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ORIGINAL INVESTIGATION

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Disability-free life expectancy: a cross-national comparison of six longitudinal studies on aging. The CLESA project

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Abstract Disability-free life expectancy (DFLE) was compared in six countries taking part in the Cross-national Determinants of Quality of Life and Health Services for the Elderly (CLESA) project. Data from six existing longitudinal studies were used: TamELSA (Tampere, Finland), CALAS (Israel), ILSA (Italy), LASA (The Netherlands), Aging in Leganés (Leganés, Spain) and SATSA (Sweden). A harmonised four-item disability measure (bathing, dressing, transferring, toileting) was used to calculate DFLE; the harmonised measure was dichotomised into 'independent in all four activities' vs. 'dependent in at least one'. Calculations of DFLE were made using the multistate life table approach and the IMaCh program (INED/EuroREVES, http://eurorevesinedfr/imach/) for subjects aged 65–89 years. Prevalence ratios of disability varied significantly across countries, with Italy and Leganés having the highest percentages among men and among women, respectively, while The Netherlands presented the lowest for both sexes. At 75 years of age the estimated total life expectancy among men ranged from 7.8 years in Tampere and Sweden to 9.0 years in Israel; among women it ranged from 9.5 years in Israel to 11.6 years in Italy. For both sexes Italy showed the lowest total life expectancy without disability (72% among men, 61% among women) and Sweden the highest (89% among men and 71% among women). The results yielded a north/south gradient, with residents in Tampere, The Netherlands and Sweden expected to spend a higher percentage of their lives without disability than those in Italy, Israel and Leganés.

Keywords CLESA project · Disability-free life expectancy · Cross-national comparison · Ageing

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Introduction

In recent decades life expectancy has increased remarkably in almost all European countries. However, it is not clear whether the years gained are years in good health or years lived with disability and in need of help. Since a longer life does not necessarily mean a healthier life, several methodological approaches have been developed to study and combine information on life expectancy and disability.

Disability-free life expectancy (DFLE) is one of the most common measures of health expectancy since it distinguishes between life years that are free of any activity limitations and life years with some level of activity limitation; it is also an alternative to the life expectancy measure which addresses issues related solely to length of life. Further, DFLE provides a convenient way of combining mortality and morbidity into a single measure, and different methods are available for its calculations. *The observed prevalence life table method*, also known as Sullivan's method (Sullivan 1971), uses prevalence data on disability to calculate hypothetical years of life, lived with or without disability, for a

fictitious cohort derived from a period mortality table. The main advantages of this approach, which is still the most commonly used method in health research, are that it adopts simple calculations and the required information is relatively easy to find. *The double decrement life table method* (Katz et al. 1983) considers not only death but also transition towards definite life-states as decrement events for the cohort. This model does not envisage a return to the initial status: rather, death and disability are considered to be absorbing states, i.e. there can be no return to the initial status (as in the case of senile dementia). *The multistate life table method* (Rogers et al. 1989a, 1989b, 1990) is based on incidence rates of disability and death and also includes transitions between health states in both directions. This approach treats dependency as a temporary rather than as an irreversible transition, and therefore both disability incidence and disability remission rates are used. *The microsimulation method* (Laditka and Wolf 1998) has similar properties to the multistate method and is based on microsimulation techniques to estimate health expectancies from transition probabilities between health states.

Most of the work on health expectancy has been carried out in the United States. Nevertheless, European studies have also provided insight into DFLE, based mainly on disability prevalence using the Sullivan method. Valkonen et al. (1997) calculated life expectancy and DFLE in Finland using three measures: long-standing illness, functional disability, and poor self-rated health among the non-institutional population aged 15 years and over. They found that both DFLE and total life expectancy (TLE) were strongly dependent on the measure used, but that the patterns of differences between both gender and educational categories were largely independent of the measures used. Minicuci and Noale (2004) estimated DFLE among a cohort of Italians aged 65–84 years and evaluated geographical differences. The hierarchical approach based on the Physical Performance Test, Instrumental Activities of Daily Living and Activities of Daily Living (ADL) showed that women experience more years with some level of disability than men, although moderate and severe disability occurred almost simultaneously among men. Further, Italians residing in the central part of the country lived more mild disability-free years, while northern Italians lived a longer life free of moderate or severe disability, with no gender differences. Perenboom et al. (2004) assessed DFLE trends among a Dutch population. An increase in years with disabilities and a decline in DFLE were observed for both men and women aged 16 and 65 years. These trends were mainly the result of a rise in the number of years with mild disabilities, together with a decrease in the number of years with moderate and severe disabilities. Gutiérrez-Fisac et al. (2000) studied geographical differences in Spain and reported that the number of years that subjects lived without disability varied widely from one province to another, and that the unemployment rate and smoking were the main factors associated with the variation.

When comparisons were made across countries, the use of different definitions and instruments for measuring disability meant that observed differences did not necessarily reflect differences in health years. In the Cross-national Determinants of Quality of Life and Health Services for the Elderly (CLESA) project the harmonised ADL measure lends itself to cross-nation comparison and possible socio-cultural explanations for the dissimilarities.

Comparing DFLE across countries may provide insights of value to health policy. First, the magnitude of observed differences between countries provides information that can be used for benchmarking. Second, cross-country comparison may aid explanation of observed differences. This insight in turn is helpful in terms of setting health priorities and guiding health sector reform among countries. The aim of this study was to compare DFLE indicators across six countries participating in the CLESA project. As the six countries include three from northern Europe and three Mediterranean countries, the cross-country comparison permits examination of a possible north-south gradient; higher levels of disability are reported in Mediterranean countries than in northern Europe and the United States (Crimmins 2004; Crimmins and Saito 2001; Valderrama-Gama et al. 2002). DFLE is estimated for men and women separately because of the well documented gender differences both in level of disability and in mortality.

Material and methods

Study sample

The CLESA project is supported by the European Community in the V Framework Programme aimed at investigating the determinants of quality of life and health services among the elderly through six existing longitudinal studies: TamELSA (Tampere, Finland; Jylhä et al. 1992), CALAS (Israel; Walter-Ginzburg et al. 2001), ILSA (Italy; Maggi et al. 1994), LASA (The Netherlands; Deeg et al. 2002), Aging in Leganés AL (Leganés, Spain; Béland and Zunzunegui 1995a, 1995b) and SATSA (Sweden; Pedersen et al. 1991). A detailed description of the CLESA project is provided by Minicuci et al. (2003).

The CLESA project attempted to harmonise the original variables from each of the six longitudinal studies to allow cross-national comparisons (Minicuci et al. 2003; Nikula et al. 2003; Pluijm et al., submitted) of predictors of major outcomes such as mortality, disability and cognitive functioning. A common database of 11,557 subjects was created and included domains such as socio-demographic characteristics, health habits, health status, physical and cognitive functioning, social networks and support, and health care utilisation at both baseline and follow-up. Considering the different sampling designs, the age groups considered in the

CLESA project varied from 65–89 years (Tampere, Leganés, Sweden) to 65–84 years (Italy, The Netherlands) to 75–89 years (Israel). All study designs except Leganés included institutionalised subjects. The mean time intervals between the baseline and the follow-up for each study are presented in Table 1 and varied between 3–4 years for CALAS, ILSA, LASA, AL, and SATSA to over 10 years for TamELSA. The response rate of the original studies varies between 88% (LASA) and 71% (SATSA).

Disability measurement

In all six countries a variety of variables measuring ADL were assessed by means of a structured interview both at baseline and follow-up. Since the phrasing of the questions, the number, type and response format of the ADL items differed in each study, a procedure was devised to harmonise the data (Pluijm et al., submitted). Four items covering Katz's ADL index (Katz et al. 1970)—bathing, dressing, transferring, and toileting—were selected to construct a harmonised scale across six countries. The ADL items were dichotomised into whether help was needed (yes/no) to create the same response format, and the item scores were summed to a total score ranging from 0 to 4. The harmonised four-item scale appeared to be reliable and valid in each country (Pluijm et al., submitted). Cronbach's α of the four-item ADL measure varied from 0.81 in Spain to 0.92 in Finland (Pluijm et al., submitted). A subject was considered as *dependent* if he/she reported needing help with at least one of the ADL4 items, and as *independent* if no help was needed in any of the four items.

Mortality ascertainment

For each study information on deaths was obtained through the official registry.

Calculation of health expectancies

The Multistate life table approach is well suited to deal with transitions and their summarisation (Rogers et al. 1989b) and is hence appropriate for analysing the evolution of active life expectancy. Despite its heavy data requirements and more complex modelling, the increment-decrement life tables are a very powerful tool in understanding current mortality and morbidity patterns and their implications. In the CLESA project both prevalence and incidence measures for physical disability were available; hence the decision to consider the multistate life table approach.

For each country the TLE and DFLE were estimated using the IMaCh software (INED/EuroREVES 0.96d; Lièvre and Brouard 2003). Following the method developed by Laditka and Wolf (1998), this software estimates the parameters of a model of transition probabilities between initial status and final status. On this basis the computer program produces life expectancy estimates and their variances. The main advantage of this package is that complete individual information is used even when the interval between waves is not identical for each individual, as in the case of the CLESA project. However, differences in baseline–follow-up mean time intervals can be controlled by IMaCh software using interpolation or extrapolation. If $hPijx$ is the probability of being observed in state i at age $x+h$ conditional to the observed state i at age x, the delay 'h' can be split into an exact number (nh×*stepm*) of unobserved intermediate states. This elementary transition (by month or quarter/trimester, semester or year) is then modelled as a multinomial logistic and the hPx matrix is simply the matrix product of nh×*stepm* elementary matrices, and the contribution of each individual to the likelihood is $hPijx$ (Lièvre and Brouard 2003). The package also envisages the possibility of imputing missing functional status data between measurements, i.e. a respondent with missing information on functional status at follow-up can still appear if necessary responses are provided at baseline. In the transition model we defined two non-absorbing (possibility of return) functional status states: independent in ADL4 (no help in any of the four items) and dependent in ADL4 (need of help in at least one). Death was included as an absorbing state.

Statistical analyses

Data were weighted using a set of country-specific weights created within the CLESA project to generalise the study sample to the total referent population. The sex-specific association of disability and age groups

Table 1 Mean period (se) between baseline and follow-up, by study; weighted data

	Baseline	Follow-up	Mean period (years)	Response rate at baseline (%)
Tampere (TamELSA)	4/1989–12/1989	12/1999–3/2000	10.7 (0.007)	81
Israel (CALAS)	1/1989–10/1992	2/1993–5/1994	3.47 (0.028)	76
Italy (ILSA)	1/1992–12/1993	1/1995–12/1997	3.47 (0.007)	81
The Netherlands (LASA)	9/1992–10/1993	9/1995–11/1996	3.11 (0.006)	88
Leganés (AL)	3/1993–12/1993	1/1997–11/1997	4.08 (0.006)	82
Sweden (SATSA)	10/1987	10/1990	3.00 (0.0)	71

across countries was investigated using the χ^2 test. Subjects could present the following states: unknown (no information was available at one of the two measurements), independent, dependent or dead at follow-up. Marginal homogeneity (lack of significant difference) between one or more of the row marginal proportions and the corresponding column proportion(s) of the transition matrix were evaluated, by country and sex, using the Stuart-Maxwell homogeneity test (generalisation of the McNemar test). All statistical analyses were performed using the 8.02 SAS release (SAS Institute, Cary, N.C., USA).

Results

The prevalence of independency in the ADL4 scale varied significantly across countries except for subjects aged 85–89 years. Considering the common 75–84 age group the lowest percentages of ADL independent men were observed in Italy (69% for 75–79 years and 56.5% for 80–84 years), while the highest were found in The Netherlands (96.5% and 91.4%, for 75–79 years and 80–84 years, respectively). Among women in the 75–84 years age range the lowest proportion of independent women was reported in Leganés (67.4% and 48%, for 75–79 years and 80–84 years, respectively) while The Netherlands reported the highest (92.1% and 83%, for 75–79 years and 80–84 years, respectively). For each country a significant positive association also emerged between age and ADL status.

State distribution (unknown, independent, dependent, dead at follow-up) between baseline and follow-up (Table 2) differed significantly in the two sexes in all six studies, with the sole exception of Leganés women (the p from the Stuart-Maxwell test was not significant). The proportion of men who became dependent during the follow-up was 5.5% in Tampere, 17.1% in Israel, 10.6% in Italy, 5.7% in The Netherlands, 5.8% in Leganés, and 3.5% in Sweden. The corresponding proportions among women were 14.5%, 28.4%, 12.7%, 14.9%, 7.8% and 8.5. Findings in Israel were higher since they refer to the 75–89 age range.

The analyses on DFLE excluded subjects with missing functional status at both interviews and were based on 133 men and 406 women in Tampere, 618 and 677 in Israel, 1,809 and 2,335 in Italy, 864 and 1,229 in The Netherlands, 562 and 756 in Leganés, and 317 and 416 in Sweden, respectively. In Italy the high number of subjects with missing information on the ADL items at both interviews may be due to the fact that functional status, along with other assessments, had been collected during a medical visit performed at the healthcare facility, and at baseline only 62% of the total sample presented. The remaining 38% were found to be statistically significantly older (53% of non-respondents, 48% of respondents) and more often female (54% of non-respondents, 47% of respondents), but no association ($p < 0.05$) was found with the major chronic diseases (15.3% vs. 15.4% for heart disease, 16.7% vs. 16.3% for diabetes, 8.2% vs. 7.9% for stroke and 5.5% vs. 7.1% for cancer, for respondents and non-respondents, respectively).

Table 2 Transitions among disability states, by country and sex; weighted data

Baseline	*n*: M/F	Men at follow-up					Women at follow-up				
		Unknown	Indep.	Dep.	Dead	P^a	Unknown	Indep.	Dep.	Dead	P^a
Tampere	133/406					0.0058					< 0.0001
Unknown	0/0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Independent	120/354	3.7	33.6	5.5	57.2		6.2	36.0	14.5	43.3	
Dependent	13/52	0.0	0.0	3.7	96.3		0.0	2.6	8.5	88.9	
Israel	618/678					< 0.0001					< 0.0001
Unknown	2/6	0.0	46.8	33.0	20.0		21.2	0.0	41.9	36.9	
Independent	483/469	6.0	55.1	17.1	21.8		5.7	49.3	28.4	16.6	
Dependent	133/203	1.4	3.0	22.9	72.7		3.5	7.4	42.9	46.2	
Italy	2,318/3,308					0.0032					< 0.0001
Unknown	792/1,344	64.3	14.8	2.5	18.4		72.4	12.8	3.6	11.2	
Independent	1,211/1,507	11.6	68.7	10.6	9.1		16.0	63.3	12.7	6.0	
Dependent	316/457	8.2	27.0	39.0	25.8		10.6	22.6	43.5	23.3	
The Netherlands	867/1,235					< 0.0001					< 0.0001
Unknown	27/43	11.1	35.5	22.7	30.7		14.0	34.7	18.0	33.3	
Independent	815/1,113	4.3	74.4	5.7	15.6		5.5	71.0	14.9	8.6	
Dependent	25/79	3.7	7.4	48.4	40.5		7.3	4.0	58.2	30.5	
Leganés	562/756					0.0135					n.s.
Unknown	0/1	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	
Independent	479/546	22.2	58.5	5.8	13.5		34.9	48.3	7.8	9.0	
Dependent	83/209	23.8	14.8	22.8	38.6		25.4	22.1	31.5	21.0	
Sweden	319/422					0.0068					0.0002
Unknown	6/8	39.3	38.2	22.5	0.0		83.5	16.5	0.0	0.0	
Independent	292/343	14.6	65.3	3.5	16.6		17.8	67.4	8.5	6.3	
Dependent	21/71	27.9	5.6	35.6	30.9		31.3	9.5	41.0	18.2	

[a]Stuart-Maxwell test

Table 3 presents the TLE estimates calculated by IMaCh software and the official ones drawn from the National Life Tables for selected ages, by sex and country. For subjects aged 75 years Israel, Italy and Leganés were the centres with the highest estimated TLE among men (9.0, 8.8, and 8.9 years, respectively), and Tampere and Sweden the lowest. The same ranking was observed in the National Life Tables. Among women of the same age TLE ranged between 9.5 years in Israel and 11.6 years in Italy and the ranking closely corresponded to the one based on the National Life Tables. Comparisons of life expectancy estimates by the National Life Tables and IMaCh should be approached with caution since these measures are not directly comparable; differences are inevitable since IMaCh estimates take heterogeneity into account by considering both mortality and disability distributions. Nevertheless, it is worthwhile noting that the magnitude of the differences is low across all ages and countries.

Table 4 presents DFLE by number of years and as a percentage of TLE (DFLE/TLE). It can be observed that Israel, Italy and Leganés with the highest life expectancy among men aged 75 years also presented the lowest proportion of life years without disability (76%, 72%, and 77%). Israeli women aged 75 years were, however, the ones expected to live both the fewest number of years (9.5) but with the lowest percentage spent in an independent state. At 75 and 80 years, at which ages comparison across all countries is feasible, Italy displayed the lowest percentage of TLE lived without disability among men (72% and 64% at age 75 and at age 80 years, respectively), while Sweden had the highest (89% and 87%, respectively). Among women aged 75 and 80 the lowest DFLE/TLE ratio was observed in Israel (59% and 48%, respectively) and the highest in Sweden (71% at 75 years) and The Netherlands (63% at 80 years). On the other hand, men aged 65 or 70 years living in Tampere, The Netherlands or Sweden could expect to live a higher proportion of their life free of disability than men residing in Italy or Leganés. Among women expected disability-free years showed little variation across countries, although women in Sweden and Tampere were expected to live slightly more time free of disability than women from the other centres.

Figure 1 shows the ratio of DFLE/TLE by sex across ages for all six countries. Men from Israel, Italy and Leganés (''Southern'' countries of the CLESA project) exhibited a lower percentage of life expectancy free of disability than men from Tampere, The Netherlands and Sweden (''Northern'' countries of the CLESA project). Increasing dependency with advancing age showed a less pronounced trend among men living in the northern than in the southern countries.

Cross-national variations in ADL independence at any given age were smaller among women, and the north/south gradient was less pronounced. The Netherlands curve presents a less steep slope and crosses the curves of Tampere, Leganés and Sweden. In general, the decreasing trend of DFLE/TLE with advancing age was evident among women for all countries except The Netherlands.

Discussion

As expected, DFLE in both sexes and in all countries decreased with advancing age but remained substantially high; DFLE was also lower among women than among men, which reflects the superior longevity of women and the higher mortality of men at all ages. Among men a clear north-south gradient in the percentage of life expectancy free of disability was observed. Older men from northern countries have lower life expectancies

Table 3 Total life expectancies (*TLE*; years) from the IMaCh software and from National Life Tables (NLT), by country, sex and age. NLT data: for Tampere, life expectancy in 1989 in Finland, EUROSTAT, Newcronos database; for Israel, life expectancy in 1990–1994 for the Jewish population; for Italy: life expectancy in 1994, EUROSTAT, Newcronos database; for The Netherlands, life expectancy in 1994; for Leganés, life expectancy in 1993 in the Region of Madrid, calculated from population (Evolution of the Spanish population figures between 1991 and 2001 census–provisional figures) and death (Natural Population Movement) figures from the Instituto Nacional de Estadística de España; for Sweden, life expectancy in 1988. EUROSTAT, Newcronos database (*na* not applicable by study design)

	Tampere		Israel		Italy		The Netherlands		Leganés		Sweden	
	IMaCh	NLT	IMaCh	NLT	IMaCh	NLT	IMaCh	NLT	IMaCh	NLT	IMaCh	NLT
Men												
65	13.2	13.8	na	na	16.3	15.6	14.8	14.7	15.5	16.1	13.9	14.9
70	10.2	10.8	na	na	12.3	12.3	11.4	11.5	12.0	12.7	10.7	11.6
75	7.8	8.3	9.0	9.6	8.8	9.5	8.5	8.7	8.9	9.8	7.8	8.7
80	5.8	6.2	6.7	7.3	6.0	7.0	6.3	6.4	6.5	7.2	5.2	6.3
85	4.4	4.5	5.0	5.4	na	na	na	na	4.7	5.2	2.5	4.5
Women												
65	17.6	17.7	na	na	19.8	19.4	18.8	19.1	18.1	20.6	19.6	18.7
70	13.7	13.8	na	na	15.5	15.4	15.0	15.1	14.0	16.3	14.8	14.7
75	10.2	10.3	9.5	10.7	11.6	11.7	11.4	11.5	10.3	12.4	10.3	11.2
80	7.3	7.4	6.9	8.0	8.3	8.5	7.9	8.4	7.2	9.1	6.5	8.0
85	5.1	5.2	5.0	5.8	na	na	na	na	4.7	6.4	3.6	5.6

Table 4 Disability-free life expectancies (DFLE), by sex, age and country: number of years (standard error) and percentage of total life expectancy (*na* not applicable by study design)

	Tampere	Israel	Italy	The Netherlands	Leganés	Sweden
Men						
65 years						
DFLE	12.0 (0.969)	na	13.5 (0.409)	13.5 (0.548)	13.5 (0.743)	12.8 (0.960)
DFLE/TLE	91%		83%	91%	87%	93%
70 years						
DFLE	9.0 (0.585)	na	9.7 (0.333)	10.1 (0.389)	10.0 (0.562)	9.7 (0.752)
DFLE/TLE	88%		79%	89%	83%	91%
75 years						
DFLE	6.7 (0.538)	6.8 (0.517)	6.4 (0.296)	7.3 (0.336)	6.9 (0.4429	7.0 (0.703)
DFLE/TLE	86%	76%	72%	86%	77%	89%
80 years						
DFLE	4.8 (0.541)	4.4 (0.310)	3.8 (0.288)	5.1 (0.359)	4.4 (0.382)	4.6 (0.579)
DFLE/TLE	83%	65%	64%	82%	67%	87%
85 years						
DFLE	3.4 (0.508)	2.4 (0.219)	na	na	2.5 (0.363)	2.1 (0.388)
DFLE/TLE	79%	48%			53%	85%
89 years						
DFLE	2.6 (0.681)	1.2 (0.212)	na	na	1.4 (0.343)	0.3 (0.280)
DFLE/TLE	75%	30%			39%	81%
Women						
65 years						
DFLE	14.5 (0.887)	na	14.8 (0.456)	14.8 (0.559)	14.7 (0.756)	16.2 (0.819)
DFLE/TLE	82%		75%	79%	81%	83%
70 years						
DFLE	10.5 (0.659)	na	10.6 (0.386)	11.1 (0.423)	10.6 (0.601)	11.6 (0.754)
DFLE/TLE	77%		69%	74%	76%	78%
75 years						
DFLE	7.1 (0.500)	5.6 (0.728)	7.1 (0.340)	7.8 (0.383)	6.9 (0.487)	7.4 (0.683)
DFLE/TLE	69%	59%	61%	68%	67%	71%
80 years						
DFLE	4.3 (0.410)	3.4 (0.389)	4.3 (0.320)	5.0 (0.424)	4.0 (0.408)	4.0 (0.619)
DFLE/TLE	58%	48%	52%	63%	55%	62%
85 years						
DFLE	2.2 (0.406)	1.9 (0.266)	na	na	1.8 (0.349)	1.7 (0.521)
DFLE/TLE	43%	37%			39%	47%
89 years						
DFLE	1.1 (0.379)	1.1 (0.262)	na	na	0.8 (0.273)	0.6 (0.394)
DFLE/TLE	28%	28%			26%	31%

than those from southern countries, but they are expected to live free from disability for a larger proportion of their remaining years than southerners. Among women there are very slight cross-nation differences in the proportions of expected disability-free life.

Two possible explanations could be advanced for the north-south differences: socio-economic and cultural differences. Differences in socio-economic status, as measured by educational level, were observed among the CLESA countries. The percentage of subjects aged 75–84 years with incomplete primary school education ranges from 41% to 80% in the south and from 0% to 15% in the northern (Minicuci et. al 2003). Furthermore, there may be cultural differences in the meaning of dependence and the availability of family help. Self-reported level of disability has been shown to be higher when help to perform ADL activities is available within the family (Seeman et al. 1996) and is therefore subject to cultural influences. In the Mediterranean culture family interdependence is highly valued, and older adults expect their children to provide help in ADL in exchange for the help that they gave to their children throughout their active life (Zunzunegui et al. 2001). Older persons in northern countries, particularly older men, have learned to withhold information about their weaknesses and not to report that they need help, even if they really do (the 'Calvinist' attitude). This cultural norm may result in underreporting of dependency in northern countries and overreporting of dependency in the south. Some studies have provided evidence that the effects of children's support make a difference to self-rated health (Walter-Ginzburg et al. 2004; Zunzunegui et al. 2004), even when comparing the elderly in a Mediterranean and those in a northern country. Self-rated health comparisons between Tampere, Finland, and Florence, Italy, yielded no substantial differences between the sexes but did find sensitivity to cultural environment (Jylhä et al. 1998). These cultural differences imply that a single assessment of ADL dependency would indicate different needs for services across the six countries. Further research is warranted to evaluate differences in self-reported ADL dependency and how it

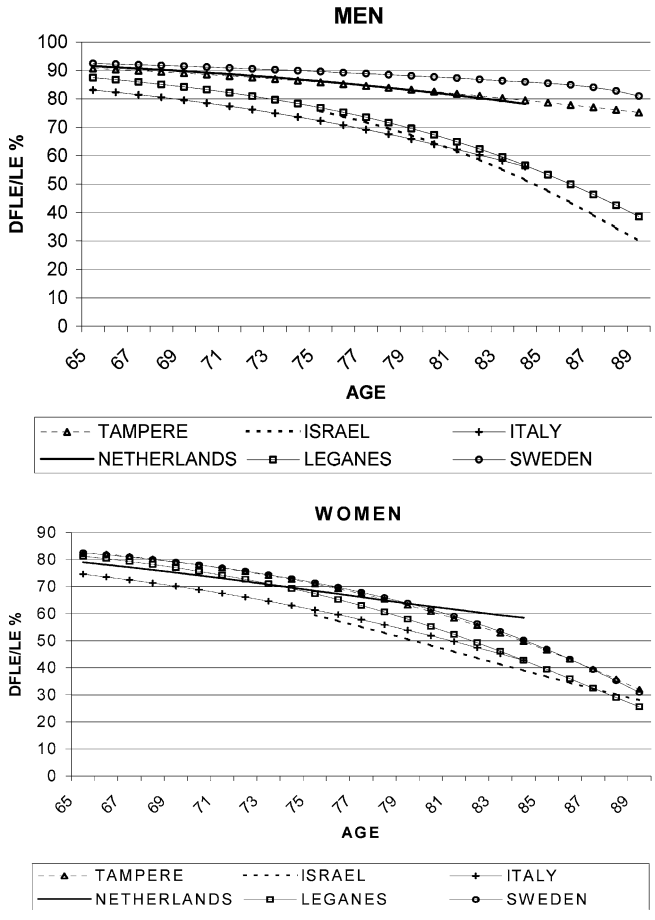

Fig. 1 DFLE as a proportion of total life expectancy, by sex, age and country

is influenced by cultural norms in order to make this measurement a sound indicator of need for services.

Accumulated evidence shows that men enjoyed greater gains in life expectancy during the last quarter of the twentieth century than did in women. Mortality from acute heart disease is sharply decreasing, and this fall in mortality is more marked in men than in women, suggesting that male survivors are at risk of disability and dependency at all ages (Janssen et al. 2004). We therefore expect converging DFLE trends for men and women in all countries as male life expectancy continues to rise and disability among survivors of acute heart disease increases.

Interestingly, in keeping with the findings of international comparative studies (World Health Organization), life expectancy in men in Israel is among the highest of all developed countries, with a relatively small gap between men and women. However, this study found that among 75- to 84-year-olds Israel has the lowest proportion of disability-free life years of all the CLESA European countries (especially among the women). One explanation for this finding stems from the greater ethnic heterogeneity in Israel than in European countries. The elderly population in Israel is composed mainly of immigrants from European, North African and Middle Eastern countries, with a high proportion having no primary education and a cultural preference for cohabiting with their children.

The sample designs of the original studies included both community-dwelling and institutionalised persons, except for the Leganés sample. The institutionalisation ratio among men aged 75–84 years varied between 1.2% in Italy and 8.1% in Israel; among women of the same age group it varied from 2% in Italy to 9.6% in Israel. Considering that institutionalisation rates were also low in Leganés (2–3%), including the institutionalised subjects should not present a serious bias in calculating the prevalence of independency. This is mainly because disabled elderly in Mediterranean countries tend to move to their children's homes, and the proportion of elderly living alone decreases after the age of 80 years.

This study presents a reliable comparison of DFLE in six countries and can be used as a baseline for assessing whether the onset of disability is postponed by better living conditions and better access to health care in later life.

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