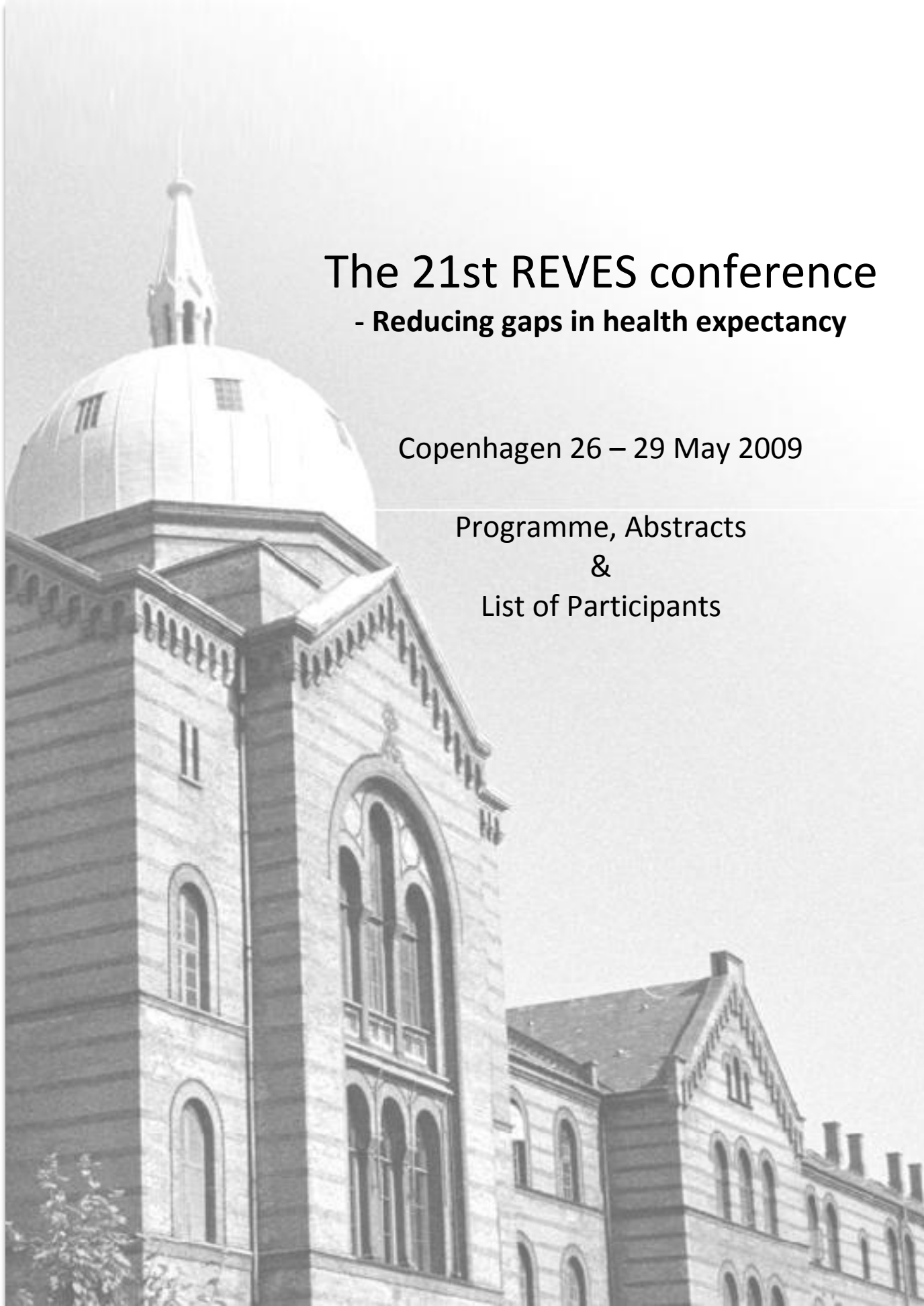

The 21st REVES conference

- Reducing gaps in health expectancy

Copenhagen 26 – 29 May 2009

Programme, Abstracts
&
List of Participants

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Contents

Welcome to the 21st REVES conference

The overall theme of the conference "Reducing gaps in health expectancy" reflects that one main objective of REVES is to study and quantify differences in health expectancy between men and women as well as inequalities between socioeconomic groups and subpopulations of different ethnicity. The conference deals with these subjects together with studies focusing on international comparisons, trends, health among the oldest old and other topics.

A special session on basic concepts and methods is planned to brush up on what it's all about. The aim is to present a general view and provide the opportunity for a discussion on measuring disability, classification systems, estimation methods, statistical considerations and available software.

This year a special optional training session will be offered on the day before the conference (26 May) with presentations and exercises using specific software tools.

I welcome all the participants representing more than 20 countries from all over the world and hope you will benefit from the conference and enjoy your stay in Copenhagen.

Henrik Brønnum-Hansen

Meeting Organization

Henrik Brønnum-Hansen
Bernard Jeune
Jean-Marie Robine
Kirsten Zachariassen

Programme

26 May **Optional training session**
Hands on session for computing health expectancy

10:00 - 10:05 Brief introduction (Y Saito)
10:05 - 10:30 Overview of multi-state life table methods (C Jagger, F Mattews)
10:30 - 12:00 Application of Bayesian Statistic for computing HE (1) (S Lynch, S Brown)
12:00 - 12:50 Lunch
12:50 - 14:20 Application of Bayesian Statistic for computing HE (2) (S Lynch, S Brown)
14:20 - 14:30 Break
14:30 - 16:00 Using SAS Macro for computing HE (1) (L Cai)
16:00 - 16:10 Break
16:10 - 17:40 Using SAS Macro for computing HE (2) (L Cai)
17:40 - 18:00 Discussion

Conference 27-29 May – Reducing gaps in health expectancy
Except for the concept and methods session (session 5), the presenters will be given 20 minutes each (including discussion).

27 May
8.00-9.00 **Registration**

9.00-9.15 **Welcome remarks**

9.15-10.45 **Session 1: Harmonization and International comparisons**
Chair: Y Saito

- C Jagger, JM Robine, H Van Oyen and the EHLEIS team. A comparison of health expectancies in the EU25: results from the EHLEIS project.
- O Ekholm and H Brønnum-Hansen. Cross-national comparisons of non-harmonized Healthy Life Years indicators may lead to more confusion than clarification.
- NK Rasmussen. Cross cultural comparability of questionnaire based data used for health expectancy calculations.
- M Smith and C White. An investigation into the impact of question change on estimates of general health status and healthy life expectancy in the United Kingdom.

10.45-11.00 **Break**

11.00-12.30 **Session 2: Gender**
Chair: DJH Deeg

- WJ Nusselder. Decomposition of gender differences in Healthy Life Years.
- H Van Oyen, B Cox, JM Robine and C Jagger for the EHEMU-team. Patterns in gender gaps in the EU.

- L Frova, A Battisti and A Burgio. Are gaps in disability free life expectancies reducing in Italy?
- RS Goyal. Whether the poverty of women in childhood and adult ages affect their health disability status in later years?

12.30-14.00 **Lunch** at Simplycooking, CSS

14.00-15.30 **Session 3: Methods – measures, models, simulations**
Chair: MD Hayward

- A Andreotti, N Minicuci, P Kowal and S Chatterji. Multidimensional profiles of health status: An application of the grade of membership model to the World Health Survey.
- F Matthews and A van den Hout. The shape of life and healthy life expectancies.
- X Liu, CC Engel, H Kang and KL Gore. Reducing selection bias in analyzing longitudinal health data with high mortality rates.
- L Cai. Health-adjusted value of health care spending on the elderly in the United States, 1992-2002.

15.30-16.00 **Break**

16.00-17.30 **Session 4: Projections, forecasts and scenarios**
Chair: H Brønnum-Hansen

- D Banham. Targeting health expectancy gaps in South Australia.
- M Lagergren, M Thorslund and M Parker. Revised projections of the development of LTC costs in Sweden 2005-2040.
- R Matthews, C Jagger and MRC CFAS. Trends in disease and how they will impact on disability in the older population.
- KJ Anstey and the DYNOPTA collaborators. Pooling longitudinal studies of ageing for epidemiological analysis and to model health futures: the DYNOPTA project.

19.00 **Conference dinner** at "Spiseloppen", Christiania
(Bådsmandsstræde 43, 2.th. 1407, København K)

28 May

9.00-11.30 **Session 5: Basic concepts and methods**
Chair: JM Robine

- K Avlund. How to measure disability, the disablement process and early signs of disability.
- C Mathers. The disability process and WHO classification systems: past, present and future.
- Discussion
- Break
- F Matthews. Estimation and statistically considerations.
- Y Saito. Software overview.

11.30-14.30 **Lunch** at Statens Museum for Kunst, National Art Gallery (Sølvgade 48-50, 1307, København K)

14.30-15.30 **George Myers lecture** by James W Vaupel

15.30-15.45 **Break**

15.45-17.15 **Session 6: Oldest old and healthy aging**
Chair: B Jeune

- LA Gavrilov and NS Gavrilova. Physical characteristics at the midlife and survival to age 100: A study of American men.
- H Engberg, A Oksuzyan, B Jeune, JW Vaupel and K Christensen. Healthy aging in Danish centenarians – a 29 year follow-up of hospitalizations among 40,000 Danes in the 1905 birth cohort.
- T Sarkeala, M Vuorisalmi, A Hervonen and M Jylhä. Functional status among Finnish nonagenarians in 1996-2007: Vitality 90+ Study, Tampere.
- VM Shkolnikov, EM Andreev, P Demakakos, A Oksuzyan, K Christensen, MA Shkolnikova and JW Vaupel. Patterns of grip strength in Moscow as compared to Denmark and England.

17.15-17.30 **Break**

17.30-18.30 **Session 7: Trends I**
Chair: F Matthews

- JW Bruggink. Health expectancies in the Netherlands since 1981.
- CH Van Gool, HSJ Picavet, DJH Deeg, MMY de Klerk, WJ Nusselder, MPJ van Boxtel A Wong and N Hoeymans. Trends in late-life activity limitations: The Dutch population between 1990 and 2007.
- SL Reynolds and EM Crimmins. Trends in the ability to work among the older US working population, 1997-2007.

29 May

9.00-10.45 **Session 8: Social, ethnic and other differences**
Chair: SL Reynolds

- DC Brown, MD Hayward, JK Montez, MM Hidajat and RA Hummer. The significance of education for rectangularization of the survival curve in the United States.
- R Wilkins. The Canadian census mortality follow-up study: a new resource for the study of socioeconomic disparities in health expectancies.
- K Knoops, JW Bruggink and M van den Brakel. Healthy life expectancy and socio-economical status in the Netherlands.
- A Burlison. Healthy life expectancy in Scotland.
- Z Zimmer, M Wen and T Kaneda. A multi-level analysis of urban versus rural differences in functional status transition among older Chinese.

10.45-11.00 **Break**

11.00-12.30 **Session 9: Risk factors, chronic diseases and disability**
Chair: N Minicuci

- L Bonneux, M Reuser and F Willekens. Disability trajectories and life style. A longer life in good health is closed by a longer period in more severe disability.
- B Klijs. Contribution of chronic diseases to the burden of disability in the Netherlands.
- N Brouard, M Espagnacq, JF Ravaud and the Tetrafigap group. Life expectancy of tetraplegic spinal cord injured individuals in France: a ten years follow-up.
- C Himes. The effects of obesity on disability recovery.

12.30-13.30 **Lunch** at Simplycooking, CSS

13.30-15.00 **Session 10: Trends II**
Chair: R Wilkins

- MG Parker, B Meinow, P Schön and M Thorslund. Health trends in Sweden 1992-2002: Gender and complex health problems.
- LH Chen. Disability-free life expectancy trends in Taiwan: Compression, expansion or dynamic equilibrium.
- SLK Cheung and SFP Yip. Are we heading to the compression of disability? The case of Hong Kong SAR, 1984-2008.
- I Pool, W Boddington, J Cheung and R Didham. Differential trends in mortality compression: Assessing the antecedents to gaps in health expectancy in New Zealand.

15.00-15.30 **Closing ceremonies**

Abstracts – Session 1:
Harmonization and International Comparisons

27 May 9.15-10.45

Chair: Yasuhiko Saito

A comparison of health expectancies in the EU25: results from the EHLEIS project

Carol Jagger, Jean-Marie Robine, Herman Van Oyen and the EHLEIS team

The European Health and Life Expectancy Information System (EHLEIS) project began in 2007 as an extension to the European Health Expectancy Monitoring Unit (EHEMU). The project aims to promote the understanding of the new EU Structural Indicator Healthy Life Years and its use in monitoring the ageing of the European population, with particular focus on researching the gender gaps in life and health expectancies and in identifying factors which might explain the inequalities in life and health expectancies between the 25 Member States (EU25). Three health expectancies are now available for the EU25 for 2005 and 2006: HLY (life expectancy free of activity limitation), life expectancy in good self-perceived health, and life expectancy free of chronic morbidity.

This presentation will discuss differences between countries in the EU25 and broad groupings defined as EU15/EU10 and by geography (north/south/east/west) in:

1. The stability of health expectancies at early (age 16), mid (age 50) and late (age 65) adulthood between 2005 and 2006
2. The relationships between the three health expectancies at these ages.

Cross-national comparisons of non-harmonised Healthy Life Years indicators may lead to more confusion than clarification

Ola Ekholm & Henrik Brønnum-Hansen

A newly published study showed that healthy life years (HLYs) at 50 years of age for both men and women were much higher in Denmark than in the other EU countries in 2005 (1). Furthermore, the study showed that the life expectancy for Danes was below the EU average. The analyses regarding HLYs were based on the global long-term activity limitation index as a measure of disability. The question derives from the Minimum European Health Module (MEHM) and is included in the EU Survey on Income and Living Condition (EU-SILC). The authors mentioned that Denmark uses only two response categories (yes; no) compared to three levels in all other countries (severely limited; limited but not severely; none). The authors, however, did not mention that there are other problems with this question in Denmark that make cross-national comparisons even more inadequate. The question from the MEHM is: 'For at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do?'. In Denmark, however, only people who reported a long-standing illness were subsequently asked: 'Have you been hampered in your daily activities by this chronic problem or by other health-related problems for longer time-periods within the past 6 months?'. The questions and the response categories were revised in the Danish SILC-2008. A comparison of the previous and the revised indicator shows that the estimated number of HLYs at 50 years of age is approximately 3 years lower for both men (21.0) and women (21.1) in 2008 than in 2005. Furthermore, in Denmark data were collected via telephone interviews when feasible and postal questionnaire for other households. However, in all other countries (with the exception of Finland) data were collected via face-to-face interviews. It is well known that the mode of data collection often has serious effects on self-reported health outcomes. Based on the results shown in the present paper and the fact that different data collection modes were used in Denmark, we conclude that the published results for Denmark are erroneous and subject to great uncertainty.

1. Jagger C, Gillies C, Moscone F, Cambois E, Van Oyen H, Nusselder W, Robine JM; EHLEIS team. Inequalities in healthy life years in the 25 countries of the European Union in 2005: a cross-national meta-regression analysis. Lancet 2008; 372: 2124-31.

Cross cultural comparability of questionnaire based data used for Health Expectancy calculations

Niels Kristian Rasmussen

Background and purpose.
Calculation of Health expectancy has been adopted as one of the Structural Indicators, which supposedly will provide as an instrument for an objective assessment of the progress made towards the Lisbon objectives within EU. Therefore it is of crucial importance that the calculation of this indicator has a high level of validity and comparability across different nations and cultures. The validity and comparability issue has several aspects. Unfortunately it is seldom that data collected for or used for cross-national comparative purposes have gone through proper tests for cultural validity and comparability either in a developmental or test and pilot phase or through focused analyses when data have been collected. Probably some problems cannot be identified until data from large samples have been statistically analysed. Therefore it is important to make secondary comparative analyses on available national datasets.

Preliminary result.
Data on perceived health and longstanding illness from an inter-Nordic comparative study was used for preliminary secondary analyses. When breaking down poor perceived health according to longstanding illness and age, a striking difference appeared between on the one hand Finland and on the other hand Denmark and Sweden. As expected, the level of poor perceived health increased with increasing age. But when stratified according to longstanding illness, the age gradient among those *without* longstanding illness disappeared among Swedes and Danes, whereas it remained among the Finns. A similar differential pattern was found in data from a survey in 27 municipalities in Estonia, Latvia, Lithuania, Poland, Norway and Denmark. This analysis also comprised the GALI indicator.

Conclusion.
The observed differences might indicate that the subjective indicator “perceived health” reflect different meanings embedded in the concept “perceived health” in the countries with different patterns.

An investigation into the impact of question change on estimates of General Health Status and Healthy Life Expectancy in the United Kingdom

Michael Smith & Chris White

Objective: To examine the effect of using the EU-SILC general health question on UK estimates of healthy life expectancy (HLE) in the period 2005-6 and to develop simulation methods to rebase the time series from 2001-03.

Methods: Self-reported responses to the original general health question in the General Household Survey of Great Britain and the Continuous Household Survey of Northern Ireland samples in 2005-06 were mapped to the responses to the SILC general health question in the same surveys and an algorithm was developed to define these translations in self-reported health states. These translations were then further refined and used to calculate adjustment factors which were applied to historic GHS and CHS data to simulate the dichotomised EU definition of '*Good*' and '*Not good*' health derived from the SILC question.

Results: Use of the EU-SILC question and the EU definition of *'Good'* Health derived from it will cause a significant fall in the prevalence of *'Good'* health in the UK (11 per cent for men, and 11.5 per cent for women). Consequently, estimates of HLE were also significantly lower than published estimates for men and women at birth and at age 65. The rate of improvement in HLE observed in the UK since 2000-02 was also slightly lower in simulated estimates derived from historic data.

Conclusion: Adoption of the harmonised SILC general health question and the European definition of '*Good*' health from the reporting period 2006-08 will cause a marked, significant reduction in the prevalence of '*Good*' health and estimates of HLE for men and women at birth and at age 65 compared with estimates derived from the original question and dichotomised definition. Trends in increasing HLE over time are unlikely to be significantly affected by the change in general health question and use of the SILC question will facilitate easier comparison with other EU member states in future years.

Abstracts – Session 2: Gender

27 May 11.00-12.30

Chair: Dorly JH Deeg

Decomposition of gender differences in Healthy Life Years

Wilma Nusselder

Introduction. Healthy Life Years (HLY) is the EU structural indicator on health. It is increasingly used for health monitoring and for comparisons between Member States and population(groups). Decomposition tools have shown to increase the understanding of differences/changes in health expectancy measures, like HLY. The aim of the current study is to examine gender differences in HLY and unhealthy life years (ULY) in the EU-10, and to assess whether the overall pattern in gender differences is similar to that in the EU-15.

Methods. We obtained age and sex-specific data on the number of deaths (2006), the population (2006,2007) and prevalence of activity limitation based on the Statistics of Living and Income Conditions survey (SILC, 2006) for the pooled EU-10 and pooled EU-15 countries, from the EHEMU database. We used a recently developed software program to decompose differences in health expectancy. This tool is based on the Sullivan method and is an extension of the Arriaga method to decompose differences in life expectancy. One of its applications is the decomposition of differences in health expectancy by kind of effect (mortality vs. disability).

Results. An average 15-year old girl in the EU-10 can expect to live 3.1 more HLY than a boy of the same age, whereas in the EU-15 population HLY at age 15 do not differ by sex. Both in the EU10- and EU-15 population girls can expect to live about 5.5 more ULY than boys. Decomposition of gender differences in HLY at age 15 shows that in the EU-15 the number of HLY is similar in men and women, because the effect of lower mortality in women (increasing HLY by 2.9 years) is completely nullified by higher disability prevalence (reducing HLY by 2.6 yrs). In the EU-10 the mortality advantage of women is larger (increasing HLY by 3.9 years), and only a small part (0.8 years) is nullified by higher disability in women, yielding a larger gender gap in HLY.

Decomposition of gender differences in ULY shows that the 5.3 fewer ULY in EU-10 men as compared to EU-10 women are mainly due to higher mortality in men (4.5 yrs). EU 15-men also spend about 5.5 less ULY than EU-15 women, but in this population fewer ULY in men reflect a combination of higher mortality (2.9 years) and lower disability (2.6 years). Conclusion: The absence of a clear gender gap in HLY in the EU-15 masks important gender differences in mortality and disability within the EU-15. The similar size of the gender gap in ULY in the EU-10 and EU-15 masks the more unfavorable position of EU-10 men. Decomposition helps to make visible the underlying differences in mortality and disability. Both EU-10 and EU-15 men are worse of in terms of mortality than their female peers, but the male disadvantage is larger in the EU-10. Additionally, the generally found disability advantage in men appears to be much smaller in EU-10 males.

Patterns in gender gaps in the EU

Herman Van Oyen, B. Cox, Jean-Marie Robine, Carol Jagger for the EHEMU-team

Objective: To describe the evolution of the gender differences in Life Expectancy (LE) and Health Expectancy Indicators in the EU and to evaluate the contribution of macro-level factors to gender gaps.

Methods: We applied to Eurostat life tables disability prevalence by age to estimate the years lived with and without disability. The morbidity data were provided by the European Community Household Panel 1995-2001 question "Are you hampered in your daily activities by any physical or mental health problem, illness or disability". Next, difference in gender gap between the member states were explored through meta-regression methods with structural and sustainable indicators by country. For the latter analysis, data on the global activity limitations index capturing long-term limitations (> 6 months) in usual activities, which are caused by ill-health, were provided by the SILC-2005 to estimate the Healthy Life Years (HLY). The effects of some country differences in the instruments used were reduced as the analysis focus on gender differences within countries.

Results: The reduction in gender gap in LE at age 16 years was not consistent throughout the EU. It was the most homogenous in Western European countries compared to the North, South and East. In the Eastern European Countries there was no reduction in the LE gender gap. At older ages, the gender gap in LE even increased in these countries. The change in the gender differences in LE is most often a result of the reduction in the gender gap in the years lived in good health. The increase of the gender difference in the years with activity limitations has a negative effect on the reduction in the gender gap in LE.

The association of the structural and sustainable indicators was stronger in relation to the gender gap in LE compared to the gender difference in HLY's. There is a positive association between the size of the gender difference in LE and HLY. The effect of the structural and sustainable indicators on the gender differences in HLY's is heterogeneous between EU15 (older EU member states) and the EU10 countries. In the EU15, the gender gap in HLY's is smaller in function of a decreasing inequality in income distribution, a lower proportion of the percentage of the population with a low educational attainment and a lower mean exit age from labour among men. In the EU10 countries, the gender gap in HLY's is reduced with increasing expenditure of elderly care, a decreasing risk for poverty at older ages and decreasing unemployment rate in the older populations. The association between gender gaps and GDP, expenditure, poverty and employment rate of older women is significantly different between EU15 and EU10.

Discussion: Difference in the evolution of the gender gap in health expectancy indicators may the related to the evolution of the population health. E.g. in countries with high life expectancy among women, next to the fact that the life of unhealthy people may be extended, more women enter into ages where the probability of unhealthy outcomes is high, favoring a catch-up of men. The effect of structural and sustainable indicators on the gender gap in HLY's is probably not causal. The indicators are reflecting the current situation whereas the HLY's and LE contains the history and experience of different cohorts throughout life. Further, the gender gap in HLY's in relation to other health determinants such as life styles (smoking, alcohol, physical activity) is not yet accounted for.

Are gaps in disability free life expectancies reducing in Italy?

Luisa Frova, Alessandra Battisti, Alessandra Burgio

This paper studies gender differences in Disability Free Life Expectancy (DFLE) in Italy taking into account mortality and disability contributions.

After analysing the age inputs that account for such differences, it goes on examining gender differences for various types of disability: difficulties in movement, difficulties in functional activities, difficulties in communication. The aim is to evaluate if gender gaps reduced from 1999/2000 to 2004/2005 and to appraise the impact of variation of mortality and disability on DFLE differences.

DFLE is calculated using the Sullivan method. Mortality and disability contributions to DFLE gender differences are measured applying the model proposed by Nusselder and Looman (2004).

Prevalence of disabilities are calculated using data from two Health Interview Surveys (HIS) conducted by the Italian National Institute of Statistics (Istat) in 1999/2000 and 2004/2005. Istat's life-tables for the years 2000 and 2005 are used.

In Italy, life expectancy at age 30 was 47.8 years for men and 53.3 years for women in 2000 and respectively 49.1 and 54.3 in 2005. Thus the gender gap in life expectancy reduced from 5.5 to 5.1 years.

The introduction of a health quality dimension (disability) into the quantity of years to be lived greatly reduces the traditional advantage of women in terms of mean duration of life. DFLE at age 30 in 2005 was 47.0 years for men and 48.7 years for women, with a gender difference of 1.7 years.

If we decompose this difference, the mortality effect is 4.2 years, while the disability effect is negative (–2.5 years). Therefore, women would have been much more advantaged in terms of mortality rates, but much more disadvantaged considering disability prevalence. Hence, the onset of a disability represents a "brake" on the higher survival rate of women. With respect to 2000 gender differences in DFLE reduced, but the mortality and the disability effects increased.

References: Nusselder W. J., Looman C. W. N., *Decomposition of differences in health expectancy by cause.* Demography, volume 41, number 2, may 2004: 315-334.
Sullivan D. F.. *A single index of mortality and morbidity.* HSMHA Health Reports 1971. 86:347-354.

Wheather the poverty of women in childhood and adult ages affect their health disability status in later years?

Radhey Shyam Goyal

In many developing countries, population ageing has begun in the midst of epidemiological transition where in, the prevalence of infectious diseases continues to be large. Several people in these societies carry burden of childhood infections and poor adult health status into the old age. Further, in most of these countries, women generally have unequal and inadequate access to basic services, food and nutrition throughout their lives. The situation of women has changed very little in spite of several decades of development efforts. Then there is evidence that the behaviour of particular biological factors that lead to higher disease and disability burden among women in old age is further exacerbated by life-long discrimination against them.

Against the above backdrop, an obvious question arises, whether the men and women have different experiences of aging in these societies? Though the initial gains in expectancy of life are generally due to lowering of childhood mortality, the further gains are attributable to the rise in old age life expectancy only. If despite of relative deprivation in childhood and adult age and poverty conditions, women are living longer than men, is it a quality life? How it is different than men?

This research is an attempt to answer some of these questions taking India as a case. It carries out a comparative analysis of disease and disability burden of men and women in old age and investigates relationship between relative deprivations in nutrition, health care, education etc. in childhood and adult age and health status of women in old age.

The analysis is based on secondary data culled out from Indian census and large scale surveys. The reference period of the study is last two decades of the 20^{th} century. The study variables are identified through a correlation analysis depicting linkage between quality of life in old age and access to necessities of life in childhood and adult ages. The variable chosen for studying the old age disabilities are; blindness, locomotion, amnesia, hearing and speech impairment. For studying the morbidity pattern, prevalence of pain in joints, tuberculosis, cough, blood pressure and heart problems are considered. Levels of nutrition, immunisation coverage, access to health care and primary education are chosen to depict the relative access of men and women to necessities of life in childhood. The variables chosen to depict the quality of life in adult ages are; domestic violence against women, proportion of men and women employed in organised sector, access to health care services, and household income/assets. It is a macro level analysis taking state as a unit of analysis.

Major Findings

The expectancy of life at age 60 is 18 years for women and 16 years for men. Further, though the expectancy of life at birth for Indian people has increased from 41.3 years in 1960 to 62.9 years in 1999, the gains have largely been in childhood years. Persons above the age of 60 years did not gain many years in life. It has been largely attributed to relatively lower public health attention on the elderly.

There are significant regional variations in the mortality experience of women. With an expected length of life at birth of 75.6 years, Kerala women aged 60 on an average can expect to live for 20.6 additional years. However, most other Indian states lag behind. This phenomenon closely corroborate with the socio-economic and demographic profile of women across the Indian states.

A time series analysis of prevalence of chronic diseases (pain in joints, tuberculosis, cough, blood pressure and heart problems) among elderly men and women at two points of time (1986 and 1996) with respect to self-reported prevalence of diseases was attempted. The analysis indicates that the overall reporting of illness has increased during 1986-96. The gender specific difference in the prevalence of chronic diseases in old age is however, minimal. A multiple regression analysis between disease and disability burden of men and women and variables depicting deprivation to quality of life in childhood and adult ages was carried out. The data from 14 major states were used for the analysis. The analysis did not show any significant effect of deprivation in childhood and adult ages on health status of women in old ages. Not only women are living longer, their health status is also at par with men.

The explanations are found in the socio-cultural domain of the Indian society. In spite of discrimination and neglect, the family institutions provide protection, care and respect to old women. In the Indian society, transition to old age provides new opportunities and status to women. They exercise more power in the household as mothers-in-law or grandmother than they did as younger women. Data on living arrangements of elderly endorse this point. The analysis also shows that the quality of life (in terms of freedom from diseases particularly pain in joints and cough, two major diseases of old age) of elderly, has not shown much improvement during the decade 1986-96. Against a backdrop of continuously improving life expectancy, it means that quality of life during additional years gained should be accorded a priority.

Abstracts – Session 3:
Methods – measures, models, simulations

27 May 14.00-15.30

Chair: Mark D Hayward

Multidimensional Profiles of Health Status: An Application of the Grade of Membership Model to the World Health Survey

Alessandra Andreotti, Nadia Minicuci, Kowal P, Chatterji S

The main aim of this study was to apply the Grade of Membership (GoM) model to the World Health Survey (WHS) data, in order to summarize the full set of health and health-related variables into a set of meaningful health profiles.

The WHS was conducted by the World Health Organization (WHO) in 70 countries between 2002 and 2004, in order to provide cross-population comparable data on health, health-related outcomes and risk factors. An innovative technique, the GoM model, was applied to the WHS data in order to compute summary health profiles from WHS self-reported health status and health conditions. GoM is a flexible, non-parametric, multivariate method which differs from the other common classification methods (e.g. Factor Analysis, Cluster Analysis, etc).

The overall WHS dataset was divided into four categories based on the World Bank economic groupings, and four separate GoM analyses were performed. These four groups were defined as: *low income*, *lower middle income*, *upper middle income*, and *high income*.
For each of the four economic grouping three main health profiles were produced: I. *Robust*; II. *Intermediate*; III. *Frail*. Each health profile described physical and health characteristics with a clear economic gradient (lower education and employment sector) across economic categories (from low to high income).

Performing these GoM analyses have provided a robust method to reduce and summarize health variables from health surveys. The three obtained health profiles have described concrete levels of health and have identified characteristics of healthy and non-healthy individuals. In future, it was planned to investigate changes between health profiles and the impact of the health-wealth.

The shape of life and healthy life expectancies

Fiona Matthews & Ardo van den Hout

Current estimates of life expectancies and healthy life expectancies provide information on either the mean or median for the population. The expectation at a certain age is often given as just one number, however underneath this figure lies a more complex shape. This presentation will investigate the shape of life expectancy estimates and dementia free life expectancy estimates in a clinical Parkinson's disease cohort.

A continuous time Markov Chain model has been fitted using a Bayesian framework with random effects and microsimulation of the life expectancies. These methods will be briefly introduced.

Results suggest that the distribution of life expectancies may not be normal and that public health statements about healthy life and total life expectancies may be assisted by an evaluation of the total distribution at specific ages.

Reducing selection bias in analyzing longitudinal health data with high mortality rates

Xian Liu, Charles C Engel, Jr., Han Kang, Kristie L Gore

Nonrandom dropouts in longitudinal health data can cause biased parameter estimates and erroneous predicted values of health scores. While none of the currently available methods is flexible enough to handle all types of dropouts, there is a dearth of research on how to handle the selection bias incurred from high mortality when analyzing large-scale longitudinal health data. Dropouts due to death constitute a unique category of the non-ignorable missingness. Mortality modifies distributions of follow-up data and, at the same time, those who have been deceased no longer possess any actual values and characteristics to estimate. In this study, we develop two longitudinal regression models seeking to reduce the selection bias in analyzing longitudinal health data with high mortality, one parametric and one nonparametric. The parametric model is a two-step perspective, developed as an extension of Heckman's traditional two-step linear regression model, whereas the nonparametric random-effects regression model uses a retransformation approach taking into account the prediction bias given skewed distributions of random disturbances across time. We illustrate the new methods using the longitudinal data from the Asset and Health Dynamics among the Oldest Old (AHEAD), a nationally representative investigation of older Americans. Our empirical analysis compares results derived from the two longitudinal random-effects models and discusses merits and weaknesses in each of the two-step estimators.

Health-Adjusted Value of Health Care Spending on the Elderly in the United States, 1992-2002

Liming Cai

A large portion of the health care spending in the U.S. is consumed by the elderly population of age 65 years and over. During 1963-2000, the share of spending by the elderly, which was 13 percent of the population in 2000, reached nearly 40 percent. At the same time, older Americans living longer and healthier. Advances in the treatment dramatically reduced the mortality of heart diseases, which contributed to the 30 percent gain of life expectancy at age 65 between 1960 and 2004. Various measures of health indicate substantial improvement as well. While some suggest that the growth of spending is a rational response to improved economic conditions, there remains tremendous concern over the disproportionate allocation of limited resources to health care. To have a balanced view, it is useful to assess the value of spending on the elderly.

This study will estimate health-adjusted value of spending on the elderly during 1992-2002 using a national survey on Medicare beneficiaries. I will compare the average gains in health-adjusted life expectancy (HALE) with increases in total cumulative spending for a broad age group of elderly. I will also evaluate the differences in values by single age, gender and race/ethnicity. A large body of research has identified substantial and persistent gender and racial inequality in measures of health and use of health care services, although there is evidence that the gaps among the elderly may have narrowed in recent decades. Some have suggested that the economic value of health gains for blacks was far more than the value for whites. By estimating the incremental cost per HALE gained, this analysis will provide the necessary information to better evaluate the cost and benefit of improving the health of older Americans.

Abstracts – Session 4:
Projections, forecasts and scenarious

27 May 16.00-17.30

Chair: Henrik Brønnum-Hansen

Targeting health expectancy gaps in South Australia[1]

David Banham

South Australia's Strategic Plan (SASP) includes the aim of increasing healthy life expectancy by 5% for males and 3% for females in the period 2000 to 2014. These estimates are derived using the *Burden of Disease and Injury in Australia: 2003* study. This method provides internally consistent synthetic estimates of small area outcomes using national (whole of Australia) models, based on sex, age, area disadvantage and remoteness.
Advances in the method also enable decomposition of HALE by disease and injury condition. This enables calculation of extra healthy years of life a population with lower HALE could gain if successful intervention for a particular condition resulted in the same rates as a population with higher HALE.

However, for public reporting and monitoring of population health outcomes, an alternative approach to small area estimation based on observed outcomes (i.e. deaths, disease registries and hospital inpatient data) is desirable wherever possible. These enable differences in health outcomes within SA to be examined across time and area. One frequently asked question "How does HALE relate to the business of planning and delivering health services?" This challenges descriptive, summary measures of population health to pass the "so what?" test.

Used in a framework focusing on equitable and effective delivery of health services, the two sets of estimates may complement one another and together help inform a range of local target setting and prioritisation activities. This is because synthetic estimates provide stable benchmarks for comparison to observed health outcomes for a considerable range of major conditions. Such comparisons include:

- Actual outcomes versus expected outcomes within a given area; and
- Scenario analyses asking:

'How much inequity in HALE outcomes is due to a given condition?'; and
'How might HALE change if condition rates in an area of greater disadvantage reflect those in areas of less disadvantage?'

This paper outlines the small area work under way in South Australia, describes the comparisons made, and discusses application areas for such comparisons.

[1] Thoughts and opinions expressed herein do not necessarily reflect those of the South Australian Government or SA Health

Revised projections of the development of LTC costs in Sweden 2005 – 2040

Mårten Lagergren, Mats Thorslund, Marti Parker

Almost ten years ago projections were made at the Ministry of Health and Social Affairs in Sweden concerning the development of costs for health care and long-term care in the period 2000 – 2030. These projections were based on estimates of the health development among elderly people (aged 65+during the period 1975 -1997 as measured by ADL-dependency based on the ULF-surveys (Survey of Living Conditions). Due to the positive health development recorded in these surveys, the results showed that if these trends were assumed to continue, the projected costs would be far less than projections based only on the expected future number of elderly persons.

Since the end of the 1990s surveys show a less positive development, prompting a need for revising the earlier cost projection estimates. New cost projections have now been made for the period 2005 - 2040. The basic idea of these and earlier projections is that future needs of long-term care should be related to health and disability. A critical issue, however, is how you measure this development. Basing the estimates on the recorded trends in ADL-dependency gives different results compared to using measures of ill-health or mobility disability.

Projections based upon an index that integrates general health, restrictions in functional capacity due to illness and mobility disability resulted in an estimated cost increase for long-term care in Sweden between 50 - 60% during the time period 2005 - 2040 (fixed prices; constant service level). The lower limit refers to the health trend slope between 1980 and 2006, the higher to the health trend 1996 - 2006. An alternative calculation based on the assumption of constant cost per person per age-group, sex and remaining years of life gives a similar result. A projection based only on the number of persons per age-group and gender results in a somewhat higher cost development – 70%.

Trends in disease and how they will impact on disability in the older population

Ruth Matthews, Carol Jagger & MRC CFAS

Major causes of disability in later life are known to be the consequences of acute and chronic diseases (eg stroke, coronary heart disease, arthritis, and dementia). A dynamic micro-simulation model (SIMPOP) has been developed to estimate future numbers aged 65+ with disability over the next 20 years under a number of disease scenarios. Pathways between chronic disease, disability and death were modelled with data from the MRC Cognitive Function and Ageing Study, a nationally representative longitudinal study, and then applied to the 1992 national population data to simulate in the next two years and repeated to 2026. Scenarios for trends in incidence, risk factors and treatment of disease were devised from systematic reviews and then applied to the model. SIMPOP also produces projections of disability-free life expectancy (DFLE). This presentation will focus on trends in DFLE under the different health scenarios to assess how compression or expansion of morbidity might play out over the next twenty years.

Pooling longitudinal studies of ageing for epidemiological analysis and to model health futures: The dynopta project

Kaarin J Anstey & the DYNOPTA collaborators

The Dynamic Analyses to Optimise Ageing (DYNOPTA) project has built on Australia's investment in longitudinal ageing studies to develop a data resource for researching the compression of morbidity. DYNOPTA has pooled data from nine Australian longitudinal studies of ageing. The pooled datafile includes over 50 000 participants with an average three waves of data (range 1 to 11) per participant. Over 400 variables have been harmonized so that the variables in the new datafile are distinct from the contributing datasets. DYNOPTA is being used to identify key incidence rates and risk factors for health outcomes. Four key areas of interest include dementia and cognition, mental health, sensory disability, and mobility/activity limitations. DYNOPTA will also develop the first Australian dynamic micro-simulation model that can forecast the health and social outcomes of the baby boomer cohort and older cohorts. Methodological challenges relating to harmonization of the studies will be described. Preliminary descriptive results from the dataset will be presented including differentials in cognitive impairment, driving status, self-rated health and social networks.

Abstracts – Session 5:
Basic concepts and methods

28 May 9.00-11.30

Chair: Jean-Marie Robine

How to measure disability, the disablement process and early signs of disability

Kirsten Avlund

According to the model developed by Verbrugge and Jette (1994) the disablement process goes from pathology via impairments and functional limitations to disability. Disability is experienced difficulty doing activities in any domain of life due to health or physical problems. Most current studies of disability among elderly people focus on the ability to carry out the activities of daily living (ADL), which involve daily activities in the home, at work and in leisure time. Most measures comprise two phenomena: PADL (Physical Activities of Daily Living) and IADL (Instrumental Activities of Daily Living). PADL include basic daily tasks, which need to be performed by all people regardless of gender, culture, housing conditions, housing environment and leisure time interests. IADL comprise more complex, outgoing activities, which are essential for living an independent life in society.

It may be important also to study early signs of the aging process. Even though it is evident that the aging process is influenced by all the factors included in the disablement process, it is possible that there are some early signs that can be measured but which are not yet manifested in the disablement process. These early signs may be biological indicators, e.g. low grade inflammation, physiological markers, e.g.; general muscle function and hand grip strength, physical performance, e.g., walking speed, restricted activity and modification of daily activities, and self-reported frailty, measured as unexplained fatigue. Knowledge about these early signs may be useful in primary prevention to identify well-functioning individuals at high risk of functional decline.

The disability process and WHO classification systems: past, present and future

Colin Mathers, Somnath Chatterji

This presentation will give an overview of WHO work on the conceptualization, classification and measurement of health states and disability. Are disability and loss of health synonymous? The presentation will review the ICF approach to classification of disability and two approaches to the measurement of disability prevalence and severity - through self-report questions on functioning in health domains as implemented in the WHO World Health Surveys and through disease- and injury-specific epidemiological data analysis as implemented in the Global Burden of Disease project. The presentation will present and contrast some results on estimates of disability prevalence at global and regional level from both these data sources, and discuss their limitations and strengths.

Estimation and methods

Fiona Matthews

This presentation will discuss the calculation of health expectancies using longitudinal data. It will cover both study design and analysis methodology. Basic statistical principles for the most common statistical analysis methods will be described.

Software overview

Yasuhiko Saito

George Myers lecture

James W Vaupel

Abstracts – Session 6:
Oldest old and healthy ageing

28 May 15.45-17.15

Chair: Bernard Jeune

Physical characteristics at midlife and survival to age 100: A study of American men

Leonid A Gavrilov, Natalia S Gavrilova

Centenarians (persons living to age 100 and over) represent a population, which could be useful in identifying factors leading to long life and avoidance of fatal diseases. This study explores whether people living to 100 and beyond were any different from their peers at their middle age (30 years). A random sample of 240 men born in 1887 and survived to age 100 was selected from the US Social Security Administration database and then linked to the US WWI draft registration cards collected in 1917 when these men were 30 years old. Randomly selected shorter-lived men matched by birth year, race and county of draft registration were used as controls. It was found that the 'stout' body build (being in the heaviest 15% of population) was negatively associated with survival to age 100 years. Both farming and having large number of children (4+) at age 30 significantly increased the chances of exceptional longevity by 100-200%. The effects of immigration status, marital status, and body height on longevity were less important, and they were statistically insignificant in the studied data set. This study provides the first estimates of height, body build and other vital characteristics for the future centenarians at their young adult ages, and shows that detrimental effects of obesity may have an exceptionally long time range, and that obesity at young adult age (30 years) is predictive for almost three times lower chances of survival to age 100 years.

Healthy aging in Danish Centenarians - a 29 year follow-up of hospitalizations among 40,000 Danes in the 1905 birth cohort

Henriette Engberg, Anna Oksuzyan, Bernard Jeune, James W Vaupel, and Kaare Christensen

Background: Centenarians surpass the current human life expectancy with about 20-25 years. However, whether centenarians represent healthy aging is still an open question. Previous studies have been hampered by a number of methodological shortcomings such as a cross-sectional design and lack of an appropriate control group. In a longitudinal population based cohort we examined whether the centenarian phenotype may be a useful model for healthy aging.

Material and methods: The study was based on a complete follow-up of 39,945 individuals alive in the Danish 1905 birth cohort on January 1st 1977 identified through the Danish Civil Registration System (DCRS). We used data from the Danish Demographic Database and The Danish National Patient Register (in existence since 1977). The 1905 cohort was followed-up from 1977 through 2004 with respect to hospitalizations and number of hospital days. Survival status was available until December 2006.

Results: Danish centenarians from the 1905 cohort were hospitalized substantially less than their shorter lived contemporaries at the same point in time during the years 1977 through 2004. For example, at age 71-74 centenarians had a lower mean number of hospital days per individual per year (1.0) compared to individuals dying in their late seventies (5.5). This trend was evident in both sexes.

Conclusion: Due to their lower hospitalization rates and length of stay in hospital compared to their contemporaries, who died at younger ages, Danish centenarians represent healthy agers. Centenarians constitute a useful study population in the search for fixed traits associated with exceptional longevity, such as genotype.

Functional status among Finnish nonagenarians in 1996-2007: Vitality 90+ Study, Tampere

Tytti Sarkeala, Vuorisalmi M, Hervonen A, Marja Jylhä

Background: Absolute and relative numbers of nonagenarians are increasing. Only few studies have explored longitudinal development of their functional capacity.

Methods: The Vitality 90+ Study of Tampere, Finland, was started in 1995. Mailed surveys were sent to home-dwelling (1996, 1998), and all (2001, 2003, 2007) Tampere citizens aged 90 years or over (n=2456) to evaluate self-reported indicators of functioning during the study period. The assessed variables were ability to dress, ability to get up from bed, and ability to walk inside, walk 400 meters, and walk stairs.

Results: The attendance rate among the study population varied between 79% and 91%. Most of the participants had functional limitations. No clear change in the self-reported functional capacity from 1996 to 2007 could be found.

Conclusions: Functional status among the oldest old in Finland has remained more or less the same since the mid 1990's. High proportion of those having functional limitations entails increasing demand of care from the society.

Patterns of grip strength in Moscow as compared to Denmark and England

Vladimir M Shkolnikov., Andreev EM, Demakakos P, Oksuzian A, Kaare Christensen, Shkolnikova MA and James W Vaupel

Russian population experiences very high mortality and high prevalence of poor reported health. Little is known about objective health of Russians. There are no data on their physical performance. This study begins to fill the gap by examining hand grip strength (GS) of Muscovites from Survey on Aging and Health in Russia (SAHR, 2006-9). We also use the equivalent data from Denmark (the Study of Middle-Aged Danish Twins (MADT), the Longitudinal Study of Aging Danish Twins (LSADT)) and from England (English Longitudinal Study of Ageing). GS is the most common indicator of muscle strength. It correlates with strength of many muscle groups and predicts morbidity and mortality. GS measurements in the three countries were performed by the same device (Smedley dynamometer, TTM, Japan) and according to the same protocol. Analyses are restricted to individuals aged 55 to 89 at examination. Within this range, GS decreases linearly with age. The pooled data include 1,317, 4,967, and 5,848 individuals from Moscow, Denmark, and England, respectively. In near future, the Moscow sample will be increased to 2,000 individuals. The study describes how GS varies depending on country, sex, age, height, weight, education, and marital status. Both common features and peculiarities are shown. In all countries GS decreases with age, but in Denmark this decrease is somewhat steeper. High education and being married are generally associated with greater GS. GS of Russians is lower than GS of Danes and English. The gap becomes greater if very high educational level of Muscovites was accounted for. The Russian disadvantage is more pronounced at younger than at older ages and among females than among males.

Abstracts – Session 7: Trends I

28 May 17.30-18.30

Chair: Fiona Matthews

Health expectancies in the Netherlands since 1981

Jan-Willem Bruggink

To calculate health expectancies using the Sullivan method, both data on mortality and on health are required. Usually mortality data are available over a long period. This is mostly not the case for health statistics. Furthermore these latter data are usually based on surveys. Those surveys evolve over time, which can mean changes in phrasing of the questions, answer categories and in the way of approaching the respondents. The differences make comparisons over time more difficult.

Despite these problems it has been possible to construct a time series of Dutch health expectancies from 1981 onwards. Therefore part of the data had to be repaired to deal with the changes in the survey. The results are series of life expectancy in good perceived health, life expectancy without disabilities and life expectancy without chronic morbidity. Since 1981 the life expectancy without disabilities has risen, while the expectancy without chronic morbidity declined. The life expectancy in good perceived health increased for men, while the same expectancy for women was more or less constant.

Nowadays Dutch men and women have to deal with chronic diseases during a larger part of their lives than they had to in de eighties. Nevertheless the amount of years with disability has fallen. Earlier and better diagnoses combined with better treatment and therefore higher survival probabilities, can explain (part of) the decrease of the life expectancy without chronic morbidity.

Trends in late-life activity limitations: The Dutch population between 1990 and 2007

Van Gool CH, Picavet HSJ, Dorly JH Deeg, de Klerk MMY, Wilma J Nusselder, van Boxtel MPJ, Wong A, Hoeymans N

Objectives – This study sought to give the best estimate of the time trend in activity limitations among the Dutch older population between 1990-2007 based on several datasets using a meta-analytic approach.

Methods – Data from two repeated cross-sectional surveys and three prospective surveys among non-institutionalized inhabitants of the Netherlands aged 55-84 years were used to examine study-specific and overall time trends of severe and moderate self-reported activity limitations (climbing stairs, walking, getting dressed) based on ADL and SF-36 items.

Results – With the exception of activity limitations in walking based on ADL items and in getting dressed based on SF-36 items, study-specific time trends were reasonably consistent. Overall time trends of activity limitations increased in the period 1990-2007 for the ADL items climbing stairs (ORsevere= 1.033, ORmoderate= 1.038) and getting dressed (ORmoderate= 1.047). Overall time trends of activity limitations in walking using ADL items were not statistically significantly increasing or decreasing, and this was also true for SF-36 activity limitations. Age and gender stratified analyses resulted in similar patterns.

Conclusions – Taking all activity limitations together there are no large changes over time. Looking at the separate activities, time trends for severe and moderate limitations in climbing stairs and getting dressed based on ADL items increase over time in all studies, whereas trends based on SF-36 items were mainly stable across studies. Underlying differences in criterion validity might explain differences in trends in ADL and SF-36 activity limitations.

Trends in the Ability to Work among the Older US Working Population, 1997-2007

Sandra L Reynolds & Eileen M Crimmins

Even before the current economic situation, the issue of the ability of older workers to continue working was a major economic issue in the US, as in elsewhere in the world. Current eligibility for full Social Security benefits is being gradually ratcheted up toward age 67, and there are periodic calls to consider raising it even further, at least to age 70.

In a work done ten years ago, Crimmins and colleagues examined this question for workers aged 50 to 69, concluding that men and women in their 60s had experienced significant improvement in the ability to work, enough to justify working to age 67; however, while that age was appropriate for the average US older worker, there were significant differences within subgroups of the population.

Given the current economic crisis, along with the even-closer prospect of the baby boomers' retirement, it is appropriate to revisit this issue now. In this study, we examine trends in self-reported work disability, using the National Health Interview Surveys between 1997 and 2007, separately for men and women. Findings indicate that men's reported work disability continued to decline in the ages between 62 and 69, while women's declined only during ages 67 to 69. When examining race/ethnic subgroups, we find that men's improvement was largest among Hispanic men between ages 60 and 64, and non Hispanic White men at ages 65-66. In contrast, the women's improvements in work disability were primarily for non Hispanic Black and White women in their late 60s, with the exception of some improvement for nonHispanic Black and Hispanic women in their early 60s.

Further research needs to be done to further refine these results and examine other factors driving these minimal improvements in work disability.

Abstracts – Session 8:
Social, ethnic and other differences

29 May 9.00-10.45

Chair: Sandra L Reynolds

The Significance of Education for Rectangularization of the Survival Curve in the United States

Dustin C Brown, Mark D Hayward, Jennifer Karas Montez, Mira M Hidajat, and Robert A Hummer

Studies of mortality compression often implicitly assume that compression is linked to socioeconomic development either over time or between nations. We extend this logic and argue that relative differentials in the degree of rectangularization should also exist between socioeconomically advantaged and disadvantaged sub-populations within a single period and national context. The purpose of this paper is to empirically assess the degree to which the survival curves in the United States are more or less rectangular across major educational groups. Our analyses are based on data from the Health and Retirement Study and the National Health Interview Survey Longitudinal Mortality File, and we draw on the methodological approach recently introduced by Cheung, et al. (2005) to model rectangularization. Our preliminary results show substantially higher modal ages of death and a greater degree of compression around the modal age among highly educated persons. Age-related mortality is also delayed a number of years for this group compared to persons with low education. As hypothesized, the results provide clear evidence that education leads to the the maximization of life chances as well as greater equality. This points to education's fundamental role in garnering the resources that provide health advantages.

The Canadian census mortality follow-up study: a new resource for the study of socioeconomic disparities in health expectancies

Russell Wilkins

Canada's long-form census questionnaire – distributed to approximately 1 in 5 non-institutional households – is an extremely rich source of individual, family and household-level information about Canada's diverse population. For men and women aged 25 and over, three-quarters of that sample (15% of the population, or 2.7 million persons) from the 1991 census has now been linked to mortality data from 1991 through 2001, yielding over 260,000 deaths in 28 million person-years of follow-up. This new data linkage allows us to determine how mortality varies across groups defined by income, education, occupation, language and ethnicity, aboriginal or visible minority status, period of immigration, housing type, and disability status at baseline—all of which is of course useful for understanding how differences in health expectancies also vary across subgroups of the population. The database also contains detailed disability data for about three-quarters of the respondents to the 1991 Health and Activity Limitation Survey, in addition to the four census disability screening questions available for all cohort members, so we are also able to examine subsequent mortality according to more detailed information on baseline disability status.

Healthy Life Expectancy and Socio-economical Status in the Netherlands

Kim Knoops, Jan-Willem Bruggink, Marion van den Brakel

Background: The association between a lower socio-economic status and healthy life expectancy is scarce.

Aim: The aim of the study is to investigate the difference in healthy life expectancy between different socio-economic groups in the Netherlands. Income will be used as indicator for socio-economic status.

Methods: To calculate healthy life expectancy, the Sullivan method will be used. Income data, originating from registers, will be added to the mortality database to calculate age specific mortality rates for different groups of income. The Continuous Health Interview Survey, which is also enriched with income data from registers, will be used to calculate age specific prevalence rates for different income groups.

Preliminary Results: Based only on differences in health, healthy life expectancy is higher for high income groups compared with low income groups. Life expectancy in good self-perceived health at birth for men in the first tertile of income is 56.9 years while in the highest tertile, this healthy life expectancy is 66.1. For women similar differences were found. Life expectancy without disability in the first tertile of income was 63.3 years at birth, compared with 72.0 years in the highest tertile. Also life expectancy without chronic diseases was higher in the highest tertile versus the lowest tertile.

At the conference, differences in healthy life expectancy based on differences in mortality and health status will be presented.

Conclusions: Based on preliminary results, we can conclude that people with a high income live longer and healthier compared to people with a low income.

Healthy Life Expectancy in Scotland

Alison Burlison

Background: Whilst information on life expectancy (LE) and health expectancy is published for the United Kingdom (UK) on several international databases, it is less readily available for the individual countries within the UK (England, Scotland, Wales and Northern Ireland). The first healthy life expectancy (HLE) estimates for Scotland were published in 2004 by the Information Services Division (ISD), the national agency responsible for routine health data in Scotland.
Work elsewhere has shown that LE and HLE are both lower in Scotland than in the UK as a whole. Indeed Scotland has one of the lowest LEs in Western Europe. International comparisons of HLE are hampered by the lack of consistent health measures, but on the basis of disability-free life expectancy, Scotland would appear to compare poorly with many Western European countries, particularly for men.

ScotPHO HLE publication: The Scottish Public Health Observatory (ScotPHO) collaboration brings together key national organisations involved in public health intelligence in Scotland. In December 2008, ScotPHO published updated HLE estimates for Scotland and a range of sub-Scotland groupings[1]. These were based on Sullivan's method and self-assessed health from the Scotland Census 2001 and Scottish Household Survey 1999-2007, and showed that:

- LE and HLE at birth in Scotland have both improved over recent years, but the gap between them representing the years expected to be spent in 'not good' health has also increased.
- There are considerable variations in LE and HLE within Scotland among different geographical areas, socio-economic deprivation levels and urban/rural groupings. For example:
- In the period 1999-2003, in the least deprived decile of the Scottish population male LE at birth was 79 years, with HLE 75 years, and 4 years expected to be spent in 'not good' health. By comparison, the most deprived decile had an LE at birth of 66 years, with HLE 55 years, and 11 years expected to be spent in 'not good' health. Therefore LE ranged by 13 years between the least and most deprived deciles, but HLE by 20 years.
- For both males and females born in this period, those from remote rural areas had a longer LE (by 2-3 years) and HLE (by nearly 6 years) than those from large urban areas. This may be partly due to the lower levels of deprivation in rural than urban areas.

Such findings will be discussed, along with some methodological issues which may be of interest to other relatively small countries monitoring their HLE trends.

[1] http://www.scotpho.org.uk/hle

A multi-level analysis of urban versus rural differences in functional status transition among older Chinese

Zachary Zimmer, Ming Wen, Toshiko Kaneda

A widening of the socioeconomic divide between urban and rural areas of China has accompanied the transition to a market economy. Correspondingly, research has indicated that an urban health advantage among older residents with respect to mortality and some indicators of functional status may in part be a function of differing socioeconomic conditions that describe rural versus urban individuals and the communities in which they live. Despite deep divides across these environments, we still have limited understanding of how differing socioeconomic conditions across places of residence in China influence health transitions and whether related health discrepancies can be reduced. With this in mind, the current paper examines a sample of individuals aged 55 and older in the last two waves (2002 and 2004) of the China Health and Nutrition Survey (N=1931 in 144 rural communities and N=1094 in 71 urban communities). The analysis first describes probabilities of making transitions in functional limitation (e.g. difficulties walking, climbing stairs, grasping objects) and mortality by urban versus rural residence. Then, a series of hierarchical multi-level linear models (using HLM 6.02) are tested to determine whether transitions can be explained by factors that differentiate between rural versus urban individuals and/or communities. Preliminary findings indicate urbanites are more likely to make favorable transitions (i.e. remain without or recover from limitation), and they are more likely to remain alive, regardless of baseline status. Multi-level models show a combination of individual socioeconomic indicators, such as cadre status and having health insurance, and community level socioeconomic indicators, such as number doctors and health facilities in the community, partly explain the association; yet differences remain robust, suggesting that an urban advantage in functional transition and mortality cannot be easily explained away.

Abstracts – Session 9:
Risk factors, chronic diseases and disability

29 May 11.00-12.30

Chair: Nadia Minicuci

Disability trajectories and life style. A longer life in good health is closed by a longer period in more severe disability

Luc Bonneux, Mieke Reuser, Frans Willekens

Previous work showed losses of life expectancy by obesity comparable to smoking in the Framingham Heart Study cohorts at age 40 in 1950. In the Health and Retirement Study (HRS) cohort, living through middle age and old age at the end of the 20th century, this excess mortality has receded, occurring in the groups with severe obesity only. We will present disability trajectories of HRS members by sex, smoking and obesity.

We estimated age, risk factor and state dependent probabilities and rates of ADL disability, recovery from disability and death and calculated cohort and individual biographies describing 16,167 white adults of the Health and Retirement Survey (HRS). Cohort biographies were calculated by multi state life tables, individual biographies by continuous time microsimulation. Exposures were BMI, smoking status and levels of education. The reference categories were high normal weight (BMI 23-24.9), non smoking and high education.
Except for random error, the individual biographies analysed as cohorts showed the same results as the multi-state life tables. BMI 30-34.9 did not change total life expectancy but increased ADL disability with 2.0 [95% CL 0.6-3.4] years among men and 3.2 [1.6-4.8] years among women. Smoking, by it's high mortality, shortened duration of ADL disability eamong men and women with 1.3 [0.5-2.5] and 1.4 (0.3 – 2.6) years. In the synthetic cohort, 42.6% of men and 26.6% of women die without experiencing ADL disability at mean ages 75.5 and 77.9 years. 57.5% of men and 73.5% of women die with experiencing ADL disability, at mean ages 84.0 and 88.0 years. The older the age at death, the longer the duration of disability, both in absolute and relative terms. More smokers die without experiencing ADL disability, very few obese die without experiencing ADL disability.

The older the age at death, the longer the period of ADL disability. This holds for men and women, for smokers and obese people, in absolute and relative terms. Life extension, smoking cessation and increasing obesity will therefore cause large increases of care dependence.

Contribution of chronic diseases to the burden of disability in the Netherlands

Bart Klijs

Introduction. Insight in the extent specific diseases contribute to the societal burden of disability is of major importance to set priorities in the field of public health. The aim of the current presentation is to show which diseases contribute most to the disability burden in the Netherlands, both in terms of prevalence and of life expectancy with disability.

Methods. Self-reported information on ADL disability and the presence of chronic diseases (diabetes, stroke, myocardial infarction, cancer, COPD, back pain, arthritis, neck/shoulder complaints and other diseases) was available from the Dutch Permanent Life Situation Survey 2004-2006 for 8,123 subjects aged 55-97 years. Using a multivariate additive regression model, disability was attributed to specific diseases, yielding total and cause-specific disability data by sex and age. This cause-specific disability is determined by diseases prevalence and the disabling impact. Information on number of deaths and the population by age and sex was derived from the EHEMU database. In combination with the cause-specific disability data this information was used to calculate life expectancy with disability by cause, for men and women.

Results (analyses in progress). We will describe which diseases contribute most to disability prevalence in men, and which in women. 2. We will explain differences in these contributions by presenting the disabling impacts by cause, age and sex (E.g. Higher disability from arthritis in women is the result of both higher prevalence and higher disabling impact of arthritis in women.) 3. Based on table/figure with life expectancy with disability by cause, we will describe which diseases contribute most to the years with disability in the Netherlands

Conclusion. Disability in the Netherlands is caused by a mix of diseases, diseases that contribute most include:.. Documenting which diseases contribute most to the burden of disability provides insightful information for policymakers, allowing them to setting priorities with the ultimate aim to improve population health and reduce health gaps.

Life Expectancy of tetraplegic spinal cord injured individuals in France: a ten years follow-up

Nicolas Brouard, Maude Espagnacq, Jean-François Ravaud and the Tetrafigap group

In 2006 the Tetrafigap group conducted a follow-up study of a former (1996) cross-sectional survey on tetraplegic spinal cord injured individuals living (surviving two years after the injury) in French-speaking countries (mostly but exhaustively France). One of our main interest is the computation of the Total Life Expectancy and Life Expectancy by various statuses in 1996.

From the initial 6082 cases (including 603 deaths and 769 double entries) reported in 1993 from about 35 Rehabilitation Centers, 4710 consent forms have been sent. 340 persons were already dead, 163 refused and 2251 accepted to participate and received the first printed questionnaire during December 1995 to January 1996. Among the 1638 respondents to this first wave, 1466 accepted to be interviewed again and wrote their names and address at the end of the questionnaire.

10 years after, for the second pass, we couldn't find coordinates from 258 cases (lost questionnaires, missing written addresses) but were able to search for Vital Status at the French National Institute of Statistics (INSEE) among 1380 patients.

INSEE was unable to match 290 couples (names/date of birth) but certified 227 deaths and 863 patients still alive in May 2007.

The communication aims to transform these 227 deaths cases into Life Expectancy by controlling from various factors like the loss of follow-up as well some interesting variables as age, sex and some characteristics at first round. Because of the small number of cases, the large age span as well as the 10 years follow-up we have used a modified IMaCh program to get results and confidence intervals.

The Effects of Obesity on Disability Recovery

Christine Himes

It is well known that obese older adults have higher rates of ADL and functional limitations than those with normal range BMIs. There is also evidence that some older adults recover functional abilities between waves of longitudinal surveys. The reasons for recovery, the extent of recovery, and the correlates of recovery are poorly understood. In particular, the extent to which obesity may hinder recovery is not known. In this paper I examine the effects of obesity on the recovery of functional limitations. Using data from the United States Health and Retirement Study, I will look at the extent to which respondents report improvements in functioning overall, and by specific function and activity. I examine those aged 60 and older in 1998 and follow them until 2006 with follow-ups every 2 years. BMI is measured by self-reported height and weight in 1998. Health conditions are included as controls, as well as other socio-demographic variables (age, race, gender, education). The overall recovery from any ADL limitation will be examined, followed by recovery from specific ADLs.

Abstracts – Session 10: Trends II

29 May 13.30-15.00

Chair: Russell Wilkins

Health trends in Sweden 1992-2002: Gender and complex health problems

Marti G Parker, Meinow B, Schön P, Mats Thorslund

Data from nationally representative surveys (1992 and 2002) of persons aged 77+ showed that for most single health indicators, problems increased both for women and men. For almost all indicators women showed higher prevalence rates, despite their longer life spans. There were some gender differences in change over time, with men having greater increases in poor self-rated health and myocardial infarction.

An index constructed from problems in three dimensions of health (diseases/symptoms, mobility, cognition/communication) also showed an increase between 1992 and 2002 in the prevalence of complex health problems (severe problems in two or more dimensions). Women had higher rates of complex problems, and rates increased over time for both men and women.

Although complex health problems strongly predicted 4-year mortality in both 1992 and 2002, the mortality risk for persons with complex problems decreased by 20 % during the 10-year period. No single dimension explained the decrease. Men with complex health problems accounted for most of the decrease in mortality risk, so much so that the gender difference in mortality risk was almost eliminated among elderly people with complex health problems 2002. The narrowing of the overall gender gap in mortality reported in official statistics may thus be at least partly driven by changes in mortality risk differences among men and women with complex health problems.

Disability-Free Life Expectancy Trends in Taiwan: Compression, Expansion or Dynamic Equilibrium

Lea-Hua H Chen

Objective*: To examine whether there is expansion or compression of morbidity in Taiwan.*

Materials and Methods*: Sullivan's method is used to calculate the disability-free life expectancy and its proportion to total life expectancy. The definition of "disability-free" for this study is "handicap-free" and "cancer-free". Data are derived from three sources: the File of Mortality Registry, the Handicap Registry and the National Health Insurance utilization data.*

Results*: From 1997 to 2007, the handicap-free life expectancy at age 0 (60) were 73.2(15.4), 73.1(15.2), 72.8(15.0), 73(15.1), 73.1(15.1), 73.2(15.1), 73.4(15.2), 73.3(15.3), 73.2(15.3), 73.7(15.7) and 73.7(15.6) respectively. The proportion of handicap-free life years to total life years were 96.9%, 96.4%, 95.9%, 95.5%,95.3%, 94.9%, 94.8%, 94.7%, 94.6%, 94.3% and 94.2% respectively. From 1999 to 2007, the cancer-free life expectancy at age 0 (60) were
74.4(16.1), 74.8(16.3), 75.0(16.4), 75.4(16.5), 75.6(16.7), 75.6(16.7), 75.5(16.7), 76.2(17.3) and 76.2(17.1) respectively. The proportion of cancer-free life years to total life years were 98.0%, 97.9%, 97.8%, 97.7%, 97.8%, 97.7%, 97.6%, 97.5% and 97.4% respectively.*

The empirical results provide further evidence that there is a relative expansion of morbidity.

Discussions*: The findings are influenced by population change, health system effects and measuring method. This method is relatively easy to understand for a non-technical audience and has the functions of analysis and comparison.*

Key Words*: Disability-Free Life Expectancy (DFLE)*
Cancer-Free Life Expectancy
Sullivan's method

Are we heading to the compression of disability? The case of Hong Kong SAR, 1984-2008

Cheung Siu Lan Karen & Yip Siu Fai Paul

Although Hong Kong has been hitting one of the highest world life expectancy records, only second to Japanese females, according to one of recent studies suggest that the current cohort of the aged 60+ population of Hong Kong is experiencing expansion of disability rather than compression of disability from1996 to 2004. The prevalence of functional limitation decreased from 4.9% in 1996 to 3% in 2000 and then increased to 6.9% in 2004 (Chou and Leung 2008). However, another study (Cheung and Tu 2002) shows that Hong Kong population aged 50+ only experienced the expansion of disability from 1981-85 to 1991-95 as life expectancies increased at a faster rate than disability-free life expectancies. In the later periods between 1991-95 and 1996-2000, the compression of disability should have occurred. Our paper aims to provide a better understanding of the disability trend by using Central Registry Rehabilitation disability data which covers 8 selected types of disability - physical handicap, mental handicap, mental illness, hearing impairment, visual impairment, speech impairment, autism and visceral disability from 1984 to 2008 by sex and age groups. We compute disability-free life expectancy and its proportion to total life expectancy by using Sullivan method to examine whether the soon-to-be old (50-59) and elderly people (60+) are experiencing the compression of disability during the latest period. We also compute the institutionalization-free and chronic morbidity-free life expectancies by using census-based and General Household Survey data. (234 words)

Differential Trends in Mortality Compression(MC): Assessing the Antecedents to Gaps in Health Expectancy (HE) in New Zealand

Ian Pool, Boddington, W, Cheung, J, & Didham, R

The short-run series of HEs for New Zealand show significant differentials between Maori (the indigenous minority, 15 % of the total) and Non-Maori, but also by gender and period (Tobias, M *et al* 2008 *HE: Towards Tier 1 Official Health Statistic Status*, Min of Health & Stats NZ,). These differentials appear to correlate with findings from both generation & synthetic life-tables relating to NZ's epidemiologic transition, (Pool & Cheung, J 2004 "A Hist. of Mort.in NZ", *NZ Pop Rev*, 29,2). Early in the Maori transition (1890s), quartile 1 ($Q(1)$) & Median (Med) $d(x)$ values were close and centred at young ages; during the transition the gap, $Med\text{-}Q(1)$, became very wide; at the transition's end the gap was again narrow, but seen at old ages (Pool 1994 "Cross-comparative Perspectives on NZ Health", in Spicer, Trlin and Walton (eds) *Soc Dimensions of Health…: NZ Perspectives*, Palm Nth; also Cheung, J 2001 "The Long-term Trend of Non-Maori Mortality and its Recent Compression Effect", Paper Conf., Pop Assoc of NZ; cited by Cheung, S *et al* 2005 "3 Dimensions of the Survival Curve:…", *Demography,* 42,2). The Non-Maori trend for the period from 1876 is less marked, but starts with a wide gap.
These NZ results fit with recent life-table findings using $l(x)$ and $d(x)$ functions on modal durations of life (M), and the gap between M and the standard deviation for deaths at ages $M+$. This confirms the Fries hypothesis:(Robine, J-M & Cheung, S 2008 "Nouvelles observations sur la longevite humaine", *Revue economique*, 59,5. See esp Graphique 3; their results cover adult ages only).

Our paper reviews cohort and synthetic trends in $d(x)$, $l(x)$, M, Qs and $Meds$, analysing all as well as adult ages, and linking them to recent HEs and related data (eg a Sullivan's observed prevalence method, *Hospitalisation Utilisation Expectancies (HUEs)* (Cheung, J et al 2001 "HUEs in NZ, 1980-98", *Aust Health Rev*, 24,4), which show compression of both mortality and morbidity at older ages as measured by bed-use combined with life expectancy). We will also explore the dynamics at the oldest of old ages (Robine and Cheung, *op cit*, see discussion), and disaggregate the HEs further. Most importantly, our data also point to epidemic polarisation, but cohort analyses of $l(x)$ and $d(x)$ allow us also to evaluate the role of past experiences of older cohorts on the recent HEs, and thus to point to possible strategies for reducing gaps in both $d(x)$, and in HEs.

Abstracts - posters

Reducing gaps in health expectancy: Relating HALE to health service activity in South Australia[2]

David Banham

South Australia's Strategic Plan (SASP) includes the aim of increasing healthy life expectancy by 5% for males and 3% for females in the period 2000 to 2014. Health expectancy summarises both current mortality and the amount and severity of morbidity prevalent in the community. Disaggregations by age, sex, socio-economic status, rurality, and Indigenous status are routinely published. These estimates are based on condition specific information using the 'bottom-up', Burden of Disease method. While this method has a range of uses and strengths, there are limitations in readily monitoring outcomes and linking healthy life expectancy with service and program level interventions.

This paper describes and discusses one way of providing a link between healthy life expectancy and health service activities by complementing existing health expectancy measures with the systematic and targeted measurement of health utility.

Initial methodological considerations include:

- Instrument selection from available health related quality of life/ utility measures;
- Assimilating utility measures into health expectancy estimation.

Areas of application are then discussed using an equity-effectiveness framework comprising the following stages:

1. Account for health – embed health expectancy, mortality and utility measures in formal target implementation plans, then describe differences in these outcomes by SES levels and health regions;
2. Assess community effectiveness - utility measures in evaluating community based program and services;
3. Apply knowledge to decision making and implementation;
4. Inform target and priority setting - targeting and monitoring unmet health need and health gaps within the community.

Finally, a number of identified strengths and limitations of the approach are considered.

[2] Thoughts and opinions expressed herein do not necessarily reflect those of the South Australian Government or SA Health

Interpersonal Violence in Europe: markers of prevalence and effective prevention programmes

Nadja Minicuci, Alessandra Andreotti, R. Davis, G. Pastori

In the WHO European Region 73 000 people of all ages and both sexes were killed by interpersonal violence, and homicide represents the third cause of death after road traffic and suicide. Information on deaths is relatively easy to collect but they are tip of the iceberg: psychological, physical, sexual damage and neglect are not captured by routine data. Therefore it is necessary to use more than one data source to capture all type of violence and related risk factors to describe the phenomena as realistic as possible.
The general objectives of the PHASE (Public Health Actions for a Safer Europe) project are to enhance injury data exchange in the Member States and to reinforce current health-sector related networks; in particular WP 6 addresses the theme of interpersonal violence.

Four focus intervention areas have been identified: child, youth, intimate partners and elderly and four teams of European experts in collaboration with WHO National Focal Points on injury and violence prevention have identified and collected information on:
a) Country profile indicators; b) Markers of prevalence; c) Risk factors;
d) National strategies, prevention programmes and services; e) Legislation;
f) Reporting Systems; g) Cost Analysis
in the 27 European member states. These domains aimed to describe the magnitude of violence, understand which factors increase the risk for violent victimization and perpetration, identify which type of programmes are effective and how legislation acts in this respect.

The aim of the presentation is to focus on the methodology adopted in order to collect information at each country-level; discuss gaps and deficiencies in available information; present preliminary epidemiological findings. Intervention programmes and strategies that have been implemented and shown effectiveness in preventing violence will also be presented.

Population Health Measurement in Health Systems: Pilot Applications in IHI's "Triple Aim" Collaborative

Matt Stiefel

The Institute for Healthcare Improvement is a nonprofit organization in the USA whose mission is to improve health and healthcare in the world. One portfolio of IHI work is the Triple Aim, a strategic initiative and collaborative of over 40 organizations around the world to improve population health, per capita cost, and the care experience. As part of that initiative, I am working with six health systems on an R&D project to pilot test implementation of population health measurement systems. The systems cover a wide range of organizations, including: CareOregon, a Medicaid health plan in Portland, Oregon; Kaiser Permanante Colorado; Bellin Health System in Wisconsin; The Vermont Blueprint, a statewide health reform initiative; the East Lancashire Primary Care Trust in England, and Jönköping County, Sweden. The pilots are focusing on outcome measures, determinants, and distribution of population health. The unique features of these pilots are the integration of private and public health (in the USA), and the integration of population health information for clinical and population surveillance applications. This presentation will present work in progress for these six sites, and an evolving “how-to” guide for measuring population health at the health system level.

Regional Gap in Disability Free Life Expectancy (DFLE) in Belgium between 1997-2004

Herman Van Oyen, R Charafeddine, P Deboosere

Objective: To describe the changes in the regional differences in life expectancy (LE), Disability Free Life Expectancy (DFLE) and LE with disability (DLE) in Belgium for the period 1997-2004.

Methods: Disability was defined using data from the National Health Interview Surveys 1997, 2001 and 2004 based on limitations in Activities of Daily Living (ADL's), mobility and sensorial functions (seeing, hearing). Sullivan method was used to estimate, at age 15 years, the expected years to live without and with disability. Variance and 95% confidence interval estimation ignored the part of the variance due to mortality. Four indicators of inequality in DFLE were used: (1) the absolute differences between regions; (2) the population attributable life loss ($PALL_{abs}$) defined as the absolute difference between the highest region and country estimate; (3) to estimate the combined effect of the inequality and the regional population distribution the Composite Index of Inequality (CII_{abs}) was estimated as the sum of the differences between the highest value and the other regions, weighted for population size; (4) the CII_{rel} was estimated as the proportion of the CII_{abs} relative to the overall estimate.

Results: Among males, the $PALL_{abs}$ (LE) increased significantly (+ 011 yrs (from 0.96 yrs to 1.07 yrs)), whereas the $PALL_{abs}$ (DFLE) remained unchanged (from 1.22 yrs to 1.21 yrs) and the $PALL_{abs}$ (DLE) decreased (from -0.26yrs to -0.14yrs). The CII_{abs} and CII_{rel} of the LE and DFLE increased (respectively +0.12 yrs and +0.13 yrs; +0.15% and +0.16%). The CII_{abs} (from -0.22yrs to -0.22yrs) and CII_{rel} (from -1.68% to -1.88%) of the DLE remained unchanged or increased.

Among females, all indicators of regional inequality of the LE, DFLE and DLE decreased over time, although, with the exception of the $PALL_{abs}$ (LE), none of the differences were statistical significant. The $PALL_{abs}$ (LE, DFLE and DLE) dropped respectively by 0.06 yrs (from 0.61yrs to 0.55 yrs), by 0.21yrs (from 1.43yr to 1.22yrs) and by 0.15yrs (from -0.82yrs to -0.67yrs). Similarly, the CII_{abs} and CII_{rel} of the LE, DFLE and DLE decreased over time: LE from 0.60yrs to 0.55yrs and from 0.90% to 0.81%; DFLE from 1.32yrs to 1.19yrs and from 2.73% to 2.39% ; DLE from -0.72yrs to -0.64yrs and from -3.97% to -3.62%.

Conclusion: At age 15 years among males, the regional inequality in LE increased. The regional inequality in DFLE remained unchanged and the inequality in DLE decreased. Among women, the regional inequalities in LE, DFLE and DLE decreased.

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