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32ND REVES MEETING

Online – 26th to 28th of May 2021

ABSTRACTS

REVES
NETWORK ON HEALTH EXPECTANCY
RÉSEAU ESPÉRANCE DE VIE EN SANTÉ

SCHEDULE

All times shown are Central European Time (CET), GMT +2
Links to the online sessions will be provided upon registration.

Wednesday, May 26th

15:00-15:10: **Welcome** • Herman Van Oyen & Emmanuelle Cambois

15:10-15:55: **Session 1** • Dispersion of length of life
Chairs: Eileen Crimmins & Wilma Nusselder

15:55-16:05: Break

16:05-17:00: **Pitch presentations**
Chairs: Henrik Brønnum-Hansen & Mark Hayward

Thursday, May 27th

15:00-15:30: **Session 2** • Education and health expectancy at older ages
Chairs: Marc Luy & Saito Yasuhiko

15:30-15:55: **Session 3** • Health and retirement age
Chairs: Marc Luy & Saito Yasuhiko

15:55-16:05: Break

16:05-16:45: **George Myers Lecture** • Patrick Deboosere
Chairs: Herman Van Oyen & Jean Marie Robine

16:45-17:00: Invitation to REVES 2022 • Zachary Zimmer

Friday, May 28th

15:00-15:30: **Session 4** • Health expectancy and gender
Chairs: Herman Van Oyen & Carol Jagger

15:30-15:55: **Session 5** • Focus on methods
Chairs: Herman Van Oyen & Carol Jagger

15:55-16:05: Break

16:05-16:50: **Session 6** • Health conditions and disability
Chairs: Dorly Deeg & Zachary Zimmer

16:50-17:00: **Closure** • Jean-Marie Robine, Zachary Zimmer, Herman Van Oyen

ABSTRACTS

Session 1 • Dispersion of length of life

Changes in life expectancy and lifespan variability by income quartiles in four Nordic countries: A study based on nationwide register data

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Background: Levels and trends in socioeconomic mortality differentials are typically described in terms of means, e.g. life expectancies, but studies have suggested that there also are systematic social disparities in the dispersion around those means, in other words there are inequalities in lifespan variation. This study investigates inequalities in trends in mean and distributional measures of mortality in Denmark, Finland, Norway and Sweden over two decades.
Methods: Register data for ages above 30 on income and mortality in 1997 and 2017 were utilized to examine income specific trends in life expectancy, lifespan variation, and the contribution of 'early' and 'late' deaths to increasing life expectancy.
Results: Increases in life expectancy has taken place in all four countries, but there are systematic differences across income groups. In general, the largest gains in life expectancy were observed in Denmark, and the smallest increase among low-income women in Sweden and Norway. Thus, life expectancy at age 30 increased by 1.0 year from 1997 to 2017 among Swedish women in the lowest income quartile and by 6.1 years among Danish men in the highest income quartile. Overall, life expectancy increased and lifespan variation decreased with increasing income level. These differences grew larger over time. In all countries, a marked postponement of early deaths led to a compression of mortality in the top three income quartiles for both genders. This did not occur for the lowest income quartile.
Conclusion: Increasing life expectancy is typically accompanied by postponement of early deaths and reduction of lifespan inequality in the higher income groups. However, Nordic welfare societies are challenged by the fact that postponing premature deaths among people in the lowest income groups is not taking place.

Educational Differences in Life Span Variation in Dementia Incidence

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Objective: To examine educational differences in life span variation in dementia in the United States and assess the role of adult income in explaining the variation within educational levels.
Method: We use the Health and Retirement Study (2000-2014) and techniques of microsimulation and bootstrap to estimate the age distribution of dementia incidence for major education groups, controlling and not controlling for adult income.
Hypotheses: We anticipate that life span variation in dementia incidence will be substantially larger among less educated persons than among highly educated persons. Part of the reason for the larger educational variation among less educated persons may reflect both economic vulnerability in later adulthood (a large frail tail) and economic success (a smaller but visible robust tail). Among well educated people, we expect to see a compression of dementia reflecting a very small frail tail and the postponement of dementia until ages proximate to death.

Looking beyond differences in life expectancy: Lifespan inequality, mortality crossover, and cohort dynamics among Arabs and Jews in Israel

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Israel's continued improvements in life expectancy at birth, currently exceeding 82 years for men and women combined, are coupled with persistent and increasing ethnic disparities in longevity. Substantial differences in life expectancy exist between Israel's Jewish majority population and its disadvantaged Arab minority. Although several studies documented Jewish-Arab differences in life expectancy over time, none has examined trends in lifespan variability. Analyzing vital statistics data from 1983 to 2018, we find that life expectancy increased more rapidly among Jews than among Arabs. By contrast, declines in lifespan variation were greater among Arabs, which nevertheless remains high relative to their Jewish counterparts. A contour decomposition of those trends reveals two disparate phenomena. First, Jewish-Arab disparities in infant and child mortality have narrowed over the study period. Second, the Arab old-age mortality advantage, which existed in 1983–1986, had reversed by 2015–2018, accounting for much of the widening gap in life expectancy. We discuss possible explanations for this reversal in age-specific mortality inequalities. The narrowing of infant and child mortality differentials between Jews and Arabs may be attributed to improvements in neonatal care and decreasing prevalence of consanguineous marriages among the latter. The disappearance of the Arab old-age mortality advantage may be related to cumulative exposure to social adversity and institutional discrimination over the life course, improvements in data quality over time, or changes in cohort-based mortality selection.

New tests for the 'compression vs expansion of morbidity' debate

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Motivation: Traditional approaches to test hypotheses in the 'compression vs expansion of morbidity' debate (CvEoM) are based on the comparison of health expectancy measures (HE) vs life expectancy (LE) ones. Gains in HE greater than gains in LE lend support to the morbidity compression hypothesis, and vice versa. Yet, Fries' original formulation of the compression of morbidity hypothesis (which was stated in terms like 'compression into a shorter span between the age of disability onset and death', or 'rectangularization of the morbidity curve') can be naturally tested by inspecting variations in age at morbidity onset – an approach that, surprisingly, has been overlooked in the literature.
Objective: 1. Revisit the CvEoM debate using measures of variability in age at morbidity onset across 30 European countries between 2005 and 2015; 2. Compare the new approach with the traditional one.
Methods: Healthy lifespan inequality (HLI) indicators based on the Gini index are estimated to measure variability in age at morbidity onset. Mortality data is taken from the HMD, and morbidity data is derived from the GALI indicator available across 30 EU countries included in the EU-SILC.
Results: Comparing changes over time in the average number of years spent in less-than-good health (i.e., Δ(LE – HE)) we observe increases in 16 out of 30 countries for women and in 18 for men. Thus, the traditional approach lends support to the expansion of morbidity hypothesis for more than half of the countries included in the sample, both for women and for men. Inspecting changes in the healthy lifespan inequality indicators (i.e., ΔHLI), we observe that variability in age at morbidity onset has increased in 13 countries for women and in 9 countries for men. Thus, the new approach suggested here lends support to the compression of morbidity hypothesis in more than half of the countries studied here. There is substantial disagreement among the two approaches: they disagree on whether support should be given to any of the two competing hypotheses in 13 countries for women and in 11 countries for men (out of 30).
Discussion: Current approaches to test hypotheses in the CvEoM debate are based on comparing average indicators (LE, HE) and thus ignore the variability in the underlying health distributions.

Incorporating such variability into the analysis brings a new perspective that is able to capture more effectively the increasingly heterogeneous characteristics of aging populations.

Session 2 • Education and health expectancy at older ages

Gender and educational inequalities in disability-free life expectancy among older adults in Italy. An analysis at regional level

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Increasing longevity is being observed worldwide. Italy ranks among the countries with highest life expectancy, for both women and men, and at the upper end of those with a severe population ageing process. In societies with an older population age structure, going beyond life expectancy by considering indicators that simultaneously account for mortality and morbidity is essential. Disability, resulting from functional limitations, is among the most important dimensions of morbidity to consider as it determines the possibility to be engaged in daily activities within the family, society and the economic context. It is well known that longevity and health are highly characterized by gender inequalities. Women outperform men in terms of survival, however, men seem to perform better than their counterpart when considering the health conditions in which they expect to live at later ages. Furthermore, survival and health are often not equally distributed within a country and among social groups. Health inequalities are a major public health challenge and ensuring long and healthy lives for everyone is a fundamental human goal. It has set as one of the starting points among the objectives of the Decade of Healthy Ageing (2020-2030). This study draws on census-linked mortality data by age, gender, educational attainment and region of residence, released by the Italian National Institute of Statistics for the year 2011 (including mortality records of the following three years). At the same level of detail, prevalence of long-standing activity limitations data, based on Global Activity Limitation Indicator (GALI), are derived from the Italian survey “Aspetti della vita quotidiana” (2012-2014). Using the Sullivan method, overall life expectancy (LE) and health-specific life expectancy, are computed at age 65 and 80 by gender and educational attainment, for the Italian regions. Age and mortality/morbidity contributions to gender and educational gaps in the above measures are calculated using the stepwise decomposition method. Preliminary results show that gender differences in disability-free LE reduce when stratifying the Italian population by educational attainment: high- and mid- educated women and men share similar expectations in terms of remaining years of life free from disability. This result emphasizes the importance of analysis at this level of detail in a highly heterogeneous country like Italy, for which there is no other evidence in the literature.

Inequalities in life and health expectancies by level of education among the oldest old in 2010 and 2018

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Background
Sex and socioeconomic differences in functioning and mortality are well acknowledged. However, less is known of the inequalities in health expectancies, which combine information from both health indicators. This study examines whether life and health expectancies differ by sex and level of education at age 90 in 2010 and 2018.
Methods
We used survey data from the Vitality 90+ Study from years 2010 (n=1277, response rate 79.5%) and 2018 (n=1878, response rate 76.7%). Education was categorized as basic education (≤ 6 years) and higher education. Functional ability was assessed with independent coping in basic daily activities

(dressing and undressing and getting in and out of bed) and mobility (moving indoors, walking 400 meters, using stairs). Information on mortality came from Statistics Finland. Age, sex, education level and period specific health expectancies were calculated using Sullivan's method.
Results
Life expectancy (LE) at age 90 increased from 4.32 to 4.43 years for women and from 3.68 to 3.81 years for men between 2010 and 2018. For both sexes, LE was higher among those with higher education and it increased in both education groups. LE without disabilities increased in both education groups with both functioning indicators. For both sexes, those with higher education had longer LE without disabilities in both years. Inequalities in life and health expectancies were small in years but they were statistically significant and were higher in health than life expectancies.
Conclusions
Life and health expectancies differed by sex and level of education among nonagenarians. Men had lower LE than women but they had higher proportion of the LE without disabilities. Those with higher education were expected to have longer LE and higher proportion of LE without disabilities in both study years.

Session 3 • Health and retirement age

Projecting years in good health between age 50-69 by education in the Netherlands until 2030 using several health indicators - an application in the context of a changing retirement age

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Background: Increases in longevity pose a serious challenge to the financing and sustainability of pension systems. This has led to policies that increase the retirement age. The extent to which years of life are spent on good health is important, since it affects labor market decisions that have tangible impacts on contributions and claims. We investigate whether there are changes over time in the years in good health expected to live above (surplus) or below (deficit) the statutory pension age, using several health indicators, for different levels of education for the past (2006), present (2018) and future (2030) in the Netherlands.
Methods: We used logistic regression to obtain trends of prevalence of several health indicators for individuals between 50-69 years of age, by age category, sex and education using data between 1989-2018 from the Dutch National Health Survey. We extrapolated the trends up to the year 2030. We combine these prevalence estimates with mortality projections by gender, age and education using the Sullivan method to obtain estimates of years lived in good health for each health indicator in the Netherlands. We then calculate how many years individuals are expected to live in good health above (surplus) or below (deficit) the pension age for the three points in time. The pension ages used were 65 years for 2006, 66 years for 2018 and 67.25 for 2030.
Results: Our analyses show an increasing deficit of years in good health relative to the pension age for most outcomes for low educated men and women and a decreasing surplus for high educated men and women. Our extrapolation show constant to slightly increasing inequalities in deficit/surplus, with largest increases for women.
Conclusions: Socio-economic inequalities in ill-health, combined with increasing age of retirement impact the low educated more adversely than the high educated

Estimating Working Life Expectancy: A Comparison of Multistate Models

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Background: Increased life expectancy has led to policies to offset the costs of care for aging populations, and one approach has been to extend retirement ages. Working life expectancy (WLE) measures how long people can expect to be in the workforce and is calculated from longitudinal data using multistate models. These models assume an underlying first-order Markov process (discrete or continuous time) and several programs are now available. Yet, the consistency of estimates across these methods is not clear. We extend knowledge by comparing WLE estimates across three different multistate models.
Methods: WLEs are estimated using three programs - ELECT, IMaCh, and SPACE. IMaCh and SPACE assume an underlying discrete-time Markov process, whereas ELECT is based on the continuous time Markov process with the possibility of interval censoring for states. The underlying Markov process is a three-state model with two living states: working, not working and dead as the absorbing state. The estimates are cross-classified by covariates, sex (women, men), and job class (professional, intermediate, and routine). IMaCh first estimates transition probabilities using multinomial logistic regression, then constructs population-based and status-based multistate life table functions. SPACE estimates either transition probabilities or transition rates, then it uses the deterministic or simulation approach to construct multistate life table functions.
Data Source: This study uses eight waves of data from the English Longitudinal Survey on Ageing (ELSA), where N=10,332 individuals (53.7% men, 46.3% women) have non-missing data on work status at baseline. Of the total, n=3,073 (29.7%) are professionals, n=2,482 (24.0%) intermediate, and n=4,777 (46.3%) routine. As access to mortality data in ELSA is restricted, simulated times to death with a similar distribution to real data were created using flexible parametric survival models (Stata programs stpm2 and stsurvsim).
Results: ELECT estimates of WLEs at age 50 are 10.2, 11.2, 9.3 years for men with professional, intermediate and routine jobs; 8.3, 9.3, 7.4 years, respectively, for women. Corresponding figures from IMaCh are 11.9, 13.2, 10.8 for men; and 9.8, 9.8, 9.4 years for women. SPACE estimates, are 9.9, 12.1, 11.2 years for men; and 7.4, 9.7, 9.0 years for women. Estimates were consistent though with small differences, possibly due to differences in methods used to estimate transition rates/probabilities.

Session 4 • Health expectancy and gender

Gender Differences in Disability-Free Life Expectancy in Japan: Evidence from a Longitudinal Study 1990-1999

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This study investigated trends between 1990 and 1999 in life expectancy (LE) with and without disability at age 65 years for Japanese men and women. Data came from the five waves of the Nihon University Japanese Longitudinal Study of Aging (NUJLSOA) between 1999 and 2009. Disability was defined through items on difficulty in activities of daily living (ADLs) and instrumental ADLs (IADLs). We employed the interpolated Markov chain (IMaCh) technique to calculate LE at 65, disability-free LE (DFLE) at 65, and disabled LE (DLE). At age 65, men had LE of 19.25 years, DFLE of 15.82 years, and DLE of 3.34 years, whereas women had LE of 23.09 years, DFLE of 16.69 years, and DLE of 6.40 years. We documented significant gender differences in terms of LE and DLE, suggesting that women were expected to live longer but more disabled lives. Women's health disadvantages compared to men become further clear when the results are interpreted in relative terms. At age 65, women on average were expected to spend 72.29% of their remaining years of life without disability, whereas the result for women reached 82.16 years. Although Japanese women enjoy one of the highest life expectancies in the world, the findings suggest the importance of focusing on the quality of life lived by Japanese women. Our next step is to combine the data from the National Survey of the Japanese Elderly (NSJE, 1990-1999) to examine trends over 20 years (NSJE for 1990-1999, NUJLSOA for 1999-2009) in LE, DFLE, and DLE. The addition of the NJSE data will allow us to explore how health expectancy as well as gender differences have changed over time.

Gender differences in disabled life expectancy among adults ages 60 and older in Colombia

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Colombia has experienced a rapid increase in life expectancy in recent decades, but it is unknown how much of these added years of life are lived with disability or if gender inequality observed in other health domains are also evident in disabled life expectancy. Thus, our objective is to estimate gender differences in life expectancy with disability among Colombian older adults. We obtained age- and gender-specific disability rates from the 2015 Survey of Aging, Health and Wellbeing (SABE-COL) (N=23,694)—the first nationally representative survey of adults ages 60 and over in Colombia. We used mortality rates from the Latin American Mortality Database (LAMBDA). Using Sullivan's method, we calculated prevalence-based life tables by age and gender for three measures of disability: limitations in Activities of Daily Living (ADL), limitations in Instrumental ADL (IADL), and mobility disability, which we defined as any difficulty walking up and down stairs or walking more than 400m. We found that women had higher rates of disability than men and that the gender difference increased with age. For example, at age 60 men had a total life expectancy of 18 years of which 1.8 years (10%) were spent with mobility disability, 2.3 years (13%) with IADL disability, and less than a year (5%) with ADLs disability. At the same age, women had a total life expectancy of 20.6 where 3.1 (15%) years were spent with mobility disability, 4.1 years (20%) with IADL disability and one year (5%) with ADL disability. Given the greater prevalence of disability among women, it is not surprising that we find women live more years with disability. Additionally, lower mortality rates among women also contributes to more years of life with disability for women than men. Women will spend much more of their lives with IADL and mobility disability than men, and oldest-old women will spend more of their lives with ADL disability than oldest-old men. This suggests there is a large gender disparity in disability life expectancy in Colombia that should be considered in discussions of policies to provide support to the aging population.

Session 5 • Focus on methods

The effect of sample attrition on bias in cross-sectional estimates of health in SHARE and SILC surveys

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This paper investigates the effect of longitudinal sample attrition on the prevalence of decreased health and resulting estimates of health expectancies (HE) based on EU-SILC and SHARE cross-sectional surveys. Since the remaining sample is selected by health and the refreshment sample (SHARE) - or new rotational sample (SILC) - cannot account for this selection, in cross-sectional studies the prevalence of poor health is likely to be underestimated and the resulting HE overestimated. We also study if, and to what extent, the health-status-differentiated mortality compensates this effect.
Health status is measured based on the Minimum European Health Module's three questions: self-perceived health, chronic morbidity, and the Global Activity Limitations Indicator (GALI). First, we compare health limitations between respondents who attrited and those reinterviewed. Second, we compare HE estimated for the remaining longitudinal sample with that of the refreshment sample (SHARE) or new rotational sample (SILC). Finally, under different scenarios concerning the health and mortality of those attrited, we simulate their health status at the next wave and study the effect of different assumptions on cross-sectional estimates of HE.
The first step of the analysis confirms that attrition from the longitudinal sample of SHARE and SILC is related to the respondent's health status, those in worse health being more likely to attrite from the sample. The effect of health status on attrition grows with age, and this pattern holds for all health

measures, the majority of countries, both surveys, and across all waves. The inclusion of cross-sectional weights increases selective attrition by health. This means that those who are already underrepresented and hence have higher weights are more prone to attrition.
We also demonstrate that a significant part of the observed pattern of attrition is related to differences in mortality. Respondents with decreased health are more likely to have died, their death frequently reported later than in the cross-sectional wave under study for attrition. In contrast, those in better health are more likely to be alive and to return at later waves.

Decomposing differences in multistate indices

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The problem of decomposing differences in synthetic indices derived from sets of transition probabilities is in need of a closer look. For this class of model we can choose from any of the three generalized decomposition approaches that I'm aware of (Caswell (1989), Andreev et al (2002), Horiuchi et al (2008)), and there is no acute need to develop a new decomposition approach per se. The crux of the problem is in how to parameterize the multistate model. Specifically, we can calculate the exact same index given arbitrary subsets of the transition probabilities available to us, and each of these arbitrary sets yields a qualitatively and irreconcilably different decomposition result. Each decomposition result is additive and valid in the same way. This is outrageous. I propose a new decomposition property: symmetry, whereby transition probabilities are transformed in such as way as to yield consistent decomposition results no matter which subset is chosen. I suggest a specific example parameterization for a common health model. Decomposition results retain all other properties we think are important. Now you can explain differences in discrete time multistate indices in terms of its constituent transitions and structure.

Session 6 • Health conditions and disability

The association between multiple long term health conditions and inequalities in disability-free life expectancies

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Background: Inequalities in life and health expectancy between socioeconomic status (SES) groups in the UK have widened over time. People in lower SES groups are known to have earlier onset of multiple long term conditions (MLTC). Although some evidence suggests MLTC contribute to inequalities in life expectancy (LE) there is little evidence as to whether MLTC also contribute to inequalities in disability-free life expectancy (DFLE).
Methods: The Cognitive Function and Ageing Studies (CFAS I and II) are two large population based studies with identical sampling strategies. Baseline interviews were conducted in 1991 (CFAS I) and 2011 (CFAS II). Both included a two-year follow-up interview and extended vital status follow-up. Disability was defined as difficulty with activities of daily living. A health condition count, dependent on number of health conditions available for each participant, was used to define MLTC. SES was based on area deprivation split into study specific tertiles. LE and DFLE were estimated from transitions between disability states and death in multistate models.
Results: In the most advantaged men and women the prevalence of MLTC was very similar in 1991 and 2011, but for the least advantaged men and women the prevalence increased by almost 10 percentage points (men: 1991 58.8%, 2011 66.9%; women: 1991 60.9%, 2011 69.1%). Although for men with MLTC, SES inequalities in LE, DFLE and percentage of life DFLE widened over this time, this was also

true for men without MLTC. Additionally, widening SES inequalities were also evident from status-based life tables in those initially free of disability, suggesting that higher disability prevalence in the least advantaged groups was not a major contributor. These widening inequalities for men and women without MLTC were due to a reduction in the probability of incident disability and death in a disability-free state declining for the most advantaged men and women and an increase in recovery from disability in the most advantaged women. In contrast, the least advantaged men without MLTC but with disability were less likely to die in 2011 than 1991, whilst the least advantaged women saw no change in any transitions. We also explored whether a differential incidence of MLTC in the 2-year follow-up occurred between SES groups, but found no evidence of this.
Conclusion: Growing SES inequalities in DFLE are partially accounted for by MLTC but they are not the whole reason.

Changes in Quality-Adjusted Life Expectancy (QALE) in Belgium and its regions, 2013 and 2018

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Background: No information is available in Belgium on life expectancy adjusted for health-related quality of life (HRQoL). However, quality-adjusted life expectancy (QALE) is an important measure as it allows to capture the multidimensionality of health by accounting losses in quality of life linked to physical, mental, and social impairments, and is therefore useful for assessing health problems occurring at younger age. The objective of this study is to assess QALE and the changes in QALE between 2013 and 2018 in Belgium and its 3 regions.
Methods: The Belgian Health Interview Survey (BHIS) included in 2013 and 2018 the EQ-5D-5L tool. This tool assesses HRQoL on five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) to define a large variety of health states. The Sullivan method was used to compute QALE by age, sex, and region using mortality data from the Belgian statistical office and average EQ-5D scores from the BHIS. QALE was calculated for 2013 and 2018, and changes in QALE over time were decomposed and analyzed for Belgium and its regions.
Results: Between 2013 and 2018, a decrease in QALE at 15 years (QALE15) was observed (from 55.4 years to 54.4 years); the decrease was higher in Wallonia (-1.3 years) than in Flanders (-0.8 year) and nonexistent in Brussels. In 2013, QALE15 was higher for women (56.1 years) than for men (54.7 years), however, in 2018, the gender difference disappeared (54.5 years for women, 54.3 years for men). For both years, Flanders had a higher QALE15 (57.8 years in 2013, 57.0 years in 2018) than Brussels (53.7 years in 2013, 53.7 years in 2018) and Wallonia (51.3 years in 2013, 50.0 years in 2018). The decline in QALE was driven by women <80 years who had decreasing HRQoL and low progress in life expectancy and by men <25 years who had decreasing HRQoL.
Conclusions: QALE was calculated for the first time in Belgium and revealed a decline between 2013 and 2018 in Wallonia and Flanders, particularly among younger people and women.

Environmental barriers and disablement process at older ages in France: how far stairs, streets and food facilities matter in older adult's independency in daily outdoor activities?

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Context and objective. The functional decline of older adults induces difficulties in daily activities and challenges their independence. However, there is evidence which indicates that the physical environment interacts with the disablement process. This study aims to highlight how environmental barriers interact with functional limitations (FL) to restrict older individuals' independence in basic

outdoor activity of daily living (OADL). The objective is two-fold : (1) we observe which environmental barriers increase difficulties in OADL and/or the need of someone's help and (2) we test a possible gradual interaction of environmental barriers with the number of accumulated FL.
Methods. We used the French cross-sectional survey CARE (2015) on older adults 60+ (N=10,628). We focused on individuals with 1 to 10+ severe FL (N=7,451). We selected a set of four activities to which we refer as OADL: shopping, visiting a health professional, carrying out administrative procedures, going outside the house. We considered whether they report no OADL difficulty / difficulties, but not helped / difficulties and using someone's help. We used three different approaches to assess the physical environment: general environment based on general, food and health facilities in the city of residence; immediate outside environment based on presence of stairs from house to street; near outside environment based on streets and sidewalks quality, presence of hills, resting places, public toilets. We used multinomial logistic regressions to test interactions.
Results. Multinomial logistic regressions show that 4 of the tested barriers decrease the probability of reporting no difficulty in OADL. We also found that these barriers unevenly increase the use of help for OADL: individuals are more likely to use someone's help in a city without food facility (when they have 2+ FL) and when they report stairs between home and street (significant only for 1-2 FL). Finally, individual report more difficulty in OADL in environment with poor street/sidewalk and no resting place; however they remain independent from someone's help until they have 6+ FL.
Conclusion. These results suggest that older adults may gain independence in basic outdoor activities by preventing cumulated FL and by improving general, immediate and near physical environment. More systematic measure of interactions between environment and functional status could help forecasting future needs.

Projections of dependency for the older population in England to 2038 under scenarios of varying disability progression

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Background:
Previous projections of the numbers of older people in England requiring care, have been developed using linked projections models and using the 2014-based population projections that did not reflect the recent stalling of life expectancy at birth and age 65 in England. This is important since care demand and costs of care are highly sensitive to changes in mortality rates, especially among very old people who are the most intensive users of social care. We aimed to produce updated projections of trends in independent life expectancy at age 65 (IndLE65), considering the recent stalling of life expectancy in England. In addition, we assess which scenarios for disability progression are likely to meet the UK government's Ageing Society Grand Challenge of increasing healthy, independent life years at birth by five years by 2035.
Methods:
We used the Population Ageing and Care Simulation Model (PACsim), a discrete time dynamic microsimulation model of individuals from three longitudinal studies: Understanding Society, the English Longitudinal Study of Ageing, and the Cognitive Function and Ageing Study II. To assess changes in IndLE65 against the Ageing Society Grand Challenge, we converted the increase of five years at birth to a percentage increase of the current values, equating to an increase of 8% for both men and women. We investigated the effect of five evidence informed scenarios of slowing (or increasing) disability progression on the base-case projections on future numbers requiring care and whether the Ageing Society Grand Challenge target would be met.
Results:
Between 2018 and 2038, life expectancy at age 65 increased by 2.0 years (from 18.6 to 20.6 years) for men and by 1.2 years (from 21.1 to 22.5 years) for women. Over the same period, IndLE65 is projected to increase by 1.9 years (14.7%) for men, thus exceeding the 8% target, but only by 0.5 years (4.7%) for women. The most optimistic scenario (reducing declining transitions and increasing recovery transitions by 10%) resulted in increases in men's and women's IndLE65 exceeding 8%. All five

scenarios, even the 'pessimistic' ones (increasing disability progression and reducing recovery), achieved the target for men, whilst the 'pessimistic scenarios resulted in reductions in women's IndLE65.
Conclusion:
Our projections suggest that it will be much easier to reach the equivalent of the Ageing Society Grand Challenge for men's independent life expectancy than for women's.

Pitch session

Health expectancies in the European Union: same concept, different methods, different results

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Background: Healthy life expectancy (HLE) is a population health measure that combines mortality and morbidity, which can be calculated using different methods. In this study, we aimed to assess the correlation, reliability and (dis)agreement between two estimates monitored in the European Union (EU), that is, the European Commission's HLE based on self-perceived health (SPH-HLE) and the Institute for Health Metrics and Evaluation's HLE based on disability weight (DW-HLE), by sex, and comparing these results with LE and proportion of life spent in good health (%GH).
Methods: We performed a retrospective study in the EU28 countries, between 2010 and 2017. The HLE methods differ in definition, measurement and valuation of health states. While SPH-HLE relies directly on one question, DW-HLE relies on epidemiological data adjusted for DW. Spearman's r, intraclass correlation coefficient, information-based measure of disagreement and Bland-Altman plots were used to assess reliability, correlation and disagreement in HLE resulting from both methods and in LE or %GH measured by both institutions.
Results: Correlation and reliability between SPH-HLE and DW-HLE were good (better for males), with low disagreement, and were even better for LE between both institutions. The HLE Bland-Altman plots suggest a variability range of approximately 6 years for both sexes, higher for females. There was also an increasing HLE difference between methods with higher average HLE for both sexes.
Conclusion: We showed wide variations between both methods with a clear and different high impact on female and male HLE, showing a tendency for countries with higher health expectancies to yield larger gaps between SPH-HLE and DW-HLE.

Direct Healthy Life Expectancy Estimates from Life Tables

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We provide several methods for estimating the Healthy Life Expectancy (HLE) by using only the Life Table data sets. A direct method is proposed along with an extension of the life table account for new methodology while a Sullivan approach is also added for estimating the development of the HLE by age. Following our methodology, the HLE for the unexplored period of the last decades or even centuries where LE data exists, is estimated. The problem is now solved following a methodology of estimating the HLE from the life tables after the Healthy Life Years Lost (HLYL) estimation.
Our methodology on a Direct HLYL estimation from Life Tables, is tested and verified via a series of additional methods including a Weibull parameter test, a Gompertz parameter alternative and of course a comparison with HALE estimates from WHO. Having established a methodology of data collection and handling the HLE can be estimated and provided to researchers and policy makers.

The complete methodology and estimation methods are published in the book on “Demography of Population Health, Aging and Health Expenditures” of Volume 50 of the Springer Series on Demographic Methods and Population Analysis.
https://www.springer.com/gp/book/9783030446949, https://doi.org/10.1007/978-3-030-44695-6
Keywords: Life Expectancy, Healthy Life Expectancy, HALE, forecasts, Life Tables

A new and general approach to the calculation of years of life lost (YLL) from incidence-based health models

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The concept of "years of life lost" has long been explored in the context of age-specific deaths. A death at age x loses an amount of life, the expected value of which is the remaining life expectancy at age x. Integrating this over age gives the familiar "e-dagger" index of life disparity. The concept of life as something that can be lost and accounted for has since been expanded to include causes of death and partial loss of life due to disability. Such calculations form the basis for the calculation of disability-adjust life years (DALY). They are usually restricted to examining means, just as life expectancy is restricted to means. The theory for the variance and higher moments of YLL in prevalence-based models was presented by Caswell and Zarulli (Population Health Metrics 2018). In the present paper, I will show how to analyze YLL in incidence-based models, which follow the movement of individuals among ages and health states. The analysis relies on the multistate Markov chain with rewards framework (Caswell and van Daalen, REVES meeting 2019), which permits a more efficient and detailed analysis than any other analytical approach. Using these methods, YLL can be associated with any choice of health conditions or ages, or with transitions among health conditions, or with multiple causes of death. A cost or value, economic or otherwise, can be associated with the lives lost. The analysis is not restricted to calculations of means, but provides simple formulas for the variance and the higher moments of YLL. It will not have escaped anyone's notice that years of life lost have implications for the impact of the COVID-19 pandemic. I do not intend to investigate such impacts, but the method here will provide a potentially useful tool.

Trends in life expectancy and healthy life years at birth between 2008 and 2016 for the UK and other countries of the EU28

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Background: Increases in life expectancy (LE) in the UK and elsewhere have slowed in recent years, but the reasons for this are unclear. This study aimed to compare trends in LE and Healthy Life Years (HLY) between the UK and the other countries of the EU28 using harmonised data in order to identify important differences, and to provide a benchmark of the UK’s performance before the COVID-19 pandemic and prior to leaving the European Union in early 2020.
Methods: We calculated sex-specific HLY, unhealthy life years (ULY), mild and severe ULY at birth using life tables and age-specific prevalence of activity limitation among the EU28 between 2008 and 2016 from EuroHex. We plotted country and sex-specific trends in LE and HLY, and, where non-linearity was evident, change-point linear analyses were implemented and compared to simple linear models. For countries with reductions in HLY between 2008 and 2016, and for countries with the greatest gains, we used decomposition to examine the extent to which changes in HLY between 2008 and 2016 for each country were driven firstly by changes in mortality or the prevalence of unhealthy life, and secondly by specific age groups.
Results: The majority of EU28 countries saw linear increases in LE, and a substantial number increases in HLY at birth between 2008 and 2016. However, UK LE at birth, which was increasing rapidly in 2008, slowed around 2011. HLY at birth also fell sharply over the period, leading to a steady reduction in the

proportion of remaining life spent healthy, and absolute expansion of unhealthy life, for both males and females. A sharp rise in the number of years spent with severe unhealthy life in UK females also occurred around 2011. Only three other countries of the EU28, Austria, Greece, and Luxembourg, had a significant decline in HLY over the period, but, unlike the UK, LE continued to increase in these countries. Decomposition analysis revealed that the common factor in the decline in HLY in all four countries was a greater increase in the prevalence of unhealthy life, particularly at younger ages, rather than reduction in mortality.
Conclusion: The UK's performance relative to the other countries of the EU28 was poor after 2011, combining static life expectancy and reductions in healthy life years. These trends suggest that the UK government's Ageing Society Grand Challenge (to increase the healthy life expectancy by five years by 2035) will be difficult to attain.

Regional inequalities in life expectancy and lifespan variation by educational attainment in Spain, 2014-18

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Introduction: The relationship between socioeconomic position and spatial location as determinants of the life expectancy of individuals, has been widely investigated in the literature. However, the relationship between the inequality of length of life (lifespan variation) and such social standing across the spatial dimension is much less documented. Measuring the magnitude of such relationship is critical for understanding how health inequalities operate across spatial units – in this case Spain's Autonomous Communities.
Objective: To produce measures of life expectancy and lifespan variation indicators by socioeconomic position (expressed in educational attainment) at a subnational level in contemporary Spain and visualize the relationship of said measures.
Methods: By using a combination of data sources (National Institute of Statistics Population Estimations, Mortality File and the Spanish Sociodemographic Survey), we were able to produce estimates of remaining life expectancy at age 35, age 65 and measures of lifespan variation (using life disparity and the life table entropy index as indicators) for the different Autonomous Communities in Spain, separately by sex and education, divided in the high- and low-educated groups, for the 2014-18 period.
Results: In all cases, remaining life expectancy was higher for individuals with the higher educational attainment, and higher for females than males, independently of the educational attainment. Correspondingly, lifespan variation indicators were higher for males and individuals with a lower educational attainment. While we could identify a statistically significant association between having a lower life expectancy and a higher lifespan variation for individuals with a lower educational attainment across autonomous communities, the same could not be said for individuals with a higher educational attainment, where we could not find a linear relationship between those two mortality measures.
Conclusion: The results of this study may suggest that in autonomous communities of Spain, the spatial conditions still matter as health determinants (as shown by the great deal of heterogeneity when producing the estimations), but even more among individuals with a disadvantaged socioeconomic position, not only in terms of life expectancy, but also of lifespan variation. Among the highly educated, the location where individuals live seems to be less relevant as a social determinant of health."

Cause-of-death diversity from a multi-cause perspective

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Background: Recent evidence suggests that the diversity in underlying cause-of-death has increased over the last two decades, especially among old age groups. However, the elevated (and increasing) proportion of deaths occurring at old ages, where the presence of comorbidities is extremely common, makes more complex than ever to predict underlying causes of death. Here, we contribute to the debate

of cause-of-death diversity by examining how it can be measured in the more general 'Multiple Causes of Death' (MCOD) settings, and across educational groups in the US between 2003 and 2018.
Methods: We use individual level multiple causes of death from the US for 13 main causes of death. In the MCOD setting, each death has its associated group of main causes listed in the death certificate. The suggested MCOD diversity function measures the expected difference between the groups of causes associated to two randomly chosen deaths. Our proposed method contains the standard approach based on single causes of death as a particular case – which is arrived at by assuming that the importance given to the causes other than the underlying cause of death is null. We provide age- and sex-specific results for the new diversity measures, as well as estimates for four educational groups.
Results: Cause-of-death diversity increased in the studied period, and especially up to 2012. These trends were driven by increases in ages 40 and over, while for the population aged 20-39 diversity trends show a decrease over time. For ages 85 and over cause-of-death diversity stagnated from around 2012 onwards. Compared to the standard single cause-of-death trends, results including MCOD suggested higher increases over time in all age groups except for men aged 85 years and older, where no differences were observed. Results by educational attainment showed lower diversity among the highest educated groups, and similar increases over time across groups. Interestingly, the educational gradient diminished at ages 65-84 and disappeared (men) or got reverted (women) at ages 85 and over.
Discussion: Cause-of-death diversity has increased over the last decades in the US. Our new MCOD diversity measures suggest that traditional approaches relying on single causes of death might be underestimating cause-of-death variability. The education-specific results indicate that low-educated individuals might be exposed to a more variegated set of causes of death than their high-educated counterparts.

GALI-based Healthy Life Years using Japanese National Survey

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While the official healthy life expectancy(Kenko Jumyo) in Japan is calculated by using a question on limitation of activities asked every three years in the Comprehensive Survey of Living Conditions, conducted by the Ministry of Health, Labour and Welfare, the GALI (Global Activity Limitation Indicator) question has been used sporadically in surveys for the purpose of international comparison, such as JAGES survey conducted in Kashiwa city in 2011/2012 (Kondo 2012) or a survey conducted in Shizuoka prefecture in 2012 (Ojima 2014). In addition to these surveys, the GALI question was included in the large-scale governmental household survey, the National Survey on Social Security and People's Life and results became available in 2019.

The National Survey on Social Security and People's Life was conducted in July 2017 to cover all ordinary households (including dormitories and excluding facilities) and household members aged 18 years and over in the nationally representative 300 census enumeration districts, and collected 26,383 responses of household members (75.5% of effective response rate). GALI question was asked together with other health and social indicators such as subjective health, disability registration status, perception of living long years, depression, access to health care and so forth (IPSS 2019).

The proportion of people who had severe or moderate daily activity limitation was 23.1% for both sex, 22.0% for male and 24.1% for female. Defining this proportion as unhealthy, the healthy life years at age 65 were calculated by Sullivan method; they were 11.8 years for male and 12.9 years for female. Compared with European healthy life years in 2016, Japan ranks the 6th for both female and male, although the life expectancy at 65 ranks 1st for female and 4th for male.

The results confirm the findings in Ojima (2014) where the GALI defined healthy life years are the longest in Sweden, followed by Japan, France and EU27 for both female and male (with the exception that in 2016, the French healthy life years were slightly shorter than EU28). Although the sample frame is different between the two surveys conducted in Japan, the resulted healthy life expectancy rankings are consistent which suggests that the GALI question is robust in measuring health and can be used for international comparisons. A further differential analyses would shed light on the determinants of health in different countries.

Well-being Adjusted Health Expectancy - a new summary measure of population health

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We propose a new summary measure of population health (SMPH) to which we refer as “Well-being Adjusted Health Expectancy” (WAHE). It combines health and mortality information into a single index by applying weights based on subjective well-being in different health states. WAHE answers the question ""how many years one can expect to live that would be equivalent in well-being to years lived in full health"". The advantage of WAHE over other commonly used SMPH lies in the transparent and straightforward valuation function that takes into account well-being of those who actually experience the health impairment and distinguishes this effect on the well-being depending on contextual factors, i.e. country of residence. Besides, in the construction of WAHE information on the severity of health limitations is taken into account.
In the empirical part of the study, we test WAHE’s sensitivity to single- and multi-dimensional specification of states across the three health domains of the “Minimum European Health Module”: self-perceived health, chronic morbidity and the Global Activity Limitations Indicator (GALI). The results for WAHE across the European countries are contrasted with estimates for the two most commonly used SMPH, the healthy life expectancy and disability-adjusted life expectancy. The data on the prevalence of different health states across 26 European countries and subjective well-being in 2017 come from the SILC data. The corresponding mortality data is taken from the Human Mortality Database.
The empirical part of the study demonstrates that the distribution of WAHE is characterized by the highest and significant correlation with that of all other commonly used SMPH represents the best the group of SMPH, as because it is characterized by the highest and significant correlation with the other widely used indices. Besides, WAHE carries similar health and mortality information independent of whether health is specified on a single or simultaneously across multiple measurement instruments. We conclude that, although the distributions of WAHE across the study countries is similar for the three health domains, the preferred specification is WAHE based on self-perceived health, as the most because it shows the highest correlation with results obtained for all other SMPH.

Healthy life expectancy by cohort of birth, education and gender in Europe

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The age structure of European populations has experienced a dramatic change as a cause of joint effect from two the progressive increase of the life expectancy at birth together with the low fertility rates, though both phenomena show meaningful country differences in magnitude and calendar. This is causing a substantial increase in the share of older people in a short period of time that would imply an increase in the number of people with disabilities and will put pressure on pension systems and public expenditure.
Life expectancy has been a reference outcome for measuring the aging process though this eminently a cross-sectional indicator. This rises the necessity of considering alternative outcomes from a cohort of birth perspective for the design of policies to counteract the effects of population aging. Health expectancy is a summary indicator of quality of life that refers to the average number of years an individual can expect to live (length of life and the healthfulness of life), independently from the age structure of the population and its measurement in expected years of life.
The objective of the present research is to compute and estimate healthy life expectancy based on different health outcomes (i.e. self-perceived health, activity limitation, and chronic morbidity) using the Sullivan method by cohort of birth and education level for women and men across different country groups. Education has proved to be a key factor to understand differences in healthy life expectancy as a proxy of socioeconomic status and living conditions among middle-aged and old populations and the strength of its effect differs across cohorts of birth, which highlights the relevance of taking a cohort

approach. With respect to gender, the health-survival gender paradox turns of great relevance when exploring healthy life expectancy as this indicator takes into account both sides of the paradox. Information about health outcomes is taken from the Survey of Health, Ageing and Retirement in Europe (SHARE), a longitudinal survey representative of the non-institutionalized European population aged 50 and over. We combine data from the first (2004) to the eight (2019) waves to examine trends in healthy and unhealthy life years. Complementary, life expectancy by cohort of birth is calculated using the Human Mortality Database (HMD).

The sensitivity of the Healthy Life Years indicator: Lifetable techniques and questions about dealing with age-specific prevalence data

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In this paper, we assess whether changing specific assumptions when estimating the Healthy Life Years (HLY) indicator and adopting different prevalence distributions by age can lead to different results. We test whether smoothing the disability prevalence by age using flexible smoothing splines and polynomial function has any impact on HLY. The prevalence is also computed by single-age, 5-year and 10-year age intervals. In addition, we estimate HLY considering no disability before the age of 16 and half of the prevalence for 16 to 20 years-old, which is the conventional approach. We additionally graduate mortality rates from the Human Mortality Database to evaluate if smoothing mortality patterns may affect HLY estimates. The prevalence on daily living activity limitations is obtained from the GALI instrument from the European Union Statistics on Income and Living Conditions (EU-SILC). Our overall preliminary results indicate that the absolute differences in HLY are small, but do matter for how some countries are ranked. Spain and Czech Republic alternate between the 10th and 11th ranking when comparing the spline and the polynomial smoothing functions for women. At age 50, women in the Netherlands expect to rank as the third in terms of worse healthy life years when the no disability before age 16 is considered, while that ranking goes to 5, when using the polynomial smoothing. This is a difference of 2 positions in ranking solely based on the smoothing method. Our preliminary results indicate that smoothing the prevalence of disability by age has little impact on HLY estimation. Graduating and smoothing mortality also presented no substantial effect. However, one important result was the assumption of no disability before age 16. On all the variants tested, this was the one that had the highest impact on HLY at birth, most probably because this aspect directly impacts the younger ages. Nonetheless, some countries experience changes in rankings when merely adopting different smoothing strategies, which merits further investigation. As a future step, we plan on decomposing the HLY into disability and mortality contributions, to test whether these small differences are driven by the prevalence or by mortality part and whether the summary result is masking any significant differences in prevalence by age.

Cognition as the Secret Scar of Forced Internal Displacement in Colombian Older Adults. SABE Colombia 2015 Secondary Analysis

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Background: Due to five-decades of armed conflict there are approximately 8 million internally displaced people (IDPs) in Colombia. Currently, at least one million IDPs are older adults and in the next decades many IDPs will age. Forced internal displacement (FID) is a traumatic experience that increases risk of altered mental states, including PTSD, mood disorders and anxiety disorders. We know very little, however, about the potential impact on altered mental states in older adults and whether FID plays an important role in cognitive function.

Methods: We used data from the 2015 SABE Colombia, a nationally representative survey of 23,694 adults age 60 and older. We defined altered cognition as having an MMSE score of 23 or less. We studied four different aspects of FID: experience of internal displacement; type of displacement (individual, familiar or community); period in which it occurred: 1st period (1900-1957), 2nd (1958-1981), 3rd (1982-1995), 4th (1996-2004) or 5th (2005-2015); and age of first FID. We first estimated age-adjusted prevalence of altered cognition across FID groups. Then we conducted logistic regression to identify elements of displacement associated with poor cognition.
Results: We found a prevalence of 30.13% (95%CI 27.01-33.45%) of IDPs that had altered cognition compared to only 24.51% (95%CI 23.2-25.79%) of non-displaced older adults. Higher prevalence was found amongst those displaced with their entire communities, 44.11% (95%CI 34.61%-54.06%) and amongst older adults displaced within periods 3, 4 and 5 of the armed conflict, 33.68% (95%CI: 27.23-40.81%), 33.80% (95%CI: 28.91-39.07%) and 35.44% (95%CI 29.20-42.22%) respectively. These periods encompass years 1982 to 2015, which registered the highest levels of violence. Logistic regression results showed that older adults displaced before 20 years of age had lower odds of altered cognition (OR 0.48 95%CI: 0.32-0.73), while FID after 45 years of age had increased odds (OR: 1.32 95CI: 1.01-74) of altered cognition.
Conclusions: This is the first study to analyze the impact of FID on cognition of older adults in Colombia. Our results suggest an increased risk of altered cognitive function amongst IDPs, but only among those displaced at older ages. The association found between age of first displacement and altered condition may indicate that early life FID increases cognitive reserve, thus constituting a protective factor against cognitive decline later in life.

Differences of Population Attributable Fractions of Diseases in Activity Limitations by Age Groups

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<Background>
The Japanese government has set health expectancy as the primary goal of Health Japan 21 (the second term) based on activity limitation (Ojima, 2020 in Jagger, et al. eds. International Handbook of Health Expectations, Springer). We previously reported population attributable fractions (PAFs) of various diseases in activity limitations (Myojin, et al. J Epidemiol. 2017; 27(2):75-79). Countermeasures to reduce the activity limitations that are fit for each age group are important. The objective of this study was to identify priority diseases to reduce activity limitations by age group.
<Methods>
We used 560,000 participants' data from the Comprehensive Survey of Living Conditions (CSLC) for 2016, which is a nationally representative, self-administered questionnaire survey of the non-institutionalized population in Japan. Family members may answer the questionnaire by proxy. Activity limitation in this survey was evaluated using the answer to the question, "Is your daily life now affected by health problems?" A respondent who answered "Yes" was deemed to have an activity limitation. Diseases for treatment were evaluated by answers to multiple-choice allowed questions regarding 42 disease categories. Odds ratios (ORs) of activity limitation by each disease were computed from logistic regression analyses adjusted for age group and sex. Moreover, we computed the PAFs for each disease. The analyses were performed separately for ages 40–64, 65+, and all age groups.
<Results>
For all age groups, diseases with high PAF were backache (13.9%), arthropathia (7.6%), ophthalmic diseases (7.6%), depression/other mental diseases (6.5%), and diabetes (4.8%). Diseases with large differences by age group (PAF for 65+, 40–64, difference) were depression/other mental diseases (2.5%, 10.6%, and -8.1%), dementia (5.8%, 0.2%, 5.6%), osteoporosis (6.3%, 1.3%, 5.0%), backache (16.5%, 11.5%, 5.0%), and ophthalmic diseases (8.8%, 5.4%, 3.4%).
<Conclusions>

In addition to fundamental life course prevention approaches, including diseases of the musculoskeletal system and dementia, mental health should be emphasised for the 40–64 age group to reduce activity limitation.

Socioeconomic convergence or divergence in the prevalence of comorbidity at older ages in Spain?

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The probability of suffering from more than one disease or health condition increases with age. However, one important research question left to answer is whether gender and socioeconomic differences in comorbidity have remained the same over the last 15 years, or are converging or diverging. Our goal is to obtain for different population groups an accurate picture of the prevalence in comorbidity from key medical conditions as well as associated risk factors (e.g. raised blood pressure levels, cholesterol and glucose in blood). Data will be drawn from different rounds of the National Health Survey of Spain (ENSE) (2006, 2011/12, 2017) and the Spanish samples (2009, 2014, 2019/20) of the European Health Survey (EHIS). The two surveys will be harmonized and pooled together to enable age- and time-specific changes to be studied across quasi cohorts. We will analyse trends in age-specific prevalence rates of single and comorbid conditions and estimate years of living with comorbid conditions according to socioeconomic status (e.g. educational attainment) using the Sullivan method. For the latter, we will obtain the required life tables by educational status from the Spanish National Institute of Statistics.

Gender differences in (Healthy) Life Expectancy by education level in Spain: Educational inequalities persist

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This study computes gender differences by education level in life expectancy (LE), healthy life expectancy (HLE), and unhealthy life expectancy (ULE) in Spain in 2018/19. Death registrations and vital status by level of education were obtained from Spain's National Institute of Statistics. Health prevalences were estimated from the National Health Survey for Spain (ENSE). We employ three indicators of health status to compute gender differences in HLEs based on the ENSE survey question: self-perceived health, the Global Activity Limitation Indicator (GALI) and the presence ("having a chronic disease or health problem") or the absence of any diseases ("no health problems") over the previous 6 months or more. We first estimate life expectancy by level of education and gender for the year 2018/19. We estimate Spanish gender differences in healthy and unhealthy life expectancy using Sullivan's method (Jagger et al. 2014; Sullivan 1971). This is a prevalence-based method of dividing life-table years lived in an age interval into healthy and unhealthy years based on each health measure prevalences of that five-year age group. In this way, health expectancies, a summary measure of population health that combines information about quantity and quality of life, have a similar interpretation to the total life expectancy as they indicate the average number of person-years lived in a certain health state given that he or she survived to a given age. The 2017 ENSE prevalences of the three health measures by education level and five-year age groups are, therefore, extrapolated to the Spanish population data on the life table to estimate the expected life years spent in good or bad health. Finally, we compute the variation of the gender gap in healthy life expectancy by the health measure and education level. Our preliminary results reveal that gender (female-male) differences are notable across all ages and education levels.

Capturing subjective life expectancy and its link with older adults' health

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Objectives: Subjective remaining life expectancy (SLE) is of interest because empirical evidence shows that it predicts active ageing as well as actuarial remaining life expectancy. However, evidence also shows that people have difficulty to estimate their remaining life expectancy, which raises the question what the most appropriate measurement instrument is. This study uses health as a criterion and compares two measures of SLE, a graphical and a numerical one, regarding their associations with physical performance, self-rated health, and depressive symptoms.
Methods: 64-91-year-old participants were selected from three waves of the Longitudinal Aging Study Amsterdam (2008/09, 2011/12, 2015/16; n=1,822 participants, n=3,532 observations). The graphical measure (G-SLE) was a line representing life from beginning to end, on which participants had to indicate by a cross where they perceived themselves to be in their lifetime, from which their SLE was calculated. The numerical measure (N-SLE) was a question asking about the age to which the participant expected to live. We used Generalized Estimating Equations to examine associations of SLE with health, with covariates wave number, age, sex, and education.
Results: The percentage missing observations was much larger for N-SLE than G-SLE (21.7% versus 0.7%). Older, female, and lower educated participants had more missing observations. The correlation of G-SLE with N-SLE was weak (r=0.22). Overall, G-SLE showed weaker associations with health than N-SLE. Associations of G-SLE and N-SLE with health were relatively weak, and weakest for physical performance, followed by depressive symptoms, and strongest for self-rated health. Associations of G-SLE with self-rated health were significantly stronger among higher than among lower educated participants.
Discussion: The numerical measure was more difficult to respond to than the graphical measure. The weak associations of SLE with health suggests that other factors than health play a role in perceptions of subjective life expectancy, particularly in the lower educated.