Health and Life Expectancy differences: Portugal, Spain; Italy and France

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1. The Mortality Gap between Portugal and Europe

This research purpose is to analyse the Portuguese life expectancy evolution within the scope of the convergence framework. The convergence trend in the mortality progress was an established view associated to the demographic transition theory and the modernization perspectives, and it was clearly recognised in the 70's (Omran, 1971; Preston, 1976). Wilson (2001), in a noteworthy paper, discusses the convergence in demographic patterns in the second half of the XX Century. According to Wilson, life expectancy clearly converges, in most of the world, between 1950 and 2000.

However, the convergence hypothesis has been challenged in recent research. In several countries the tendency for increase in life expectancies had stopped or even reversed, as a consequence of political, economic and health factors (McMichael et al. 2004). A new indicator for convergence, proposed by Moser et al. (2005), had showed an increase in the life expectancy divergence since the 80's. However, even in this analysis, the recent divergence in mortality patterns is clearly associated to the setbacks in the sub-Saharan Africa and in the Eastern Europe. On the other hand, the debate about convergence in the life expectancy evolution can be understood as a recurrent phase in the epidemiological transition (Valin and Meslée, 2004), since favoured populations are faster to mach up the progress but, the less favoured ones take longer time to catch up. In this view, the mortality evolution was characterized by alternated periods of divergence and convergence, and an increase of the divergence in life expectancies can be a first sign of new health improvement.

To sum up, the current debate on the convergent trends in mortality is clearly influenced by the divergent paths in the non-Western Europe and in the sub-Saharan Africa. These regions are the scenario of significant setbacks in life expectancy in the last decades.

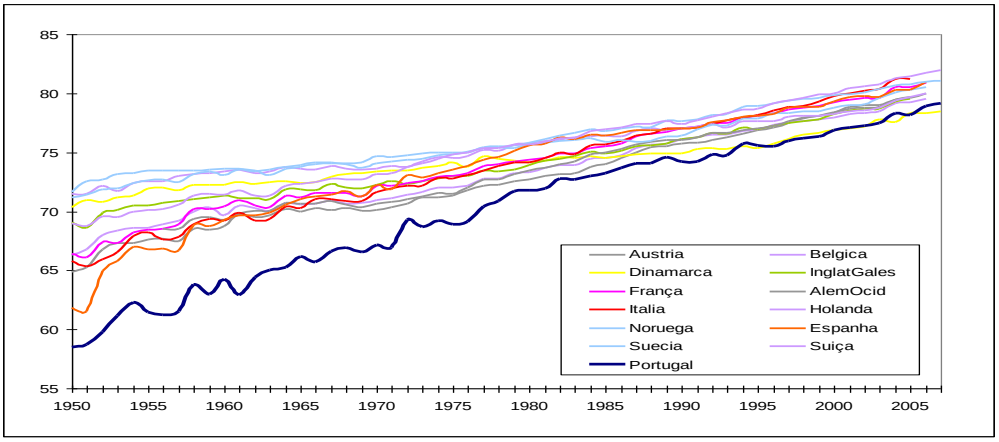
In this investigation, we will discuss the particular path observed in Portugal within the context of the Western Europe and particularly in the South European region.

In the next graph we can see the life expectancy evolution in 13 European countries: Austria, Belgium, Denmark, England and Wales, France, West Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland. These countries comprise 380.6 millions of inhabitants, almost 80% of the European Population[1].

As we can see, in these Western European countries there are not any signs of setback or stalling in the life expectancy progress. All the countries have a positive evolution in the life expectancy and the diversity founded in the 50's had diminished. The most unusual evolution is observed in Denmark, but even in this country, life expectancy had always increased.

The Portuguese situation is a particular case within the European context. During the second half of the XX century, the Portuguese life expectancy had increase steadily, however, since the mid 80s, the convergence process with the others European countries had stalled.

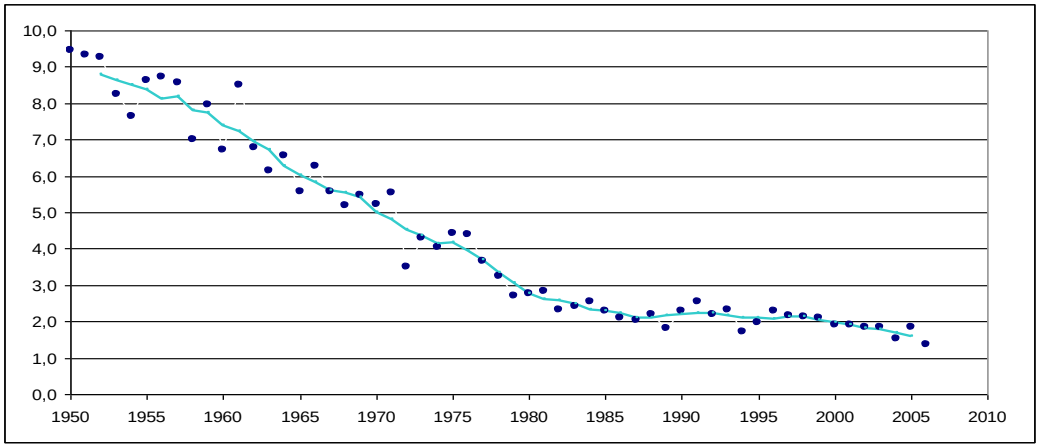
Figure 1 - Life expectancy at birth between 1950 and 2005 (source: HMD)



During the last half of the XX century, the Portuguese life expectancy was significantly below the values observed in the other European countries. In the 50's the difference between the Portuguese life expectancy and the mean value for 13 European countries was around 9 years. This remarkable discrepancy, observed in the 50's, had gradually narrowed to 2 years in the mid 80's. Since then, the divergence between Portugal and the other European countries had remained almost the same (figure 2).

Figure 2 - Life expectancy differences between Portugal and the other European countries

[1] The Central and Eastern Europe countries are not considered in this investigation, because the mortality evolution and the association with the political and economic changes are beyond the scope of this analysis.

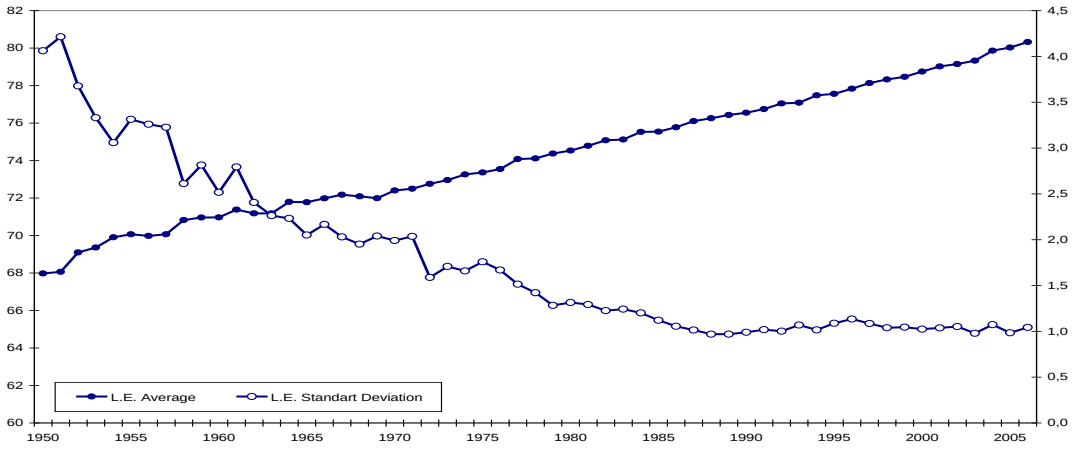


This graph clearly shows the two steps path in the Portuguese convergence progress. Until the mid 80's the attenuation in the gap with the other European countries was a reliable tendency, but since the second half of the 80's this convergence trends had stop. This is unexpected feature because Portugal had joint the European Community in 1986, and this political and economic process was associated with significant economical advantages.

In these circumstances the key question is to understand the stalling in the mortality convergence trend. Is the Portuguese interruption an exceptional case or a typical situation?

The most simple way to understand the main trends in a convergence process is to compute the standard deviation of the life expectancy, in order to observe if the diversity had widen or narrow. In the next graph we can see both the life expectancy average and the standard deviation in the same European countries between 1950 and 2005.

Figure 3 – Life Expectancy Average and Standard Deviation of 13 Countries (1950 – 2005)



The standard deviation evolution is very plain: until the beginning of the 80's the mortality convergence within the Western countries is obvious, but since then the standard deviation had remain around the same absolute values. In the Western Europe there is no support for the idea of divergent trends in mortality. However the stalling of the mortality convergence is unambiguous.

The 80's are a noteworthy point in the European mortality evolution, characterized by the end of a convergence process. In this context it is important to stress the significance of the mortality gains by the advancements in the circulatory system deceases that occurred in the 80's and 90's (Oeppen and Vaupel, 2002). The Vallin and Mesle (2004) hypothesis of alternate's phases of convergence and divergence as any new significant health advance occurs can be discussed.

Currently, in the Western European countries there are no tendency for divergence. On the contrary: almost all the countries were able to progress at the same pace, as the constancy in the standard deviation of the life expectancy evidence. Not only there was maintenance of this diversity index, but also the ranking between the western countries had remained relatively stable: the correlation between life expectancies between 1985 and 2005 is 0.80, and for 1995 and 2005 is 0.95[2].

Regarding the Portuguese stall in the convergence process, we can see that it happen almost at the same time that as in the other Western European countries.

The unusual situation of the Portuguese life expectancy in current days does not rely on a specific setback - the interruption of the convergence process – due to national specificities, but rather to a global trend to stop the convergent trend in mortality levels. Paradoxally, this interruption in the convergence of the mortality patterns is associated to a new convergence: a convergence in the pace of the life expectancy gains.

2. Age and Cause Contributions to the Portuguese Mortality Gains

The comprehension of the Portuguese current position within the European countries can only be achieved after an examination of the age and cause contribution to the life expectancy gains in the last decades.

[2] Is these correlations are computed for males and females the results are higher in the male case – 0.95 for 1985-2005 and 0.89 in 1995-2005 – but for the women the situation ten to be lower – 0.72 in the 1985-2005 correlation and 0.93 in the 1995-2005 one.

In Portugal, the life expectancy evolution since the 80's had been slower then in the previous decades. On the other hand, the importance of the juvenile mortality tends to decrease with time as the gains in this age group tend to fade, as a consequence the relative importance of the gains in adult and elderly mortality to the life expectancy evolution enlarge .

Table 1 - Life Expectancy Evolution (1980-2005)

Year	**Female**	**Male**	**Total**		**Increases**		
1950	61,0	55,8	58,5	Period	**Female**	**Male**	**Total**
1960	66,9	61,3	64,3	1950-60	5,9	5,5	5,8
1970	70,1	63,9	67,2	1960-70	3,2	2,6	2,9
1980	75,2	68,1	71,8	1970-80	5,1	4,2	4,6
1990	77,7	70,6	74,3	1980-90	2,5	2,5	2,5
2000	80,3	73,3	76,8	1990-00	2,6	2,7	2,5
2005	81,3	74,9	78,2	2000-05	1,0	1,6	1,4

In this analysis, for the life expectancy evolution since 1980 in Portugal, the idea is to use relatively small periods of time in order to get a more comprehensive view of the contemporary health evolution. The period between 1980 and 2005 enlighten important the gains in male and female life expectancy at birth. Since the 80's until now, the growth in life expectancy, between 1,0 and 1,5 years for each 5 calendar years, has been moderated, constant but consistent.

These differences in the life expectancy can be decomposed to get an improved perspective on the observed differences. In this analysis, the age specific contributions to the life expectancy gains are based in the decomposition techniques developed by Arriaga (1984) and Pollard (1988). Both methods produce similar results (Preston; Castro), so we used the Arriaga specification because of the straightforward implementation to the Human Mortality Database (HMD) life tables.

We use the usual concept of adult mortality, between the 15 and the 59 years, as a first base to describe the main tendencies. Therefore, our analysis is based in 3 different groups: young people (0-14 years), adults (15 to 59 years) and older person (60 years and above). However, for a more comprehensive observation, in the adult mortality we have considered 3 different age groups: from 15 to 29, from 30 to 44, and from 45 to 59 years old. In the elderly mortality we also considered different age groups: from 60 to 74, from 75 to 89 and higher than 90 years.

Until the mid 80's for females, and until the 90's for males, the infant and child mortality contributes almost half of the gain in life expectancy in Portugal (Canudas et al, 2008). The contribution from other age groups only became preponderant afterwards. At a first glance, we will show the youngsters, adults and elderly contribution for the gains in life expectancy. The key

feature from this analysis is the diminishing importance of infant and child mortality, the main source of the life expectancy evolution during almost all the late XX century.

Table 2 – Age Contributions for Life Expectancy Gains (1980-2005)

Males	1980-85	1985-90	1990-95	1995-00	2000-05	Females	1980-85	1985-90	1990-95	1995-00	2000-05
0-14	0,73	0,62	0,43	0,23	0,32	0-14	0,69	0,42	0,34	0,18	0,24
15-29	0,10	-0,10	0,02	0,32	0,37	15-29	0,05	0,03	0,03	0,11	0,06
30-44	0,12	-0,08	-0,11	0,09	0,22	30-44	0,07	0,05	0,05	0,03	0,12
45-59	0,15	0,25	0,26	0,16	0,07	45-59	0,08	0,11	0,21	0,09	0,12
60-74	0,27	0,19	0,35	0,46	0,45	60-74	0,35	0,20	0,39	0,35	0,33
75-89	0,13	0,15	0,26	0,14	0,17	75-89	0,28	0,19	0,43	0,30	0,22
90 +	0,00	0,00	0,01	0,02	-0,01	90 +	0,01	0,00	0,04	0,02	-0,01
Total	1,49	1,04	1,24	1,42	1,59	Total	1,53	1,00	1,48	1,08	1,08

In a closer look, we can see the evolution within the youngster, adult and elderly. The importance of the infant mortality is clearly decreasing during this period (however in the last five years there was a very small increase in this contribution for the life expectancy evolution) in both sexes. The role from the others young age groups also tends to decrease with time.

As for the adult mortality it is possible to see a more complex situation. In the women case, the contribution for the life expectancy evolution is relatively small and it is concentrated in the final age groups. In the last five years the female adult mortality evolution tends to have a higher effect in the life expectancy, and this trend is particularly clear for the final age groups. In recent times, the female adult mortality contribution for the life expectancy has approximately the same magnitude of the infant and child mortality, but is clearly lower to the old women contribution.

The male population reveals more contradictory movements. In a first glance there were important contributions from the adult population in the first period, 1980-85, and in the last ten years, between 1995 and 2005. During the first half of the 80's the young men, below 20 years old, and the male population above 40 years is the main player of the positive observed trend afterwards, between 1985 and 1990, the male population above 40 years continues to provide a positive input to the life expectancy evolution. However, during that period, the young men, from 15 to 39 years impact the life expectancy in a negative way – a common situation to other European countries (Canudas, et al, 2008; Redondo and Boe, 2005). During the first half of the 90's, this negative contribution to the life expectancy still remains, but in to a lesser extend, because there is a small number of ages with this type of impact; on the other hand, the positive effects from the older adult males remain noteworthy, but more concentrated in the last ages.

After 1990 there are no more negative impacts from the relatively young males in the life expectancy evolution. On the opposite, these age groups tend to have positive impacts and in a

higher degree, during the last decade; as a result the adult mortality contributions for the improvements of the life expectancy are above half years of life in each of these five calendar years. In the male case, the adult mortality improvements are as important as the old age improvements in the last decade, and largely superior to the infant and child mortality ones.

As for the old age mortality contribution in the increasing life expectancy we can see different evolution in each one of the sexes. In the women case the contribution is around or above half year of life for each five calendar years, and has important fluctuation in this period, so it is not clear if the last we are attending to a downward tendency from the old women impact in the life expectancy during the last 15 years. In the women case the gains tend to higher in the oldest ones.

For males, the contributions tend to be smaller until 1990 but, since the 90's, the elderly mortality contribution tends to be stable, by around 0.6 years by each five years calendar. Differing from the women old age mortality, here the gains tend to be higher in the young age groups from the elderly.

These gains in life expectancy can also be decomposed by cause to understand the relative contributions from each cause of death. As we have discuss before, this type of approach requires that the *ill defined* causes of death are residual in importance, or at least, that his importance is from the same magnitude. The last idea, the constancy of the level in the *ill defined* causes, is a based on the impossibility of substantial movements from the *ill defined* for the others specified causes of death, in a situation with constant levels of *ill defined* causes.

For the last 10 years the importance of the ill defined causes remain relatively constant in Portugal, so it reasonable to essay with this methodology. Even if the results must be read with caution, as we will see.

The decomposition methods, for differences in life expectancy, were developed in the 80's by several authors. In this analysis we use the technique propose by Arriaga, implemented as in Preston (2001,64). The data used in this estimation are the life tables from the Human Mortality Database and the cause of death statistics by age and sex from the Eurostat data base. For the cause of death percent there were used the average from the 3 years around the calendar year of the life table.

The 17 main categories from the International Classification of Deceases were grouped in only 9 categories (one is the usual ill defined causes, and the other is the aggregation of the least frequent causes)

Table 3 - Main causes of death in Portugal in 1995, 2000, 2005

	Males				Females			
	1995	2000	2005	1995-2005	1995	2000	2005	1995-2005
Infectious and parasitic diseases	2,7	2,9	2,5	-0,1	1,0	1,5	1,6	0,6
Neoplasms	21,7	23,4	24,5	2,8	17,4	17,9	18,3	0,9
Endocrine, nutritional and metabolic	2,5	2,7	3,9	1,4	4,2	4,2	5,7	1,5
Diseases of the circulatory system	36,5	33,7	29,6	-7,0	47,8	44,2	38,9	-8,9
Diseases of the respiratory system	8,4	10,1	11,0	2,6	6,9	9,3	9,9	3,1
Diseases of the digestive system	5,2	4,6	5,0	-0,3	3,4	3,2	3,6	0,2
External causes	8,0	6,3	5,9	-2,1	3,1	2,6	2,4	-0,7
Others	3,9	4,3	6,2	2,1	4,1	4,5	7,3	3,0
Ill-defined causes	10,9	12,2	11,4	0,5	12,0	12,7	12,3	0,3
Total	100,0	100,0	100,0		100,0	100,0	100,0	

As we can see, the major differences came from the increase of Neoplasms and the deaths caused by the respiratory system. However, as we discuss before, the prevalence of an important set of undefined causes is always problematic.

The contribution from the different death causes to the life expectancy increase is showed in the next tables.

Table 4 - Cause and age contribution for life expectancy increase: Males 1995-2005

	Age contributions (years)						**Total**	
Males 1995-00	**0-14**	**15-29**	**30-44**	**45-59**	**60-74**	**75+**	**(years)**	**(%)**
Infectious and parasitic	0,00	0,05	-0,02	0,00	0,00	-0,01	0,03	2,1
Neoplasms	0,01	0,01	0,01	-0,01	0,07	-0,03	0,06	4,2
Endocrine, nutritional and metabolic	0,00	0,00	0,00	0,00	0,01	-0,01	0,00	0,0
Circulatory system	0,00	0,01	0,02	0,08	0,31	0,24	0,65	45,8
Respiratory system	0,01	0,01	-0,01	0,01	0,00	-0,06	-0,04	-2,8
Digestive system	0,00	0,01	0,02	0,04	0,05	0,01	0,13	9,2
External causes	0,07	0,20	0,09	0,07	0,03	0,01	0,47	33,1
Other	0,12	0,01	0,01	0,01	0,00	-0,03	0,12	8,5
Il defined causes	0,01	0,02	-0,03	-0,03	-0,01	0,04	-0,01	-0,7
Males 2000-05	**0-14**	**15-29**	**30-44**	**45-59**	**60-74**	**75+**		
Infectious and parasitic	0,03	0,09	0,05	-0,01	0,00	-0,01	0,15	9,4
Neoplasms	0,01	0,00	0,01	-0,04	0,05	-0,01	0,01	0,6
Endocrine, nutritional and metabolic	0,00	0,00	0,00	0,00	-0,01	-0,04	-0,04	-2,5
Circulatory system	0,01	0,02	0,03	0,09	0,29	0,27	0,70	44,0
Respiratory system	0,01	0,01	0,02	0,01	0,06	0,00	0,11	6,9
Digestive system	0,01	0,01	0,00	0,00	0,02	0,00	0,03	1,9
External causes	0,05	0,10	0,02	0,00	0,00	0,00	0,16	10,1
Other	0,13	0,00	0,00	-0,02	-0,02	-0,07	0,02	1,3
Il defined causes	0,07	0,15	0,11	0,04	0,05	0,03	0,45	28,3

The male life expectancy evolution in the last five years of the XX century had significant gains mainly due to the improvements in the circulatory system deceases (45%), mainly after the 60 years old, and to the decline of the external causes of mortality (38%), largely in young male

adults[3]. The gains in the remaining causes of death and in the digestive system deceases are also noteworthy (13% and 11% of the total gains).

In the next period, the raise in the male life expectancy is mainly due to the improvements in the circulatory system deceases (47%) – as in the former period, these gains are concentrated in the elderly- and also in the external causes of death (11%) – also strong in young adults. The ill defined causes diminish, so they contributed to the overall increase in life expectancy (28%).

During the last half of the 90's, more than half (60%) of the female life expectancy increase is associated with the advances in the circulatory system deceases. The second major cause of the mortality gains is the external causes of death (19%), and the third one is the remaining causes of death (14%). And the neoplasm deaths are only the fourth factor that contributed to the life expectancy increase (11%).

Table 5 - Cause and age contribution for life expectancy increase: Females 1995-2005

	Contribution by age (years)						**Total**	
Females 1995-00	**0-14**	**15-29**	**30-44**	**45-59**	**60-74**	**75+**	**(years)**	**(%)**
Infectious and parasitic	-0,01	0,01	-0,02	-0,01	-0,01	-0,01	-0,04	-3,7
Neoplasms	0,01	0,01	0,03	0,02	0,06	0,00	0,14	13,0
Endocrine, nutritional and metabolic	0,00	0,00	0,00	0,00	0,02	0,00	0,02	1,9
Circulatory system	0,01	0,01	0,00	0,05	0,26	0,34	0,67	62,0
Respiratory system	0,01	0,00	0,00	0,00	-0,01	-0,04	-0,04	-3,7
Digestive system	0,00	0,00	0,01	0,02	0,04	0,01	0,08	7,4
External causes	0,04	0,05	0,02	0,02	0,01	0,00	0,15	13,9
Other	0,10	0,00	0,00	0,00	-0,01	-0,03	0,07	6,5
Il defined causes	0,01	0,01	-0,01	-0,01	-0,01	0,04	0,03	2,8
Females 2000-05	**0-14**	**15-29**	**30-44**	**45-59**	**60-74**	**75+**		
Infectious and parasitic	0,03	0,02	0,01	-0,01	0,00	-0,02	0,03	2,8
Neoplasms	0,01	0,00	0,04	0,03	0,02	-0,03	0,07	6,5
Endocrine, nutritional and metabolic	0,00	0,00	0,00	0,00	0,00	-0,06	-0,06	-5,6
Circulatory system	0,00	0,00	0,02	0,06	0,25	0,44	0,78	72,2
Respiratory system	0,00	0,00	0,01	0,01	0,04	-0,02	0,04	3,7
Digestive system	0,00	0,00	0,00	0,01	0,00	-0,02	0,00	0,0
External causes	0,05	0,02	0,00	0,00	0,00	-0,01	0,07	6,5
Other	0,09	0,00	0,00	0,00	-0,01	-0,13	-0,07	-6,5
Il defined causes	0,05	0,02	0,04	0,01	0,02	0,06	0,20	18,5

In the first half of the XXI century, the female mortality gains are particularly determined by the achievements made in the circulatory system deceases (more than 75%), mainly after the 75 years. The second major cause the observed increase in life expectancy is the ill defined causes of death (19%). The neoplasm and the external causes have also contributed to the observed gains in mortality. On the other hand, both the ill defined causes and the endocrine, nutritional and metabolic deceases have negative contributions to the overall life expectancy evolution.

[3] These gains are associated to the decreases of traffic accidents, as in many other European countries (Redondo and Boe, 2007, Canudas et al; 2008).

In the 2000-2005 period, the causes contribution for the improvements in the male and female life expectancy gains are severely conditioned by the ill defined causes contribution. As a mater of fact, if this cause of death has such a significant contribution, that imply that the specific gains by all the other causes would be higher if the cause definition was more accurate. The results of the cause contribution are, in the Portuguese case, a lower bound to the real contributions for the life expectancy increase.

Almost all of the causes of death have positive contributions to the mortality gains, however in this period a specific cause of death – the endocrine, nutritional and metabolic deceases – have the opposite effect in the life expectancy. This new tendency can be observed both for the women as in the male analysis.

To sum up, we can see that the main source of life increase, both for females and males, in the last decade was the improvement in the treatment of the *circulatory system* deceases. This cause of death was responsible for above 50% of the gains in life expectancy.

The *external* causes of death were also an important driver of the health evolution, particularly in the 1995-2000 period, and particularly in the male case (this cause of death was mainly associated with car accidents). The decline in the deaths by *neoplasm* also contributed positively to a longer life, particularly in the women population, by the importance of the gains from this origin tended to get smaller.

The deaths from endocrine, nutritional and metabolic deceases became an important cause for slowing the increase in life expectancy in the last five years. The contribution from the cause of death was negative, so the life expectancy gains could be a bit higher if this cause hadn't became more expressive.

Table 6 - Total Contributions to the Increase in Life Expectancy between 1995 and 2005

	Males		Females	
	1995-2000	2000-2005	1995-2000	2000-2005
Infectious and parasitic	-0,04	0,03	0,03	0,15
Neoplasms	0,14	0,07	0,06	0,01
Endocrine, nutritional and metabolic	0,02	-0,06	0,00	-0,04
Circulatory system	0,67	0,78	0,65	0,70
Respiratory system	-0,04	0,04	-0,04	0,11
Digestive system	0,08	0,00	0,13	0,03
External causes	0,15	0,07	0,47	0,16
Other	0,07	-0,07	0,12	0,02
Il defined causes	0,03	0,20	-0,01	0,45
Total	1,08	1,08	1,42	1,59

Last but the least, the decline in the ill defined causes, between 2000 and 2005, was from 0,8% (12,2%-11,4%, see table 6) in the male population but had result in a 0,45 years of life contribution: almost one third of the health gains, and it is the second most important driver of

the evolution. For females, the 0,4% difference (12,7% to 12,3%, see table 6) in this cause, resulted in a 0,20 years in life contribution, also the second major source of increase, but only one fifth of the gains.

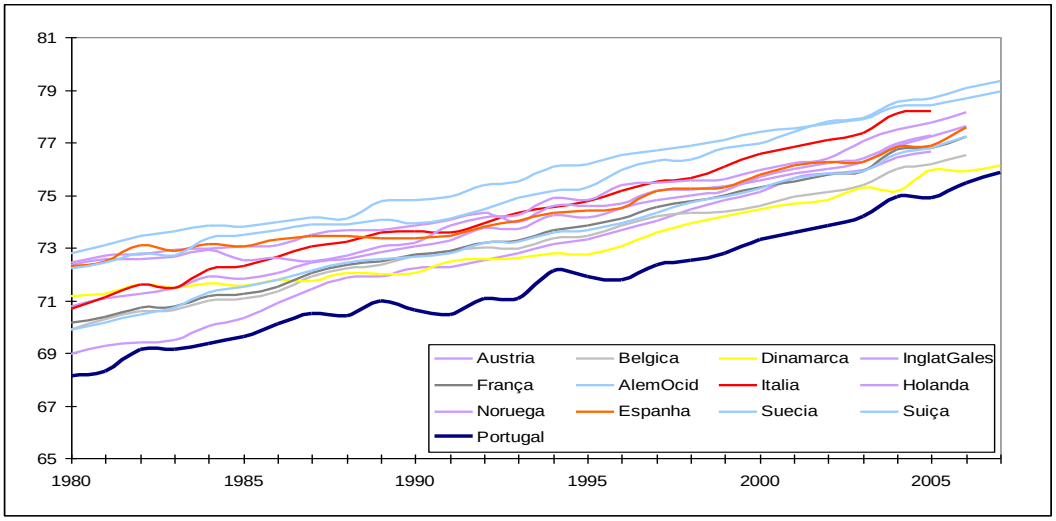
The magnitude of the ill defined causes of death constitutes a major problem in the analysis of the causes of death contribution, even in Portugal, were the relative level remain almost constant in the last decade. With different levels of ill defined causes, as between Portugal and the other countries, this type of analysis would not hold.

3. The Gap between Portugal and Other European Countries

Since the 80's the discrepancies in life expectancy between Portugal and the other European countries tend to remain around the same values. This last phase, characterised by the stability of the differences in the life expectancy, is particularly important to understand the current tendencies and the near future. So, we will focus our analysis in this period, to get a closer look regarding the differences between Portugal and the other Southern European countries. This analysis aim is to understand the age contributions for the diversity in life expectancies between Portugal and some of the other European countries (Spain, Italy and France).

As we can see, for males, the life expectancy in Portugal is clearly below the values observed in the other countries in the south of Europe. The male life expectancy in Portugal is always lower the observed values observed in the other western European countries. Since the 80's there is not any trend to convergence in the male mortality. If compared with the other south European countries, as Spain, Italy and France the difference is even clear.

Figure 7 - Male life expectancy at birth (1980-2005)



For males, the differences in life expectancy between Portugal and Italy are rather constant since the 80's and there were even a small increase: about 2.5 and 3 years of life expectancy. Regarding Spain and differences tend to narrow, from above 4 years to above 2 years of difference. And the differences with the France tend to remain around 2 years.

As for the age contribution to the observed differences, we can see the results from a decomposition analysis in the next table.

Table 7 - Decomposition of the Differences in the Male life expectancy at birth

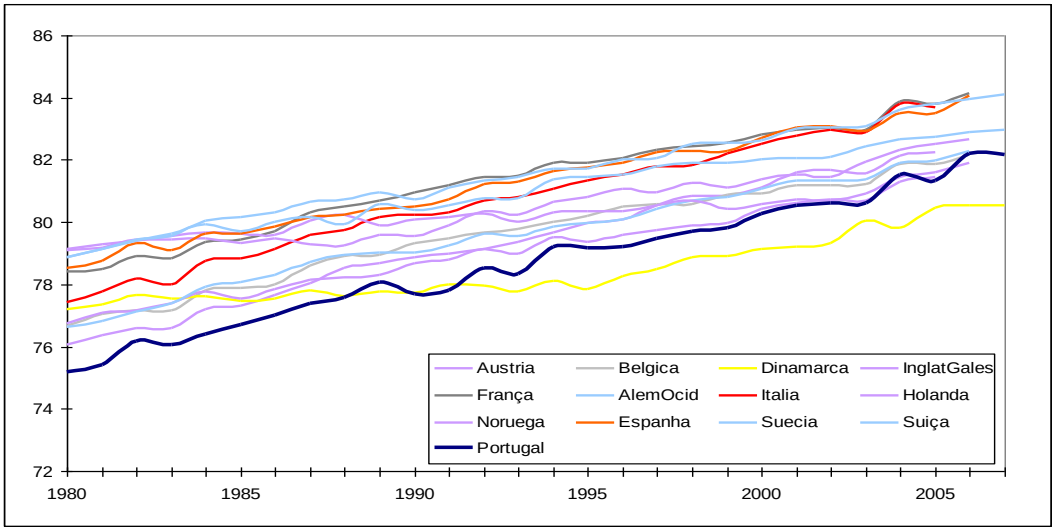
	Absolute differences (years)						Relative differences (%)					
Portugal- Italy	1980	1985	1990	1995	2000	2005	1980	1985	1990	1995	2000	2005
0-14	1,23	0,95	0,55	0,28	0,28	0,05	47,9	35,1	18,5	9,8	8,6	1,5
15-29	0,51	0,53	0,53	0,63	0,43	0,22	19,8	19,6	17,8	22,0	13,2	6,6
30-44	0,47	0,5	0,55	0,59	0,81	0,79	18,3	18,5	18,5	20,6	24,8	23,8
45-59	0,20	0,41	0,58	0,59	0,70	0,95	7,8	15,1	19,5	20,6	21,5	28,6
60-74	0,02	0,12	0,36	0,40	0,53	0,64	0,8	4,4	12,1	13,9	16,3	19,3
75-89	0,12	0,18	0,37	0,35	0,48	0,62	4,7	6,6	12,5	12,2	14,7	18,7
90+	0,00	0,01	0,03	0,03	0,03	0,06	0,0	0,4	1,0	1,0	0,9	1,8
Total	2,57	2,71	2,97	2,87	3,26	3,32						
Portugal- Spain	1980	1985	1990	1995	2000	2005	1980	1985	1990	1995	2000	2005
0-14	1,4	1,01	0,51	0,35	0,23	-0,01	33,3	29,4	19,0	13,9	9,2	-0,5
15-29	0,57	0,46	0,28	0,52	0,39	0,17	13,5	13,4	10,4	20,7	15,7	8,5
30-44	0,46	0,38	0,27	0,20	0,50	0,50	10,9	11,0	10,0	8,0	20,1	24,9
45-59	0,64	0,58	0,45	0,32	0,34	0,41	15,2	16,9	16,7	12,7	13,7	20,4
60-74	0,70	0,60	0,67	0,61	0,48	0,35	16,6	17,4	24,9	24,3	19,3	17,4
75-89	0,41	0,39	0,48	0,47	0,52	0,53	9,7	11,3	17,8	18,7	20,9	26,4
90+	0,02	0,02	0,02	0,04	0,03	0,06	0,5	0,6	0,7	1,6	1,2	3,0
Total	4,21	3,44	2,69	2,51	2,49	2,01						
Portugal- France	1980	1985	1990	1995	2000	2005	1980	1985	1990	1995	2000	2005
0-14	1,48	1,02	0,55	0,39	0,22	0,03	72,2	62,2	26,3	19,7	11,1	1,6
15-29	0,17	0,22	0,36	0,47	0,34	0,11	8,3	13,4	17,2	23,7	17,1	5,8
30-44	0,13	0,06	0,10	0,18	0,43	0,42	6,3	3,7	4,8	9,1	21,6	22,1
45-59	-0,19	-0,16	0,00	-0,04	-0,03	0,03	-9,3	-9,8	0,0	-2,0	-1,5	1,6
60-74	0,18	0,23	0,55	0,44	0,38	0,41	8,8	14,0	26,3	22,2	19,1	21,6
75-89	0,27	0,26	0,5	0,51	0,63	0,84	13,2	15,9	23,9	25,8	31,7	44,2
90+	0,01	0,01	0,02	0,03	0,02	0,06	0,5	0,6	1,0	1,5	1,0	3,2
Total	2,05	1,64	2,09	1,98	1,99	1,9						

Infant and youth mortality remain the most important source of the observed differences for a longer period than in the female case. The elderly mortality became increasingly significant but, even in nowadays, it is not the most important one in the Portugal-Italy, and in the Portugal-Spain comparisons (in the women case represent more than 75% of the total difference).

However in the Portugal-France analysis the mortality above 60 years is responsible for almost 70% of the observed differences in the male life expectancy at birth. As a matter of fact, the adult mortality is a major source of the observed discrepancies between Portugal and the other countries: almost 70% of the difference with Italy, almost 55% of the total difference with Spain and only 30% regarding France. Within the adult mortality we can see a tendency to move from the 15-29 age group to the middle one, and then to the 45-59 age group in Italy an Spain; this movement to the older ages it is not so clear in France.

As we can see, the Portuguese female life expectancy had continued to converge with most European countries. In nowadays the Portuguese level at the same level of some other European countries with the least life expectancies (United Kingdom, Netherlands, Belgium) and even better than Denmark [4]. However, the Portuguese gap with the other countries in the South of Europe remains important.

Figure 8 -Female life expectancy at birth (1980-2005)



The life expectancy difference tend to get smaller with Spain and France: the gap decrease from around 3 years to 2 or 2,5 years. However, the contrast with Italy reveals a distinct situation from the male case: the differences tend to be stable during the last 25 years. The decomposition of the age contributions to the observed differential in each moment can be seen I table 8.

[4] The Danish life expectancy evolution had a very particular situation, in the women case, associated with the highest tobacco consumption

Table 8 -Decomposition of the Differences in the Female life expectancy at birth

	Absolute differences (years)						Relative differences (%)					
Portugal- Italy	1980	1985	1990	1995	2000	2005	1980	1985	1990	1995	2000	2005
0-14	0,97	0,62	0,40	0,22	0,18	0,06	42,9	29,1	15,7	10,2	8,0	2,5
15-29	0,19	0,20	0,17	0,16	0,09	0,10	8,4	9,4	6,7	7,4	4,0	4,2
30-44	0,22	0,25	0,23	0,16	0,25	0,21	9,7	11,7	9,0	7,4	11,2	8,9
45-59	0,17	0,27	0,33	0,22	0,26	0,26	7,5	12,7	12,9	10,2	11,6	11,0
60-74	0,33	0,32	0,55	0,47	0,44	0,42	14,6	15,0	21,6	21,8	19,6	17,8
75-89	0,38	0,45	0,82	0,87	0,94	1,17	16,8	21,1	32,2	40,3	42,0	49,6
90+	0,00	0,02	0,05	0,07	0,09	0,14	0,0	0,9	2,0	3,2	4,0	5,9
Total	2,26	2,13	2,55	2,16	2,24	2,36						
Portugal- Spain	1980	1985	1990	1995	2000	2005	1980	1985	1990	1995	2000	2005
0-14	1,12	0,71	0,36	0,22	0,17	0,02	33,4	24,2	12,8	8,5	6,9	0,9
15-29	0,20	0,18	0,08	0,12	0,08	0,07	6,0	6,1	2,8	4,7	3,3	3,3
30-44	0,25	0,25	0,19	0,09	0,18	0,14	7,5	8,5	6,7	3,5	7,3	6,5
45-59	0,35	0,44	0,43	0,35	0,35	0,28	10,4	15,0	15,2	13,6	14,2	13,1
60-74	0,71	0,67	0,82	0,79	0,67	0,58	21,2	22,9	29,1	30,6	27,2	27,1
75-89	0,67	0,65	0,88	0,95	0,93	0,96	20,0	22,2	31,2	36,8	37,8	44,9
90+	0,05	0,03	0,05	0,06	0,07	0,09	1,5	1,0	1,8	2,3	2,8	4,2
Total	3,35	2,93	2,82	2,58	2,46	2,14						
Portugal- France	1980	1985	1990	1995	2000	2005	1980	1985	1990	1995	2000	2005
0-14	1,26	0,76	0,46	0,3	0,2	0,06	38,9	27,6	14,0	11,0	7,8	2,4
15-29	0,06	0,05	0,08	0,06	0,05	0,03	1,9	1,8	2,4	2,2	2,0	1,2
30-44	0,09	0,09	0,08	0,00	0,07	0,04	2,8	3,3	2,4	0,0	2,7	1,6
45-59	0,09	0,17	0,24	0,12	0,06	-0,02	2,8	6,2	7,3	4,4	2,4	-0,8
60-74	0,86	0,78	1,03	0,79	0,66	0,53	26,5	28,4	31,4	28,9	25,9	21,5
75-89	0,85	0,86	1,3	1,35	1,39	1,65	26,2	31,3	39,6	49,5	54,5	66,8
90+	0,03	0,04	0,08	0,1	0,11	0,19	0,9	1,5	2,4	3,7	4,3	7,7
Total	3,24	2,75	3,28	2,73	2,55	2,47						

In the 80's, infant mortality was the most important cause of the observed discrepancies in the female life expectancy between Portugal and the other southern countries. However, this situation had change significantly. In nowadays, the most important source of the differences in life expectancy is the elderly mortality. The mortality above 60 years old is the source of approximately 75% of the observed differences between Portugal and Italy and Spain and, 95% of the difference between Portugal and France. Within the elderly mortality, the contribution from the oldest ones, above 75 years old, is particularly significant, and attends for half or more of the inter country differences in female life expectancy.

The decomposition of the differences in the male life expectancy show a very different picture from the one observed in the female case.

If the Portuguese causes of death classification was more accurate this analysis could be extended to the cause contribution. That approach is a very important piece to understand the health differences between regions or in the life expectancy evolution. However, this type of study requires good quality data on the causes of death, as the previous one require accurate statistics on the age of death. The statistics about the age and sex of the deaths is usually reliable in all European countries, but the accuracy in the cause of death data is problematic for some countries, and in particular for Portugal.

Portugal is the European country with the higher percent of *ill defined* causes. In current days the percent of *ill defined* causes is 11% in Portugal, when the equivalent situation in Spain is about 3%, in Italy 4% and in France 7%.

The analysis of the cause of death contribution for the diversity in the life expectancies require a very low percent of ill defined causes, or at least a very similar percent in the populations in evaluation. Higher life expectancies can be related with better medical care and this factor can be associated with the accuracy in reporting the causes of death. A diminishing percent of the ill define causes induce the increase in the others causes percent. But the raise in the others causes of death is only apparent in the statistics, and does not result from any real increase of the others decease in the population. In fact, a lower level of *ill defined* causes is usually associated with a better health situation and higher life expectancies. So, an increase in the percent of other causes of death doesn't mean an increase in incidence of deaths by these causes.

The methodology for the calculus of the cause of death contribution tends to generation very problematic analysis when there are differences in the ill defined causes, as we will see latter[5].

However, even without use the contribution approach, it is important to get an idea of the main causes of death in these countries. The statistics used in this point are obtained in the Eurostat database and the 10th International Classification of Deceases (ICD-10) was used.

[5] We will see that in the evolution of the Portuguese life expectancy, differences of less than 1% in the *ill defined* causes can make this cause of death de second major source of increase in life expectancy.

Table 9 - Causes of Death in Portugal, Spain, Italy and France

	Portugal	Spain	Italy	France
Symptoms, signs, abnormal findings, ill-defined causes	11,3	2,8	1,8	6,5
Infectious and parasitic diseases	2,2	1,9	1,3	1,9
Neoplasms	22	26,7	29,3	29,9
Endocrine, nutritional and metabolic diseases	4,7	3,2	4,1	3,7
Diseases of the circulatory system	34,2	32,9	40,2	28,5
Diseases of the respiratory system	10,1	11,1	6,7	6,2
Diseases of the digestive system	4,4	5,2	4,1	4,5
External causes of injury and poisoning	4,7	4,4	4,4	7,2
Remaining Causes	6,5	11,7	8,2	11,8
All causes of death	100	100	100	100

Souce: Eurostat database. For Portugal, Spain and France the figures result from the average of the 2004, 2005 and 2006 years. For Italy the figures result only from the average between 2002 and 2006.

We can see that the most important causes of death are the deceases of the *circulatory system*; this cause of death is closely followed by the *Neoplams*, in almost all countries except in France. In France these two causes have a very similar magnitude. The deceases of the *respiratory system* are more important in Portugal and Spain than for Italy and France – this cause of death tends to be the third most important one, except in France, where the *external* causes are a bit higher. The deaths from *external causes*, from *endocrine, nutritional and metabolic deceases*, and from the *digestive system* are globally significant, but usually don't exceed the 5%.

The importance of the different causes of death is relatively reliable For Spain and Italy, but we must be cautious with the French case, and spatially the Portuguese one, due to the magnitude of the *ill defined* causes. In France, but particularly in Portugal, all causes of death are underreported due to that problem.

4. Conclusion

In the 50's the difference between the life expectancy in Portugal and the mean value in Europe was about 9 years; this discrepancy had gradually narrowed to 2 years in the mid 80's. Since then, this difference had remained almost the same.

We will focus our analysis in the period after 1980 to get a closer look concerning the differences between Portugal and the other European countries as Spain, Italy and France.

The Portuguese female life expectancy is the smaller one comparing to the other countries in study. In nowadays, the most important source of the differences in life expectancy is the elderly mortality. The mortality above 60 years old is the source of approximately 75% of the observed differences in life expectancy between Portugal and Italy and Spain and, 95% of the difference between Portugal and France.

As for the male life expectancy, the Portuguese values are also the worse, but unlike for women, adult mortality is the major source of the observed discrepancies in the male case: almost 70% of the difference with Italy, almost 55% of the total difference with Spain and only 30% regarding France.

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