

## In search of a trade-off between health and longevity: the 5-Country Oldest Old Project (5-COOP)

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for the 5-COOP Consortium



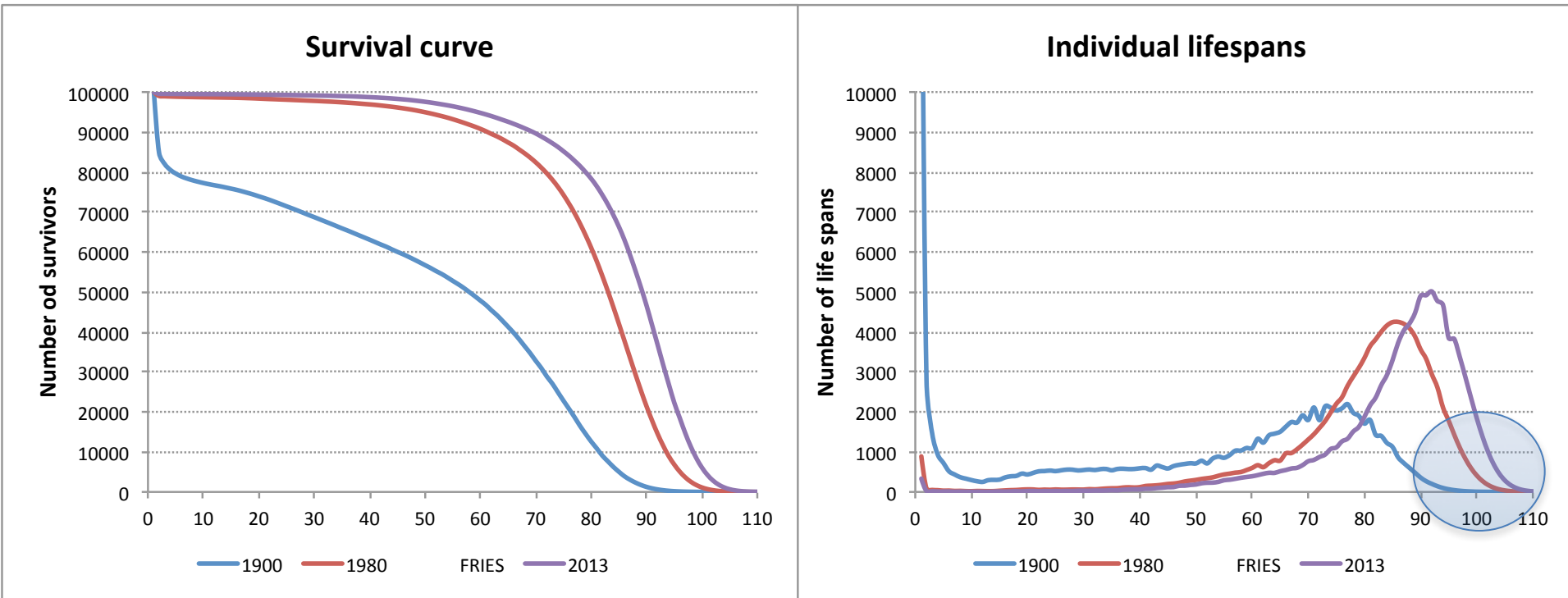
# Outline

1. Arguments for a possible trade-off between the level of mortality selection and the functional health status of the survivors
2. The selection of the 5 countries based on survival and mortality features
3. The main characteristics of the samples of centenarians used, similarities and differences
4. The age trajectory of a geriatric condition with the example of frailty

1. Arguments for a possible trade-off  
between the level of mortality selection  
and the functional health status of the survivors

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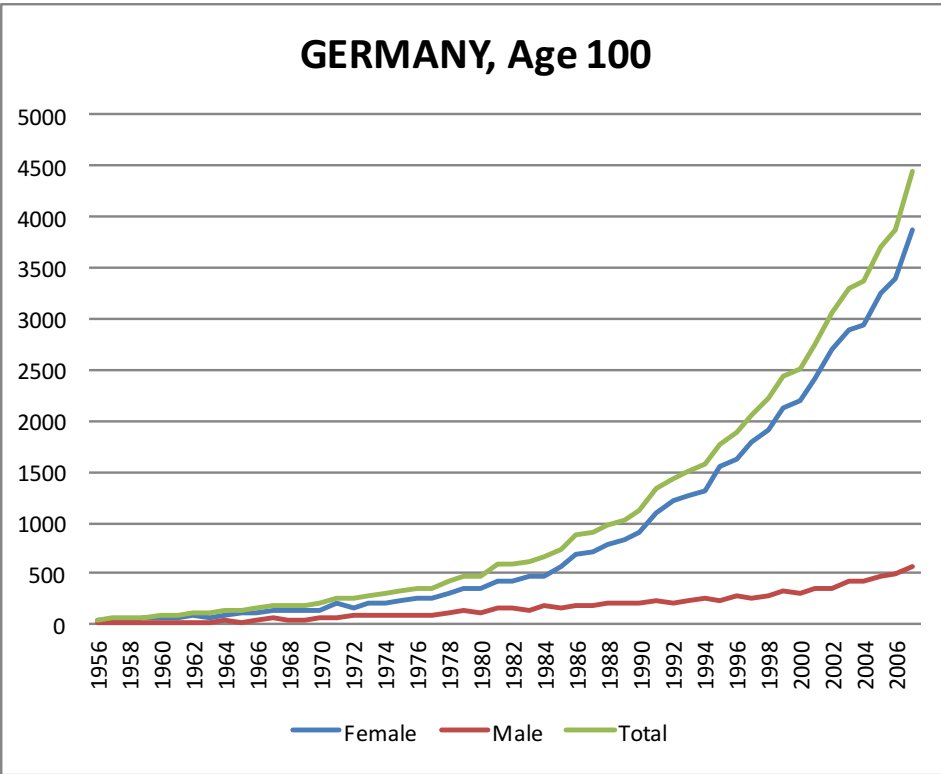
# 1- The adult longevity revolution



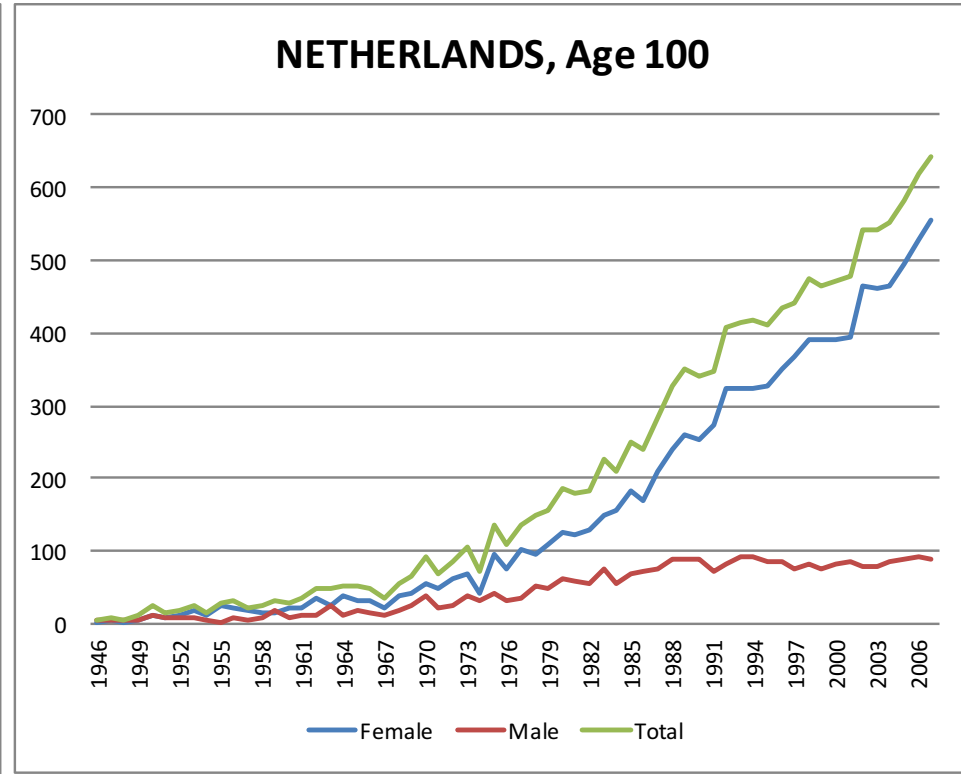
French women, 1900 - 1980 - 2013

# 2- The variation in this revolution

### GERMANY, Age 100



### NETHERLANDS, Age 100



French women, 1900 - 1980 - 2013

# 3- contradictory results of existing centenarian studies

- In Denmark
- In Japan

## Genetic and Environmental Determinants of Healthy Aging

# Improving Activities of Daily Living in Danish Centenarians—But Only in Women: A Comparative Study of Two Birth Cohorts Born in 1895 and 1905

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**Background.** The number of centenarians has increased rapidly since the 1950s. In Denmark, 42% more of the 1905

**Results.** The 1905 cohort displayed better self-reported ADLs than the 1895 cohort did. Stratified by gender, this apparent cohort advantage was due to women in the 1905 cohort performing significantly better than their female counterparts in the 1895 cohort.

Activities of Daily Living (ADLs) were assessed in both cohorts.

**Conclusion.** The increasing number of female centenarians does not entail increasing proportions of disabled individuals. In contrast, there is a lack of improvement in ADLs among male centenarians even though the number of male centenarians is stagnating.

**Key Words:** Centenarians—Activities of Daily Living—Cohort comparisons.

## Prevalence of centenarians confined to the room

Year	Population size	Sampling rate	% confined to the room		% bedridden	
			Males	Females	Males	Females
1973 (1)	405	28.9	19.1	37.5	14.3	21.9
1975 (2)	548	39.1	38.5	46.8	15.4	25.7
1981 (3)	1072	94.2	33.1	50.7	18.2	27.9
1992 (4)	4152	13.2	36.5	59.8	21.2	36.6
1993 (5)	4802	59.9	39.3	61.1	17.9	34.4
2000 (6)	13036	14.6	57,0	78,0	22.2	41.1

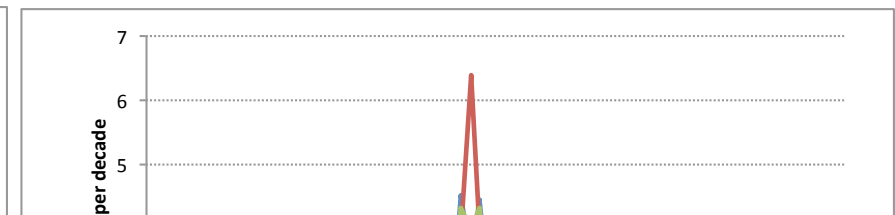
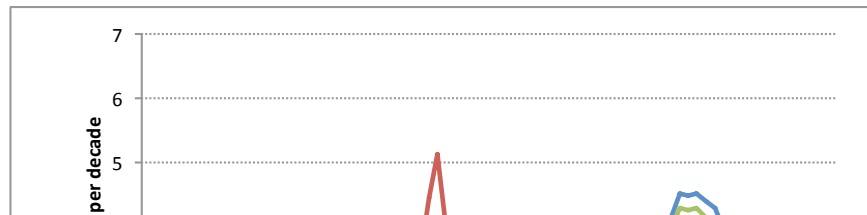
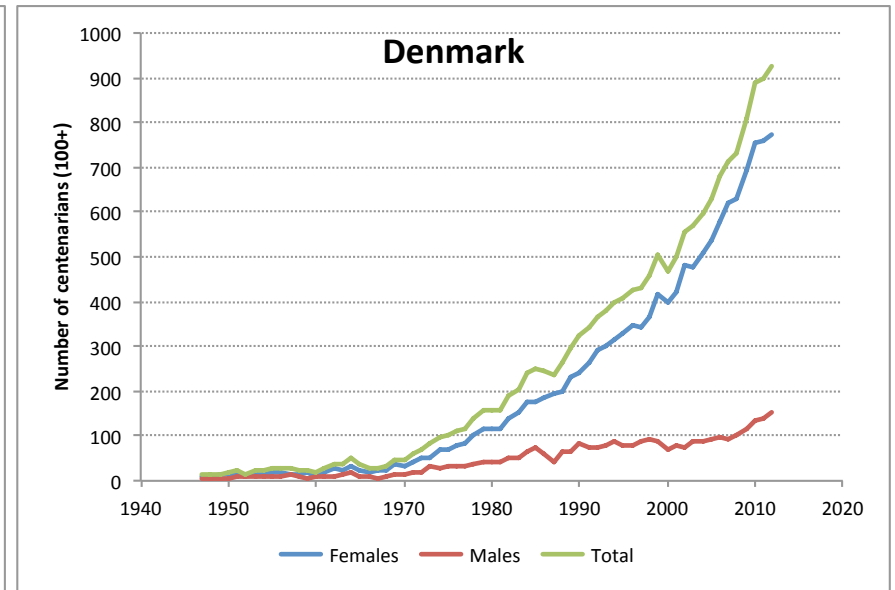
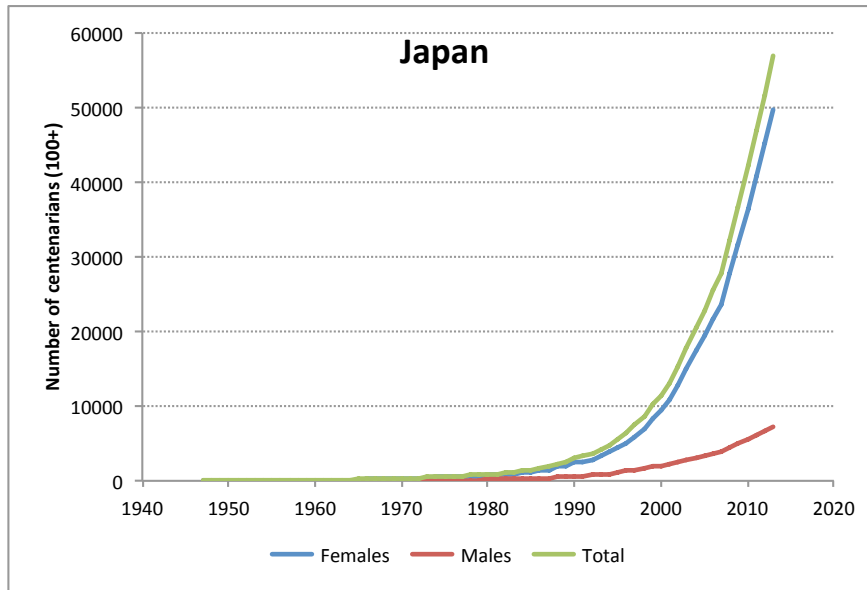
### Research reports

- (1) Tokyo metropolitan institute of aging (1973)
- (2) Center for development of elderly welfare (1976)
- (3) Japan Health promotion and Fitness Foundation (1992)
- (4) Japan College of Social Work (1992)
- (5) Japan Health promotion and Fitness Foundation (1993)
- (6) Japan Health promotion and Fitness Foundation (2002)

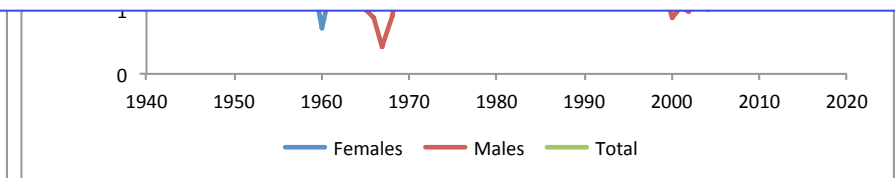
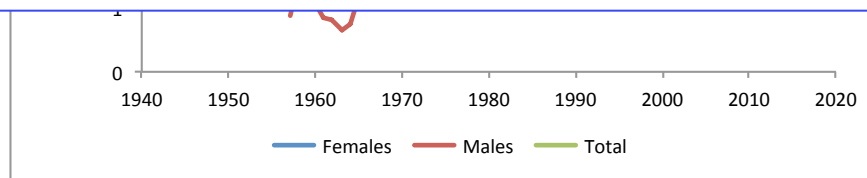
Courtesy from Yasuyuki Gondo



# Number of centenarians (100+): Japan vs. Denmark



This suggests a trade-off between the level of mortality selection and the functional health of the survivors to the highest ages.



## 2. The selection of the 5 countries based on survival and mortality features

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# Criteria of selection for the countries

1. Good data quality about age and survival
2. Existence of research teams studying oldest old people (demographers, epidemiologists and/or geriatricians)
3. Displaying different speeds of accumulation of nonagenarians and centenarians

# The 5-COOP study



Denmark

France

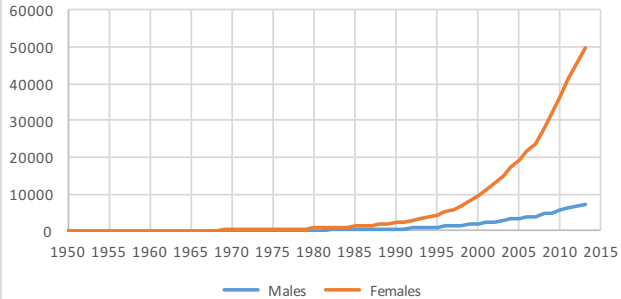
Japan

Sweden

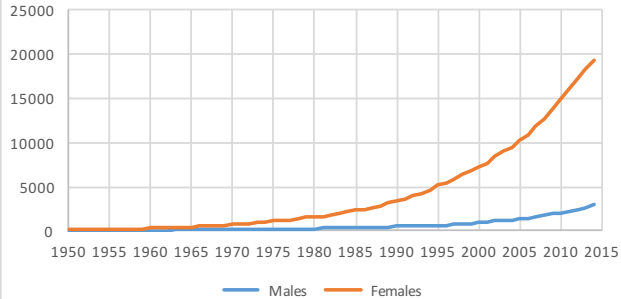
Switzerland

# Number of centenarians in the 5-COOP countries

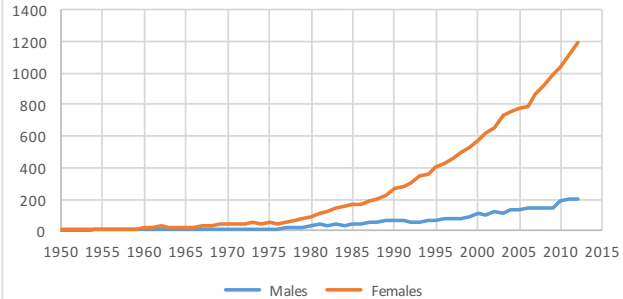
### Number of centenarians in Japan



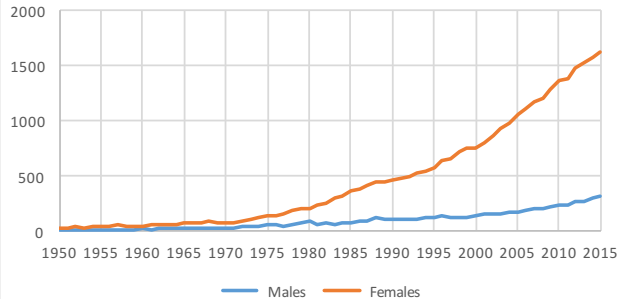
### Number of centenarians in France



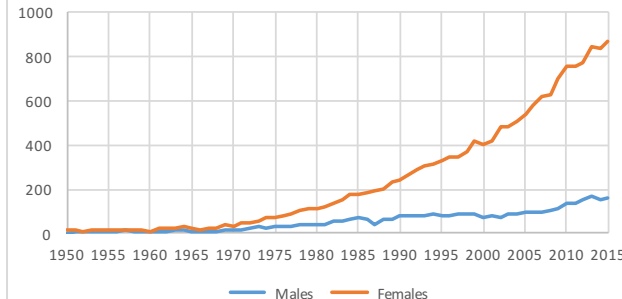
### Number of centenarians in Switzerland



### Number of centenarians in Sweden

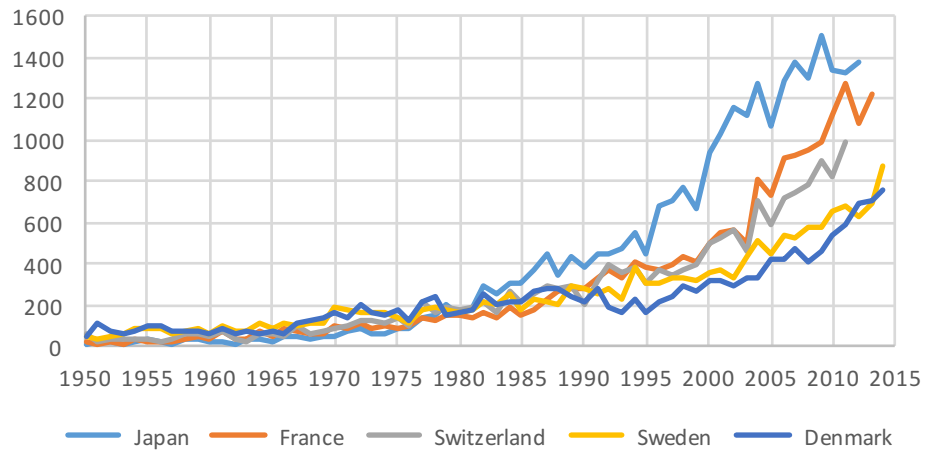


### Number of centenarians in Denmark

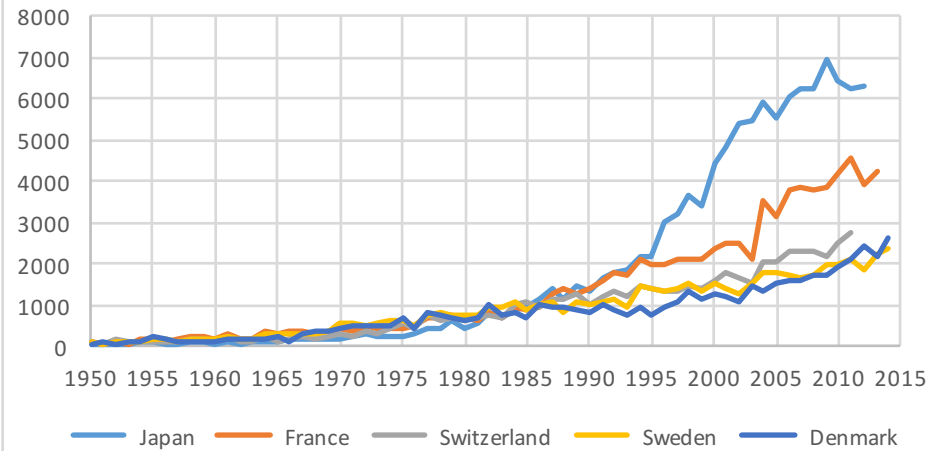


# Probability of surviving to age 100

## Male probability of surviving to age 100



## Female probability of surviving to age 100



# Levels of mortality selection

## Males

- Up to 100 years
  - Japan
  - France and Switzerland
  - Denmark and Sweden
- At age 100 and after
  - Japan
  - France, Denmark and Switzerland
  - Sweden

## Females

- Up to 100 years
  - Japan
  - France
  - Denmark, Sweden and Switzerland
- At age 100 and after
  - Japan
  - France and Denmark,
  - Sweden and Switzerland

### 3. The main characteristics of the samples of centenarians used, similarities and differences

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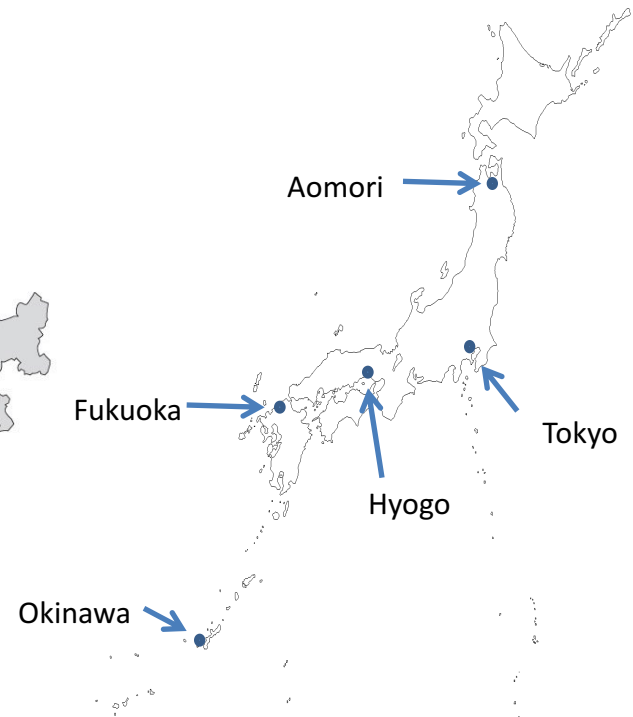
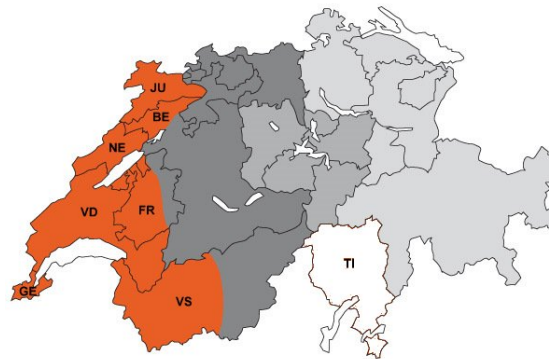
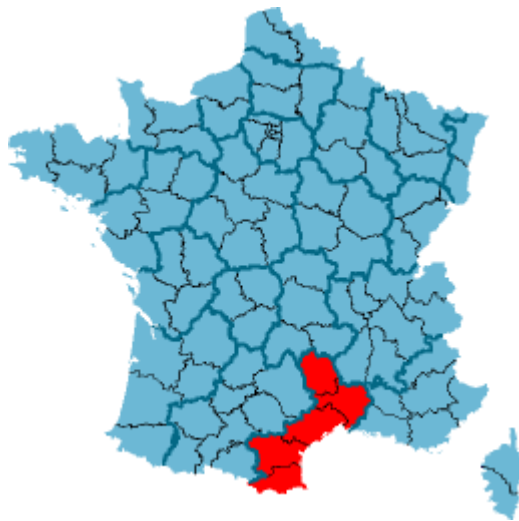


# Design

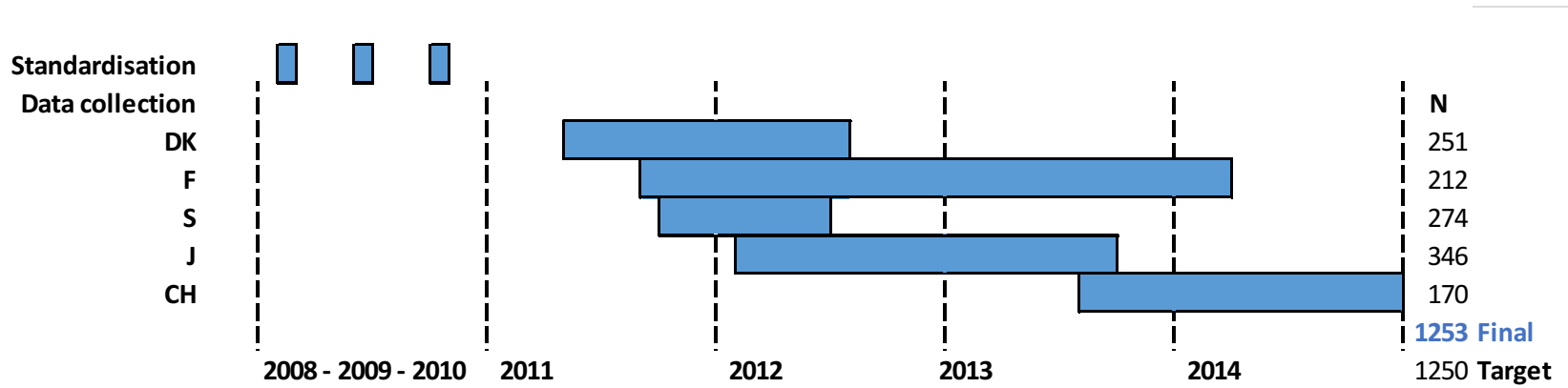
1. Multinational cross-sectional study
2. Comparison of representative samples (at the national or regional level)
3. Subjects aged 100 years ( $N=5*250$ )
4. At the same point in time

# Sampling scheme

	DK	S	F	CH	J
<b>Ethical committee</b>	1	1	1	6	1
<b>Sample</b>	National	National	Regional	Regional	5 cities
<b>Residents lists</b>	1	1	every 3 months	At different time for each administrative unit	Managed by cities



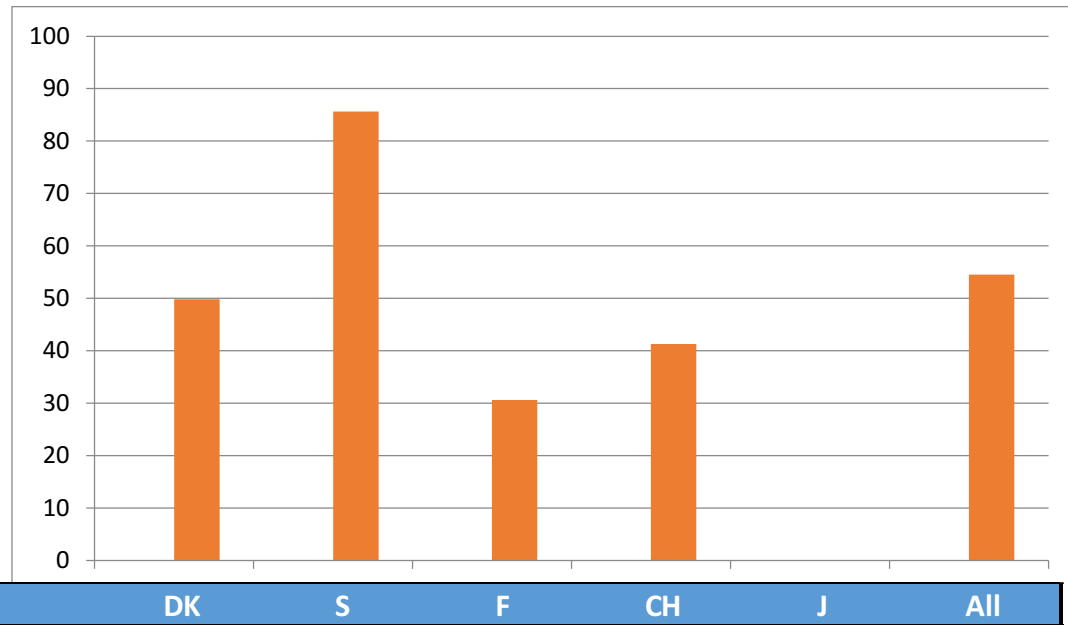
# Timeline



# Data collection

- Standardization of the data collection across the 5 participating countries started before the field study (2008-2009-2010)
- Original questionnaire designed in English
- Includes standardized instruments
- Then translated in each local languages.

# Response rates



%	DK	S	F	CH	J	All
Response rate $(b/(a-c)*100)$	49.8	85.6	30.6	41.3		54.5
Sample size (a)		360	756	427		
Interviews (b)	251	274	212	170	346	1253
Deceased before interviewed (c)		40	63	15		118

# Heterogeneity despite standardization

- Time synchronization
- Country wide vs regional sampling
- Response rates, modes and type of interviews, background of the interviewers vary among the 5 countries

## 4. The age trajectory of a geriatric condition with the example of frailty

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# The importance of frailty in geriatrics

- More than 600 variables in our survey
- Frailty as an example
- Predictor of poor health outcomes and predictor of use health care resources
- A window for action to prevent worsening of health and disability

Possibly the most important concept  
in modern geriatrics



# Frailty in the oldest old

- Few data:

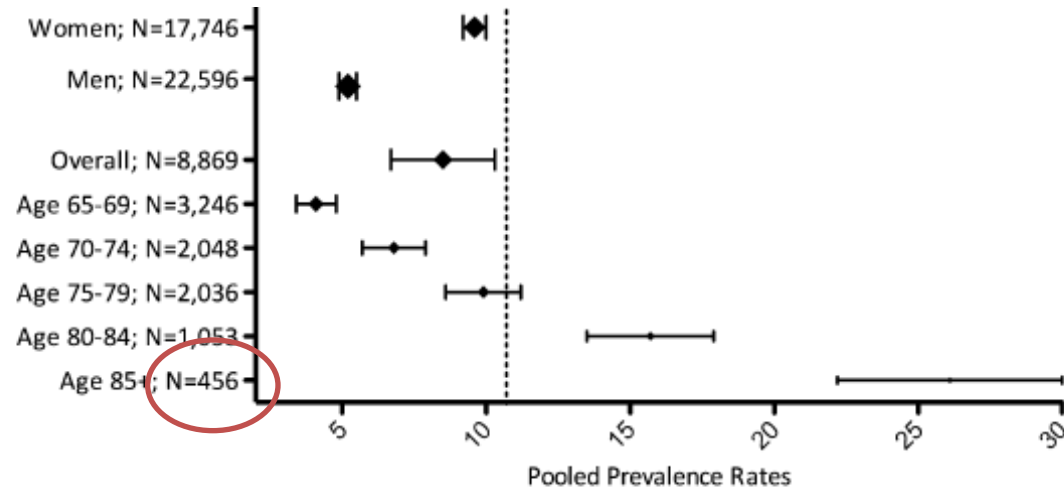


Figure 1. Prevalence of frailty and 95% confidence intervals.

*Collard et al, JAGS 2012*

- Half of the individuals aged 90 years and over (54%) included in the SIPAF study, France (n=512)

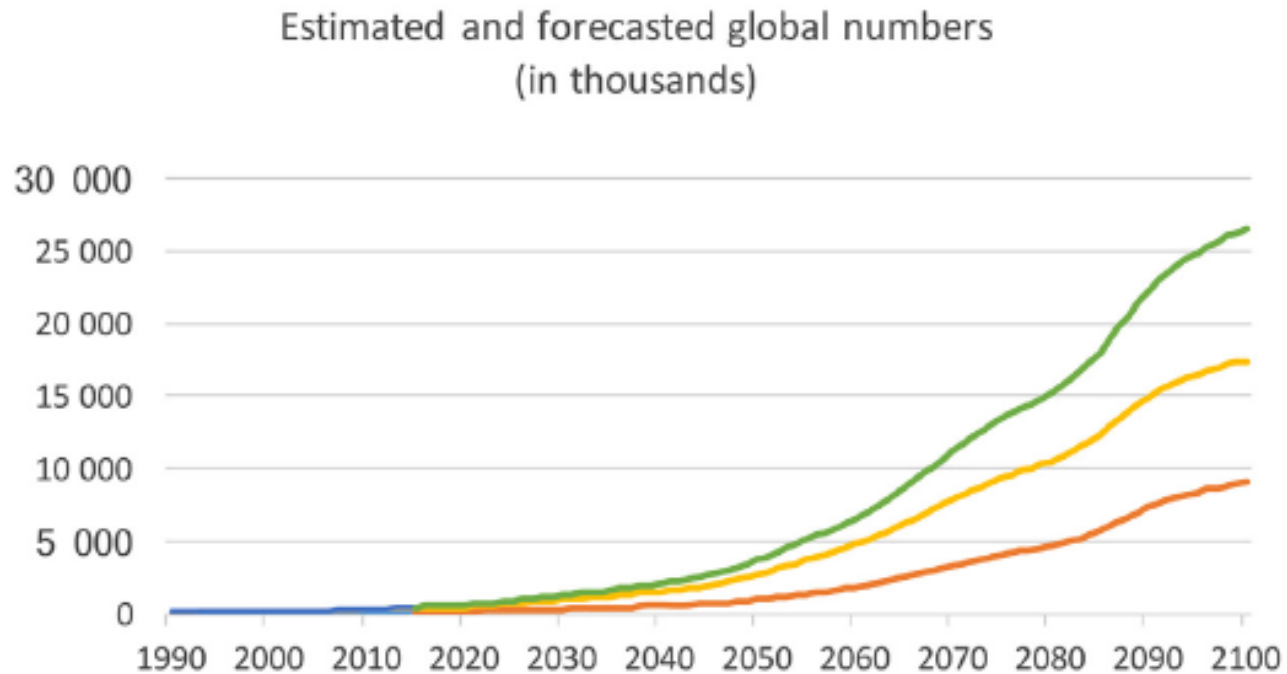
*Herr et al, Archives Gerontol Geriatr 2016*

- 60% of the 50 centenarians included in the Oporto Study (Portugal)

*Duarte et al, Eur Geriatric Med 2014*

# Demography of centenarians

- According to the Population Division of the United Nations (UNDP), their number will reach 25 millions in 2100 (x15 their number in 2015)



# Objective

- The 5-COOP frailty study aims to describe the prevalence of frailty and associated factors in the centenarians participating in the Five Country Oldest Old Project (5-COOP).

# Frailty definition

*according to Fried et al, J Gerontol 2001*

Criteria	Definition
<b>Weight loss</b>	Self-reported weight loss of 5 kg during the past year And/or self-reported weight loss of 3 kg during the past 3 months And/or Body Mass Index $\leq 18.5$ kg/m <sup>2</sup>
<b>Fatigue</b>	Self-reported fatigue (when moving, resting or all the time) <i>Except Sweden</i>
<b>Weakness</b>	Grip strength lower than the 20 <sup>th</sup> percentile And/or self-reported difficulty carrying a bag weighting 5kg
<b>Slow walking speed</b>	Self-reported slow walking speed And/or difficulty walking up a flight of stairs
<b>Low level of physical activity</b>	No regular exercise or outdoor activity (self-reported)

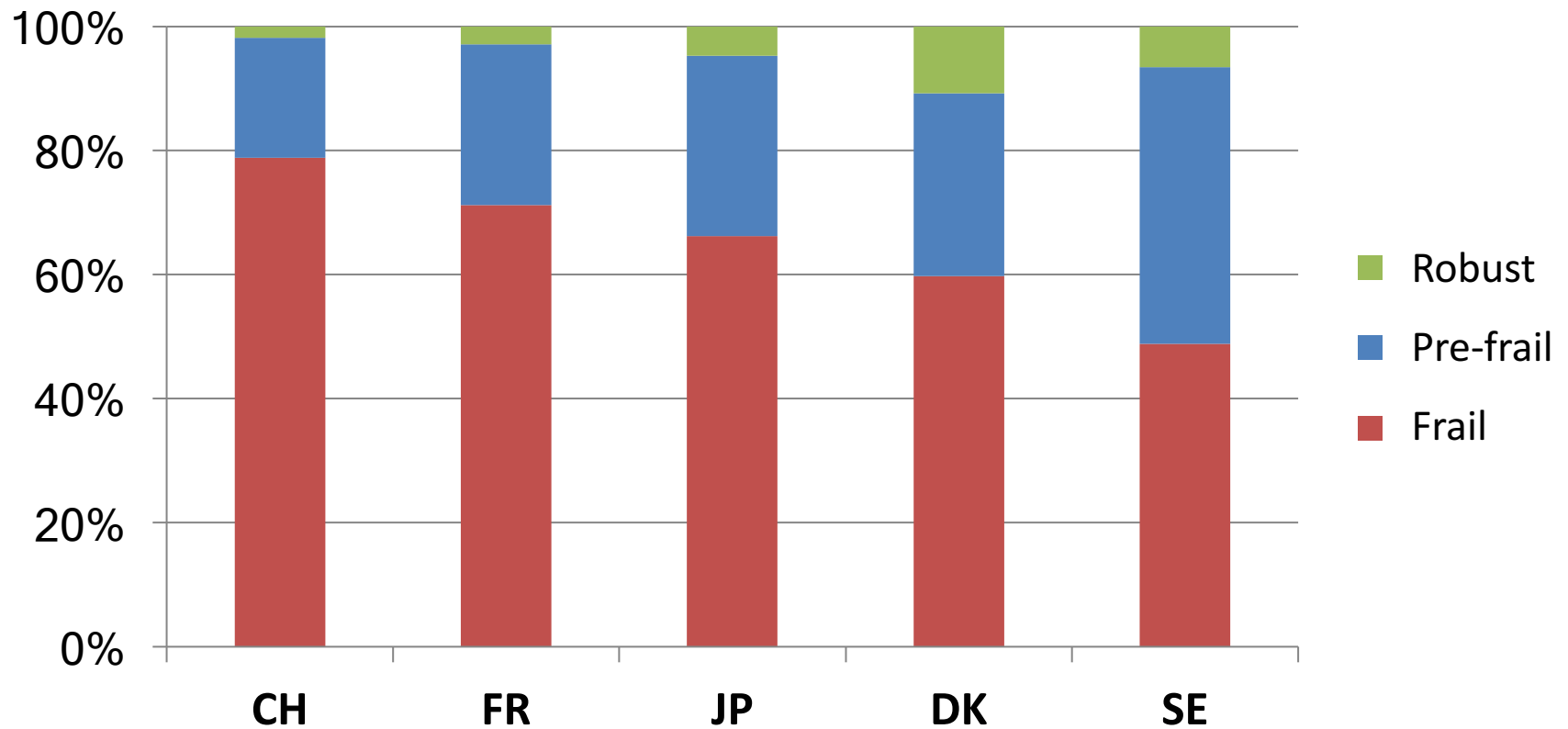
# Prevalence of frailty

(according to the criteria of Fried et al, 2001)

Frailty phenotype	Total N (%)	Men N (%)	Women N (%)
Robust	69 (5.6)	30 (12.2)	39 (4.0)
Pre-frail	378 (30.7)	92 (27.4)	286 (29.1)
Frail	<b>783 (63.7)</b>	<b>124 (50.4)</b>	<b>659 (67.0)</b>

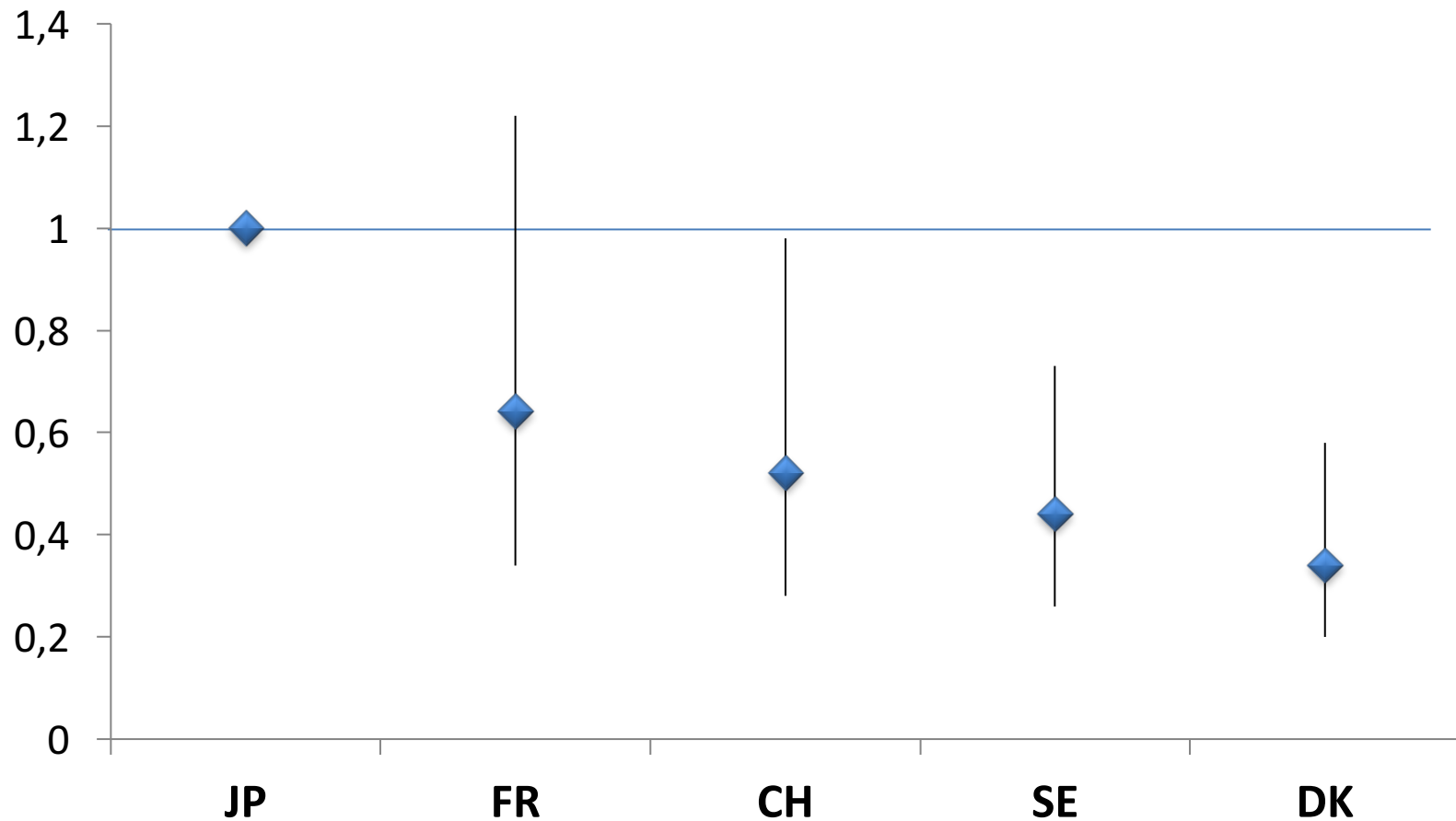
# Prevalence of frailty by country

Range: 48.9% - 78.8%



# Slow walking speed

(logistic regression, OR)



# Discussion

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- Almost 95% of the centenarians had at least one criteria for frailty ; 63.7% had 3 criteria or more
- Frailty in the oldest old is mainly driven by :
  - Lack of muscle strength
  - Limited mobility
  - Low level of physical activity
- The risk of frailty was higher in France, Switzerland, and Denmark compared to Japan, but this pattern may differ according to the criteria of frailty considered.

Thank you

5coop

The word '5coop' is rendered in a large, bold, blue, sans-serif font. Each letter contains a national flag: the '5' features the flag of Denmark (a white field with a red Scandinavian cross); the 'c' features the flag of Sweden (a blue field with a yellow Scandinavian cross); the first 'o' features the flag of Japan (a white field with a red disc in the center); the second 'o' features the flag of Switzerland (a red field with a white cross); and the 'P' features the flag of France (a vertical tricolor of blue, white, and red).

Similarities and peculiarities on the way to longer life in human populations  
4th Human Mortality Database Symposium, WissenschaftsForum, Berlin, 22-23 May 2017

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