Room for Optimism from Generational Hardship: Trends in Disability and living conditions among Spanish Elderly[1]

Antonio D. Cámara, Amand Blanes, Ainhoa Alustiza, Teresa Menacho
University Autònoma of Barcelona (UAB) and Centre d'Estudis Demogràfics (CED)

Annual PAA Conference (2011)
Program session 87: Disability Trends and Dynamics - International and Comparative Perspectives

1. Introduction: longevity and health in Spain over the 20th-century

Facts and implications of rapid survivorship improvements

Within current Western affluent societies (Spain ranks very high in any conventional indicator of development and well-being), this country is characterized by having transitioned relatively late, rapidly and intensily in socioeconomic and demographic terms. Life expectancy at birth doubled in Spain during the last century to be one of the highest in the world (Figure 1). Gains of 42 years for males (from 33.8 in 1900) and 47 years for females (from 37.5 in 1900) occurred over the 20th century which means more than one year gained every three. A demographic change of such magnitude took about two hundred years among forerunners like Sweden or England. This illustrates both the delay in the onset of epidemiological and sanitary transitions in Spain and their velocity once in progress.

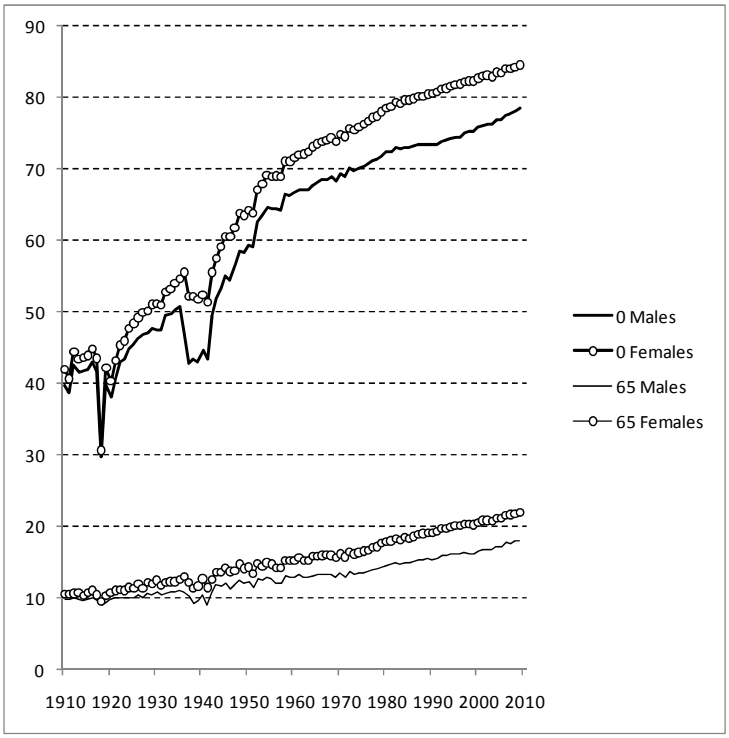
The upward trend followed by life expectancy was not lineal and the gains by age shifted as in the rest of Western countries according to the pathways of epidemiological transition largely associated to the socioeconomic modernization though not exclusively. For instance, it is apparent that an acceleration of the trend occurred from the mid 1940s, about two decades before the highest economic growth rates were reached (Prados de la Escosura, 2003). From 1940 to 1960 the country experienced the largest advances in

[1] This work is associated to the I+D research project CSO2009-09851-SOCI granted by the Spanish Ministry of Science and Innovation

survivorship in absolute terms that mainly contributed to the convergence with other Western European countries. To be noticed, the onset of this take off in survivorship coincided with a context of social and economic crisis (the 1940s was a decade of severe deprivation after the Spanish Civil War —1936-1939— and during the 1950s the country only could partly recover in a context of economic autarchy imposed by a fascist-oriented regime –1940-1975–). The large room for improvement in key areas of wellbeing like nutrition and sanitary conditions is represented by the fact that until the beginning of the 1980s the gains in life expectancy mainly came from the reduction in infant mortality. From then on, matching an advanced stage of the epidemiological transition, the force of mortality moved towards old ages so that the decline of rates did not result in so meaningful gains in life expectancy as in previous decades (Blanes, 2007). This, nevertheless, must not obscure the relevance of the improvement within the elderly that intensified since the decade of 1970s (Figures 1 and 2).

Figure 1

Life expectancy by sex at ages 0 and 65 in 20-century Spain



Sources: Human Mortality Database (1910-2006); Mortality Tables of the National Statistic Institute (2007-2009)

Figure 2

Age-Specific Death Rates within the elderly (per thousand)

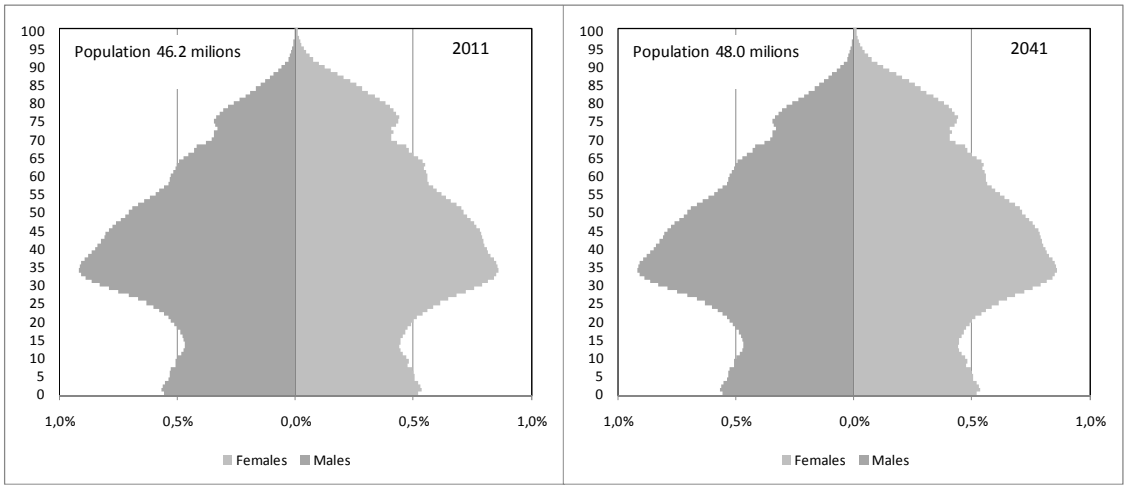
Spain, 1911-2004

Source: Own calculations (in Blanes 2007)

The elderly themselves exemplify the impact of this process on the population structure. At the beginning of the 20th century (1900 census) the Spanish population rose to 18.6 million and the share of those over 64 years was 5.5. In 2011, within a population of 46.1 million the elderly are the 17.1 percent. In the next decades it is expected this process of aging to intensify as a result of stable low fertility levels and improvements in longevity that in addition will be lived by the Spanish baby-boomers (1955-1975). Under these premises, the official projections to the year 2041 forecast 14 million people age 65+ (one out of three residents in Spain) and a share of 5 percent of people aged 85+ (Figure 3).

Figure 3

Population structure in Spain, 2011 and 2041.



Own elaboration from Population Now-Casts (INE) and Official Population Projections (INE)

Overview on disability trends in Spain

Unlike survivorship, health and disability cannot be either diagnosed in a so refined manner or over a so long time span. Actually, as in most countries, the specific concern on these fields emerged as a consequence of what has been hitherto described. The first *ad hoc* surveys were held in Spain once the evidence of the population aging replaced previous interest in the improvement of survivorship. This only happened during the decade of 1980s. As in other countries, the significant increase in the number and share of the elderly has encouraged the debate about the compression or expansion of morbidity at old ages (Puga, 2001; Sagardui-Villamor, 2005, Alustiza, 2009). Studies dealing with trends, nevertheless, are few and results have been either puzzling or little consistent partly because of the variety of sources that have been served for these purposes (up to nine different survey projects with different design and disability measurement criteria have been implemented in Spain since the decade of 1980s). An example of this is found in the general reports on the elderly elaborated bi-annually by the IMSERSO (the governmental department that manage elderly-related policy issues) that contain a specific section on longevity, health and disability. Since the first report that dates from 2000, each successive one has been based on a different data source and

no conclusion on the recent evolution of health among the elderly can be elucidated from them[2].

More specific studies have been undertaken that are briefly listed and commented here sorted by the type of source they made use.

Most of the public microdata come from cross-sectional surveys as well as the bulk of works coping with disability trends. This is the case of the studies based on one or several waves of the disability survey. The most recent, called EDAD2008, estimated the number of old people with any kind of disability in 2.23 million or 30.3 percent of the non-institutionalized elderly in Spain. These figures mean an improvement with respect to the former disability survey (EDDES1999) that reported 2.1 million and 32.2 percent respectively. The picture changes if we regard more specific measurements. Limitations in any ADL rose from 1.03 million (nearly 70 percent among those that reported any sort of disability) in 1999 to almost 1.8 million (80 percent) in 2008. The highest degree of severity points in the same direction. A study by Sagardui and associates (2005) used the first disability survey held in Spain (1986) as baseline to compare with the EDDES1999. Results displayed an overall reduction in the prevalence of disability between 1986 and 1999. The annual decline was larger among males and younger females (aged 65-74) whereas the oldest old showed lower reductions. The comparability between all three disability surveys is difficult but if results are assumed to be minimally reliable the conclusion is that an inflection is likely to have occurred at some point between 1999 and 2008.

The number of waves (seven until 2006 with future waves planed) and the stability of wording and codification regarding the disability items have made the National Health Interview Survey (ENSE) the most used source in the study of trends. Casado-Marin (2007) analyzed functional capability on the basis of daily life activities (surveyed by the ENSE exclusively for population aged 65+). Author concluded that between 1993 and 2001 the prevalence of having any functional limitation decreased in somewhat more than 2 percent points. Despite the existence of two more waves of the

[2] Just in order to exemplify this, the 2000 report did extensive use of the National Health Survey (1993 and 1997 waves). In turn, the 2002 report was almost exclusively based on the large disability survey EDDES99. In 2004, the section consisted of a monographic study on disability by comparing two disability surveys (1986 and 1999) whose classification had varied following the international criteria.

survey at the time (1997 and 2003) only two were included in this study. The slight improvement regarding the time span, invites one to caution in the interpretation of these results. Furthermore, Puga (2001) found a slight upward trend in dependence among the elderly between 1993 and 1997 whereas Casado-Marin and Lopez-Casasnovas (2001) found a decrease in the prevalence to perform daily life activities over the same period.

An optimistic, rather than a pessimistic picture of recent trends is endorsed by the few longitudinal studies that have been done in Spain. These, nevertheless, were based on much more reduced samples and for very specific territories.

Zunzunegui and associates (2004, 2006) followed up a sample of 1560 people aged 65+ in Leganes (urban district in the suburbs of Madrid where response rate at baseline was 82%) during a period that roughly matches that in the cross-sectional study by Casado-Marin. Respondents were interviewed in 1993, 1995, 1997 and 1999 and the study controlled by age, sex and education. Results showed significant declines in both ADL and IADL disability except for those over age 90 who displayed a reversed trend (worsening). From these results, authors concluded a postponement of severe disability onset until very old ages which could lead in their view to advances in healthy life expectancy.

It is difficult to say how Spain compares cross-nationally before the evidence of a very puzzling scenario for a good number of developed coutries that authors have often summarized in the existence of 'mixed trends'. In the US, some works have reported large declines in disability (Manton, 2001) whereas other studies have not found consistent trends over long time spans (Crimmins et al. 1997, Freedman et al. 2004). For instance, Freedman and associates did not found any consistent trend during the 1980s whereas they reported annual declines in ADL limitations of 1-2.5 percent among people aged 70+ during the 1990s. Wolf and associates (2007) analyzed longitudinal data over the period 1982-1994. They found decreasing trends in the prevalence of the onset of disability but recovery from disability also decreased among people aged 75+.

In Europe, cross-national comparisons based in longitudinal surveys did not conclude in one direction neither. The EHEMU network (2006, 2007 and 2008) studied 14 EU member countries between 1995 and 2001. While countries such as Belgium, Italy and Spain showed improvements in disability among the elderly for both sexes the rest

displayed troubling patterns. In Austria, Germany, Greece and the Netherlands the trends were positive for males but the prevalence remained stable or worsened for females.

The underlying question is whether despite of the uniform characterization of the target population by age (65+) or age-specific groups, the elderly are strictly comparable across countries. The question seems pertinent by looking at the Spanish case.

2. Spanish elderly: between hardship and affluence

Given the age of the subjects and the time at which they were surveyed by the ENSE (1987, 1993, 1995, 1997, 2001, 2003 and 2006) we may observe that our target population is one evenly characterized by having experienced a more or less durable hardship during early life. The youngest elderly surveyed were those interviewed at the age of 65 years in 2006 so that they were mostly born in 1941 whereas those aged 80+ in 1993 (first wave to include specific items about the performance of daily activities) were born prior to 1914. Thus most of the current elderly (i.e. until the last wave of the ENSE held in 2006) in Spain were born between 1900 and 1941). An historical overview of those four decades serves to understand that no of them was free of historical hazards either episodic (the Spanish flu epidemic, the civil war) or more structural (socioeconomic and political convulsions affected the country over the whole half of the 20th century). More importantly, those hazards were experienced during periods of the life cycle such the infancy and the adolescence that have largely displayed their influence on health status in later life. There are, nevertheless, differences within these common generational traits since cohorts did not arrive at the same age nor stayed the same time under the extreme conditions of environmental stress associated to the most devastating episode of the recent Spanish history: the civil war (1936-1939) and the immediate post-war decade (the 1940s). Those born in the 1920s could have lived the conflict as adolescents and the subsequent scarcity of postwar years as young adults. Those born in 1936 lived the conflict as early infants and they also had to deal with post-war at early ages. Finally, those born during the immediate post-war years had to suffer it as infants but they took the chance to partly recover from this burden during the 1950s as

adolescents (for instance food security was attained during the mid 1950s; Cusso, 2005) at the time that development indicators also improved and autarchy and international isolation were reaching to an end. Thus, we find cohorts whose potential accumulated scarring burden is relatively high (those born 1925 onwards) and cohorts for that such burden is relatively low regarding the two above mentioned critical periods for health (infancy and adolescence). In contrast, all these cohorts born during the first half of the 20th century witnessed and experienced the onset and transition towards affluence and somehow the benefits from improved living conditions during the second half of the century.

Current elderly in Spain are therefore the vivid reflect of demographic and socioeconomic changes in 20th-century Spain that have shaped their health status as adults. The difference with respect to other Western European countries is that high development levels as well as welfare state provisions were established much later in Spain. This circumstance has made the Spanish Health System to collect information from people belonging to cohorts with extremely different vital experiences. Even within the current elderly born in a context of hardship (at least pre-affluence) such differences might have influenced the way they are aging in terms of health (i.e. the related scarring burden). To what extend this matters for the interpretation of cross-sectional trends in disability is illustrated in Table 2 which summarizes the valid cases that are used forward in the analysis. It is observed not only that the elderly surveyed in each of the waves of ENSE belong to different cohort groups but also, and more importantly, that such cohorts weigh very different in each survey. This varying composition, even if age remained constant, carries an implicit, and also varying, life-cycle effect that is independent of the age-specific effect on the disability prevalence that any cross-sectional approach deals with. As in the case of other classic period indicators, the fastest the change in living conditions in a society, the higher the potential cohort effect lying behind cross-sectional results. For instance, in the ENSE93 about one third of the elderly aged 65-94 lived their infancy and adolescence before the Spanish Civil War (1936-39) and the post war decade. Oppositely, 95 percent of the sample in 2006 belongs to cohorts that were affected by war or postwar effects in early life. Thus overall, the ENSE06 owns a much higher potential scarring burden caused by the duration of the exposure to hardship of the

surveyed cohorts. In the case of those aged 65-69 the trend between 1993 and 2006 would be the result of the information provided by cohorts born 1924-28 and 1937-41 respectively, the latter owning a quite longer exposure to the hazards of war and post-war during early life.

Table 2

Cohort distribution of cases in the ENSE (1993, 2001 and 2006)

	Cohorts						
Survey year	1905-09	1910-14	1915-19	1920-24	1925-29	1930-34	1935-39
1993	4.50	10.90	18.50	31.80	34.40	0.00	0.00
2001	0.30	2.70	7.30	17.00	25.80	32.20	14.80
2006	0.00	0.90	4.90	14.10	23.40	29.50	27.10

Source: valid cases. ENSE microdata. Ages 65 to 94

In light of this varying cohort composition of the ENSEs one should not be surprised to find that the either the level of the sense of the trends in Spain substantially differ from those obtained, say, for the American elderly. Otherwise we would be assuming that living standards in Spain and the US have been the same throughout the 20th century.

In the following sections it is thus attempted to analyze and interpret the trends in disability among the Spanish elderly bearing in mind the historical background that determined the variations in the duration of the potential exposure to extreme environmental stressors. We start by re-assessing cross-sectional trends on the basis of the most consistent waves of the ENSE. Then we apply a protocol of aggregation of microdata to get a good representativeness of sex-age-cohort combinations that allow for cohort analysis. Finally we hypothesize on these recent trends as well as on mid-term future scenarios in Spain by combining the information provided by both cross-sectional and cohort trends and other indirect evidence on the change in living conditions over the last century.

Cross-sectional trends are adjusted by age and presented for each item whereas cohort trends are age-specific and they depicture synthetic indicators of functional limitations (Any, ADL, IADL and Mobility). Both type of trends as displayed separately for males and females.

Data and methods

Data

The ENSE is a cross-sectional health interview survey held face to face on non-institutionalized population. Much of wording, sample criteria and response sets of the involved items are harmonized with health interview surveys of other European countries and the US (details can be provided at request; here we restrict ourselves to comments regarding the most substantial issues that had to be dealt with). Data is entirely self-reported. Microdata from five of the seven waves of the ENSE (1993, 1997, 2001, 2003 and 2006) have been used to construct cohort trends whereas only 1993, 2001 and 2006 were used for cross-sectional trends. The waves held in 1987 and 1995 did not include the required items.

We firstly tested the reliability of self-reported data on each wave. One by one, the waves showed very coherent patterns of disability by age (significant increases took place at the threshold of 74 years) and sex (females always displayed higher prevalence than males and the aging-related deterioration was also higher). In turn a very puzzling picture of period trends was found when all five waves were used. The drop of the 1997 and 2003 waves was done on technical evidence and without any aprioristic consideration of the new resulting trend. As regard to 1997, the sample size more than halved with respect to the rest of the waves resulting in sex by age combinations notably less consistent than in previous and successive waves. The reason to discard the wave of 2003 is the extensive use of proxies (33 percent of respondents whereas no previous wave had made use of them; in 2006, a 6 percent of respondents were proxies). Thus we opted to harmonize the type of respondent by dropping the wave of 2003 and by discarding proxies in 2006. Consequently, only direct informants are included in both cross-sectional and cohort trends.

The sample and its weighing until 2001 followed age and sex criteria within each Spanish region (*comunidades autonomas*) but the number of interviews assigned to each region was not proportional to the weight of its population over the total of the country. Yet a minimum number of interviews were established for each region regardless its population size in order to get a good representativeness for all regions. In the 1993 to

2001 waves, weighting factors were not adjusted by the no response so that factors were computed on the final valid sample that was adjusted to the population structure (it is important to note that 65+ was treated as an aggregate group and that factors did not weigh the actual population but its proportion by age group, sex and region of residence[3]). In 2003 the National Statistic Institute (INE) took over the design and implementation of the survey and several methodological changes took place (former waves were carried out by the Sociological Research Centre –CIS–). Weighting factors in 2003 and 2006 were adjusted by the no response and they weigh the actual population by age, sex and region of residence.

The wording, codification and response set of the 27 items that are used in this work remained unchanged across waves. Also the placement of the items within the questionnaires remained approximately the same. These items are referred to the performance of daily life activities so that in this work disability is approached by the perceived and self-reported limitations in the performance of this sort of activities. Only respondents over age 64 were asked for these items and they had to respond whether they were able to do them 1) *on your own* 2) *with help* 3) *not able* (the list of activities can be found in the next section).

Methodology

All the waves of the ENSE were firstly screened up from age and sex misreporting. The surveys ask for the complete age at last birthday and the birth year was only asked in 2003 and 2006 so that a respondent from former ENSEs is ascribed to a given cohort by subtracting her age from the year of the survey. Age heaping is observed in some waves of the survey at 0 and 5 digits and especially among women aged 65. This is not supposed to bias the results since we work with 5yr age groups and cohort groups were made of respondents from different waves. The resulting datasets contained the following variables: survey year, age, sex, birth year and the 27 daily life activities.

[3] The age intervals to compute the factors were very broad (for adults, 16-24, 25-34, 35-44, 45-54, 55-64 and 65+; for infants, 0-3, 4-7, 8-11, 12-15). It implies biassess that are of particular importance for the study of the elderly.

A new weight factor was computed for each individual in order to harmonize the two systems that were originally applied. To do so, we used the official population statistics provided by census and intercensus estimates according to the INE databases for each survey year (we used or computed mid period populations)[4].

Cross-sectional trends

These trends are constructed with data from ENSE93, ENSE01 and ENSE06. Table 3 presents the valid cases by survey, sex and age group.

Table 3

Valid cases by survey year, sex and age group

	Males					Females				
Survey year	65-69	70-74	75-79	80-84	85+	65-69	70-74	75-79	80-84	85+
1993	545	414	229	113	42	764	532	318	188	65
2001	581	536	418	177	99	854	706	501	264	133
2006	361	753	620	414	182	673	1283	1154	779	389

Source: ENSE microdata

Period trends are presented for the whole population aged 65+. Accordingly, prevalence are adjusted to prevent the effect of the change in the age structure of this groups (i.e. the increase in mean age over the analyzed period; in 1993 22.0 percent of the elderly was 80+ which rose to 26.7 percent in 2006). Adjustment consisted on a direct standardization by age. To do this we used the age structure of the European Standard Population provided by the WHO. The prevalence for each item is depictured as the relative annual change during the specified period. Standard errors were also computed with respect to the mean relative annual change for all 27 items.

[4] Adjustment for the institutionalized population is not possible because its distribution by sex and age is only provided by the censuses in 1991 and 2001. Also in 2003 and 2006 the INE computed the weighting factors over the total population.

Cohort trends

Valid cases from direct respondents in 1993, 1997, 2001, 2003 and 2006 were aggregated into one large dataset. As ages over 84 were systematically underrepresented in the unweighed samples sex-age-cohort combinations were not enough robust and showed a random behavior in the trends. Therefore we restricted the cohort analysis to ages 65-84 (cohorts born 1909-1941).

The next step consisted on checking the age distributions within each 5yr age-cohort combination. Broader aggregations resulted in smoother and more solid trends but these aggregations were more age-biased due to the time sequence of the ENSE. In words, in some age-cohort combinations ages may be left or right-skewed (i.e. the mean age of older cohorts was higher than that of younger cohorts so that cohort trends may partly reflect an age effect). This effect is caused for either a non uniform or sometimes too long time span between the waves of the survey. For instance, those aged 65-69 in the cohort group 1940-44 mostly belong to the cohort 1941 and they are almost exclusively 65 since they enter the dataset from the wave of 2006. Consequently, this age-cohort combination was discarded because of its inadequacy to be compared with older cohorts were the mean age was actually centered. The same (but right-skewed) occurred for the older cohorts. In conclusion, only age-cohort combinations that contained a balanced representation of all or almost all single ages were finally validated to be included in the analysis (Tables 4 and 5).

Table 4

Cases by sex, age and cohort

	Males				Females			
Cohort	65-69	70-74	75-79	80-84	65-69	70-74	75-79	80-84
1910-14			36	**112**			49	**187**
1915-19		48	**217**	**161**		83	**304**	**269**
1920-24	86	**419**	**417**	**571**	120	**527**	**535**	**1079**
1925-29	**526**	**503**	**964**	220	**729**	**745**	**1566**	376
1930-34	**592**	**1184**	286		**845**	**1939**	528	
1935-39	**1134**	324			**1758**	516		

Enlightened, valid age-cohort combinations included in the cohort analysis

Table 5

Mean age by age-cohort groups

	Males				Females			
Cohort	65-69	70-74	75-79	80-84	65-69	70-74	75-79	80-84
1910-14				81.84				81.93
1915-19			76.82	82.02			76.90	82.17
1920-24		72.13	77.19	81.61		72.24	77.12	81.57
1925-29	67.16	72.24	76.65		67.04	72.27	76.64	
1930-34	67.29	71.59			67.20	71.65		
1935-39	66.66				66.70			

Cohort trends are depictured through four synthetic indicators of disability (Table 5). The items included in ADL and IADL categories are similar to those previously proposed and often used internationally (i.e. those by Katz-Barthel in the case of ADL and those by Lawton in the case of IADL). We also designed one specific indicator on mobility addressed to capture the more physical dimensions of disability.

As shown below (Figure 4), items #15 ('Cleaning a stain from the floor') and #21 ('Cutting your toe nails') do not follow the observed pattern of change between 2001 and 2006 both within the whole set of variables and with respect to items displaying a similar prevalence at the baseline (#26 'Walking for an hour continuously'). Just to prevent misleading effects we opted to remove them from the synthetic indicators. Both items do are depictured in the cross-sectional trends. Their eventual deletion in that analysis only affect the results in that the standard errors of annual change decreased (i.e. trends are even more consistent) but the figures remain substantially unchanged.

Items involving potential gender roles (this is more important as we regard older cohorts and particularly in young and mid old ages when both members of the couple are often still alive) were not included in the composed indexes in order to not over represent sex differences.

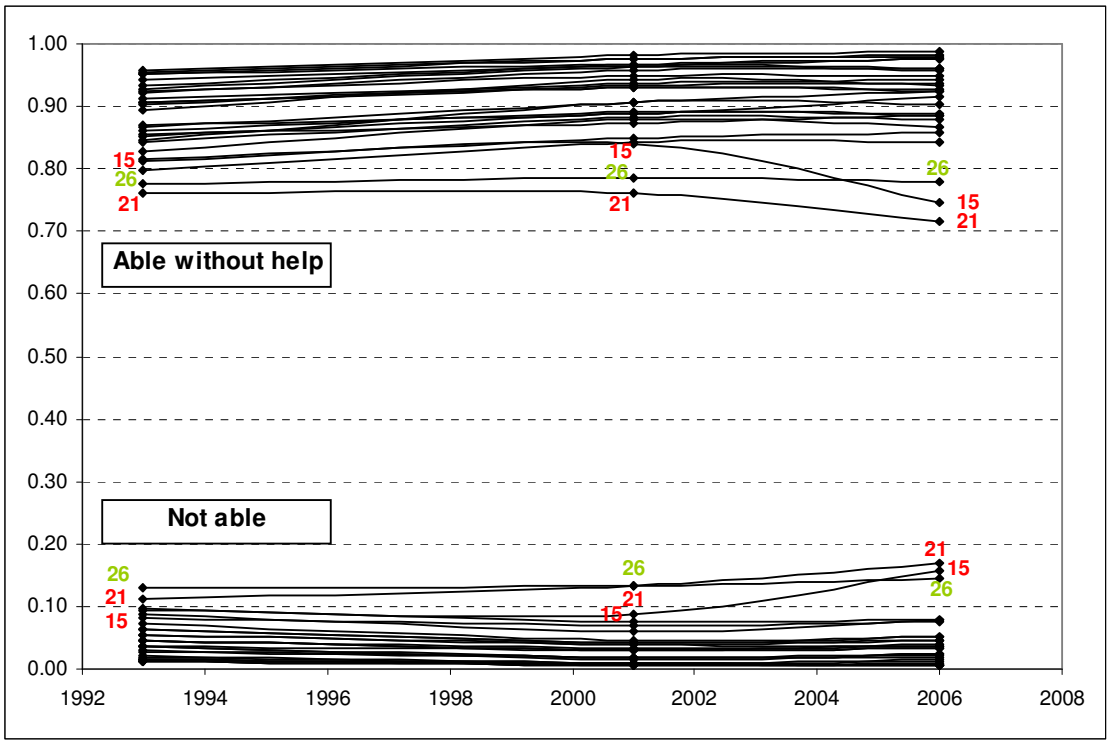
Table 6

Daily life activities in the ENSE

Code	Activity	Disability indicator			
		Any	ADL	IADL	Mobility
1	Telephoning (seek a number and dial)	x		x	
2	Daily shopping (food, clothes, etc.)	x		x	x
3	Taking public transports	x		x	x
4	Preparing breakfast	x		x	
5	Preparing lunch	x		x	
6	Taking your medicine (timing and amount)	x		x	
7	Handling money	x		x	
8	Cutting bread	x			
9	Washing up	x			
10	Making the bed	x			
11	Changing the sheets	x			
12	Washing light clothes by hand	x			
13	Using the washing machine	x		x	
14	Domestic cleaning	x			
15	Cleaning up a stain from the floor on your hands and knees				
16	Eating	x	x		
17	Dressing, undressing and choosing your clothes	x	x		x
18	Combing your hair and shaving	x	x		
19	Walking (with or without a stick)	x	x		x
20	Standing up and lying down in bed	x	x		x
21	Cutting your toe-nails				
22	Sewing a button	x			
23	Cleaning your face and your body from your waist upwards	x	x		
24	Taking a shower or a bath	x	x		
25	Climbing ten stairs	x			x
26	Walking for an hour continuously	x			x
27	Staying on your own for the night	x		x	

Figure 4

Age-adjusted prevalence by item.Spain, 1993-2006



Own elaboration from ENSE microdata

In the final harmonized data set, missing values by item range from 2.0 to 2.6 percent which indicate that in most cases they come from individuals that did not respond to any of the 27 items on daily life activities (see a detailed distribution of missing values by sex, age and cohort in the appendix). Both, period and cohort prevalence are computed on valid cases (respondents that reported sex, age and all 27 items).

Results

Cross-sectional trends

The category of total ability (‘able without help’) displays consistent improving trends for 15 out of 27 items over the analyzed period; 1 out of 27 worsened and 11 out of 27 shifted from an upward to a downward trend (Table 6).

Seven activities (six among those improving in the former category) also improved in the category of total inability (‘not able’; in this case improvement is assessed by a decreasing prevalence). In turn 8 activities that presented a positive trend in the former category, also worsened in this category. This is explained by a prevalence transfer between the intermediate performance ability (‘able with help’; not shown) and the total inability. This mainly happened between survey years 2001 and 2006. Yet 23 out of 27 activities improved also in the latter category regarding the cut-off points (1993 and 2006).

Now the length of the time span between surveys and the relative magnitude of the change in prevalence is incorporated together with a separated analysis for each sex (Figure 5). From these results it is concluded an apparent improvement for both sexes in the autonomous ability to performance daily life activities (‘able without help) between survey years 1993 and 2006.

The overall trend is also positive for both sexes regarding inability (more items are found below 0 in the annual change rate) (Figure 6). However, females’ trend is much more consistent to this regard. Among males, a total of 8 items displayed a statistically significant worsening in this category (and they were not associated to a specific type of activities since we find ‘lunch’, ‘medicine’, ‘walking’ or ‘staying on your own at night’ among others).

Table 6

Age-adjusted prevalence by activity for population 65+. Spain, 1993-2006

Activity	Code	Able without help			Not able		
		1993	2001	2006	1993	2001	2006
Phone	1	89.43	94.33	93.40	3.67	1.44	2.30
Buying	2	86.19	89.05	88.45	5.36	3.85	4.56
Transports	3	81.45	85.00	85.73	6.50	4.33	4.64
Breakfast	4	92.28	95.68	96.09	3.57	1.74	2.20
Lunch	5	90.29	93.04	92.31	3.68	2.87	3.30
Medicine	6	92.38	94.87	94.90	1.47	1.02	1.50
Money	7	90.52	92.94	92.78	3.10	1.91	2.40
Cutbread	8	95.54	97.58	98.05	1.63	0.82	1.20
Wash-up	9	90.50	93.30	93.65	4.55	3.10	3.24
MkBed	10	86.94	88.97	91.67	5.49	4.06	3.74
Chsheets	11	84.31	88.17	88.03	6.41	4.34	5.15
WsHand	12	82.79	87.92	86.75	8.82	6.03	7.94
WsMachi	13	84.47	90.52	90.42	7.15	4.41	5.20
Clean	14	79.75	84.33	84.40	9.74	7.47	7.97
CleanStain	15	81.16	83.88	74.58	9.29	8.90	15.59
Eating	16	95.64	98.25	98.64	1.49	0.65	0.57
Dress/Und	17	95.13	96.57	96.13	1.08	0.66	0.66
Comb/Shav	18	95.14	97.48	97.94	1.25	0.65	0.60
Walking	19	94.24	96.39	95.72	1.15	0.54	0.98
SUp-LDw	20	93.28	96.58	97.67	1.75	0.95	0.74
ToeNails	21	76.20	76.05	71.71	11.22	13.40	17.05
Sewing	22	85.27	88.75	88.85	8.13	6.99	7.59
CleanBody	23	92.83	96.34	97.68	2.02	0.81	0.72
Shower/Bath	24	86.59	90.61	92.49	2.69	1.93	1.76
Stairs	25	85.62	87.45	88.40	4.42	3.41	3.58
Walk1H	26	77.78	78.53	77.95	12.96	13.17	14.40
NightOwn	27	91.30	93.79	94.40	4.61	3.01	3.83

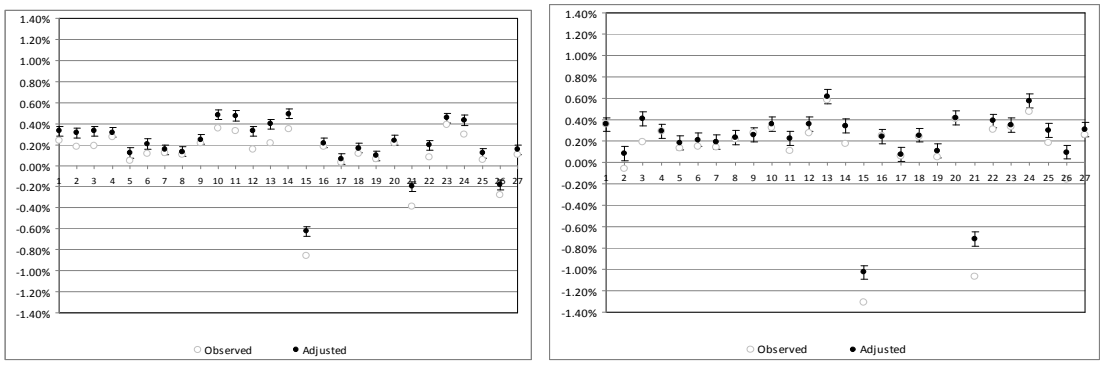
* In green, improving trends in absolute percent points (upward ability or downward inability)

Figure 5

Relative annual change in the prevalence of elderly reporting total ability

Spain, 1993 and 2006

Males Females



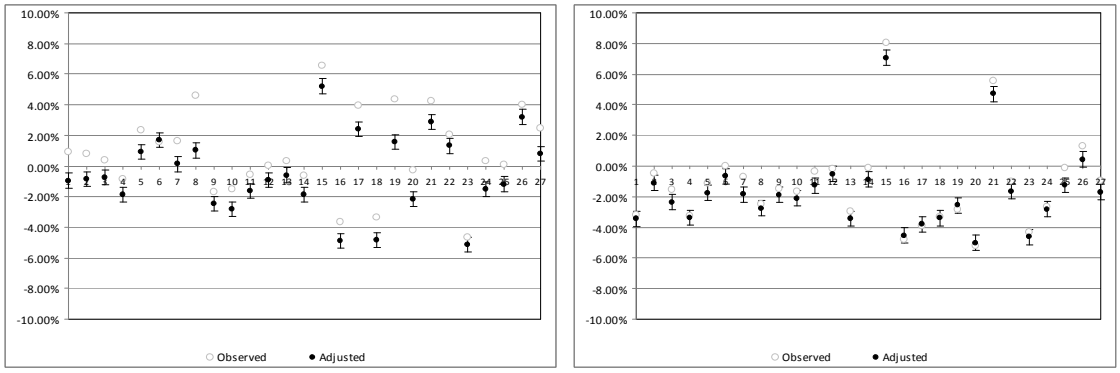
Own calculations. ENSE microdata

Figure 6

Relative annual change in the prevalence of elderly reporting total inability

Spain, 1993 and 2006

Males Females



Own calculations. ENSE microdata

As expected, if the baseline is set in 2001 results substantially differ particularly for males. In the total ability category, activities that worsened and those that improved in statistically significant margins cancel each other out for males. Unlikely, females' ability only worsened for 3 activities whereas 12 of them improved (Figure 7).

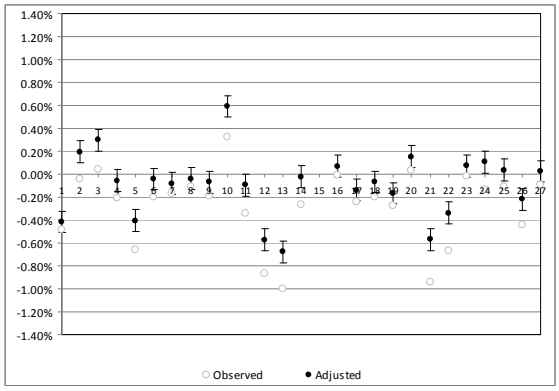
Among males inability increased for 25 out of 27 activities between 2001 and 2006. Females' prevalence also increased for 14 activities where significant decreases (improvement) are found for a total of 8 activities (Figure 8).

Figure 7

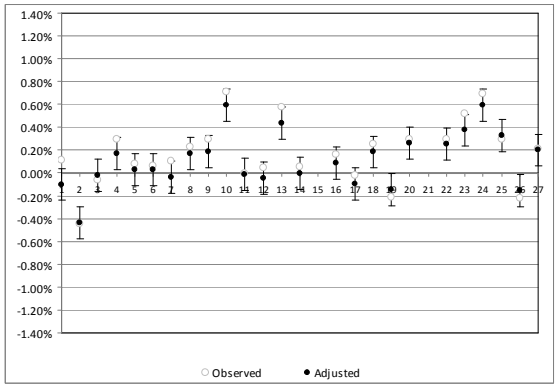
Relative annual change in the prevalence of elderly reporting total ability

Spain, 2001 and 2006

Males



Females



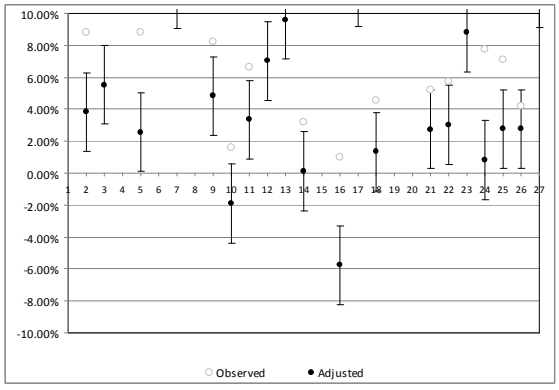
Own calculations. ENSE microdata

Figure 8

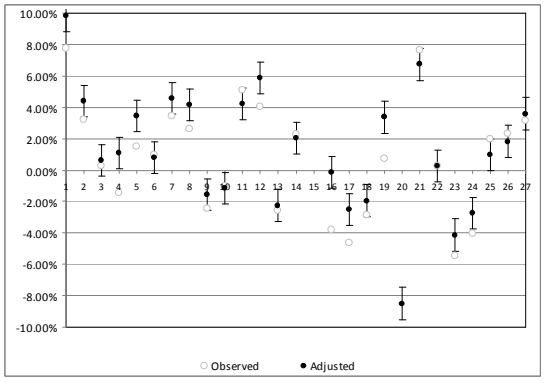
Relative annual change in the prevalence of elderly reporting total inability

Spain, 2001 and 2006

Males



Females



Own calculations. ENSE microdata

Cohort trends

Cohort trends mostly reflect cross-sectional figures but this time age and cohort are added to the analysis.

Firstly, trends are invariably more uniform for females and mostly point downwards. The picture for males is more troubling for in most cases an age group does not show a uniform trend between successive cohorts but an inflection (usually upwards thus resulting in U-shaped trends) is observed. This effect even derives in the overlapping of the prevalence by age (i.e. within a given cohort group younger ages show a higher prevalence) in some cases. These cases also coincide with very misleading values of the prevalence by sex. Female prevalence is always higher at a given age group and within a given cohort group (an exception is cohort 1920-24 at age 70-74 in ADL and IADL which probably informs about some degree of misreporting among males in that age-cohort combination[5]).

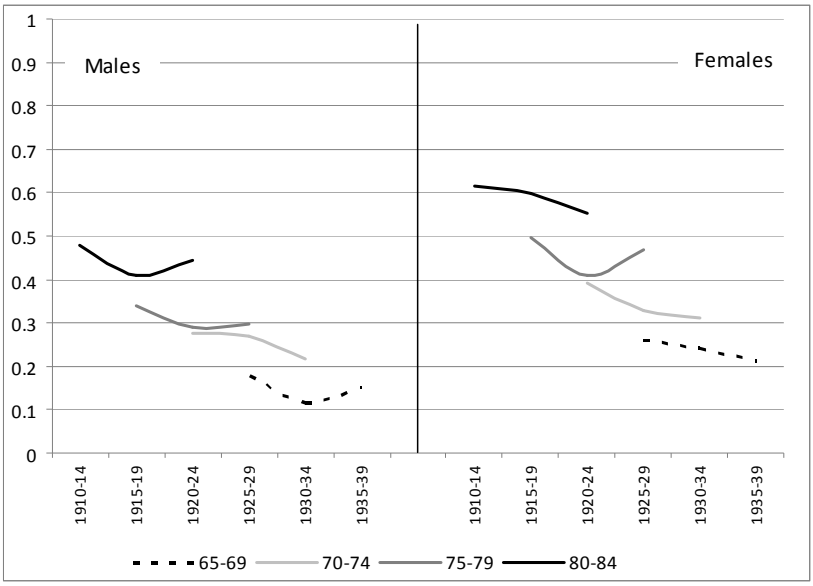
Any functional limitation (Figure 9)

For females, three out of four age groups display a lower prevalence in any functional limitation for successive younger cohorts. Among males only age 70-74 displays a consistent trend (improvement) between cohorts born 1920-1934.

[5] This age-cohort combination is mainly made of cases from the ENSE held in 1993 where missing values were considerably higher especially for males (see enlightned diagonal in the appendix table).

Figure 9

Prevalence in functional limitation by age and cohort (25 items)



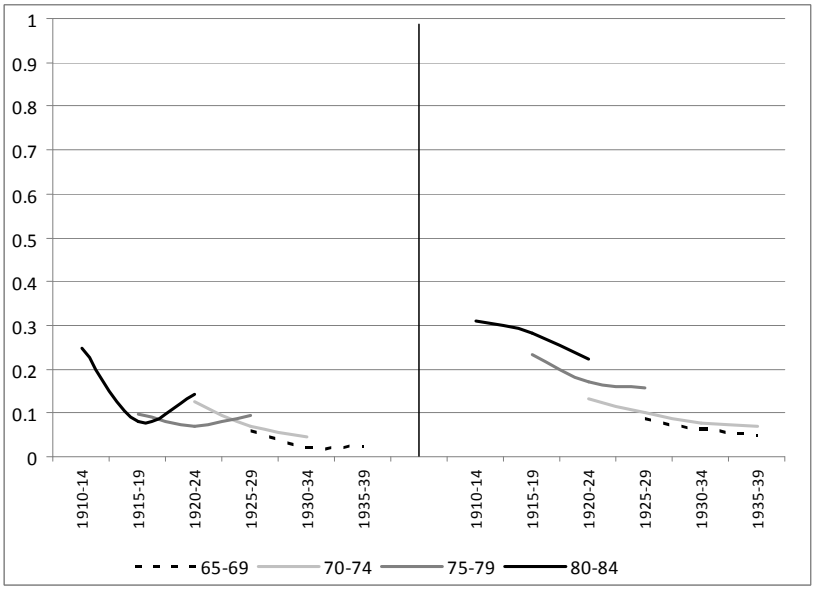
Own calculations. ENSE microdata

Limitations in ADL (Figure 10)

Trends follow the above described pattern by sex, age and cohort. In this case all the age groups for females display a decreasing prevalence by cohort.

Figure 10

Prevalence in ADL by age and cohort

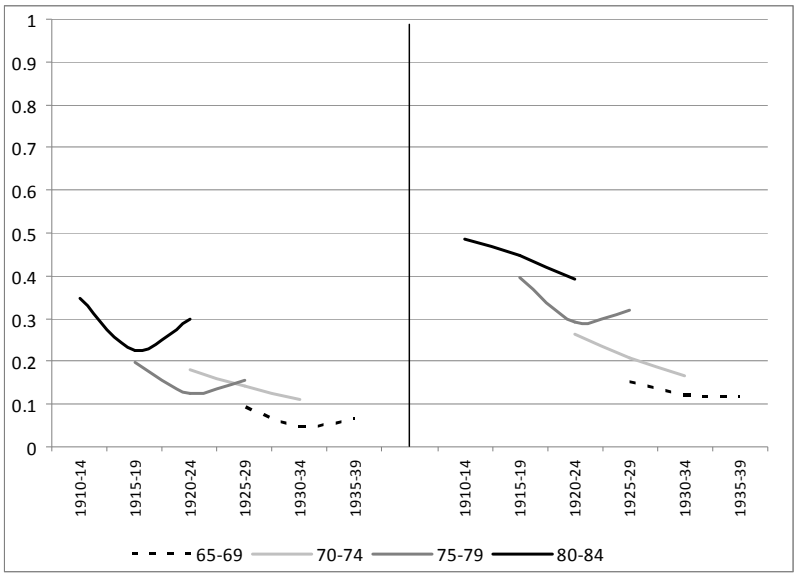


Limitations in IADL (Figure 11)

Cohort trends present minor changes with respect to the aforementioned pattern for ADL and the most outstanding difference is the rise of the prevalence in this category for any sex-age-cohort combination.

Figure 11

Prevalence in IADL by age and cohort



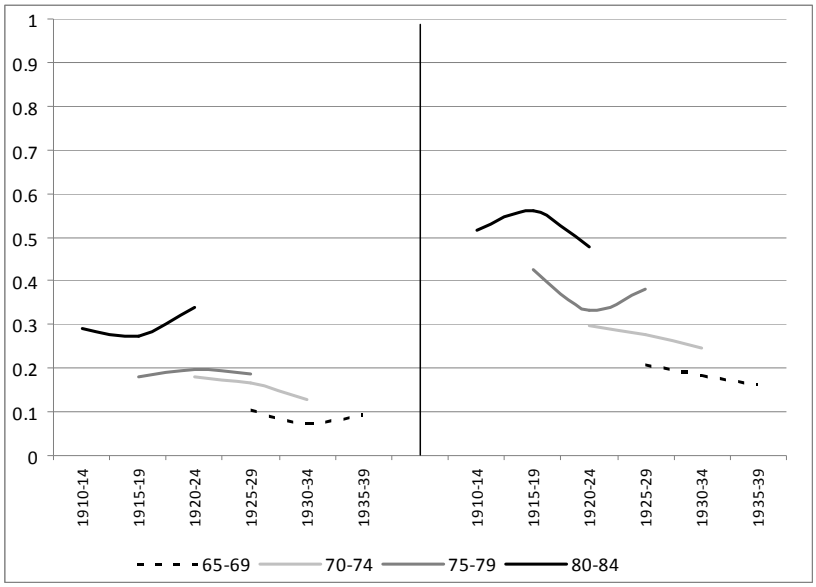
Own calculations. ENSE microdata

Limitations in mobility (Figure 12)

Age and sex patterns keep their consistency whereas for females only young and mid-age elderly display a uniform downward trend.

Figure 12

Prevalence in Mobility by age and cohort



Own calculations. ENSE microdata

Discussion

In absolute terms, the general picture of disability as measured by the ability to performance daily life activities in 2006 improved in Spain with respect to that observed in 1993. However, the previous decrease in prevalence during the period 1993-2001 makes the most recent trend to be a moderately worsening one within the elderly as a whole. This is confirmed when the relative magnitude of the annual change for each involved item is regarded. Our results point to a deterioration of functional ability among the Spanish elderly between survey years 2001 and 2006 that affected more to males. The items that worsened are not of any specific type (i.e. they pertain to ADL, IADL, Mobility and neither domestic tasks potentially associated to gender roles are responsible for differences between males and females, males doing worse).

Cross-sectional outcomes partly agree with previous works in Spain. We observed a noticeable increase of the autonomy degree to performance most of the activities between 1993 and 2001 as in Casado-Martin's work (2007) but the slight inflection of this trend between 2001 and 2006 had not been previously underlined. Such inflection

appears to be coherent with the trend drawn by the two last disability surveys held in 1999 and 2008 that reported an increase in the prevalence of the elderly that required any type of help in their daily life (from 16.5% in 1999 to 19.1% in 2008). However, our results differ from the former since females are who mainly featured the worsening according to those disability surveys (comparability with ENSE is nevertheless very limited due to the different set of daily activities included as well as differences in the wording and the response sets).

In no case these results are exceptional within Europe. In the neighbour France, it was found a similar stable trend (referred to mild disability) over the decades of 1980 and 1990 (Cambois et al. 2008). A recent paper focused on functional limitations in Sweden concluded an overall decline between 1980 and 2005 (Parker et al., 2008). However, declines appear to be located during the 1980s and the early 1990s. After 1996, improvements slowed down or even a slight worsening is observed so that the end of the positive trends is hypothesized (Parker and Thorslund, 2007). Similar findings were published for Denmark (Jeune and Brønnum-Hansen, 2008).

For Spain it must be firstly admitted an inflection point at the beginning of the 2000s following a precedent decade of improvement. What it is intended to find out is to what extend the most recent trends reflect the onset of a durable trend towards increasing disability among the elderly or they are a product of a transitory cohort effect. For these purposes, we analyzed successive Spanish cohorts surveyed at old ages and we hypothesized that recent period trends (at least in Spain) might be partly explained by the historical background that determined living conditions in early life. In the case of the current Spanish elderly, though all of them were born prior to the onset of affluence, significant differences can be found.

A sharp deterioration of living conditions took place during the war and post-war years that might particularly have affected those who lived that epoch as infants or adolescents (the exact duration of the exposure is not dealt with here for parsimony purposes). The inflection of period trends coincides with the arrival of those cohorts to old ages. The cohort analysis shows that either U-shaped (mostly but not exclusively observed within males) or the slowing down in cohort improvements within an age group (mostly observed in females) are associated with progressively less selected cohorts (non

adult mortality had started a declining trend since the beginning of the 20th-century) that in addition were highly exposed to the effects of war and immediate post-war hardship at critical ages. An in depth observation of the sharpest inflection points in cohort trends discloses that they are mostly the result of worsening within cohorts born since the 1920s that lived war or immediate postwar years at early ages (i.e. before reaching adulthood). Furthermore, inflection for different cohort groups move to younger ages as the potential exposure also anticipated to earlier ages (this nevertheless is only apparent for males) (Table 7).

Table 7

Any functional limitation								
	Males				Females			
	65-69	70-74	75-79	80-84	65-69	70-74	75-79	80-84
1910-14	22-26	22-26	22-26	22-26	22-26	22-26	22-26	22-26
1915-19	17-21	17-21	17-21	17-21	17-21	17-21	17-21	17-21
1920-24	12-16	12-16	12-16	12-16	12-16	12-16	12-16	12-16
1925-29	7-11	7-11	7-11	7-11	7-11	7-11	7-11	7-11
1930-34	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6
1935-39	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1

To the left, enlightened, cohorts that were exposured to war or post-war hardship at non-adult ages. Coloured cells express a worsening with respect to the precedent cohort within the same age group. The content of cells is the age of the cohort at the beginning of the Civil War (1936)

Keeping in mind the hazardous early-life cycle for these cohorts the evidence provided by both period and cohort trends should not invite to pessimism. On the contrary, since we hypothesize on these life-cycle effects explaining the inflection of recent period trends in Spain we may also hypothesize on their transitory effect. Trends are not consistently worsening even referred to these cohorts born in a context of general hardship that was not definitively overcome until the 1960s (the elderly studied in this work were born 1910-1939). More importantly, the indirect evidence provided by key indicators on well-being and living conditions in 20th-century Spain cannot be neglected. Nutritional status approached by cohort adult height displayed a dramatic improvement for cohorts born

since the 1960s (Spijker et al., 2008). Educational attainment also illustrates, on one hand, the decline in infant work and, on the other, the improvement in human capital that occurred in Spain during the second half of the 20th century (López-Falcón and Cámara, 2010).

Future improvements in survivorship are not discarded in that they may contribute to expand life at older ages and consequently the potential age-related disability. Nevertheless, these expected changes will not probably develop in the same wide margins that the sociodemographic momentum associated to the progress in living conditions during the second half of the 20th century. To this regard, we think that the most outstanding effects are expected to be observed on horizon 2035 when cohorts born during the 1960s will arrive to old ages. Then successive cohorts born in a wealthier better provided and more democratic Spain will be entering on the senescence. Some variables can actually play against such general cohort-based optimistic hypothesis regarding the unpredictable effects of lifestyles and their health risk related factors. To this regard, it must be said that the public intervention in these fields is currently incomparably higher to that only a couple of decades ago. Overweight may serve as an example since only very recently its high prevalence became a real concern and made it a central issue in the policy agenda. Additionally, recent works have displayed that within the Spanish elderly and over the last two decades the increasing trends in excess weight are higher within the cohorts that were more exposed to scarcity and deprivation, males again doing worse (Camara and Spijker, 2010).

It must be acknowledged that this evidence are rather suggestive than concluding and data from future waves of the ENSE will tell us to what extend our hypothesis is well founded. Some actual longitudinal follow-up in Europe have not observed any cohort effect on disability trends. Winblad and associates (2001) neglected such effect in Finland through the study of cohorts born before 1903, 1913 and 1923 in 1979, 1989 and 1999. Age and sex, rather than cohort were the significant determinants of disability. In the UK, two longitudinal studies again provided mixed evidence. The Cambridgeshire study (Jagger et al, 2007) followed up health status and functional limitations among a sample of young elderly (64-70 years old) during the period 1991/92-1996/97. No improvement was found within younger cohorts but a slight increase in disability. Oppositely the

Gloucestershire study (Donald et al. 2010) was carried out between 1998 and 2008 and it found decreasing disability trends among elderly aged 75+ for both sexes and age groups. These improvements implied younger cohorts to enter on care dependency 2.1 years later than older cohorts. Finally, in the US, Crimmins and associates (2009) found improving cohort trends for different types of disabilities (ADL, IADL) in the Longitudinal Study of Aging (LSOA).

In any case the Spanish illustrates the potential effect that differences in the exposure to hardship during the life cycle may exert on period trends. This strongly limits cross-national comparability based on cross-sectional data since the more rapid and intense the change in living conditions in a country, the more misleading a cross-sectional approach may result. Cohort effects are potentially more determining in those countries that experienced rapid socioeconomic and demographic changes. Technically, disability is studied over the same population (i.e. in terms of age). However, in our view, results will necessarily reflect the cumulative effect (both in terms of scarring and benefits) of living conditions prior to the senescence.

References

ABELLAN, A. (2002): Ageing in Spain. II World Assembly on Ageing. April 2002

ABELLÁN, A.; PUGA, M.D. (2004): "Una estimación de la dependencia en España", en Revista Multidisciplinar de Gerontología, nº 14 (5): 301-303.

ABELLAN, A.; RODRIGUEZ, V. (2000): Salud y atención sanitaria. In: Informe Mayores 2000. Madrid, IMSERSO.

ALUSTIZA, A. (2009): Longevidad, discapacidad y dependencia en la C.A. de Euskadi: una aproximación demográfica. Tesis presentada en la Universitat Autónoma de Barcelona. Mimeo.

BERLAU, D.; CORRADA, M.M.; KAWAS, C. (2009): "The prevalence of disability in the oldest-old is high and continues to increase with age: findings from The 90þ Study" in International Journal Of Geriatric Psychiatry, 24: 1217–1225.

BLANES, A. (2007): La mortalidad en la España del Siglo XX. Análisis demográfico y territorial. PhD, Universitat Autónoma de Barcelona. Mimeo.

CAMARA, A.D.; SPIJKER, J. (2010). Super size Spain? Cross-sectional and quasi-birth cohort trends in overweight and obesity in an accelerated transition country. Journal of Biosocial Science, 42(3), pp. 377-393

CAMBOIS, E.; ROBINE, J.M.; HAYWARD, M.D. (2001): "Social Inequalities in Disability-Free Life Expectancy in the French Male Population, 1980-1991", en Demography, nº 38 (4): 513-524.

CAMBOIS, E. et. al. (2008): "Trends in disability-free life expectancy at age 65 in France: consistent and diverging patterns according to the underlying disability measure ", European Journal of Ageing, nº 5 (4): 287-298.

CAMBOIS, E. et. al. (2001): "Social Inequalities in Disability-Free Life Expectancy in the French Male Population, 1980-1991", en Demography, nº 38 (4): 513-524.

CASADO MARÍN, D. (2007): Análisis de la evolución de la dependencia en la tercera edad en España. Documentos de Trabajo. Bilbao: Fundación BBVA.

CASADO-MARÍN, D.; LÓPEZ I CASASNOVAS, G. (2001): Vejez, dependencia y cuidados de larga duración. Situación actual y perspectivas de futuro. Colección Estudios Sociales. Barcelona.

CRIMMINS, E.M. et al (2009): "Change in disability-free life expectancy for Americans 70 years old and older", in Demography, 46 (3): 627-646.

CRIMMINS, E.; SAITO, Y.; REYNOLDS SL: (1997): "Further evidence on recent trends in the prevalence and incidence of disability among older American from two sources: the LSO and the NHI", in Journal of Gerontology, 52 (2): 559-571.

CRIMMINS, E.; SAITO, Y.; INGEGNERI, D. (1997): "Trends in Disability-Free Life Expectancy in the United States, 1970-90", in Population and Development Review, nº 23 (3): 555-572.

CUSSO, X. (2005): El estado nutritivo de la población española, 1900–1970. Análisis de las necesidades y disponibilidades de nutrientes. Historia Agraria 36, 329–358.

DONALD, I.P.; FOY, C.; JAGGER, C. (2010): Trends in disability prevalence over 10 years in older people living in Gloucestershire, in Age and Aging 39: 337-342.

EHEMU (2006): Estimations of health expectancy at age 65 in European Union countries in 2004 (EHEMU Technical report 2006-3). Montpelier: REVES.

EHEMU (2007): Health expectancies in Europe (EHEMU Technical report 2007-4). Montpelier: REVES.

EHEMU (2008): EHEMU Country Reports (EHEMU Technical report 2008-1). Montpelier: Réseau Espérance de Vie en Santé.

EHEMU (2005): Are we living longer, healthier lives in the EU? (EHEMU Technical report 2005-2). Montpelier: Réseau Espérance de Vie en Santé.
EHEMU (2008): EHEMU Country Reports (EHEMU Technical report 2008-1). Montpelier: Réseau Espérance de Vie en Santé.

FRIEDMAN, V. et al (2004): "Resolving inconsisencies in trends in old-age disability: report from a technical working group", in Demography, 41 (3): 417-441.

INE (2005): Encuesta sobre Discapacidades, Deficiencias y Estado de Salud, 1999. Informe General. INE: Madrid.

JAGGER, C. et al (2007): "Cohort differences in disease and disability in the young-old: findings from the MRC Cognitive Function and Ageing Study (MRC-CFAS)", in BMC Public Health, 7: 156.

JEUNE, B.; BRØNNUM-HANSEN, H. (2008): "Trends in health expectancy at age 65 for various health indicators, 1987–2005, Denmark", in European Journal of Ageing 5: 279–285.

LOPEZ-FALCON, D.; CAMARA, A.D. (2010): Human capital and biological well-being: intragenerational effects in 20th-century Spain. EPC, Vienna.

MANTON, K.G.; GU, X. (2001): "Changes in the prevalence of chronic disability in the United States black and nonblack population above age 65 from 1982 to 1999", en Proceedings of the National Academy of Sciences.

MANTON, KENNETH G. et. al. (2006): "Long-Term Trends in Life Expectancy and Active Life Expectancy in the United States", en Population and Development Review, nº 32 (1): 81-105.

MINICUCI, N. et al. (2004): "Disability-free life expectancy: a cross-national comparison of six longitudinal studies on aging. The CLESA Project", en European Journal of Ageing, nº 1 (1): 37-44.

OBSERVATORIO ESTATAL DE LA DISCAPACIDAD (2010): Las personas con discapacidad en España. Informe Olivenza 2010. Olivenza: Observatorio Esatal de la Discapacidad.

OTERO, A. et. al. (2004): "Volumen y tendencias de la dependencia asociada al envejecimiento en la población española", en Revista Española de Salud Pública, nº 78 (2): 201-213.

PARKER, M.G.; THORSLUND, M. (2007): "Health Trends in the Elderly Population: Getting Better and Getting Worse", en Gerontologist, nº 47 (2): 150-158.

PRADOS DE LA ESCOSURA, L. (2003): El progreso económico de España, 1850-2000. Fundación BBVA.

PUGA, M.D. (2002): Dependencia y necesidades asistenciales de los mayores en España, una previsión a 2010. Madrid: Fundación Pfizer.

ROBINE, J.M. et al. (2004): Disability-Free Life Expectancy (DFLE) in EU Countries from 1991 to 2003 (EHEMU Technical report 2004-1). Montpelier: REVES.

ROBINE, J.M. et al. (2005): Are we living longer, healthier lives in the EU? (EHEMU Technical report 2005-2). Montpelier: REVES.

ROBINE, J.M.; ROMIEU, I. (1998): "Healthy active ageing: Health expectancies at age 65 in the different parts of the world", en REVES PAPER, nº 318: 1-59.

SAGARDUI-VILLAMOR, J. et. al. (2005): "Trends in disability and disability-free life expectancy among elderly people in Spain: 1986-1999." Journal of Gerontology: biological sciences, nº 60A (8): 1028-1034.

SPIJKER, J.; PEREZ, J.; CAMARA, A. (2008): Cambios generacionales de la estatura en la España del siglo XX a partir de la Encuesta Nacional de Salud. *Revista de Estadística Española* 169: 571-604.

WINBLAD, I. et al (2001): "Prevalence of disability in three birth cohorts at old age over time spans of 10 and 20 years", in Journal of Clinical Epidemiology 54: 1019-1024.

WOLF, D.A. et al (2007): "Trends in rates of onset of and recovery from disability at older ages: 1982-1994", in The Journals of Gerontology, 62B (1): S3-10.

ZUNZUNEGUI MV, NUNEZ O, DURBAN M, GARCÍA DE YÉBENES MJ, OTERO A. (2006): Decreasing prevalence of disability in activities of daily living, functional limitations and poor self-rated health: a 6-year follow-up study in Spain. Aging Clinical and Experimental Research, 18(5), pp. 352-358.

Appendix

Prevalence by item and response category
Spain 1993-2006

65+	Able without help		Not able	
	Observed	Standardized	Observed	Standardized

Code	Activity	1993	2001	2006	1993	2001	2006	1993	2001	2006	1993	2001	2006
1	Phone	89.4%	93.7%	93.0%	89.4%	94.3%	93.4%	3.8%	1.6%	2.7%	3.7%	1.4%	2.3%
2	Buying	86.3%	88.1%	86.9%	86.2%	89.0%	88.4%	5.3%	4.2%	5.3%	5.4%	3.9%	4.6%
3	Transports	81.4%	83.6%	83.5%	81.4%	85.0%	85.7%	6.4%	4.9%	5.5%	6.5%	4.3%	4.6%
4	Breakfast	92.3%	95.3%	95.7%	92.3%	95.7%	96.1%	3.5%	1.9%	2.5%	3.6%	1.7%	2.2%
5	Lunch	90.3%	92.4%	91.4%	90.3%	93.0%	92.3%	3.7%	3.1%	3.9%	3.7%	2.9%	3.3%
6	Medicine	92.4%	94.3%	94.1%	92.4%	94.9%	94.9%	1.6%	1.2%	1.7%	1.5%	1.0%	1.5%
7	Money	90.6%	92.2%	92.2%	90.5%	92.9%	92.8%	2.9%	2.1%	2.8%	3.1%	1.9%	2.4%
8	Cutbread	95.7%	97.3%	97.8%	95.5%	97.6%	98.0%	1.6%	0.9%	1.4%	1.6%	0.8%	1.2%
9	Wash-up	90.3%	92.7%	93.1%	90.5%	93.3%	93.6%	4.6%	3.4%	3.6%	4.5%	3.1%	3.2%
10	MkBed	86.8%	88.1%	90.6%	86.9%	89.0%	91.7%	5.5%	4.4%	4.4%	5.5%	4.1%	3.7%
11	Chsheets	84.3%	87.2%	86.5%	84.3%	88.2%	88.0%	6.5%	4.7%	6.1%	6.4%	4.3%	5.1%
12	WsHand	83.0%	86.9%	85.4%	82.8%	87.9%	86.7%	8.8%	6.6%	8.7%	8.8%	6.0%	7.9%
13	WsMachi	84.7%	89.7%	89.3%	84.5%	90.5%	90.4%	7.2%	4.8%	6.0%	7.2%	4.4%	5.2%
14	Clean	79.9%	82.9%	82.6%	79.7%	84.3%	84.4%	9.7%	8.2%	9.3%	9.7%	7.5%	8.0%
15	CleanStain	81.3%	82.9%	72.2%	81.2%	83.9%	74.6%	9.4%	9.6%	17.4%	9.3%	8.9%	15.6%
16	Eating	95.8%	98.1%	98.5%	95.6%	98.2%	98.6%	1.5%	0.7%	0.6%	1.5%	0.6%	0.6%
17	Dress/Und	95.1%	96.3%	95.7%	95.1%	96.6%	96.1%	1.1%	0.7%	0.7%	1.1%	0.7%	0.7%
18	Comb/Shav	95.2%	97.2%	97.5%	95.1%	97.5%	97.9%	1.2%	0.7%	0.7%	1.2%	0.6%	0.6%
19	Walking	94.3%	96.1%	95.0%	94.2%	96.4%	95.7%	1.1%	0.6%	1.0%	1.2%	0.5%	1.0%
20	SUp-LDw	93.3%	96.4%	97.3%	93.3%	96.6%	97.7%	1.7%	1.0%	0.8%	1.7%	0.9%	0.7%
21	ToeNails	75.9%	74.3%	68.6%	76.2%	76.1%	71.7%	11.6%	14.4%	19.3%	11.2%	13.4%	17.0%
22	Sewing	85.0%	87.8%	87.3%	85.3%	88.7%	88.8%	8.3%	7.6%	8.7%	8.1%	7.0%	7.6%
23	CleanBody	93.0%	95.9%	97.3%	92.8%	96.3%	97.7%	1.9%	0.9%	0.8%	2.0%	0.8%	0.7%
24	Shower/Bath	86.6%	89.6%	91.1%	86.6%	90.6%	92.5%	2.7%	2.1%	2.0%	2.7%	1.9%	1.8%
25	Stairs	85.5%	86.5%	87.0%	85.6%	87.5%	88.4%	4.3%	3.7%	4.3%	4.4%	3.4%	3.6%
26	Walk1H	77.8%	76.9%	75.7%	77.8%	78.5%	78.0%	13.0%	14.2%	16.1%	13.0%	13.2%	14.4%
27	NightOwn	91.3%	93.3%	93.6%	91.3%	93.8%	94.4%	4.4%	3.3%	4.4%	4.6%	3.0%	3.8%

Males		Able without help						Not able					
		Observed			Standardized			Observed			Standardized		
Code	Activity	1993	2001	2006	1993	2001	2006	1993	2001	2006	1993	2001	2006
1	Phone	91.3%	96.4%	94.1%	90.6%	96.5%	94.5%	2.2%	1.1%	2.4%	2.4%	1.0%	2.1%
2	Buying	89.3%	91.6%	91.4%	88.8%	91.5%	92.4%	3.9%	3.0%	4.3%	4.1%	3.1%	3.7%
3	Transports	89.2%	91.2%	91.4%	88.6%	91.0%	92.4%	3.8%	2.6%	4.0%	3.8%	2.7%	3.4%
4	Breakfast	91.3%	95.5%	94.5%	91.4%	95.4%	95.1%	3.4%	1.5%	3.0%	3.4%	1.6%	2.6%
5	Lunch	87.5%	91.0%	88.0%	87.7%	90.9%	89.1%	4.1%	3.7%	5.4%	3.9%	3.9%	4.4%
6	Medicine	93.0%	95.4%	94.4%	92.7%	95.4%	95.2%	1.6%	0.7%	2.0%	1.5%	0.7%	1.8%
7	Money	93.3%	95.6%	94.8%	93.4%	95.6%	95.2%	1.6%	1.0%	2.0%	1.6%	1.1%	1.7%
8	Cutbread	96.4%	98.2%	97.7%	96.3%	98.2%	98.0%	0.9%	0.5%	1.4%	1.0%	0.4%	1.1%
9	Wash-up	89.7%	93.0%	92.2%	89.7%	93.0%	92.6%	5.5%	3.0%	4.3%	5.7%	3.1%	3.8%
10	MkBed	86.0%	88.5%	89.9%	85.7%	88.5%	91.1%	6.4%	4.7%	5.1%	6.8%	4.7%	4.3%
11	Chsheets	83.0%	88.1%	86.6%	82.7%	88.2%	87.8%	6.8%	4.8%	6.3%	7.1%	4.8%	5.6%
12	WsHand	82.4%	87.9%	84.1%	81.9%	87.9%	85.4%	9.2%	6.1%	9.3%	9.4%	6.1%	8.3%
13	WsMachi	82.0%	88.6%	84.2%	81.3%	88.5%	85.5%	8.4%	5.2%	8.8%	8.5%	5.3%	7.8%
14	Clean	81.7%	86.6%	85.5%	81.4%	86.7%	86.6%	8.8%	7.0%	8.1%	9.2%	6.9%	6.9%
15	CleanStain	81.3%	82.9%	72.2%	81.2%	83.9%	74.6%	9.4%	9.6%	17.4%	9.3%	8.9%	15.6%
16	Eating	96.2%	98.5%	98.5%	96.1%	98.4%	98.8%	1.1%	0.6%	0.6%	1.1%	0.6%	0.4%
17	Dress/Und	95.5%	97.1%	95.9%	95.6%	97.0%	96.4%	0.5%	0.4%	0.7%	0.5%	0.4%	0.6%

18	Comb/Shav	96.0%	98.4%	97.4%	95.9%	98.3%	98.0%	0.9%	0.4%	0.5%	1.1%	0.4%	0.4%
19	Walking	95.7%	97.8%	96.5%	95.7%	97.7%	96.9%	0.8%	0.3%	1.3%	1.0%	0.3%	1.2%
20	SUp-LDw	94.9%	97.4%	97.5%	95.1%	97.3%	98.0%	1.0%	0.3%	0.9%	1.0%	0.4%	0.7%
21	ToeNails	81.9%	81.6%	77.8%	81.5%	81.7%	79.4%	7.5%	9.3%	11.7%	7.8%	9.4%	10.7%
22	Sewing	83.0%	86.7%	83.8%	83.1%	86.7%	85.2%	8.5%	8.4%	10.8%	8.3%	8.5%	9.8%
23	CleanBody	93.1%	97.8%	97.7%	92.7%	97.8%	98.1%	1.5%	0.4%	0.6%	1.6%	0.4%	0.5%
24	Shower/Bath	89.8%	93.9%	93.3%	89.3%	93.8%	94.3%	1.7%	1.3%	1.7%	1.8%	1.4%	1.4%
25	Stairs	90.8%	92.0%	91.5%	90.7%	91.9%	92.1%	2.9%	2.1%	2.9%	3.0%	2.2%	2.5%
26	Walk1H	86.2%	84.9%	83.0%	86.0%	84.9%	84.0%	7.0%	8.8%	10.7%	7.1%	8.9%	10.1%
27	NightOwn	94.1%	95.8%	95.4%	94.2%	95.9%	96.0%	2.6%	1.9%	3.4%	2.7%	1.9%	2.9%

Females		**Able without help**						**Not able**					
		Observed			**Standardized**			**Observed**			**Standardized**		
Code	**Activity**	**1993**	**2001**	**2006**	**1993**	**2001**	**2006**	**1993**	**2001**	**2006**	**1993**	**2001**	**2006**
1	Phone	88.1%	91.7%	92.2%	88.5%	93.1%	92.6%	4.9%	2.1%	2.8%	4.5%	1.7%	2.5%
2	Buying	84.2%	85.5%	83.6%	84.7%	87.5%	85.6%	6.4%	5.1%	6.0%	6.0%	4.2%	5.2%
3	Transports	75.9%	78.0%	77.8%	76.9%	81.1%	81.0%	8.2%	6.5%	6.6%	7.9%	5.3%	5.5%
4	Breakfast	93.0%	95.1%	96.5%	93.2%	95.9%	96.7%	3.6%	2.2%	2.0%	3.5%	1.8%	1.9%
5	Lunch	92.3%	93.5%	93.9%	92.4%	94.5%	94.6%	3.4%	2.7%	2.9%	3.3%	2.2%	2.5%
6	Medicine	92.0%	93.5%	93.8%	92.2%	94.6%	94.7%	1.6%	1.5%	1.6%	1.4%	1.2%	1.3%
7	Money	88.6%	89.8%	90.2%	88.8%	91.2%	91.1%	3.7%	2.9%	3.4%	3.9%	2.4%	2.9%
8	Cutbread	95.1%	96.7%	97.8%	95.2%	97.3%	98.1%	2.1%	1.2%	1.4%	2.0%	1.0%	1.3%
9	Wash-up	90.7%	92.5%	93.9%	91.3%	93.5%	94.3%	4.0%	3.6%	3.2%	3.7%	3.1%	2.8%
10	MkBed	87.3%	87.9%	91.0%	87.9%	89.3%	92.0%	5.0%	4.1%	3.9%	4.6%	3.6%	3.4%
11	Chsheets	85.2%	86.5%	86.5%	85.6%	88.2%	88.1%	6.2%	4.7%	5.9%	5.8%	4.0%	4.9%
12	WsHand	83.5%	86.2%	86.4%	83.7%	87.9%	87.7%	8.6%	6.9%	8.3%	8.3%	6.0%	7.7%
13	WsMachi	86.5%	90.4%	93.1%	87.0%	91.9%	93.9%	6.4%	4.5%	3.9%	6.0%	3.8%	3.3%
14	Clean	78.7%	80.2%	80.4%	79.2%	82.8%	82.8%	10.3%	9.1%	10.1%	9.8%	7.9%	8.7%
15	CleanStain	79.0%	79.9%	65.5%	79.7%	81.7%	69.0%	10.8%	10.8%	22.0%	10.1%	9.6%	19.4%
16	Eating	95.4%	97.8%	98.6%	95.5%	98.1%	98.6%	1.7%	0.8%	0.7%	1.6%	0.7%	0.7%
17	Dress/Und	94.9%	95.7%	95.6%	95.0%	96.4%	95.9%	1.5%	1.0%	0.7%	1.4%	0.8%	0.7%
18	Comb/Shav	94.6%	96.4%	97.6%	94.8%	97.0%	97.9%	1.4%	1.0%	0.8%	1.3%	0.8%	0.7%
19	Walking	93.3%	94.9%	93.9%	93.5%	95.5%	94.9%	1.3%	0.8%	0.8%	1.2%	0.7%	0.8%
20	SUp-LDw	92.1%	95.6%	97.0%	92.4%	96.2%	97.4%	2.3%	1.5%	0.7%	2.2%	1.3%	0.8%
21	ToeNails	71.8%	69.0%	61.8%	72.9%	71.9%	66.1%	14.5%	18.0%	24.9%	13.4%	16.2%	21.7%
22	Sewing	86.4%	88.6%	89.9%	87.0%	90.3%	91.4%	8.2%	7.0%	7.1%	7.7%	6.0%	6.1%
23	CleanBody	93.0%	94.5%	97.0%	93.1%	95.6%	97.4%	2.2%	1.3%	0.9%	2.1%	1.1%	0.8%
24	Shower/Bath	84.3%	86.5%	89.5%	84.9%	88.6%	91.2%	3.4%	2.8%	2.2%	3.1%	2.3%	2.0%
25	Stairs	81.8%	82.6%	83.8%	82.5%	84.3%	85.7%	5.4%	4.8%	5.3%	5.2%	4.1%	4.3%
26	Walk1H	71.8%	71.1%	70.4%	72.7%	74.1%	73.6%	17.2%	18.1%	20.1%	16.6%	16.0%	17.5%
27	NightOwn	89.3%	91.4%	92.3%	89.6%	92.3%	93.2%	5.8%	4.4%	5.1%	5.8%	3.8%	4.5%

Missing values by age-cohort groups (cases and percent)[6]

[6] Missing values are more numerous in the wave of 1993 so that specific age-cohort combinations are affected which must to bear in mind to explain some inconsistencies observed in the cohort trends To be noted, missing values in 1993 ranged from 6.2 (telephoning, shopping) to 8.2 (sewing a button) and the total missing cases rose to about 7 percent (this is enough to potentially reshape some of the cohort trends due to the dissagregation by sex, age and cohort that we have applied; cross-sectional analysis is unlikely to be affected in the main). In the rest of the waves forming the cross-sectional trends, the percentage of

	65-69	70-74	75-79	80-84
1910-14				10
1915-19			27	7
1920-24		39	13	9
1925-29	44	18	9	
1930-34	4	10		
1935-39	9			

	65-69	70-74	75-79	80-84
1910-14				15
1915-19			19	17
1920-24		40	24	9
1925-29	34	22	16	
1930-34	11	15		
1935-39	13			

	65-69	70-74	75-79	80-84
1910-14				8.93
1915-19			12.44	4.35
1920-24		9.31	3.12	1.58
1925-29	8.37	3.58	0.93	
1930-34	0.68	0.84		
1935-39	0.79			

	65-69	70-74	75-79	80-84
1910-14				8.02
1915-19			6.25	6.32
1920-24		7.59	4.49	0.83
1925-29	4.66	2.95	1.02	
1930-34	1.30	0.77		
1935-39	0.74			

.

missing values for the involved items are lower (0.99 in 2001 and 2.32 in 2006). No imputation has been attempted. As it is easily understandable the data aggregation contributes to smooth some of the inconsistencies of each of the waves but in any case they are totally solved.