Trends in Disability-free life expectancy in France: consistent and diverging patterns according to the underlying disability measure

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ABSTRACT

In this study we propose several estimates of disability-free life expectancy (DFLE) for France around the year 2000 and over the 1990's, based on various indicators of disability: common functional problems, activity restrictions, etc. The aim is to point out specific and common patterns related to these indicators to give a more complete picture of disability and potential needs for the elderly population. We estimated 10 different DFLEs based on 4 different population surveys: 3 estimates based on restrictions for personal care activities, 3 estimates based on general activity limitations, 4 estimates based on physical and sensory limitations. Three of the surveys provide time series. The DFLEs vary greatly according to the underlying disability indicator. Around the year 2000, at age 65, life expectancy without any kind of functional difficulties (walking, seeing…) is less than a third of the total life expectancy but life expectancy without restrictions for personal care activities reaches about 90% of total life expectancy. These proportions are larger for men than women and decrease with age whatever the underlying concept, but these patterns vary in intensity. The study also demonstrates the congruence of DFLE estimates based on similar disability indicators, even coming from different surveys. Time trends differ according to the estimates; the more severe the disability indicator, the steeper the increase in DFLE. Despite data constraints and limitations, this study highlights the policy relevance of producing a whole set of DFLE indicators to better appraise disability patterns and trends in each country.

INTRODUCTION

In France, disability-free life expectancy (DFLE) was previously calculated for the years 1981 and 1991, using data from the decennial surveys on health and medical care (*enquêtes décennales sur la santé et les soins médicaux*, ESSM). These estimates shed light on combined mortality and functional health trends over the period, based on a general disability question enquiring about disability or discomforts in daily life (Robine and Mormiche, 1994). They showed that the increase in life expectancy in the 1980s was associated with a lengthening of the disability-free period of life for both men and women. Though life expectancy at birth rose by 2.5 years between 1981 and 1991, DFLE increased by 3 years for men and 2.5 years for women over the period. So these life expectancy gains between 1981 and 1991 did not increase the number of years lived with disabilities, either severe or moderate.

More generally, research on DFLE reveals contrasting trends by period and country. Indeed, the direction and speed of change depend partly on the instruments used to measure disability,

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and on the type of functional problems and limitations explored, as different European research projects have shown (Perenboom et al., 2004; Breakwell et al., 2005; Sagardui-Villamor et al, 2005; Doblhammer et al., 2001; ONS, 2006). The level of severity of the functioning problem is also an important aspect to consider to compare DFLE or interpret the meaning of trends. Indeed, in recent decades, life expectancy *without severe disability* appears to have increased faster than life expectancy *without disability, all levels of disability included* (Robine et al., 2003). In the 1970s and 1980s, increased life expectancy worldwide could have been accompanied, at the level of whole populations, by an increase in functional limitations and discomfort due to the greater longevity of old and ill people. On the contrary, these years of life gained do not appear to be years of severe disability such as confinement or dependency on others' help in daily life. More recently, even the risk of moderate limitations has been trending down at each age. These studies highlight the importance of comparing different data sources and indicators to provide an overall picture of the situation, in terms of both level of DFLE reached and ongoing trends (Robine et Michel, 2004).

For France, the 1981-91 DFLE estimates described above have constituted for a long time the single available source of information for trends. The purpose of this study is to update this series using data from the latest ESSM survey, conducted in 2002-2003, but also to complete it with estimates based on other disability indicators, from the 2002-2003 ESSM survey and other data sources. Our aim is to gain a clearer picture of the French situation by depicting different approaches to disability: alteration of body functions, discomfort, activity limitations, social disadvantage… By doing so, we also aim to take into account the possible lack of consistency between the DFLE estimate based on the most recent ESSM survey in France and the series initiated in 1981: the ESSM survey protocol has been substantially modified and may have changed respondents' understanding of the question used, and hence introduced methodological bias in the comparison between the 1991-1992 and the 2002-2003 survey results (Cambois et al., in press).

Altogether, we present estimates based on 10 disability indicators from 4 different surveys: 4 disability indicators from the 2002-03 ESSM survey, three indicators from the "Health and social protection" survey (*Enquête sur la santé et protection sociale* or ESPS); two indicators from the "Handicap, disability and dependence" survey (*Handicap, incapacités, dépendance* or HID), conducted by INSEE; one indicator from the "European Community Household Panel" (ECHP). Two of these surveys, alongside the ESSM, have been conducted several times and allow to document trend patterns (ECHP and ESPS). Among these 10 indicators, some are covering similar concepts of disability while others are tackling specific situations. This study finally aims to put together on the same picture these 10 indicators in order to appraise their proximity or divergence. We will first describe the disability indicators used and surveys design before the full set of DFLE estimates.

DATA AND METHODS

Calculating the DFLE

The DFLE is the mean length of time in total life expectancy that individuals can expect to live free of disability if current health conditions continue to apply. Various methods exist to combine the risks of disability and mortality (Cambois et al., 1999). For cross-sectional data, we use the Sullivan method, which involves applying the prevalence of disability observed in a survey to the person-years of the period life table (Sullivan, 1971). As most of the surveys used are limited to the population of ordinary households, we also follow Sullivan's method by treating the years spent in an institution as years of disability. For each estimation, we calculate a confidence interval taking account of the survey sample size (Jagger et al., 2006). In this study, we use DFLE as a generic terminology: the 10 disability indicators will be derived in 10 different DFLE estimates. We will distinguish each of them using the specific terminology corresponding to the underlying question or concepts used to compute this summary estimate.

The health and medical care surveys (ESSM)

The ESSM survey, conducted every 10 years by the Institut National de la Statistique et des Etudes Economiques (National Institute for Statistics and Economic Studies, INSEE), is administrated to a sample representative of the French ordinary households. It aims to collect information on self-reported health, health consumption and health behaviour. In the most recent survey conducted in 2002-2003, information was gathered over a one-month period, over which an interviewer visited the household three times. On the first visit, the interviewer recorded general socio-demographic data concerning the household and household members. He was also administrating individually to each household member the first visit questionnaire about general health and disease. The household members where again interviewed individually during the two subsequent visits to update information on diseases and health consumption and answer some new questions.

For the 2002-2003 ESSM survey, 25,000 addresses were randomly selected in the census database. The sample interviewed for the first visit totalled 40,832 individuals living in ordinary households in metropolitan France and represents 78% of the selected households within the scope of the survey. A total of 6,237 persons aged 65 years and older answered the entire questionnaire during the first visit, and 5,226 completed all the questionnaires of the three visits. A weighting system provided by INSEE was used to adjust the final sample according to the characteristics of persons who dropped out of the survey between visits. The individual questionnaire for the third visit, containing detailed questions on functional health problems, only concerned adults who were reported capable of replying for themselves during the first visit. We will discuss later the impact of excluding persons reported as incapable of replying. We use two general questions on disability as well as modules of detailed questions on functional limitations and activity restrictions.

<u>The general question on "disability or discomfort":</u> The general question on "disability or discomfort" was asked for the first time in the ESSM of 1980-1981, then repeated with the same wording in 1991-1992 and 2002-2003: "Is there anyone in the household being disabled or who simply have difficulties or discomfort in daily life?" (excluding temporary limitations or disabilities, such as a broken leg in plaster)". The DFLE estimated with 1980-1981 and in 1991-1992 surveys were based on this question. Despite the same question wording, comparison of the first two surveys with the third in 2002-2003 is uncertain due to a major change in the survey protocol (Cambois et al., in press). With the first two surveys, the whole questionnaire was administered to one person in the household in charge to reply on behalf of him/herself and the other household members; the question "disability or discomfort" was asked during the 5th and last visit of the interviewer. In 2002-2003, the whole questionnaire was entirely addressed individually to every household member, except for the part dealing with the household description in the introductory section (one or more persons in the household has documented it with the interviewer). Therefore, in ESSM 2002-2003, the question "disability or discomfort" was moved to this introductory section in order to conserve a "household interview" mode rather than the individual face to face mode applying now for the rest of the questionnaire. Analysis of this data suggested that the positioning of the question in a new context tended to reduce the respondents' propensity to designate household members as "being disabled or having discomforts". Trends described by this question is probably partly artificial, over-estimating a decrease in disability. Knowing that, we have kept this indicator to document trends but only within a full set of different estimates

in order to monitor the possible excessive decrease indicated by these DFLE estimates. We computed life expectancy *without disability or discomfort*.

The general question on "long term general activity limitations": Another general disability question was asked in the individual part of the ESSM 2002-2003 survey, at the start of the questionnaire. Respondents were asked if they were "limited for at least six months in activities people usually do, because of health problems". This indicator of long term activity limitations was developed for the European Commission within a research programme "Euro-reves" dealing with transnational comparisons of DFLE (van Oyen et al, 2006). We compute life expectancy *without long term activity limitations*.

The module of questions on "physical and sensory functional limitations": The questionnaire of the third visit of the ESSM 2002-2003 survey, comprises a module of questions on *functional limitations* for locomotion (difficulty walking, climbing stairs), joint mobility and grasping (difficulties kneeling, picking up an object, lifting and carrying a package) and *sensory limitations* (difficulties hearing a conversation, poor near vision, poor distant vision). All persons reporting difficulties in at least one of these areas are considered as having functional limitations, including when they use an assistive or corrective device (lens, stick etc.). This module allows computing life expectancy *without physical or sensory functional limitations*.

The module of questions on "restrictions for personal care activities": A second module covers restrictions in personal care activities reported by individuals (difficulty or inability to do the following activities: get dressed without help, feed him/herself without help, get into and out of bed without help; wash without help; go to the toilet without help). All persons reporting difficulties in at least one of these areas are considered to have restrictions in personal care activities. This module allows to compute life expectancy *without personal care activity restrictions.*

Health and social protection survey (ESPS)

The ESPS survey, conducted by the Institut de recherche et documentation en économie de la santé (IRDES), aims to measure and analyse health and healthcare consumption of households in France. The ESPS survey is conducted since 1988 on a sample of households in which at least one person is registered with one of the three main health insurance schemes, representative of around 95% of persons living in households in 2000 (Doussin et al., 2002 ;

Auvray et al., 2003). The households are contacted by phone via an agency. The non-response rates are high (56% of usable addresses supplied to the agency), mainly because many households cannot be reached, and increase over time. This decreasing response rate appears to be mostly linked to the process operated by a new agency to contact household, and could be mostly independent from health (this can be observed as the change has been operated with a 4 year-round allowing to compare prevalences in the different waves). A reduction of the sample size is avoided by increasing the number of addresses in the initial sampling frame. The questions used to measure disability are included in a self-administered questionnaire sent to households after initial contact has been established. Here too, the non-response rates are generally high and we do not know if there are due to lack of time or motivation to return the questionnaire or to health problems (30% in 2002). Persons over age 65 receive a personal visit from an interviewer and in this case the response rate is higher. In this study, we used data covering four periods: 1988-91 ; 1992-95 ; 1996-98 ; 2000-02. In 2002, a total of 4,650 persons aged 65+ were contacted. To calculate disability-free life expectancy, we used the mid-period life tables (1990, 1994, 1997, 2001). From this series of surveys, two questions are used. Comparisons over time based on the ESPS survey, notably for the last year used here, should be interpreted with caution however. We will still add the DFLE series obtained from this survey to the other estimates for reference purposes.

Mobility difficulties: People were asked if they have difficulties for moving around. Responses categories allow to distinguish two levels of difficulties. We consider "all levels of difficulty" and "severe difficulties only". We compute life expectancy *without mobility difficulties* and life expectancy *without severe mobility difficulties*.

Washing difficulties: People were asked if they have difficulties for washing themselves. This question has been used to cover the domain of restriction for personal care activities. Meanwhile, this single question is not covering the full range of activity usually used to tackle this type of restrictions. We compute life expectancy *without washing difficulties*.

The handicap, disability and dependence survey (HID)

The HID survey is a survey covering the entire French population (ordinary and institutional households). For consistency with the other surveys, we use the part concerning ordinary households that was conducted in 1999. The sample of households is built based on a screening health questionnaire (*Vie Quotidienne et Santé*), which has been attached to the

1999 general census population for 400 000 randomly selected ordinary households. This procedure enabled us to identify and over-represent the population with different types of disabilities. Among these households, the response rate was 77.8%. Out of the selected sample, 12% refused to reply and 7.3% could not be contacted, and between the selection process and the interviewer's visit, 0.7% died and 0.3% entered an institution. The sample of persons aged 65+ totalled 7,560 individuals. When individuals had difficulties answering, another person could help them or answer on their behalf. The possibility of answering "by proxy" tends to bias the results, though it avoids excluding people who cannot answer for health reasons. This survey comprises modules of questions on physical and sensory functional limitations and personal care activity restrictions. Despite different wording, these two modules allows indicators covering similar approaches of disability than what is obtained with the 2002-2003 ESSM survey to be produced.

The module of questions on functional limitations: We use the module on *physical or sensory functional limitations* (difficulties walking, going up and down stairs, using one's hands, cutting one's toenails, bending down to pick up an object; poor near vision; poor distant vision; poor hearing). The wording of these questions in the HID survey makes no distinction between functional limitations with or without the use of a technical aid. It seems to measure difficulties experienced, including for those who use a technical aid. This is why we also recorded "residual limitations" for the questions of the ESSM survey as described above. All persons reporting difficulties in at least one of these areas is considered to have functional limitations. We compute again life expectancy *without physical and sensory functional limitations*.

The module of questions on personal care activities restrictions: We use the module of questions concerning *restrictions in personal care activities*. People were asked if they had severe difficulties or inability to do the following activities: eat without help; dress without help; wash without help; use the toilet without help; go into or out of bed without help). All persons reporting difficulties in at least one of these areas is considered to have restrictions in personal care activities. We compute life expectancy *without personal care activity restrictions*.

The European Community Household Panel (ECHP)

The ECHP is a European survey based on a harmonized questionnaire. For France, it was conducted by INSEE for Eurostat. A panel of households in each country was interviewed annually (1994-2001). It covered a broad range of sociodemographic topics and includes several questions on health. During the first wave (1994), a sample of 60,500 ordinary households, i.e. around 130,000 adults over age 16, was interviewed in the 12 EU member countries. The French sample comprised around 12,600 people aged over 20 in 1995, and around 9,500 in 2001. Participation rates were variable. Eurostat announced a response rate of 79% for the French part of the first survey in 1994 (90% of non-response being due to failure to contact households and 10% due to health problems). The response rate was 90% in 1995 (Eurostat, 1997). The final sample of persons aged 65+ totalled 2,000 individuals.

<u>Discomfort due to illness or disability:</u> It contains the following question, with the same wording since 1995: "are you hampered in your daily activities by a physical or mental health problem, illness or disability". Respondents can reply "yes severely" "yes, to some extent" and "no". We compute life expectancy *without discomfort due to illness or disability*.

On the basis of these four surveys, we can calculate ten different estimates for DFLE, including four for which a trend over time can be described by calculating annual rates of change using a log-linear regression. For the series obtained from the ESPS and ECHP surveys, comprising more than three relatively fluctuating points, we estimated the rates on the basis of estimated DFLE values obtained by the regression parameters. All the estimates are shown on Figure 1.

RESULTS

DFLE in France over the period 1999-2003

Table 1 gives the values of the ten DFLE estimates obtained for the period 1999-2003, based on the most recent surveys and in decreasing order. The survey samples are quite large and confidence intervals are small. The largest confidence interval applies to the ECHP data and hardly exceeds one year. For the other estimates, the margin of error is counted in months. The order of DFLEs is the same for men and for women, and the estimates obtained from indicators based on similar definitions are in the same range, even when the data sources are different. At age 65, life expectancy *without personal care activity restrictions, without washing difficulties,* and *without severe mobility difficulties* ranges between 14 and 15.5 years for men and 17 and 19 years for women. Men can thus expect to live between 86% and 91% of their lives without this type of difficulties, and women between 80% and 88%.

Persons aged 65 spend around ¾ of their life expectancy without *mobility difficulties* (all levels of severity) or without *disability or discomfort.* Women are much more affected by mobility difficulties than men, with only 69% of their life expectancy free from such difficulties (compared with 76% for men). This difference is probably due to gender variation in reporting moderate difficulties as for the most severe ones, the differences between men and women are smaller (88% and 91% respectively). Among the indicators based on general disability questions, *long-term activity limitations* are the most frequent, leading to the shortest DFLE: less than 13 years for mean and 15 years for women. Life expectancy *without discomfort due to illness or disability* based on the French version of ECHP is quite low meaning that it visibly encompasses a broad range of situations including those who only have common moderate functional problems beside those with the most severe difficulties.

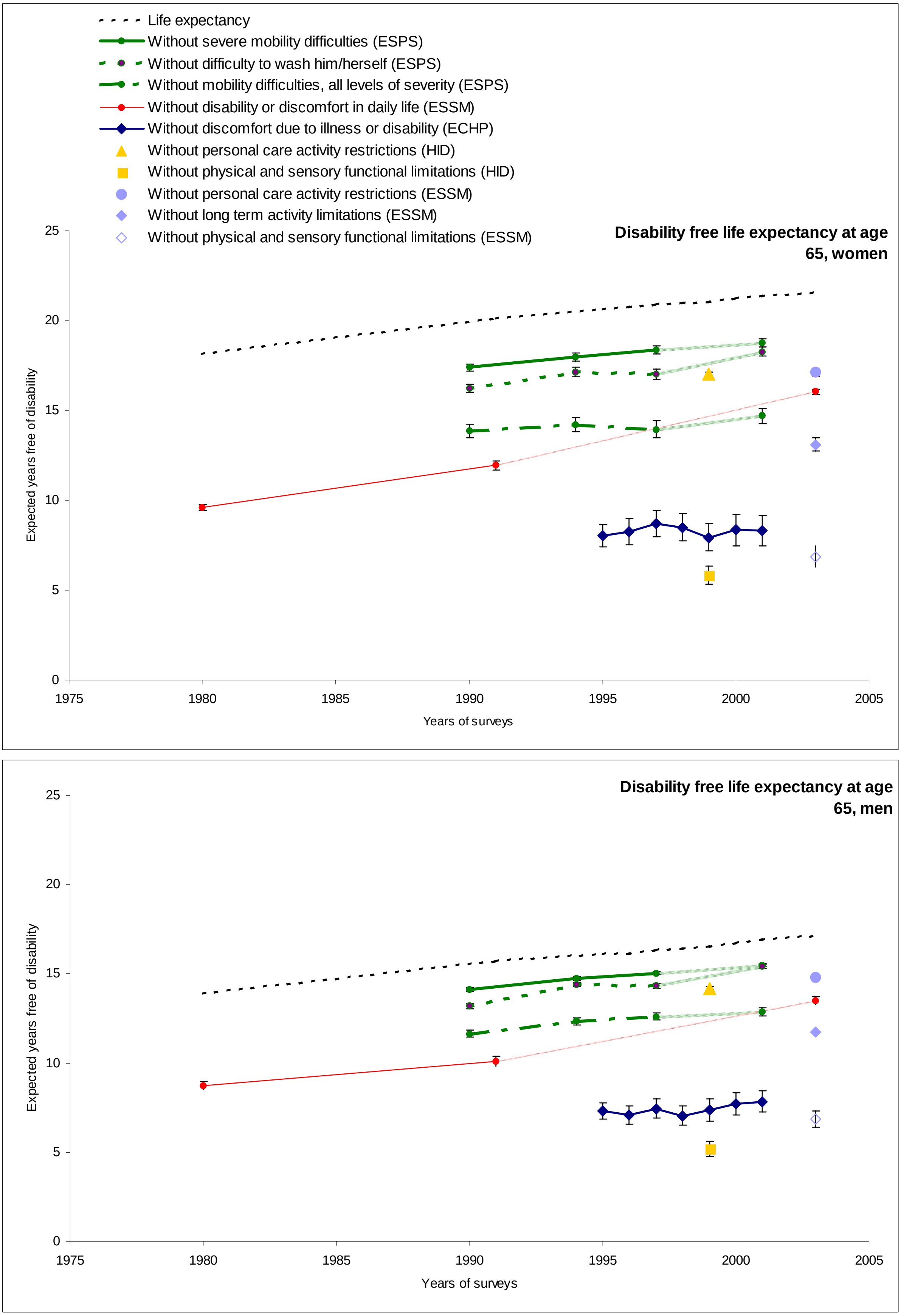
At the bottom of the gradient is the third group of DFLE, based on *physical or sensory functional limitations*. These functional problems are quite commonly reported in the elderly people and occupy around two-thirds of life expectancy at age 65.

Table 1: Disability free life expectancies (DFLE) for men and women at age 65 years old based on different disability indicators available in four recent household population health surveys, France 1999 to 2003 (% DFLE/LE and confidence intervals)

	Men		Women	
Life expectancy at age 65years old in 1999	16,5	-	21,0	-
Life expectancy at age 65years old in 2003	17,1	-	21,5	-
Life expectancy…				
Without severe mobility difficulties (ESPS 2000-02)	15,5 (91%)	*[15,4-15,6]*	18,8 (88%)	*[18,5-19,0]*
Without washing difficulties(ESPS 2000-02)	15,4 (91%)	*[15,3-15,5]*	18,3 (86%)	*[18,0-18,5]*
Without personal care activity restrictions (ESSM 2002-03)	14,8 (87%)	*[14,7-14,9]*	17,1 (80%)	*[16,9-17,3]*
Without personal care activity restrictions (HID 1999)	14,2 (86%)	*[14,1-14,3]*	17,0 (81%)	*[16,9-17,1]*
Without disability or discomfort in daily life (ESSM 2002-03)	13,5 (79%)	*[13,3-13,6]*	16,1 (75%)	*[15,8-16,3]*
Without mobility difficulties, all levels of severity (ESPS 2000-02)	12,9 (76%)	*[12,6-13,1]*	14,7 (69%)	*[14,3-15,2]*
Without long term activity limitations (ESSM 2002-03)	11,7 (69%)	*[11,5-11,9]*	13,1 (61%)	*[12,7-13,5]*
Without discomfort due to illness or disability (ECHP 2001)	7,8 (46%)	*[7,1-8,5]*	8,3 (39%)	*[7,4-9,2]*
Without physical and sensory functional limitations (ESSM 2002-03)	6,8 (40%)	*[6,4-7,3]*	6,9 (32%)	*[6,3-7,5]*
Without physical and sensory functional limitations (HID 1999)	5,2 (32%)	*[4,8-5,6]*	5,8 (28%)	*[5,4-6,3]*

ESSM, INSEE, 2002-03 ; ESPS, IRDES, 2000-2002, ECHP, Eurostat/INSEE, 2001; HID, INSEE, 1999

Graph 1 : Disability-free life expectancy estimates at age 65 for France between 1980 and 2003 based on 10 disability indicators and 4 surveys (see detailed figures in tables 1 to 4), Men and women



Change in DFLE over time

Life expectancy *without disability or discomfort* increased sharply between 1981 and 2003 (Table 2). Over the first period, 1981-1991, women at age 65 gained 1.3 years and men 2.3 years, with an annual rate of increase between 1.3% and 2.0%. Between 1991 and 2003, men gained 3.4 years and women 4.1 years, more than double the gains achieved in 1981-91. In the early 1990s, this indicator appears to reflect relatively moderate disability levels, close to *long-term activity limitations.* But following its rapid increase, the indicator in 2003 is more closely associated with the indicators of severe disability.

Tableau 2: Life expectancy (LE) and life expectancy *without disability or discomfort in daily life* (DFLE) for men and women at age 65 based on ESSM surveys (1980-81; 1991-92; 2002-03)

	Men			Women		
	1980-81	**1990-91**	**2002-03**	**1980-81**	**1990-91**	**2002-03**
LE	13,9	15,7	17,1	18,16	20,14	21,52
DFLE	8,8	10,1	13,5	9,6	12,0	16,1
%DFLE/LE	63%	64%	79%	53%	59%	75%

The ECHP data for the period 1995-2001 indicate that life expectancy *without discomfort due to illness or disability* levelled off for women at age 65 and rose slightly for men (Table 3). The annual rates of increase in life expectancy at age 65 *without discomfort due to illness or disability* are an estimated 1.3% per year for men (0.1% for women); in view of the sample size, the confidence intervals are larger than the variations. The proportion of years of life at age 65 *without discomfort due to illness or disability* remains stable, at around 46% for men and 40% for women. The years of life gained over the period are accompanied by the functional problems reported via this question.

Tableau 3: Life expectancy (LE) and life expectancy *without discomfort due to illness or disability* (DFLE) for men and women at age 65 based on ECHP (de 1995 à 2001)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Men							
LE	16,09	16,12	16,32	16,39	16,50	16,72	16,91
DFLE	7,3	7,1	7,4	7,0	7,4	7,7	7,8
%DFLE/LE	46%	44%	46%	43%	45%	46%	46%
Women							
LE	20,64	20,72	20,88	20,94	20,99	21,22	21,37
DFLE	8,1	8,3	8,7	8,5	7,9	8,4	8,3
%DFLE/LE	39%	40%	42%	41%	38%	39%	39%

The ESPS survey data were used to construct three DFLE time series for 1988-91, 1992-95, 1996-98 and 2000-02 (Table 4). Life expectancy *without mobility difficulties* (severe and all levels of severity combined) and *without difficulty for washing him/herself* trending upwards in all series, though the confidence intervals do not enable us to draw definite conclusions. The increase is not always as rapid as that of life expectancy however. Over the period, life expectancy at age 65 increased by 1.35 years for men and 1.44 years for women. The increase in life expectancy *without mobility difficulties*, for all levels of severity, is smaller than the total increase in life expectancy over the same period (+1.0 year for men and +0.9 years for women) and the increase in life expectancy *without severe mobility difficulties* is equivalent (+1.4 years for both sexes). Life expectancy *with no difficulty washing him/herself* increased faster than total life expectancy (+2.2 years for men and +2.1 years for women). At age 65, the annual rate of increase for life expectancy *with no difficulty washing him/herself* is +1.3% for men and +1% for women. The years of life gained are not accompanied by an equivalent proportion of severe difficulties in personal care activities, even though the most common mobility limitations occupy a stable proportion of life expectancy at age 65.

Tableau 4: Life expectancy (LE) and life expectancy without mobility difficulties and without difficulty to wash her/himself (DFLE) for men and women at age 65 based on ESPS surveys (1988-91 ; 1992-95 ; 1996-98 ; 2000-02)

	Men				**Women**			
	1988-91	**1992-95**	**1996-98**	**2000-02**	**1988-91**	**1994-95**	**1996-98**	**2000-02**
LE	15,6	16,2	16,3	16,9	19,9	20,7	20,9	21,4
Without mobility difficulties, all levels of severity								
DFLE	11,6	12,3	12,6	12,9	13,9	14,2	14,0	14,7
%DFLE/LE	75%	76%	77%	76%	70%	69%	67%	69%
Without severe mobility difficulties								
DFLE	14,1	14,7	15,1	15,5	17,4	18,0	18,4	18,8
%DFLE/LE	91%	91%	92%	92%	87%	87%	88%	88%
Without difficulty to washing difficulties								
DFLE	13,2	14,4	14,3	15,4	16,2	17,1	17,0	18,3
%DFLE/LE	85%	89%	88%	91%	81%	83%	82%	86%

DISCUSSION

For the first time, this study brings together all sets of population data that can be used to estimate DFLE in France over the last two decades. These estimates, based on four different surveys, provide a benchmark for the estimates obtained until now from the decennial survey on health and medical care (ESSM).

Analysis shows that the 10 DFLE estimates obtained represent a range of different disability situations: some reflect the most common functional limitations, while other reflect restrictions of activity which may involve substantial need of assistance and which therefore correspond to a certain form of dependence. Two of the global disability questions (disability or discomfort and long term activity limitations) are situated between these two extremes. A first outcome of this study is that the DFLEs are grouped together on the basis of the definitions of disability indicators used in the calculations, even when they are based on different surveys: physical and sensory functional limitations and personal care activity restrictions can be viewed as robust dimensions of functional health remaining quite stable for close period from one survey to another.

In addition, the comparison of these different estimates reveals several compelling facts, such as the smaller proportion of disability-free life enjoyed by women than by men, whatever the aspect of functional health examined, or the fact that disability problems are generally concentrated in the last years of life. But this set of estimates also shows to what extent these common patterns vary according to the functional health indicator used. For example, for the indicator on *disability or discomfort* in 2003, the difference between men and women is small.

Trends over time should be viewed with caution due to methodological problems. The increase in life expectancy without *disability or discomfort* obtained for the last two ESSM surveys, like those based on mobility and washing difficulties (ESPS survey), is probably overestimated due to changes in survey design that might have affected the nature of the question and how people reply to it (Cambois et al., in press). The fact that the question was moved to the start of the questionnaire in 2002-2003, being therefore isolated from the health environment that was surrounding the same question in the 1980-81 and 1991-92 editions, may provide one possible explanation. This new position may have reduced respondents' propensity to report persons in the household "being disabled or having simply discomfort and difficulty". In the new survey protocol, this *disability or discomfort* question appears to "screen" persons with disabilities that are severe and recognized, either officially or by the household member, despite the wording also suggest "simple discomforts". The new design might have operated a selection of situations more scarce than in previous editions; this might have thereby reduced the prevalence of disability by modifying the perceived definition of *disability or discomfort*.

In these surveys, non-responses pose a problem: persons who did not succeed to answer any or some part of the questionnaire, people reported unfit who were not interviewed for some questions or persons who did not return their questionnaire in the case of ESPS survey. By ignoring this problem, it is thus assumed that these people are no different from the respondents, especially in terms of disability. But when these people are excluded for health reasons, the prevalence of disabilities is thereby under-estimated. We made some computations to estimate the impact of such an assumption on the DFLE values with the 2002-03 ESSM survey data: considering that the non-respondents to the third visit questionnaire all have *functional limitations*, the estimates of life expectancy *without functional limitations* at age 65 are reduced by around 1.5 months for men and women. If we consider that they all have *restrictions in personal care activities* – a strong hypothesis given the severity of this type of disability – the indicators of life expectancy *without restrictions in personal care activities* are reduced by about 4.5 months for men and 5.5 months for women. Even if such errors are more important if we consider life expectancy with disability, it does not change the conclusions.

Another methodological bias of our DFLE calculations is to treat all the years lived by non-respondent institutionalized persons as years of disability, whatever the type of disability measured (Sullivan, 1971). Here again, we can assess the magnitude of the bias. The HID survey was not only conducted for ordinary household population but also in nursing homes and long term care institutions, to avoid excluding persons with health problems. We used these data from the so called HID-institutions survey in order to apply the actual prevalence of functional limitations and personal care restrictions measured for institutionalized persons instead of considering all of them as having disability: doing so, life expectancy *without personal care activity restriction* at age 65 gains almost 3 months for men and 5 months for women. Life expectancy *without functional limitations* remains practically unchanged due to the very high prevalence of functional limitations among residents of institutions (less than one month's difference for men and women alike). According to these calculations, the absence of information on institutionalized persons or on survey dropouts has only a marginal effect on the estimates obtained. These differences of a few months are in some cases smaller than the margins of error of the confidence intervals.

Apart from the survey problems, changes in DFLE estimated on the basis of self-reported morbidity are difficult to interpret. The way in which restrictions, limitations, discomforts or disorders are reported may be influenced by the respondents' level of knowledge about their health in general. Developments over time in diagnosis techniques and technical aids, or of individual demands relating to health status, may modify the way disability is reported "at equivalent level of functioning". This effect may primarily concern moderate limitations and disorders which are more easily overlooked by repondents. In this respect, the levelling-off or sluggish increase in life expectancy without *discomfort due to illness or disability*, while life expectancy increases, may be partly linked to an increase of people with discomforts and partly due to increase in the identification and self-report of such discomfort by the persons affected. Differences between men and women may also be linked to variations in the perception and report of disability, for instance in term of severity levels. We note a large disparity between men and women for life expectancy without mobility limitations when considering all levels of severity, while the gap is reduce when considering severe levels only. This effect can explain the small differences between men and women with the indicator of "disability or discomfort", knowing that it appears to screen severe or recognized situations.

Despite these data limitations, our results can still be red in the light of the international situation. Especially because in some countries data allows the possible causes of the various trends in DFLE to be further interpreted. The decrease in severe disabilities over recent decades, such as restrictions of activity among the oldest-old, can be explained by improved compensation of functional difficulties, by the growing use of technical aids, by a general increase in educational level (Manton et al., 1997 ; Crimmins et al., 1997), but also, perhaps, by a decrease in the prevalence of certain physical functional limitations, sensory limitations (Freedman et al., 1998) and even maybe cognitive limitations (Freedman et al., 2001). Improvements in the least severe forms of disability continued over the 1990s (Crimmins, 2004). It is estimated that in the United States of America the prevalence of all levels of disability in the elderly population is falling by between 0.9% and 1.6% annually (Freedman et al., 2002), and that need of assistance for personal care is decreasing by 1% to 2.5% per year (Freedman et al., 2004). For restrictions of daily activities, the decrease appears to be larger for domestic activities than for personal care, and above all for the most highly educated persons (Schoeni et al., 2001). The decline in disability appears to be slower among the oldest-old however (Schoeni et al., 2004). Improved management of common functional limitations may have been more beneficial for reducing difficulties in domestic activities than difficulties in personal care activities. The changing nature of tasks of everyday living is now a focus of strong attention, along with the growing desire among the elderly to remain independent (through movements such as "independent living" for example). This demand for independence and healthy ageing may have an incentive effect on the reporting of difficulties and need of assistance (Spillman, 2004; Wolf et al, 2005).

The French results are also trending towards a shortening of the time lived with severe disabilities, such as restrictions of personal care activities, though they indicate a stagnation or even a slight lengthening of the time spent with more moderate difficulties (mobility, limitations, etc.) A more accurate comparison of the French situation regarding the international context will be possible using all these different DFLE computed for several periods. The next health and disability survey will be enhanced with detailed modules of questions allowing to carry on this analysis. It will be also allow to approach limitations in cognitive functions which has never been easily approached so far in these surveys.

CONCLUSION

Though methodological problems and large confidence intervals prevent us from drawing any definite conclusions for this study, the results presented seem to run counter to the hypothesis of a French pandemic of severe disabilities, namely those associated with dependence in activities of daily living. However, on the basis of available data, we cannot confirm the conclusion regarding the shortening of the period spent with moderate difficulties. The time series corresponding to difficulties of all levels of severity does not follow this pattern. The full set of DFLE estimates contribute to clarify the country situation and can help to better assess needs associated with daily care and which kind of technical assistance can alleviate functional limitations.

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