Japanese Longitudinal Study of Aging

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Nihon University
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Overview of presentation

• Longitudinal Study of Aging in the World
• Longitudinal Study of Aging in Japan
• Nihon University Longitudinal study of Aging
  – Introduction
  – Defining health
  – Framework for aging study
• Introduction of studies conducted using survey data
Longitudinal Study of Aging: USA

• National Long-Term Care Survey: 1982
• Longitudinal Study of Aging I: 1984; II: 1994
• Assets and Health Dynamics Among the Oldest Old (AHEAD): 70+ started in 1993
• Health and Retirement Study: 51-61 started in 1992
• AHEAD and HRS was combined in 1998: HRS
• National Social Life, Health, and Aging Project: 2005
• National Health & Aging Trends Study: 2011
Longitudinal Study of Aging North and South America

- Mexican Health and Aging Study (MHAS): 2001
- Costa Rican Study of Longevity and Healthy Aging (CRELES): 2004
- Canadian Longitudinal Study of Aging (CLSA)
Longitudinal Study of Aging: Europe

• Survey of Health, Ageing, and Retirement in Europe (SHARE)
• English Longitudinal Study of Ageing (ELSA)
• The Irish Longitudinal Study on Ageing (TILDA)
• Longitudinal Aging Study Amsterdam (LASA)
Longitudinal Study of Aging: Asia

- Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan: 1989
- Indonesian Family Life Survey (IFLS)
- Chinese Longitudinal Healthy Longevity Survey (CLHLS)
- Chinese Health and Retirement Longitudinal Study (CHARLS)
- Korean Longitudinal Study of Ageing (KLoSA)
Longitudinal Study of Aging: Asia 2

- Longitudinal Aging Study in India (LASI)
- Social Isolation, Health and Lifestyles Survey
  - baseline commissioned by MCYS in 2009
  - aged 60+
  - 2nd wave--2011: Panel on Health and Aging of Singaporean Elderly (PHASE)
Longitudinal Study of Aging: by WHO

• Study on Global AGEing and Adult Health (SAGE) World Health Survey (WHS) baseline
  – aged 50+
  – China, Ghana, India, Mexico, Russian Federation and South Africa
Useful URL on Aging Study

• National Archive of Computerized Data on Aging
  – http://www.icpsr.umich.edu/icpsrweb/NACDA/

• Center for the Study of Aging
  – http://www.rand.org/labor/aging/dataprod.html

• Health and Retirement Study
  – http://hrsonline.isr.umich.edu/
Longitudinal Study of Aging: Japan

- National Survey of the Japanese Elderly: 1987
- National Longitudinal Survey of Middle Aged and Elderly in Japan: 2005
- Nihon University Japanese Longitudinal Study of Aging: 1999
NUJLSOA -- Purpose

• Investigate levels of and changes in health status of Japanese elderly
• Investigate factors affecting health status and changes in health status over time
• Observe effect of long-term care insurance program on attitude toward long-term care
• Collect comparable data to other longitudinal data for cross-national comparisons
<table>
<thead>
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<th>Wave</th>
<th>Main</th>
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<tr>
<td>4</td>
<td>Nov. 2006</td>
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</tr>
<tr>
<td>5</td>
<td>Mar.-Apr 2009</td>
<td>June 2009</td>
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Survey Design

• For Wave 1
  – Nationally representative sample of 65 and over
  – Initial sample of 6,700 persons selected by Multi-stage stratified random sampling
  – oversampled those aged 75 and over by factor of 2
  – In-person interview survey using structured survey questionnaire (proxy allowed)

• For later waves
  – Sample refreshing - New sample persons for those age 65 and 66 were added at waves 2 and 3
  – No sample refreshing for waves 4 and 5
# Sample Size

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<td></td>
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<tr>
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<tr>
<td></td>
<td>25.4%</td>
<td>13.6%</td>
<td></td>
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</table>
Question Items in Wave 1

- Demographic attributes
- Family Structure
- Socioeconomic status
- Intergenerational exchange
- Information on Surviving Children’s family
- Health behaviors
- Chronic conditions

- Physical functioning (ADL, IADL, NAGI)
- Mental Health
- Vision & Hearing
- Dental Health
- Health Care Utilization
- Housing
- Information Technology
- Living Arrangement
Question Items in Wave 2

Additional Feature
  Decedent Interview
  • Date of death
  • Cause of death
  • Place of death
  • Medical expenses in the last 6 months prior to death
  • Relationship of main caregiver

Additional Questions
  • Long-term care insurance system
  • CIDI
Question Items in Wave 3

Additional Feature
- survey of survival status of those who did not respond at Wave 1

Additional Questions
- Sleeping disorders
- Restless Leg Syndrome
- Pain
- Stress
Question Items in Wave 4

Additional Feature
• Blood Pressure / Pulse
  – Omron HEM-762
• Anthropometric Measures
  – Waist
  – Leg length
  – Knee height
• Grip strength
  – Tanita

Additional Questions
• Cognitive functioning
  – Immediate word recall
  – Delayed word recall
  – Serial 7
• Anchoring Vignettes
• Health utilization
Question Items in Wave 5

Additional Feature

• Anthropometric Measures
  – Height
  – Weight
5 Aspects of Health

• Healthy

• Diseases, Conditions, and Impairments:
  – stroke, heart disease, pain, loss of vision

• Functioning:
  – walking, kneeling, grasping

• Disability:
  – ability to perform personal activities, independent living, work

• Death
Question items corresponding to each aspect

• Healthy: overall health status—self-rated health

• Diseases/conditions/impairments:
  – physical health: diseases, pain, vision, hearing, blood pressure, grip strength, anthropometric measures
  – mental health: CES-D, PGC Morale Scale, cognition
  – social health: abuse, social ties
  – oral health: number of teeth, chewing ability, denture

• Functioning: Nagi measures

• Disability: ADLs and IADLs

• Death: Cause of death
Indicators of Functional Ability
Nagi Measures

• walk up 10 stairs without resting
• walk 200 meters
• reach over head
• Lift 10 lbs (Lift 20 lbs)
• sit for two hours
• stand for 2 hours
• reach out
• Use fingers to grasp
• stoop, crouch, kneel
ACTIVITIES OF DAILY LIVING (ADLs)

• eat
• dress
• bath or shower
• walk
• go to the toilet
• transfer (from/to bed/chair)
INSTRUMENTAL ACTIVITIES OF DAILY LIVING (IADLs)

• use telephone
• prepare your own meals
• go shopping for personal items
• manage your own money
• get to places out of walking distances?
• light housework
• heavy housework
• laundry
• take care of your appearance, for example combing your hair and (for men) shaving?
• medication
3 Transition Frameworks

- Demographic Transition: Frank W. Notestein
- Epidemiological Transition: Abdel R. Omran
- Nutritional Transition: Barry M. Popkin
Demographic characteristics

- Age
- Race/Ethnicity
- SEX/GENDER

SES
Education
Income
Wealth
Asset
Occupation
Work experience

Health Behavior
- Exercise
- Drinking
- Smoking
- Diet/Nutrition
- Health care Access
- Access
- Usage
- Insurance
- Social environment
- Social support
- Marital status
- Oral Health
- # of teeth
- Denture
- Chewing ability

Biological Risk
- Blood Pressure
- Cholesterol
- Glycated Hemoglobin
- Waist size
- BMI
- Leg length
- CRP
- Albumin
- IL-6

Perception of health

Genetics: APOE, Parents' age at death, cause of death

Physical environment: Place of residence, Type of housing, cooking fuel, type of toilet, climate, water supply

Past experience: Childhood experience, Place of birth, Place of residence when child, Past disease experience

Health Outcome

- (Prevalence and Incidence)
- Diseases
- Conditions
- Impairments
- Healthy
- Disability
- Death

Framework for Aging Study
Demographic characteristics

- Age
- Race/Ethnicity
- SEX/GENDER

Health Behavior
- Exercise
- Drinking
- Smoking
- Diet/Nutrition

Oral Health
- # of teeth
- Denture
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Health Outcome

- Healthy
- Death
- Diseases
- Impairments
- Functional Loss
- Disability

(by Med/Bio Scientists)
Demographic characteristics
- Age
- Race/Ethnicity
- SEX/GENDER

SES
- Education
- Income
- Wealth
- Asset
- Occupation
- Work experience

Health Behavior
- Exercise
- Drinking
- Smoking
- Diet/Nutrition
- Health care Access
- Access
- Usage
- Insurance

Social environment
- Social support
- Marital status
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- # of teeth
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Perception of health

Biological Risk
- Blood Pressure
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- Waist size
- BMI
- Leg length
- CRP
- Albumin
- IL-6

Health Outcome
- (Prevalence and Incidence)

Diseases
- Conditions
- Impairments

Healthy

Functional Loss
- Disability

Death

Framework for Aging Study

Genetics: APOE, Parents' age at death, cause of death

Physical environment: Place of residence, Type of housing, cooking fuel, type of toilet, climate, water supply

Past experience: Childhood experience, Place of birth, Place of residence when child, Past disease experience
Health Expectancy

• Summary measures of population health
  – Disability-free life expectancy, Active life expectancy, Healthy life years, Health-adjusted life expectancy

• Combining information on morbidity and mortality
  – dividing life expectancy into healthy and unhealthy years

• Sanders 1964; Sullivan 1966,1971

• REVES and GBD group

http://reves.site.ined.fr/en/
Survival curves for morbidity, disability, and mortality: Percentages surviving to given age without the event
<table>
<thead>
<tr>
<th></th>
<th>Occ</th>
<th>Educ</th>
<th>Income</th>
<th>Killer disease</th>
<th>Other disease</th>
<th>TLE</th>
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<td>White</td>
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<td>Mean</td>
<td>N</td>
<td>N</td>
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<td>&lt;JH</td>
<td>L</td>
<td>Y</td>
<td>Y</td>
<td>Mean</td>
<td>Mean</td>
<td>17.9</td>
<td>16.3</td>
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<td>20.5</td>
<td>17.2</td>
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</table>
Which matters for health of the elderly: Ability to chew or number of teeth?
Purpose of Study

• Examine effect of ability to chew on elderly health
• Examine effect of number of teeth on elderly health
• Compare the results
4 Possible Outcomes

- Ability to Chew (Y) and Number of teeth (Y)
- Ability to Chew (Y) and Number of teeth (N)
- Ability to Chew (N) and Number of teeth (N)
- Ability to Chew (N) and Number of teeth (Y)
Data

• Nihon University Japanese Longitudinal Study of Aging (NUJLSOA)
• Conducted in 1999, 2001, 2003
• Nationally representative sample of age 65 and over in 1999
• Sample Size for this study
  – Males: about 1800  Females: about 2400
Definition of Health

• **Inactive**: unable or very difficult to perform, at least, one of 7ADLs or 7 IADLs

• **Active**: otherwise

  – 7 ADL: bathing, dressing, eating, getting in/out of bed, walking, going outside, toileting
  – 7 IADL: preparing for own meal, shopping, managing money, making phone, doing light house work, using public transportation, medication
Measure of Ability to Chew

Question (1999): The following foods are ordered from hardest to softest to chew. What is the hardest group you are able to bite and chew? If you are using dentures, please respond as if you were eating with your dentures.
List of Food

1. Saki ika or takuan (Hard dried squid or pickled radish)

2. Boiled pork meat (from the rump), raw carrots, or celery

3. Deep-fried tofu, pickled octopus, pickled Chinese cabbage, or raisins

4. Rice, apples, fish cake, or boiled asparagus

5. Bananas, boiled beans, canned corned beef, or wafers

6. Unable to chew the foods listed
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<thead>
<tr>
<th></th>
<th>Singapore version of food list</th>
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<tbody>
<tr>
<td>1</td>
<td>Ikan Bilis in Nasi Lemak or shredded dry squid</td>
</tr>
<tr>
<td>2</td>
<td>Mutton curry, dry mango, or fresh carrots,</td>
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<tr>
<td>3</td>
<td>Bak-kwa, bread with crust not toasted, or kang kong steam boiled,</td>
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<tr>
<td></td>
<td>chicken satay, or raw cucumber</td>
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<tr>
<td>4</td>
<td>Thai Rice, fried fish ball, or Wanton noodle</td>
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<tr>
<td>5</td>
<td>Bananas, ripe papaya, hard boiled egg</td>
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</table>
Number of Teeth

Question (1999): How many original teeth do you (subject) have? Adults have 28 natural adult teeth (32 including wisdom teeth) and 0 for full dentures. Prosthetic teeth with roots should be included in the number. For bridges, the artificial tooth should not be counted; however, natural teeth acting as supports should be.

20 or more vs 19 or less
Multistate Life Table Method

Healthy

Dead

Unhealthy

- Transition from Healthy to Dead
- Transition from Unhealthy to Dead
- Transition from Healthy to Unhealthy
## LE by Ability to Chew
### Population-based: Both Sex

<table>
<thead>
<tr>
<th>Age</th>
<th>Group A LE</th>
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### ALE by Ability to Chew
#### Population-based: Both Sex

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<td>SE</td>
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<td>70</td>
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<td>11.4</td>
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<td>75</td>
<td>10.2</td>
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<td>80</td>
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## LE by Number of Teeth
### Population-based: Both Sex

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<td>LE</td>
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## ALE by Number of Teeth
### Population-based: Both Sex

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<td>ALE</td>
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<tr>
<td>85</td>
<td>5.0</td>
<td>0.56</td>
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</table>
Answer to the Question

BOTH Matters!!

for ALE based on the grouping we used
Are we really living longer healthier years? 
A case of the Japanese elderly
Aim

• Examine whether the changes in life expectancy observed for the elderly Japanese in the 1990s and 2000s accompanied with the improvement in health by applying the concept of health expectancy
Previous Studies: Incidence Based

• Crimmins et. al. (2009): a study in the US using 2 longitudinal surveys (LSOA I and LSOA II) for those age 70 and over
  – Increase in life expectancy after age 70 were concentrated in years of life expectancy without ADL or IADL disability.
  – This was accomplished through
    • delay in the onset of disability and
    • An increase in the likelihood of recovery from disability
Trends in Life Expectancy at 65: Japan
Data

2 nationally representative longitudinal surveys

- Conducted in 1987, 1990 and 1993
  - National Survey of the Japanese Elderly (NSJE)
    - sample size: 2,200

  - Nihon University Japanese Longitudinal Study of Aging (NUJLSOA)
    - sample size: 4,997
Definition of **health** in this study

- 1 ADL: Bathing
- 2 IADLs: shopping and making a phone call

any difficulty

- **Inactive**: have difficulty to perform at least one ADL or IADL measure
- **Active**: otherwise
## Description of Data: NSJE

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<td>501</td>
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<td>70-74</td>
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<tr>
<td>80-84</td>
<td>134</td>
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<tr>
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<td>38</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>w1</td>
<td>w2</td>
<td>w3</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>Active</td>
<td>1898</td>
<td>1530</td>
<td>1335</td>
</tr>
<tr>
<td>Inactive</td>
<td>185</td>
<td>134</td>
<td>197</td>
</tr>
<tr>
<td>Dead</td>
<td>163</td>
<td>192</td>
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</tr>
<tr>
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<td>359</td>
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### Description of Data: NUJLSOA

<table>
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<tr>
<td>Females</td>
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</table>

<table>
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<tr>
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<tr>
<td>65-69</td>
<td>892</td>
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<tr>
<td>70-74</td>
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<tr>
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</tr>
<tr>
<td>85+</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>w1</td>
<td>w2</td>
</tr>
<tr>
<td>----------</td>
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<td>------</td>
</tr>
<tr>
<td>Active</td>
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<td>3239</td>
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<tr>
<td>Inactive</td>
<td>808</td>
<td>745</td>
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<td>Dead</td>
<td>321</td>
<td>370</td>
</tr>
<tr>
<td>Missing</td>
<td>316</td>
<td>854</td>
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## Estimated life expectancies at age 60

<table>
<thead>
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<th></th>
<th>Total</th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>This study: NSJE</td>
<td>22.5</td>
<td>19.6</td>
<td>2.9</td>
</tr>
<tr>
<td>By Liu et.al. in 1995*</td>
<td>23.0</td>
<td>18.7</td>
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</tr>
<tr>
<td>Published F 1990</td>
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</tr>
<tr>
<td>Published M 1990</td>
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* Based on wave1 and wave2 data and health was defined by bathing, climb 2-3 steps, walking 2-300 meters
## Estimated life expectancies at age 65

<table>
<thead>
<tr>
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<th>NUJLSOA</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
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<tr>
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</tr>
<tr>
<td>75</td>
<td>13.0</td>
<td>14.7</td>
<td>11.1</td>
</tr>
<tr>
<td>85</td>
<td>7.1</td>
<td>7.9</td>
<td>6.0</td>
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</table>
Transition Probabilities from Active to Dead

<table>
<thead>
<tr>
<th>Probability</th>
<th>0.0000</th>
<th>0.0500</th>
<th>0.1000</th>
<th>0.1500</th>
<th>0.2000</th>
<th>0.2500</th>
<th>0.3000</th>
<th>0.3500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>65</td>
<td>66</td>
<td>67</td>
<td>68</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
</tr>
</tbody>
</table>

Graph showing transition probabilities from active to dead across different ages for NUJLSOA, lower, upper, NSJE, lower, and upper.
Transition Probabilities from Inactive to Dead

Age: 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85

NUJLSOA
lower
upper
NSJE
lower
upper
## Differences in life expectancy

<table>
<thead>
<tr>
<th></th>
<th>NUJLSOA</th>
<th></th>
<th>NSJE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LE</td>
<td>lower</td>
<td>upper</td>
<td>LE</td>
</tr>
<tr>
<td>65</td>
<td>21.0</td>
<td>20.5</td>
<td>21.1</td>
<td>18.1</td>
</tr>
<tr>
<td>75</td>
<td>13.0</td>
<td>12.6</td>
<td>13.4</td>
<td>10.6</td>
</tr>
<tr>
<td>85</td>
<td>7.1</td>
<td>6.7</td>
<td>7.5</td>
<td>5.7</td>
</tr>
</tbody>
</table>
Differences in active life expectancy

<table>
<thead>
<tr>
<th></th>
<th>NUJLSOA</th>
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<th>NSJE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LE</td>
<td>lower</td>
<td>upper</td>
<td>LE</td>
</tr>
<tr>
<td>65</td>
<td>16.9</td>
<td>16.5</td>
<td>17.3</td>
<td>15.2</td>
</tr>
<tr>
<td>75</td>
<td>8.9</td>
<td>8.6</td>
<td>9.2</td>
<td>7.7</td>
</tr>
<tr>
<td>85</td>
<td>3.3</td>
<td>3.0</td>
<td>3.5</td>
<td>2.9</td>
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</table>
## Differences in inactive life expectancy

<table>
<thead>
<tr>
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<th>NUJLSOA</th>
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<th></th>
<th>NSJE</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>LE</td>
<td>lower</td>
<td>upper</td>
<td>LE</td>
<td>lower</td>
<td>upper</td>
</tr>
<tr>
<td>65</td>
<td>4.1</td>
<td>3.8</td>
<td>4.3</td>
<td>2.9</td>
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<td>3.3</td>
</tr>
<tr>
<td>75</td>
<td>4.1</td>
<td>3.8</td>
<td>4.3</td>
<td>2.9</td>
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<td>3.3</td>
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<tr>
<td>85</td>
<td>3.8</td>
<td>3.5</td>
<td>4.1</td>
<td>2.7</td>
<td>2.1</td>
<td>3.4</td>
</tr>
</tbody>
</table>
Conclusions

• Total, Active, Inactive life expectancy increased between 1987-1993 period and 1999-2006 period.
• These changes are statistically significant except for active life expectancies at higher ages.
• Implied prevalence of inactive population decreased.

• Increased in life expectancy accompanied with improvement in health defined by functional abilities for the Japanese elderly. ...............
HOWEVER

- Proportion of active life expectancy, or life expectancy without functional difficulties decreased over the same time period.
<table>
<thead>
<tr>
<th></th>
<th>NUJLSOA</th>
<th></th>
<th></th>
<th>NSJE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LE</td>
<td>Active</td>
<td>%</td>
<td>LE</td>
<td>Active</td>
</tr>
<tr>
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<td>85</td>
<td>7.1</td>
<td>3.3</td>
<td>46.1</td>
<td>5.7</td>
<td>2.9</td>
</tr>
</tbody>
</table>
Limitation

• Institutionalized population is not fully covered
• only AGE is considered
• Definition of health is limited

Joshua A Salomon*, Haidong Wang, Michael K Freeman, Theo Vos, Abraham D Flaxman, Alan D Lopez, Christopher J L Murray

Summary
Background Healthy life expectancy (HALE) summarises mortality and non-fatal outcomes in a single measure of average population health. It has been used to compare health between countries, or to measure changes over time. These comparisons can inform policy questions that depend on how morbidity changes as mortality decreases. We characterise current HALE and changes over the past two decades in 187 countries.

Interpretation HALE differs substantially between countries. As life expectancy has increased, the number of healthy years lost to disability has also increased in most countries, consistent with the expansion of morbidity hypothesis, which has implications for health planning and health-care expenditure. Compared with substantial progress in reduction of mortality over the past two decades, relatively little progress has been made in reduction of the overall effect of non-fatal disease and injury on population health. HALE is an attractive indicator for monitoring health post-2015.
# Results Summary

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th>Females</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LE0</td>
<td>HE0</td>
<td>% HE</td>
<td>LE0</td>
<td>HE0</td>
<td>%HE</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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<tr>
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<tr>
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<td>81.4</td>
<td>43.6</td>
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Inequalities in healthy life years in the 25 countries of the European Union in 2005: a cross-national meta-regression analysis

Carol Jagger, Clare Gillies, Francesco Moscone, Emmanuella Cambois, Herman Van Oyen, Wilma Nusselder, Jean-Marie Robine, and the EHLEIS team

Summary

Background Although life expectancy in the European Union (EU) is increasing, whether most of these extra years are spent in good health is unclear. This information would be crucial to both contain health-care costs and increase labour-force participation for older people. We investigated inequalities in life expectancies and healthy life years (HLYs) at 50 years of age for the 25 countries in the EU in 2005 and the potential for increasing the proportion of older people in the labour force.

Interpretation Substantial inequalities in HLYs at 50 years exist within EU countries. Our findings suggest that, without major improvements in population health, the target of increasing participation of older people into the labour force will be difficult to meet in all 25 EU countries.
## Results Summary

<table>
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<th>Females</th>
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<tr>
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Association between Depression and Insomnia Subtypes: A Longitudinal Study on the Elderly in Japan

Eise Yokoyama, MD; Yoshitaka Kaneita, MD; Yasuhiko Saito, PhD; Makoto Uchiyama, MD; Yoko Matsuzaki, MD; Tetsuo Tamaki, MD; Takeshi Munezawa, PhD; Takashi Ohida, MD

1Division of Public Health, Department of Social Medicine, 2Advanced Research Institute for the Sciences and Humanities, and Population Research Institute, and 3Department of Psychiatry, Nihon University School of Medicine, Tokyo, Japan

Study Objective: To examine the association between depression and three subtypes of insomnia, namely, difficulty initiating sleep (DIS), early morning awakening (EMA), and difficulty maintaining sleep (DMS).

Conclusion: The longitudinal study revealed a statistically significant relationship, controlling for other relevant factors, between DIS and the presence of depression three years later, but not between EMA or DMS and depression. Based on our findings, we recommend that the association between insomnia subtypes and depression be studied longitudinally in clinical settings.

Keywords: Depression, insomnia subtypes, longitudinal study, elderly Japanese

Citation: Yokoyama E; Kaneita Y; Saito Y; Uchiyama M; Matsuzaki Y; Tamaki T; Munezawa T; Ohida T. Association between depression and insomnia subtypes: a longitudinal study on the elderly in Japan. SLEEP 2010;33(12):1693-1702.
Cross-national comparison of sex differences in health and mortality in Denmark, Japan and the US

Anna Oksuzyan · Eileen Crimmins · Yasuhiko Saito · Angela O’Rand · James W. Vaupel · Kaare Christensen
How accurate are self-reported height, weight, and BMI among community-dwelling elderly Japanese?: Evidence from a national population-based study

Vanessa Yong and Yasuhiko Saito

Advanced Research Institute for the Sciences and Humanities (ARISH), Nihon University, Tokyo, Japan