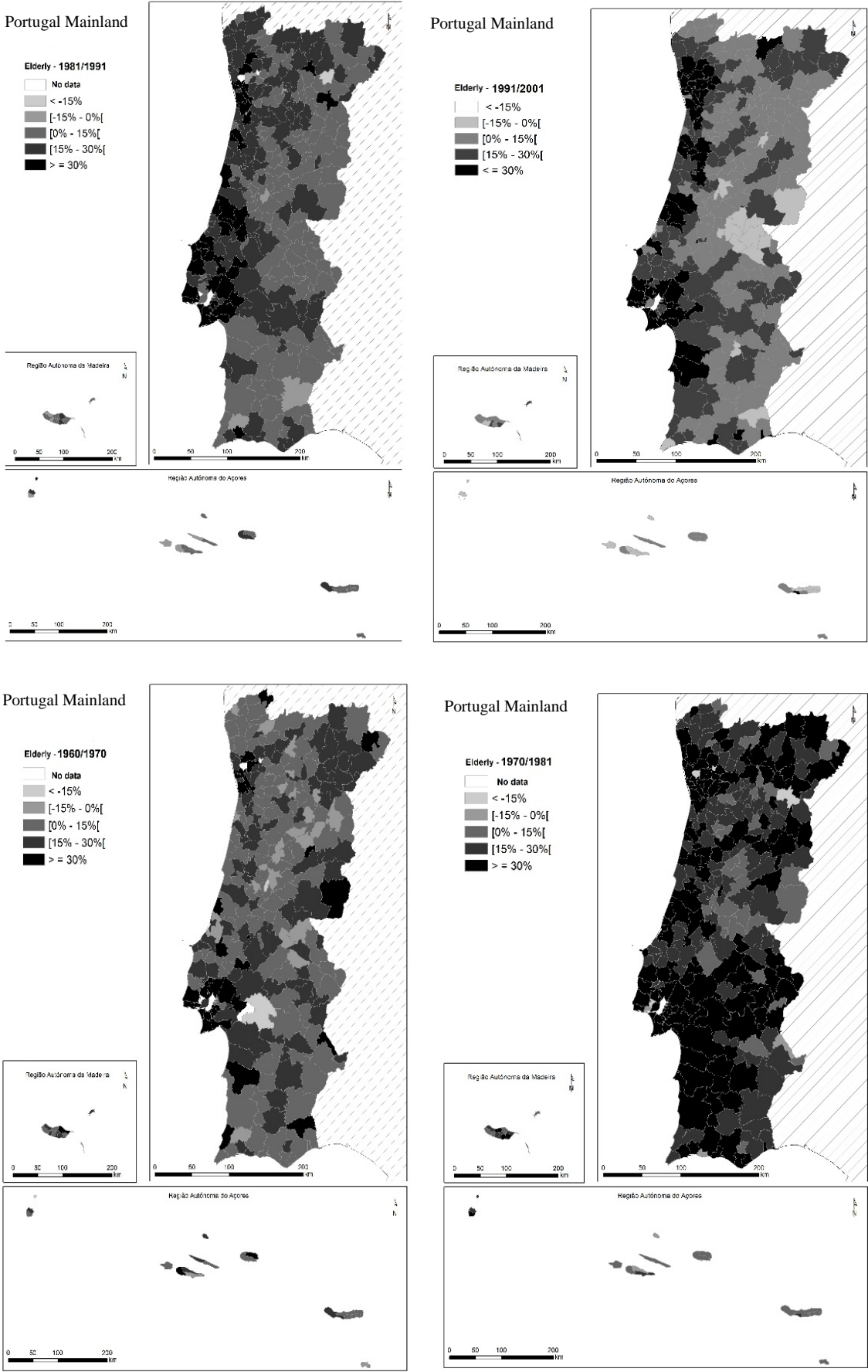
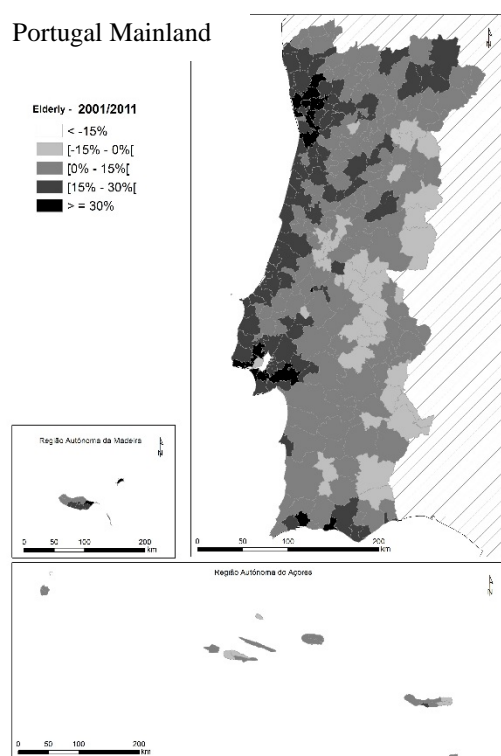


Figure 10, continued



Source: INE - General Census of Portuguese Population, between 1970 and 2011.

As mentioned, the Portuguese development has favoured the coastline, resulting in a progressive loss of demographic and economic vitality of the inland regions, reflecting the geographical distribution of ageing. Previous studies⁴⁰ show that the inland regions, especially the most aged counties, had an overall low index of demographic, economic and social⁴¹ wellbeing. It confirms that different levels of regional development, distribution of wealth and equipment, and levels of wellbeing cause disadvantage and vulnerability for elderly⁴².

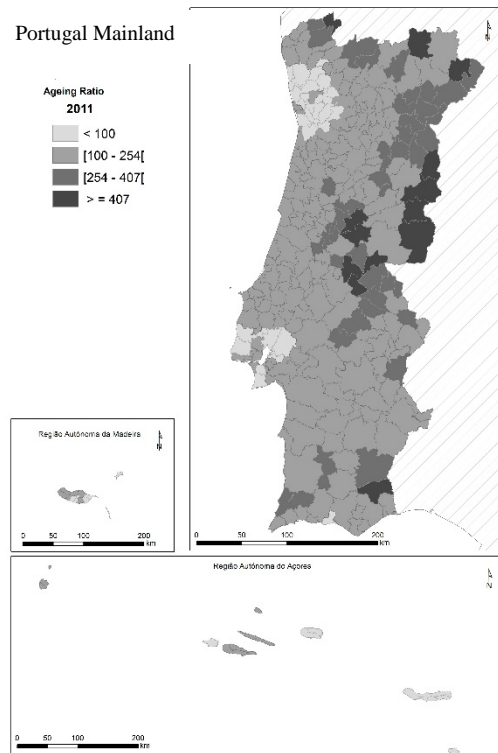
40 Teresa Rodrigues, Maria João G Moreira, “Realidades Demográficas”, in Teresa Rodrigues, João T. Lopes, Luís Baptista, Maria João G, Moreira, coord., *Regionalidade Demográfica e Diversidade Social*, (Porto, 2009), pp. 77–110; Maria João G Moreira, “Environmental Changes and Social Vulnerability in an Ageing Society: Portugal in the Transition from the 20th to the 21st Centuries”, *Hygieia Internationalis*, Volume 9, Issue 1(2010) 397–409.

41 With the goal of understanding if Portugal is or is not more homogeneous regarding the quality of life and social well-being, we built a statistical indicator to summarise and allow a stratification of what was referred to as “global rate of demographic, economic and social well-being”, applicable to all districts of mainland Portugal between 1993 and 2004 (Pereira, L.N., Chorão, L.R. “Avaliação da qualidade de vida e bem-estar”, in Teresa Rodrigues, João T. Lopes, Luís Baptista, Maria João G, Moreira, coord., *Regionalidade Demográfica e Diversidade Social*, (Porto, 2009), pp. 129–151).

42 Maria João G Moreira, “Environmental Changes and Social Vulnerability in an Ageing Society: Portugal in the Transition from the 20th to the 21st Centuries”, *Hygieia Internationalis*, Volume 9, Issue 1(2010) 397–409.

Figure 11. Ageing ratio in Portugal, 2011 (%)

Source: INE - General Census of Portuguese Population, 2011.



Consequently, and regardless of the intensity, in 2011 Portugal's ageing is consolidated, both at the national level and at the local county level. Some counties, around Lisbon and Oporto, in the islands and the Algarve (Albufeira) do, however, still maintain structures where the proportions of youths are higher than that of the elderly (Figure 11). The more aged counties are located in the interior, with some cases where the population aged 65 and over reaches 40 per cent of the total population.

Health facilities and medical personnel are mostly located in the coastal, urban areas, which is a quantitative and qualitative disadvantage for elderly in rural areas.⁴³ Therefore, this resource is not distributed according to in geo-demographic terms and the health/family/patient professional ratio. In addition, above 65 years, there is a growth of diseases related to human ageing (almost entirely chronic diseases, of prolonged evolution), increasing the number of consumers of health services.

⁴³ Paula Santana, "Poverty, social exclusion and Health", *Social Science and Medicine*, 55, (2002), 132–145; Paula Santana, "Ageing in Portugal: regional inequities in health and health care", *Social Science and Medicine*, 50, (2000) 1025–1036; Paula Santana, *Geografias da Saúde e do Desenvolvimento. Evolução e Tendências em Portugal* (Coimbra, 2005).

Final Remarks

In 1979, a pioneer study on the aging of Portuguese society by J.M. Nazareth⁴⁴ stated that, although Portugal was a young country in the European context, it was already possible to see contrasts between young municipalities and other municipalities that already had aged structures.

Today, Portugal is not only one of the most aged countries in Europe, and regional asymmetries are less visible. In fact, between 1970 and 2013, the physiognomy of the Portuguese population has changed, it has grown old, as a result of improved living conditions. The ongoing ageing appears to be one of the biggest challenges of the Portuguese society, with consequences at the economic and social level. Those are not necessarily negative, but require planning and a paradigm shift in society⁴⁵, in a demographic context of negative natural and migratory balances and a declining population trend.

It will be necessary to develop policies that are adopted to real specificities of the Portuguese population structure, to different regional characteristics and to the epidemiological profile. The legislative implementation must be effective, based on transparency and well defined and realised responsibilities of institutions and professionals. If these changes are accomplished, they will contribute, in a positive way, to financial, economic and demographic sustainability of the society in general and of health system in particular, giving all Portuguese excellent standards of health and quality of life.

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⁴⁴ J.M. Nazareth, *O envelhecimento da população portuguesa* (Lisboa, 1979).

⁴⁵ J.M. Nazareth, *Crescer e envelhecer. Constrangimentos e oportunidades do envelhecimento demográfico*, (Lisboa, 2009); Maria João V, Rosa, *O Envelhecimento da Sociedade Portuguesa* (Lisboa, 2012).

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References

- Aguiar, Álvaro e Martins, Manuel M. F., “O Crescimento Industrial”, pp. 185–226 in Pedro Lains, Álvaro Ferreira da Silva (org.) *História Económica de Portugal (1700–2000)*, Vol. III, ICS, Lisboa, 2005.
- Baganha, Maria Ioannis, Marques, J. C. “População”, pp. 33–126, in Nuno Valério, (org.). *Estatísticas Históricas Portuguesa*, II, INE, Lisboa, 2001.
- Bandeira, M. Leston, *Demografia e Modernidade. Família e Transição Demográfica em Portugal*, Imprensa Nacional-Casa da Moeda, Lisboa, 1996.
- Bardet, J.-P., Dupaquier, J., *Histoire des populations de l'Europe-II La révolution démographique 1750–1914*, Fayard, Paris 1999
- Canudas-Romo, V., Gleij, D., Gómez-Redondo, R., Coelho, E., Boe, C. “Mortality changes in the Iberian Peninsula in the last decades of the twentieth century”, *Population*, 63 (2) (2008), 319–344.
- Fernandes, Ana. A. “Determinantes da mortalidade da longevidade: Portugal numa perspectiva europeia (EU-15, 1991–2001)”, *Análise Social*, XLII (183) (2007), 419–443.
- Fernandes, Ana. A., Moreira, Maria João G., Rodrigues, Teresa, “Transição demográfica e transição epidemiológica”, *Forum Sociológico*, 11/12 (2) (2004), 75–104.
- Gonzalez, E. R., Bernabeu Mestre, J.y Benavides, F. G. “La transición sanitaria. Una revisión conceptual”, *Boletín de la Asociación de Demografía Histórica*, XIV: 1 (1996), 117–144.
- Henriques, Filipa, C. e Rodrigues, Teresa, “O Século XX: a transição”, pp. 417–513 in Rodrigues, Teresa, coord, *História da População Portuguesa*, Afrontamento, Lisboa, 2008.
- INE. *Destaque de 10 de julho – População residente em Portugal com tendência para diminuição e envelhecimento*, 2014.
http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=218629052&DESTAQUESmodo=2
- Meslé, F., Vallin, J. “La transition sanitaire: tendances et perspectives”, pp. 439–461 in G. Caselli, J. Vallin, G. Wunsch (dirs.), *Démographie: analyse et synthèse – Les déterminants de la mortalité*, Vol. III, INED, Paris, 2002.
- Morais, Graça, *Causas de Morte no Século xx: A Transição da Mortalidade e Estruturas de Causa de Morte em Portugal Continental*, Edições Colibri, Lisboa, 2002.
- Moreira, Maria João G., Alves, H., Fernandes, O. 2010. Tipologias Regionais do Envelhecimento da População Portuguesa (1900–2005). O envelhecimento no topo”, comunicação apresentada na sessão “Vejez y envejecimiento en la Península Ibérica desde una perspectiva comparada (siglos XVIII–XX)”, no IX Congresso da ADEH, 16, 17, 18 e 19 de Junho de 2010, São Miguel, Açores.

- Moreira, Maria João G., “Environmental Changes and Social Vulnerability in an Ageing Society: Portugal in the Transition from the 20th to the 21st Centuries”, *Hygiea Internationalis*, Volume 9, Issue 1(2010) 397–409
- Moreira, Maria João G., Rodrigues, Teresa, “Os modelos de mortalidade em Portugal”, *Ler História*, 49 (2010), 145–169
- Nazareth, J.M. *Crescer e envelhecer. Constrangimentos e oportunidades do envelhecimento demográfico*, Presença. Lisboa, 2009.
- Nazareth, J.M., *O envelhecimento da população portuguesa*, Presença, Lisboa, 1979.
- Nazareth, J.M., *Explosão Demográfica e Planeamento Familiar*, Presença, Lisboa, 1982
- Oeppen, J. & Vaupel, J.W. “Broken limits to life expectancy”, *Science*, 296 (2002), 1029–1031.
- Oliveira, Isabel, T. “Mortalidade: Compressão, Deslocamento e Causas de Morte (Portugal 1950–2005)”, *Revista de Estudos Demográficos*, 48 (2010), 35–62.
- Oliveira, Isabel. T., Mendes, M. F., “A diferença de esperança de vida entre homens e mulheres: Portugal de 1940 a 2007” *Análise Social*, XLV (194) (2010), 115–139.
- Oliveira, M. M., Afonso, A., Filipe, P., “Perfil da mortalidade por causas de morte para os distritos de Portugal” in *Actas do XII Congresso da Sociedade Portuguesa de Estatística*, Évora. 1994
- Onram, A. R. “The Epidemiologic Transition: a theory of the epidemiology of population change”, *The Milbank Quarterly*, Vol. 83: 4 (2005), 731–57 (Reprinted from *The Milbank Memorial Fund Quarterly*, Vol. 49, No. 4, Pt. 1 (197), 509–538). Style and usage are unchanged)
- Pereira, L.N., Chorão, L.R. “Avaliação da qualidade de vida e bem-estar”, pp. 129–151 in Teresa Rodrigues, João T. Lopes, Luís Baptista, Maria João G, Moreira, coord., *Regionalidade Demográfica e Diversidade Social*, Ed. Afrontamento, Porto, 2009
- Redondo, R. G. (dir). *Salud, Demografia y Sociedad en la población anciana*, Alianza Editorial, Madrid, 2010
- Remoaldo, Paula Cristina A. *Desigualdades territoriais e sociais subjacentes à mortalidade infantil em Portugal*. Textos Universitários de Ciências Sociais e Humanas, Lisboa, Fundação Calouste Gulbenkian, Ministério da Ciência e da Tecnologia, 2002
- Ribeiro, Felipe, Mendes, M. F., “O contributo das diferentes causas de morte para a diferença na esperança de vida entre Portugal e Espanha” Comunicação apresentada *X Congresso da ADEH*, 18 A 21 de Junho de 2013, Albacete (Espanha), 2013
- Rodrigues, I. R. C., *A população portuguesa por nível de escolaridade, sexo e grupo etário: uma análise prospetiva para 2001–2013*. Trabalho de Projeto apresentado ao Mestrado em Bioestatística, Universidade de Lisboa Faculdade de Ciências, 2012

- Rodrigues, Teresa, coord., *História da População Portuguesa*, Afrontamento, Lisboa, 2008
- Rodrigues, Teresa, Alves, H., Fernandes, O. “Tipologias Regionais do Envelhecimento da População Portuguesa (1900– 2005). O envelhecimento na base”, comunicação apresentada na sessão “Vejez y envejecimiento en la Península Ibérica desde una perspectiva comparada (siglos XVIII–XX)”, no *IX Congresso da ADEH*, 16, 17, 18 e 19 de Junho, São Miguel, Açores, 2010.
- Rodrigues, Teresa, Moreira, Maria João G., “Realidades Demográficas”, pp. 77–110 in Teresa Rodrigues, João T. Lopes, Luís Baptista, Maria João G, Moreira, coord., *Regionalidade Demográfica e Diversidade Social*, Ed. Afrontamento, Porto, 2009
- Rodrigues, T., Moreira, Maria João G., “Realidades Demográficas”, pp. 77–110 in Teresa Rodrigues, João T. Lopes, Luís Baptista, Maria João G, Moreira, coord., *Regionalidade Demográfica e Diversidade Social*, Ed. Afrontamento, Porto, 2009
- Rodrigues, Teresa, Lopes, João Teixeira, Baptista, Luís, Moreira, Maria João Guardado, *Regionalidade Demográfica e Diversidade Social*, Porto, 2009
- Rosa, Maria João V., *O Envelhecimento da Sociedade Portuguesa*, FFMS, Lisboa, 2012.
- Rosa, Maria João V., Chitas, P., *Portugal: Os Números*, FFMS, Lisboa, 2010
- Rosa, Maria João V., Seabra, H. e Santos, T., *Contributos dos "Imigrantes" na Demografia Portuguesa: O papel das populações de nacionalidade estrangeira*, Lisboa, Alto Comissariado para a Imigração e Minorias Étnicas (ACIME), 2004
- Santana, P. *Geografias da Saúde e do Desenvolvimento. Evolução e Tendências em Portugal*, Coimbra, 2005.
- Santana, P., “Ageing in Portugal: regional inequities in health and health care”, *Social Science and Medicine*, 50 (2000), 1025–1036.
- Santana, P., “Poverty, social exclusion and Health”, *Social Science and Medicine*, 55 (2002), 132–145.
- Santana, Paula, Vaz, Artur, Fachada Marta, “Estado de saúde dos Portugueses, uma perspectiva espacial”. *Revista de Estudos Demográficos*, 36, (2004), 5–28
- Vallin, J., and Meslé, F., “Convergences and divergences in mortality. A new approach to health transition”, *Demographic Research, Special Collection*, 2 (2004), 12–44.
- Vaupel, J. W., “Biodemography of human aging” *Nature* 464(7288) (2010), 536–542.
- Veiga, Teresa, R., Moreira, Maria João G., Fernandes, A. A. “Social changes and better health conditions of the Portuguese population 1974–2000”, *Hygiea Internationalis*, volume 4, Issue 4 (2004), 255–275.