



UNIVERSITÀ DI PAVIA  
Dipartimento di  
Scienze Politiche e Sociali

# LM Day: PaNDA2023

## Pavia - Ngo & Gov Data Analysis

Pavia | Martedì 30 Maggio 2023 | Ore 14:00

Università degli Studi di Pavia | Dipartimento di Scienze Politiche e Sociali

Aula Foscolo

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# Sfide e Opportunità per l'Healthy Ageing

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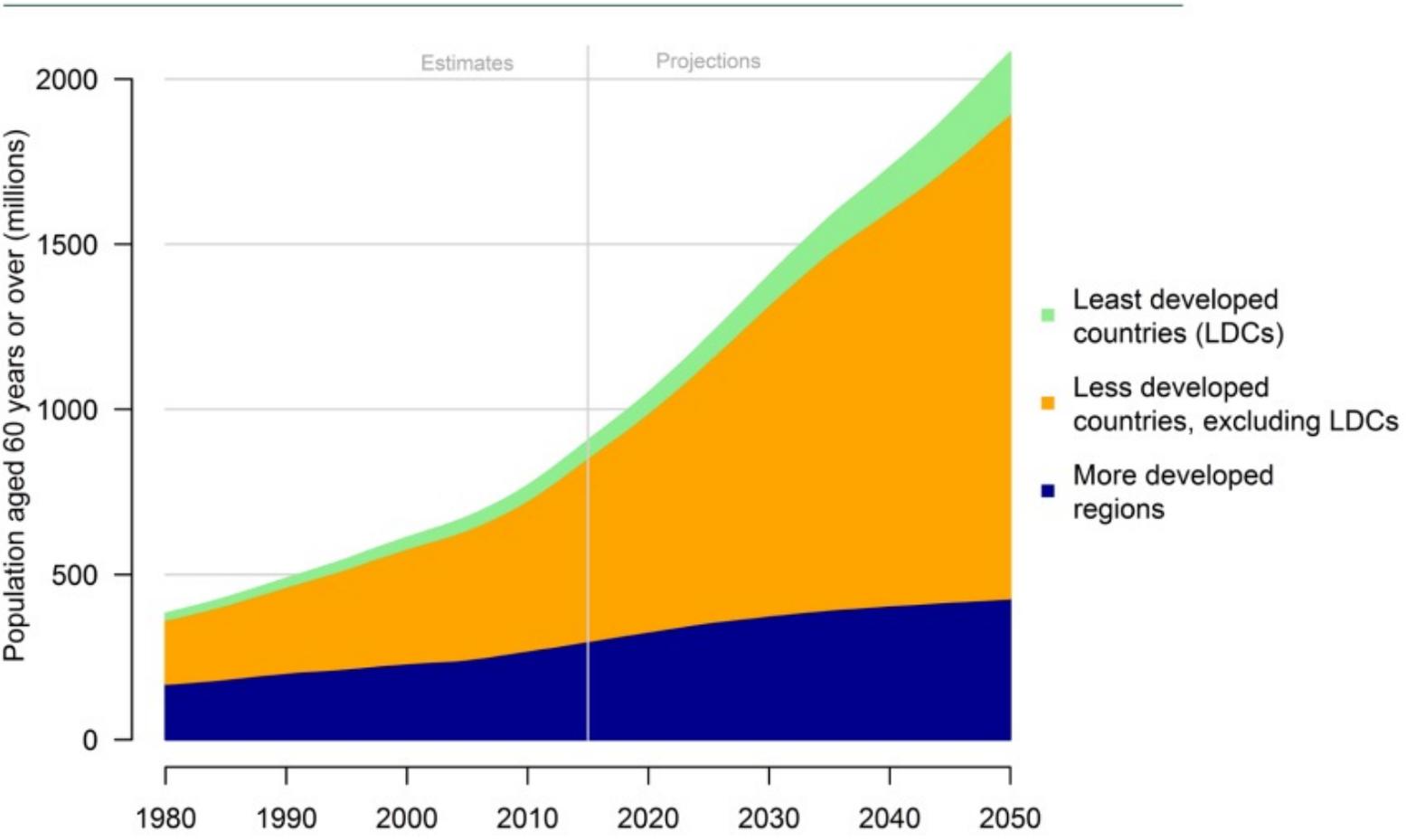


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# Contesto: invecchiamento globale

Number of persons aged 60 years or over by development group,<sup>1</sup> from 1980 to 2050



Data source: United Nations (2017). World Population Prospects: the 2017 Revision.



# Contesto: spese per il welfare sociosanitario



[Countries](#) [Monitors](#) [Themes](#) [COVID-19](#) [Publications](#) [Events](#) [About Us](#)

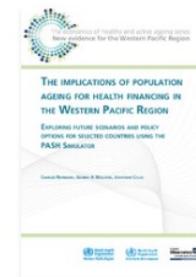


## Population Ageing financial Sustainability gap for Health systems (PASH) Simulator

There is a common perception that population ageing will adversely affect health financing sustainability. Yet the extent to which changes in population age-structure affect health financing is dependent not only on the age mix of the population, but also on how health expenditure levels vary by age, as well as how health revenues are generated. If health expenditures grow more rapidly than revenues as a result of population ageing, there will invariably be a health financing gap.

To better understand the implications of population ageing for health financing and to identify policy options, the European Observatory, together with the WHO Kobe Centre, developed the [Population Ageing financial Sustainability gap for Health systems](#) (or alternatively, the **PASH**) Simulator tool. The PASH Simulator tool allows a user to see how both health expenditures and health revenues are expected to change through the end of the century due to changes in population age-structure across a wide range of countries. Where there is a financing gap between revenues and expenditures, users can explore potential policy options. The overall message is that how population ageing affects health financing is a policy choice, rather than an inevitable consequence of ageing societies.

[Please click here to use the simulator \(PASH\)](#)



7 NOVEMBER 2022

### The implications of population ageing for health financing in the Western Pacific...

Economics of Healthy and Active Ageing

[Download](#)

[Read More](#)



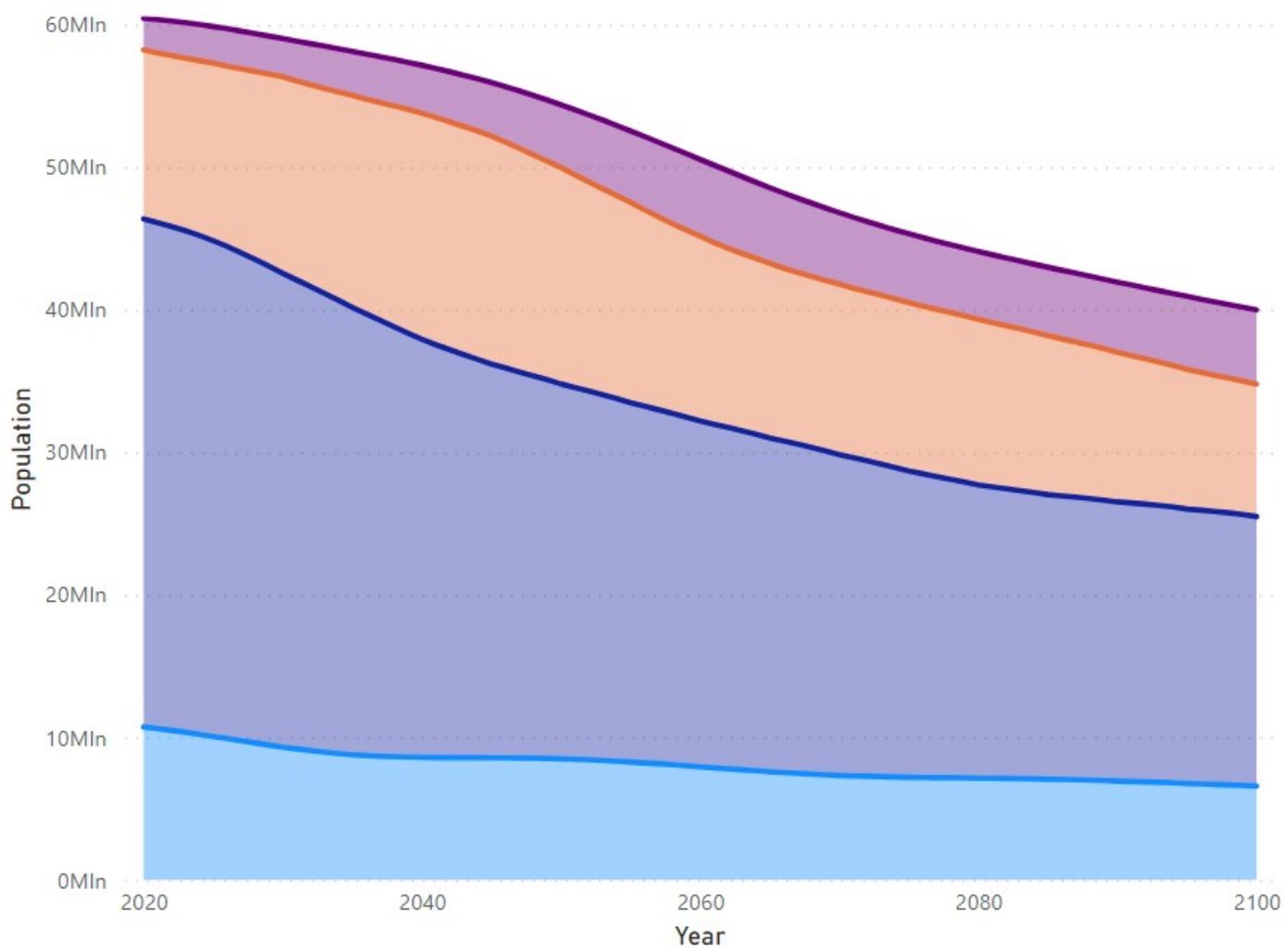
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Italy

Population by Year and Age Group

Age Groups 0-19 20-64 65-84 85+



In 2020, **23%** of the population was aged 65 and over. By 2060, that share is projected to **increase** to **36%**. At the end of the projection period in 2100, **36%** of the population is projected to be aged 65 and over.

Population distribution by age group

Year	0-19	20-64	65-84	85+
2020	18%	59%	20%	4%
2040	15%	51%	28%	6%
2060	16%	48%	26%	11%
2080	16%	47%	26%	11%
2100	16%	47%	23%	13%

Source: <https://population.un.org/wpp/>

## Select a hypothetical health expenditure by age profile i

Profile A (EU average) ∨



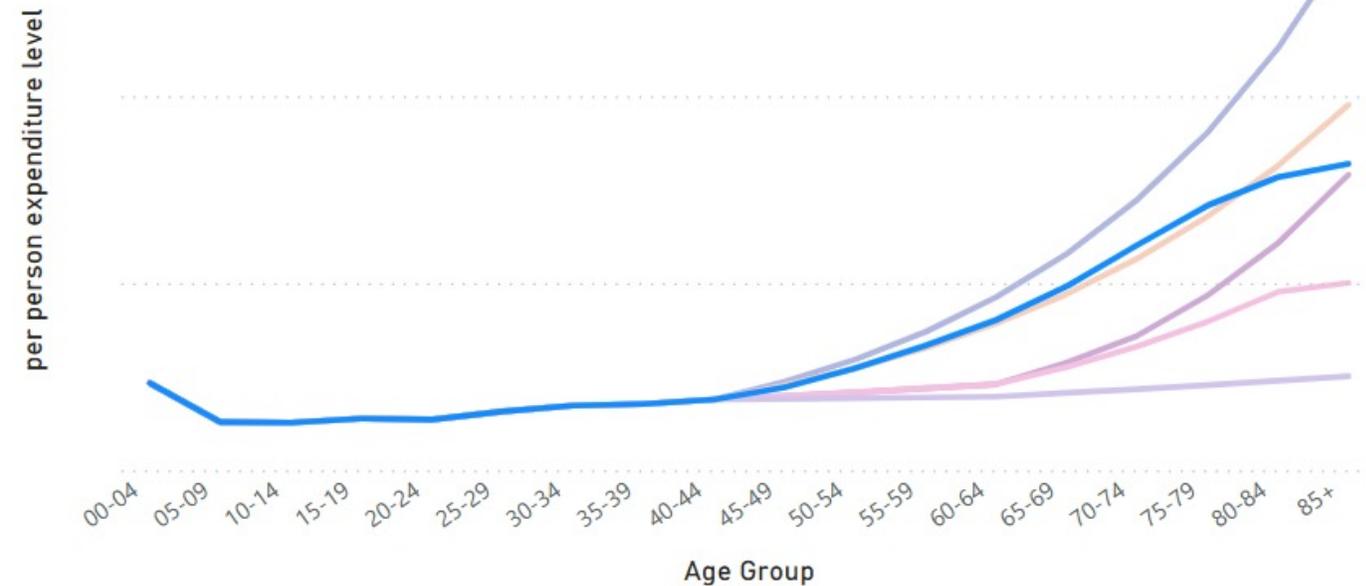
Country

Baseline Results



### How does domestic general government health expenditure vary by age?

● Profile A (EU average) ● Profile B ● Profile C ● Profile D ● Profile E ● Profile F



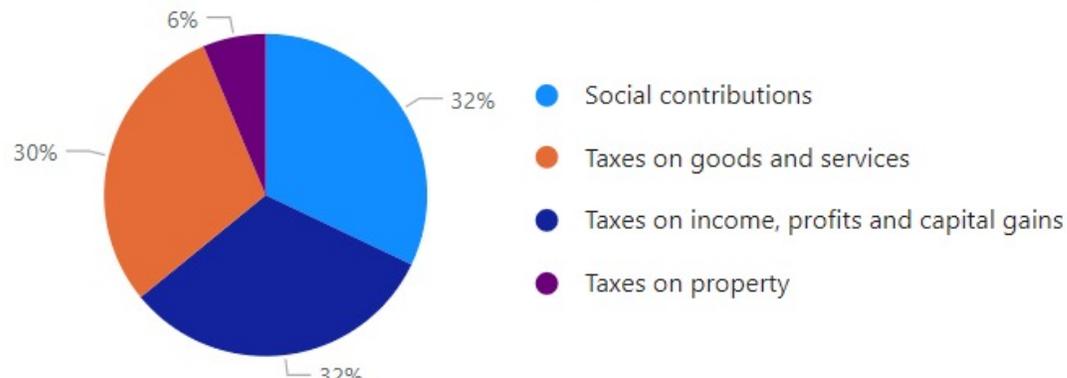
Select a hypothetical baseline health expenditure profile on the top left. This should approximately reflect current per person health expenditure by age patterns in Italy.



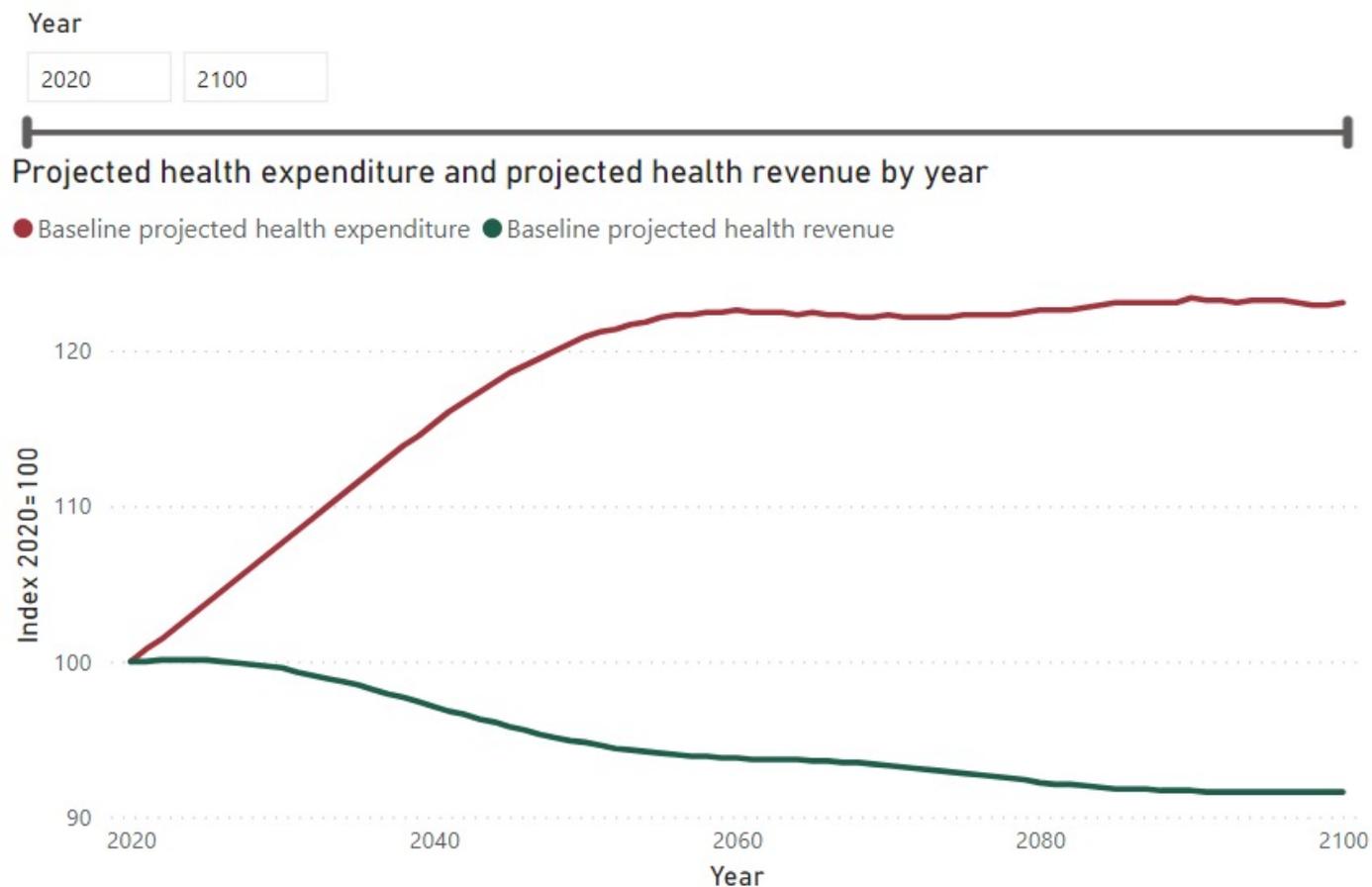
In health expenditure Profile A (EU average), health expenditure for the average 85 year old is assumed to be 2.5 times greater than expenditure for the average 55 year old and 5.2 times the expenditure for the average 25 year old.

Baseline health revenue profiles are fixed and estimated for Italy based on public revenue statistics.

### How is domestic general government health expenditure paid for?



# Baseline Results



With no policy changes and using the baseline health financing by age profiles, population ageing is expected to result in a health financing gap of 31.5 base points by 2100, equivalent to \$843 per person in 2018 PPP (2.0% of GDP) based on domestic general government health spending levels in 2018.

Year	Population ageing financing gap (in base points)	Population ageing financing gap in 2018 PPP per person	Percentage of population ageing financing gap attributable to changes in health revenues / expenditures
2040	18,2	\$487	16%/84%
2060	28,8	\$772	22%/78%
2080	30,4	\$815	26%/74%
2100	31,5	\$843	27%/73%

Select health expenditure and revenue policy options to address the population ageing financing gap:

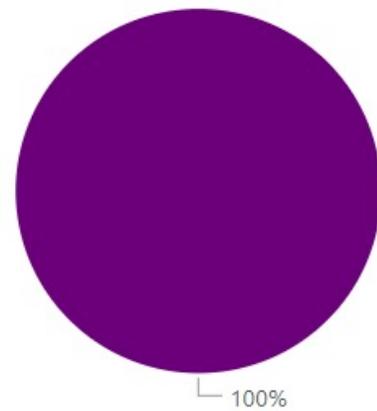
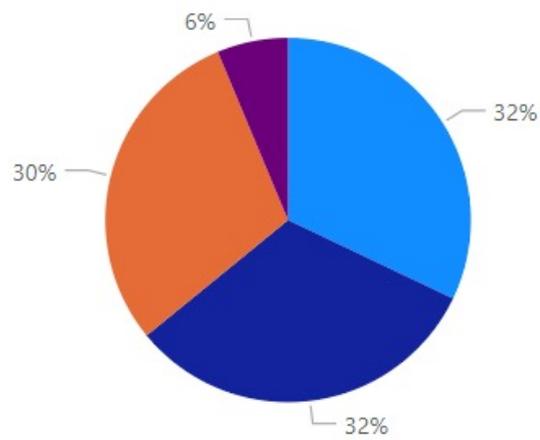
Adjust the mix of health revenues

Adjust how taxes are levied

Adjust expenditure and use patterns

Baseline mix of health revenues

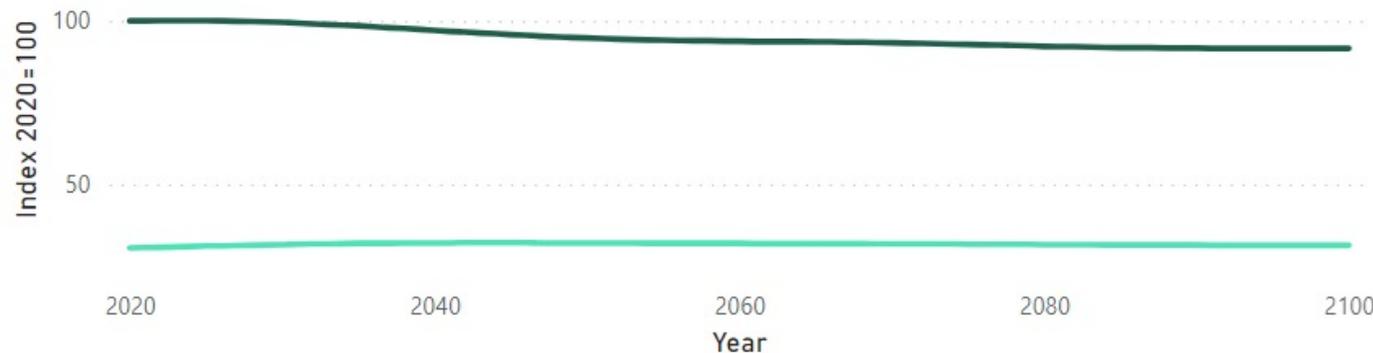
\*NEW\* mix of health revenues



- Social contributions
- Taxes on goods and services
- Taxes on income, profits and capital gains
- Taxes on property

Result preview (baseline health expenditure in 2020 = 100)

● \*NEW\* projected health revenue ● Baseline projected health revenue



Change the mix of taxes and social contributions used to pay for health by adjusting the sliders below. All adjustments are normalised to equal 100%.

See the effects of changes in the mix of taxes and social contributions used to finance health on **projected per person health revenues** on the bottom left as compared to **baseline projected health revenues**

<Less
More>

Social contributions (%)

Taxes on income, profits, and capital gains (%)

Taxes on goods and services (%)

Taxes on property (%)

Reset Page

Adjust the mix of health revenues

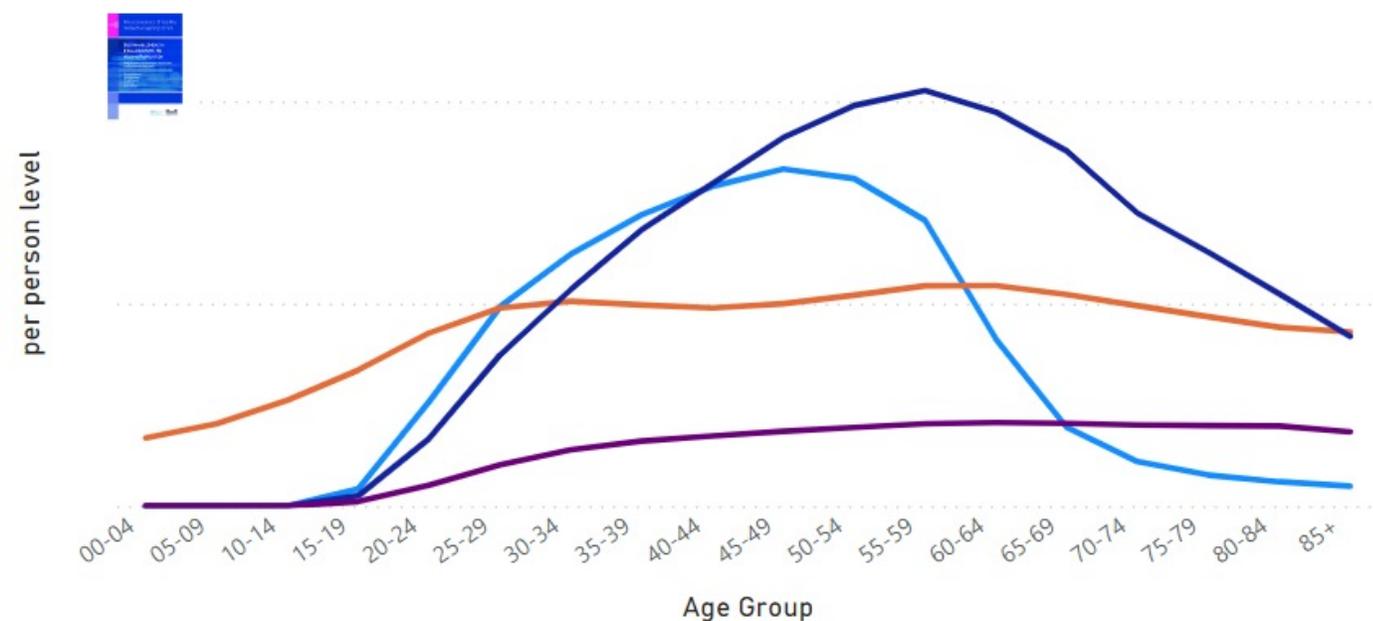
Adjust how taxes are levied

Adjust expenditure and use patterns

Results

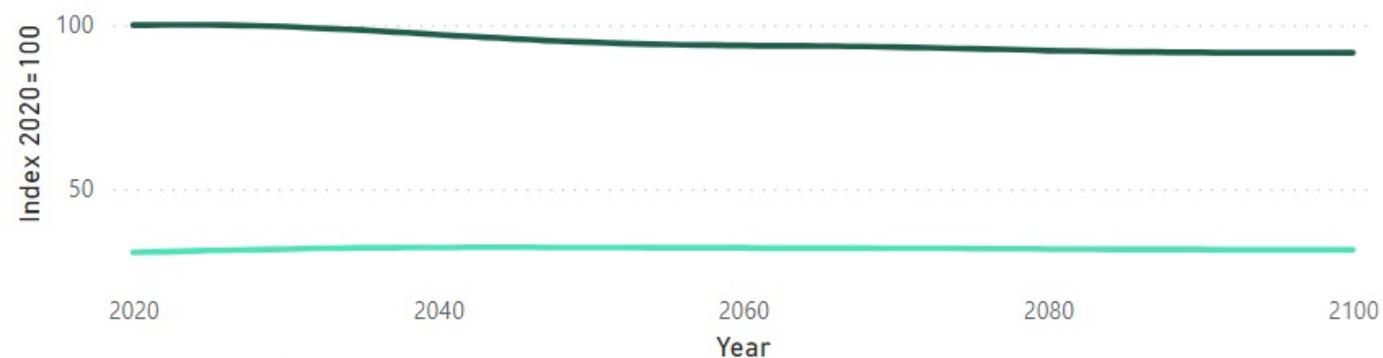
# Taxes and social contribution profile by age

Type — Social contributions — Taxes on goods and services — Taxes on income, profits, and ca... — Taxes on property



## Result Preview (baseline health expenditure in 2020 = 100)

● \*NEW\* projected health revenue ● Baseline projected health revenue



Change how health revenues are levied. Use the sliders below to alter the tax and social contribution levels by age through selected policy options.

See the effects of changes in how taxes and social contributions are levied on **projected per person health revenues** on the bottom left as compared to **baseline projected health revenues** [<Less](#) [More>](#)

Pensioners Social Contribution Adjustment

0,00

Employment < age 45      Employment > age 45

0,00      0,00

Taxes on income, profits, and capital gains

1,00

Taxes on goods and services

0

Taxes on property

1,00

Reset Page

Adjust the mix of health revenues

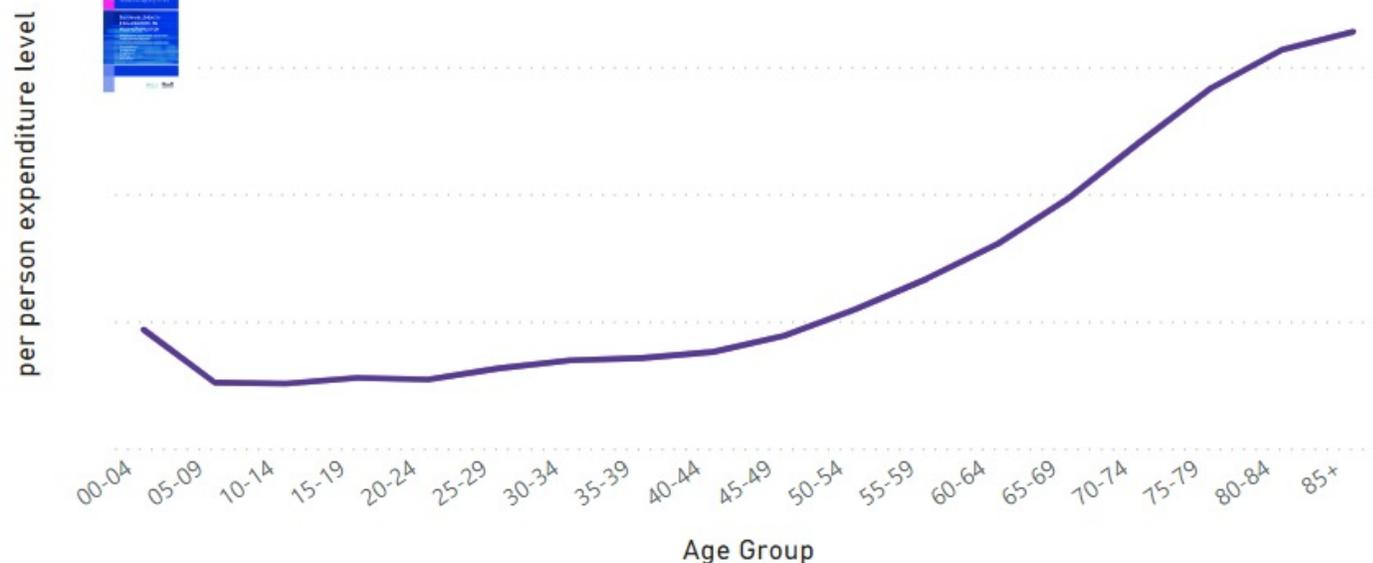
Adjust how taxes are levied

Adjust expenditure and use patterns

Results

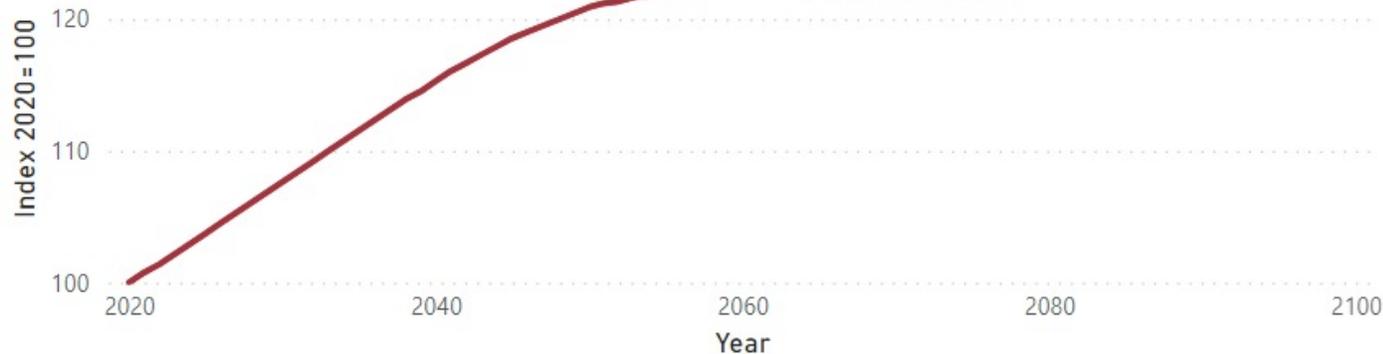
# \*NEW\* health expenditure and Baseline health expenditure by Age Group

● \*NEW\* health expenditure by age group ● Baseline health expenditure by age group



## Result Preview (baseline health expenditure in 2020 = 100)

● \*NEW\* projected health expenditure ● Baseline projected health expenditure



Use the sliders below to alter the health expenditure by age profile through selected policy options or initiatives.

<Less

More >

Healthy Ageing

0

Shift the slider to the right to lower spending for each age group (e.g. through healthy ageing) or to the left to raise spending for each age group (e.g. through unhealthy ageing)

Coverage after age 60

1,00

Shift the slider to the right to expand coverage and raise spending at older ages, or to the left to reduce coverage and lower spending at older ages.

Incremental changes for all age groups

1,00

Incrementally increase spending at all ages towards the chosen multiplier value (e.g. due to prices increasing linearly at a rate above economy-wide inflation), or incrementally decrease spending at all ages over the projection period (note: changes will not be visible in upper left panel).

Reset Page

Adjust the mix of health revenues

Adjust how taxes are levied

Adjust expenditure and use patterns

Results

# Healthy ageing

Promuovere un invecchiamento in salute è la soluzione individuata dall'OMS per garantire salute migliore per tutti e la sostenibilità dei servizi sanitari.

Healthy Ageing is the process of developing and maintaining the functional ability that enables wellbeing in older age.



# Healthy ageing

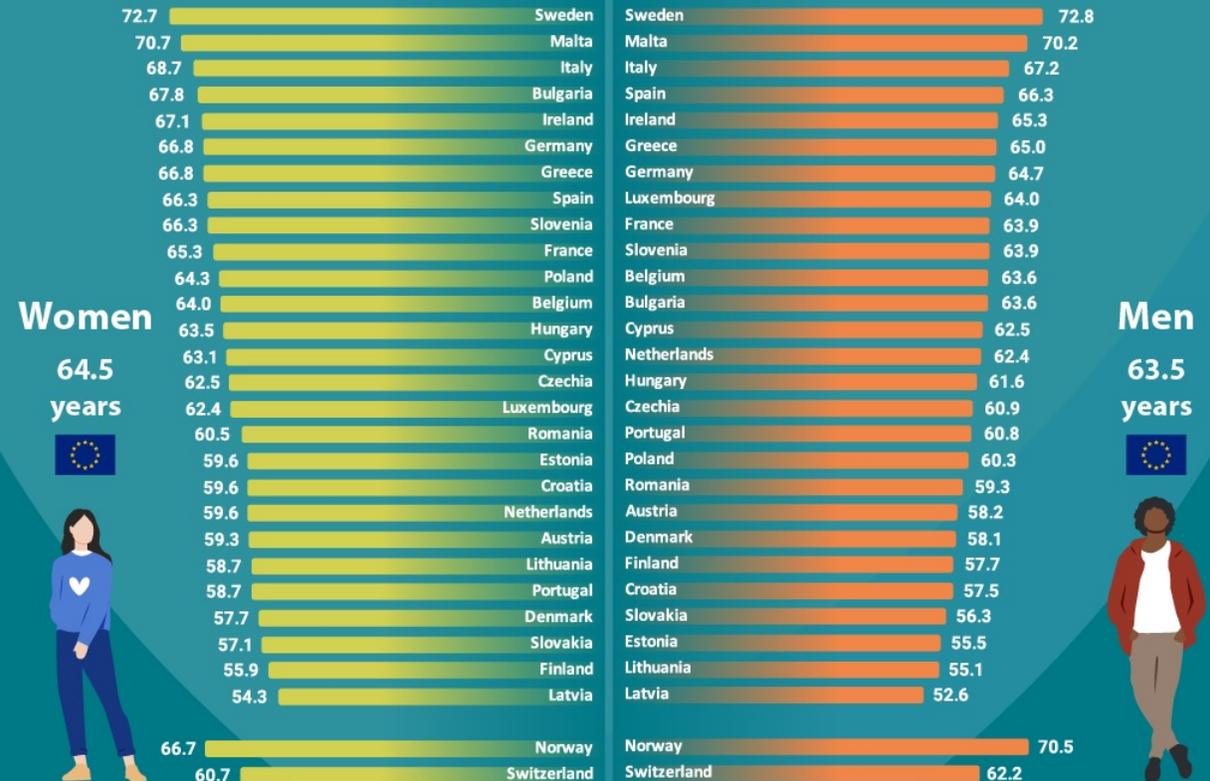
Sono 10 le dimensioni più usate dagli studi per definire e osservare l'invecchiamento in salute:

1. Disabilità/funzionalità fisica
2. Funzionamento cognitivo
3. Funzionalità sociale e produttiva
4. Soddisfazione della vita/benessere
5. Assenza di malattia
6. Longevità
7. Salute percepita
8. Personalità
9. Ambiente/risorse
10. Stato dell'invecchiamento percepito



## Healthy life years at birth (2020 data)

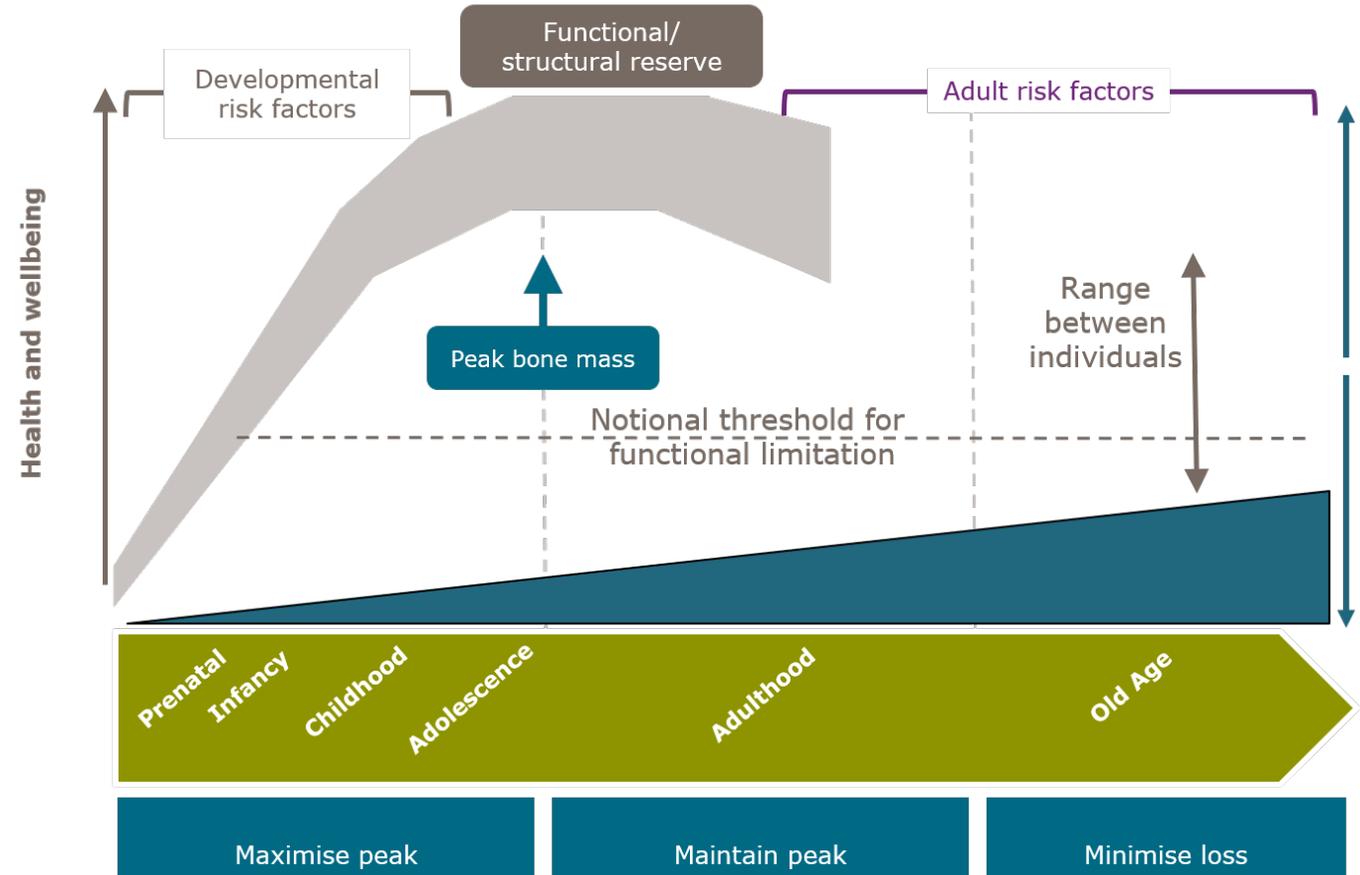
 **Healthy Life Years:**  
the number of years that a person is expected to live without an activity limitation (disability).



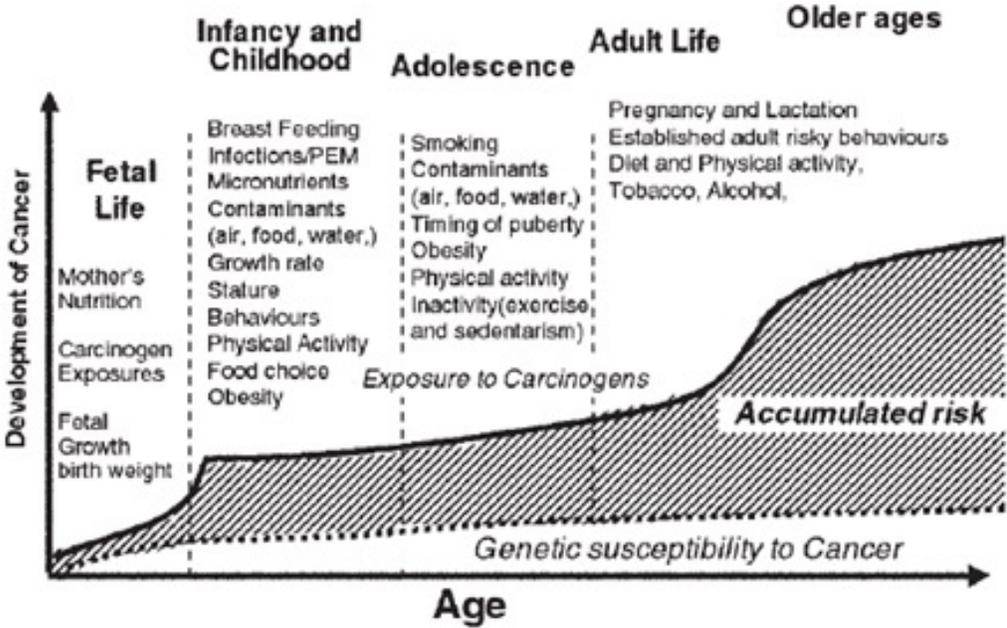
# Lifecourse epidemiology

L'epidemiologia *lifecourse* è lo studio dei processi biologici, comportamentali e psicosociali a lungo termine che correlano la salute e il rischio di malattia nell'adulto a esposizioni fisiche o sociali che agiscono durante la gestazione, l'infanzia, l'adolescenza e le diverse fasi della vita adulta o attraverso le generazioni.

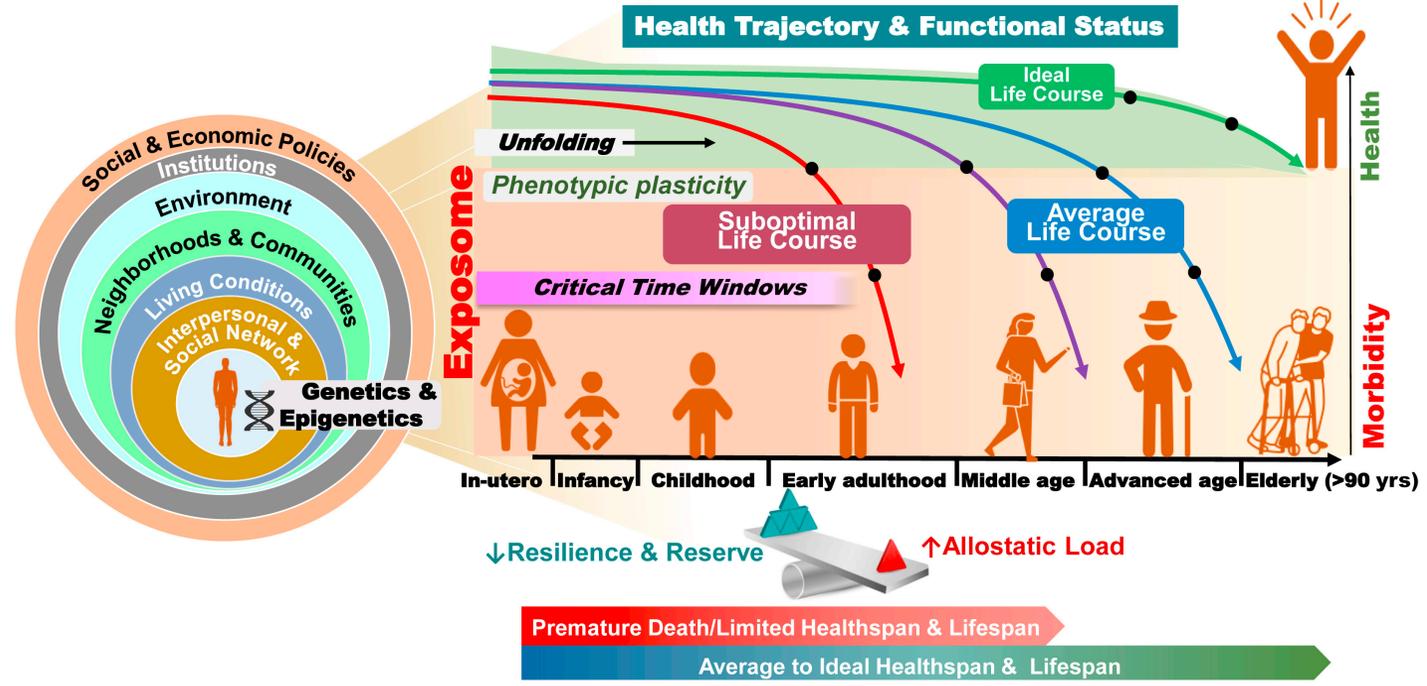
A lifecourse approach to healthy ageing:  
Maximise peak; minimise decline



# Lifecourse epidemiology applicata alle malattie croniche



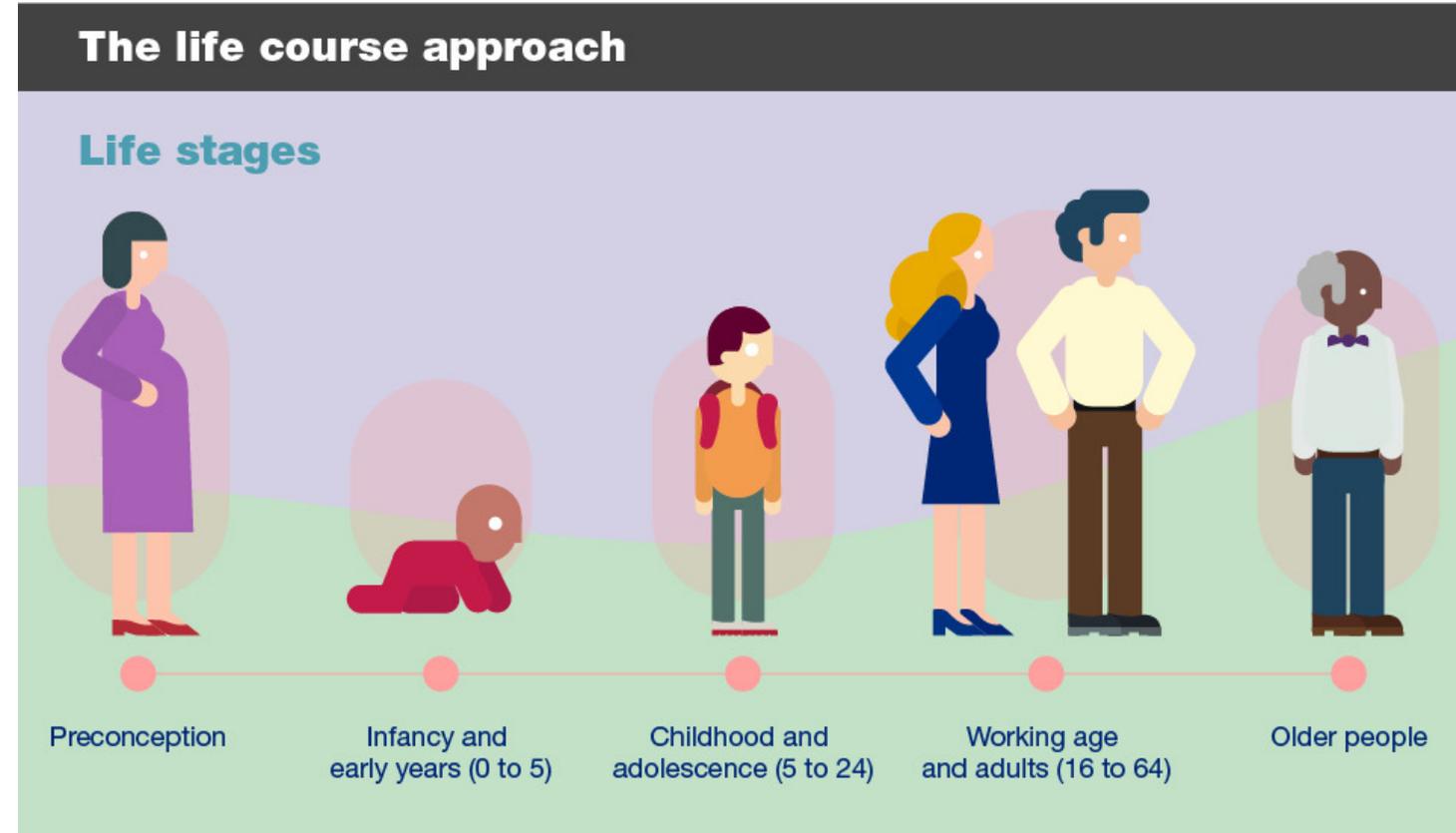
**FIGURE 3** Graph of the life-course prevention of cancer illustrates how nutritional factors at various stages of the life course, starting from fetal life, may affect the development of cancer. The underlying genetic susceptibility to cancer is modified by diet, nutrition, and other carcinogenic agents in the environment, determining the accumulated risk for cancer. Cancer prevention should include actions at every stage of the life course; the greatest potential to combat cancer effectively is through reduction of cumulative risk.



# Accumulo lifecycle delle esposizioni

L'epidemiologia *lifecourse* studia come le esposizioni durante l'infanzia, l'adolescenza e la prima età adulta influenzino il rischio di malattie nell'adulto e lo status socioeconomico, e quindi possa spiegare le disuguaglianze sociali nella salute e nella mortalità dell'adulto.

I determinanti di salute nelle diverse fasi della vita possono agire attraverso catene di rischio o influenzando l'esposizione a fattori causali nelle fasi precedenti della vita che fanno parte di catene biologiche o psicologiche di rischio a lungo termine.

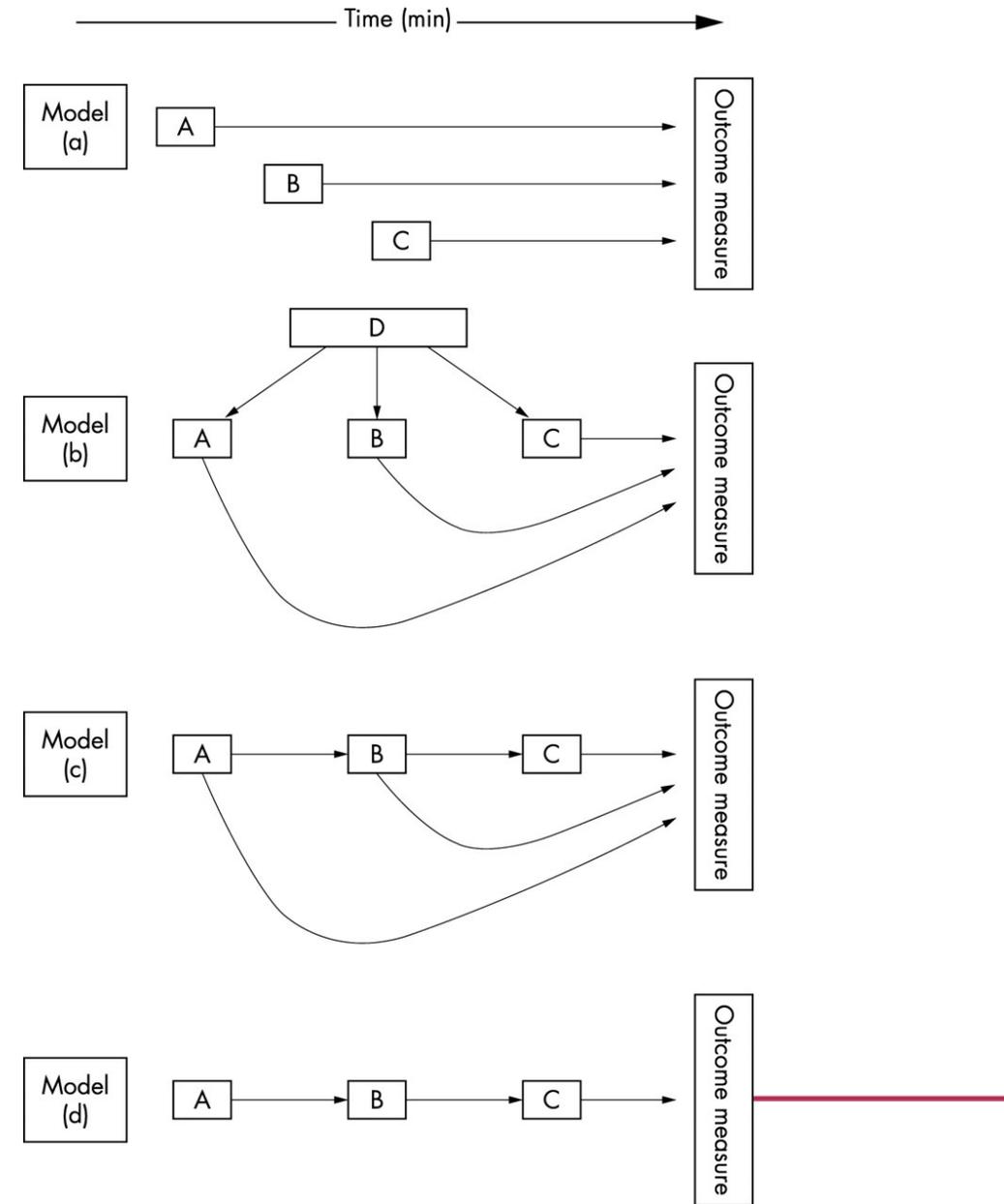


# Modelli di accumulo del rischio

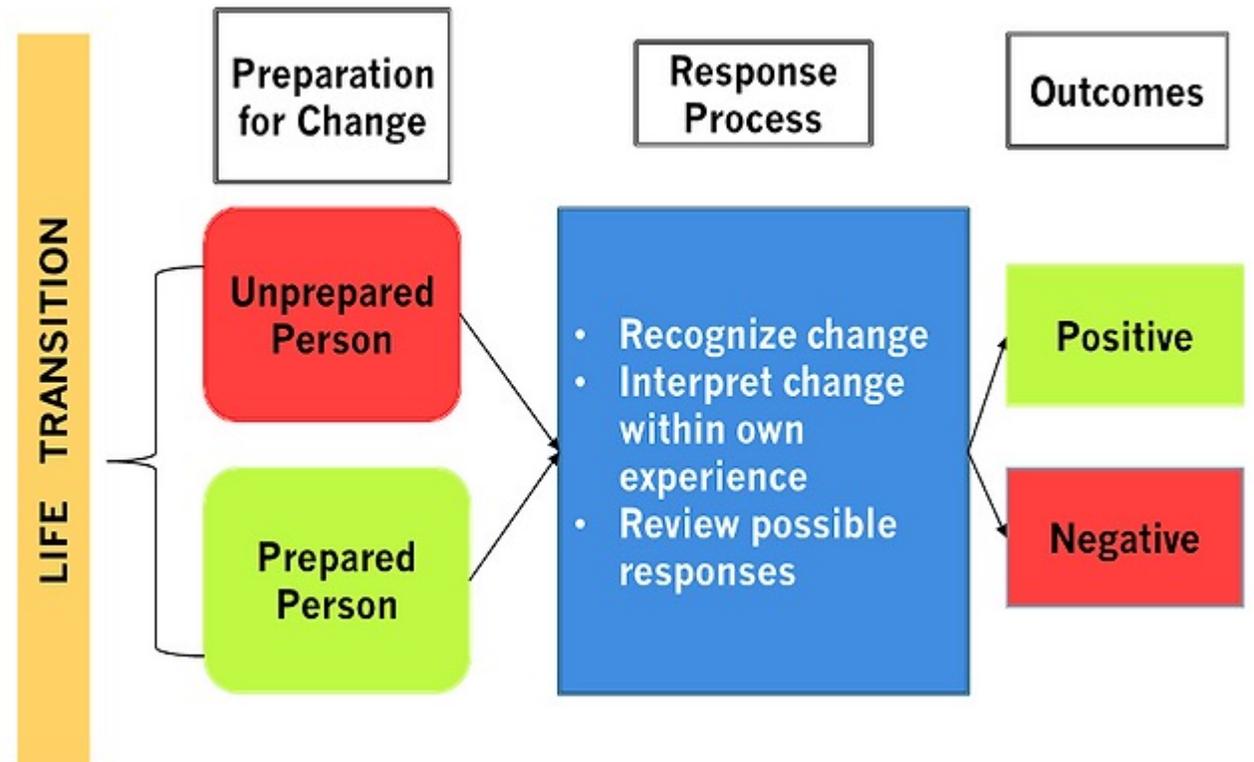
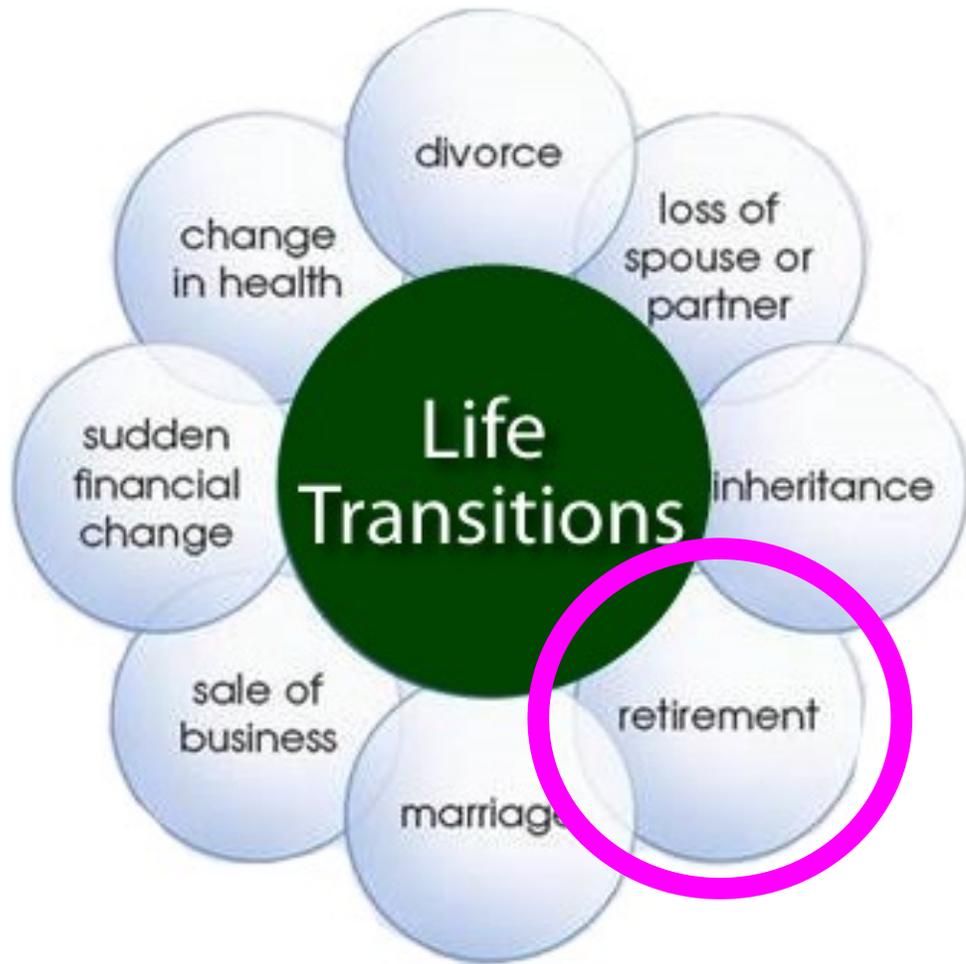
Le esposizioni nel corso della vita si accumulano gradualmente attraverso episodi di malattia e danno, condizioni ambientali avverse e comportamenti dannosi per la salute.

Uno degli scopi dell'epidemiologia *lifecourse* è verificare l'entità del danno cumulativo ai sistemi biologici con l'aumento del numero, della durata o della gravità delle esposizioni e con l'invecchiamento dei sistemi corporei, che diventano meno capaci di riparare i danni.

L'accumulo di diversi tipi di esposizione (ambientale, socioeconomica e comportamentale) può causare danni a lungo termine.



# Transizioni cruciali



I cambiamenti nelle esposizioni si sincronizzano con le transizioni cruciali nel corso della vita con esiti positivi o negativi che influenzano le probabilità di una vita e un invecchiamento in salute.



# Transizioni cruciali e prevenzione

Poiché le transizioni nel corso di vita tendono a determinare cambiamenti negli stili di vita e nella salute fisica e mentale, la sincronizzazione con gli interventi di sanità pubblica (**PREVENZIONE E PROMOZIONE DELLA SALUTE**) potrebbe essere un approccio efficace.



# La transizione dalla vita lavorativa attiva al pensionamento

I modelli teorici cercano di spiegare tutte le diverse dimensioni coinvolte nella transizioni e gli effetti sui possibili esiti.

Il pensionamento, collocandosi al termine della vita adulta, coinvolge e riassume decenni di esposizioni accumulate.

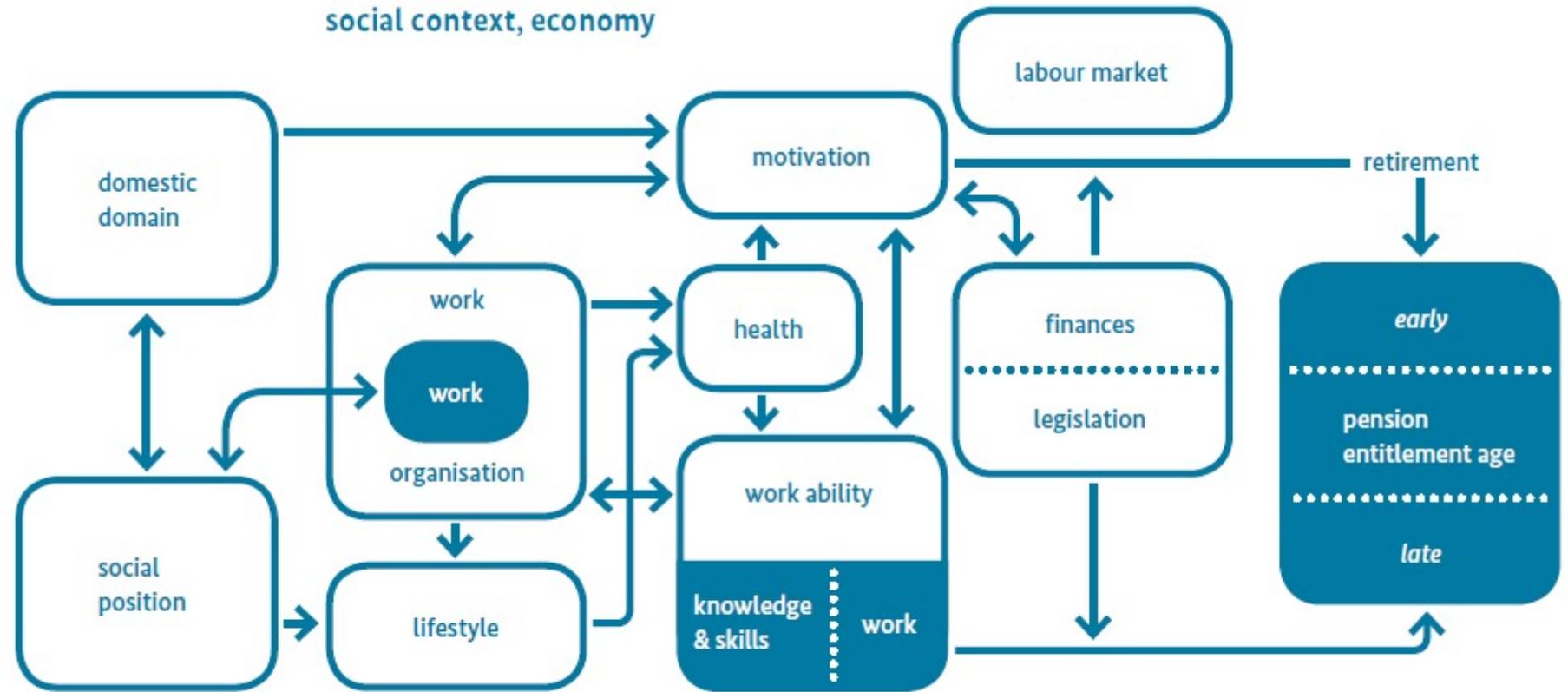
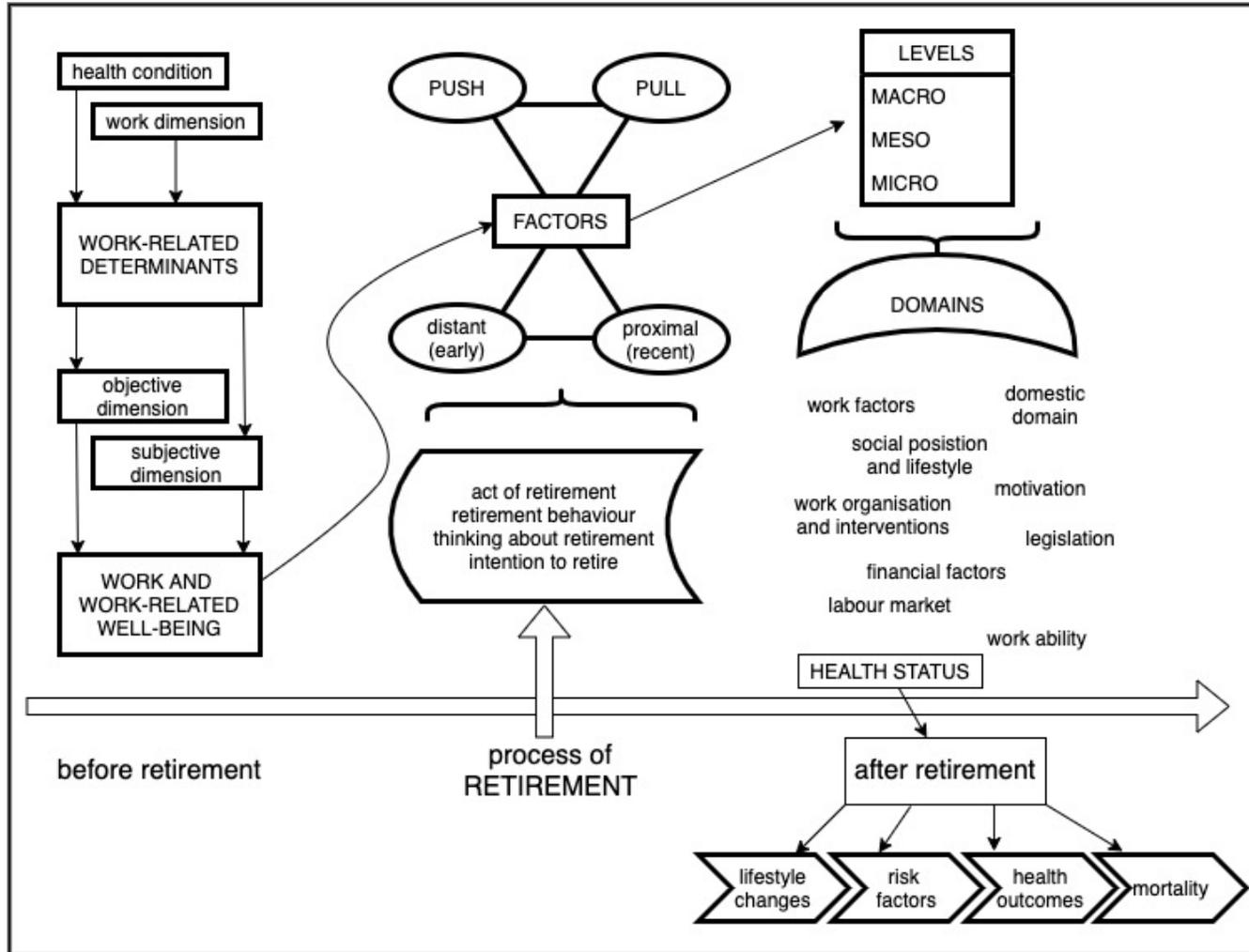


Figure 2: The "lidA conceptual framework on work, age and employment" (adapted to JPI UEP) (source: Hasselhorn & Peter 2013<sup>25</sup>, Peter & Hasselhorn, 2013<sup>49</sup>; modified)



# Transition to retirement: una proposta di modello



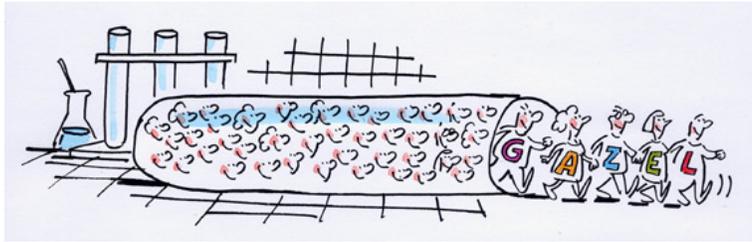
Costruito sulla base della letteratura disponibile sul tema, che si basa su importanti studi condotti su coorti molto differenti.

Alcuni esempi:

1. GAZEL study
2. Whitehall I e II
3. SHARE



# Lo studio GAZEL

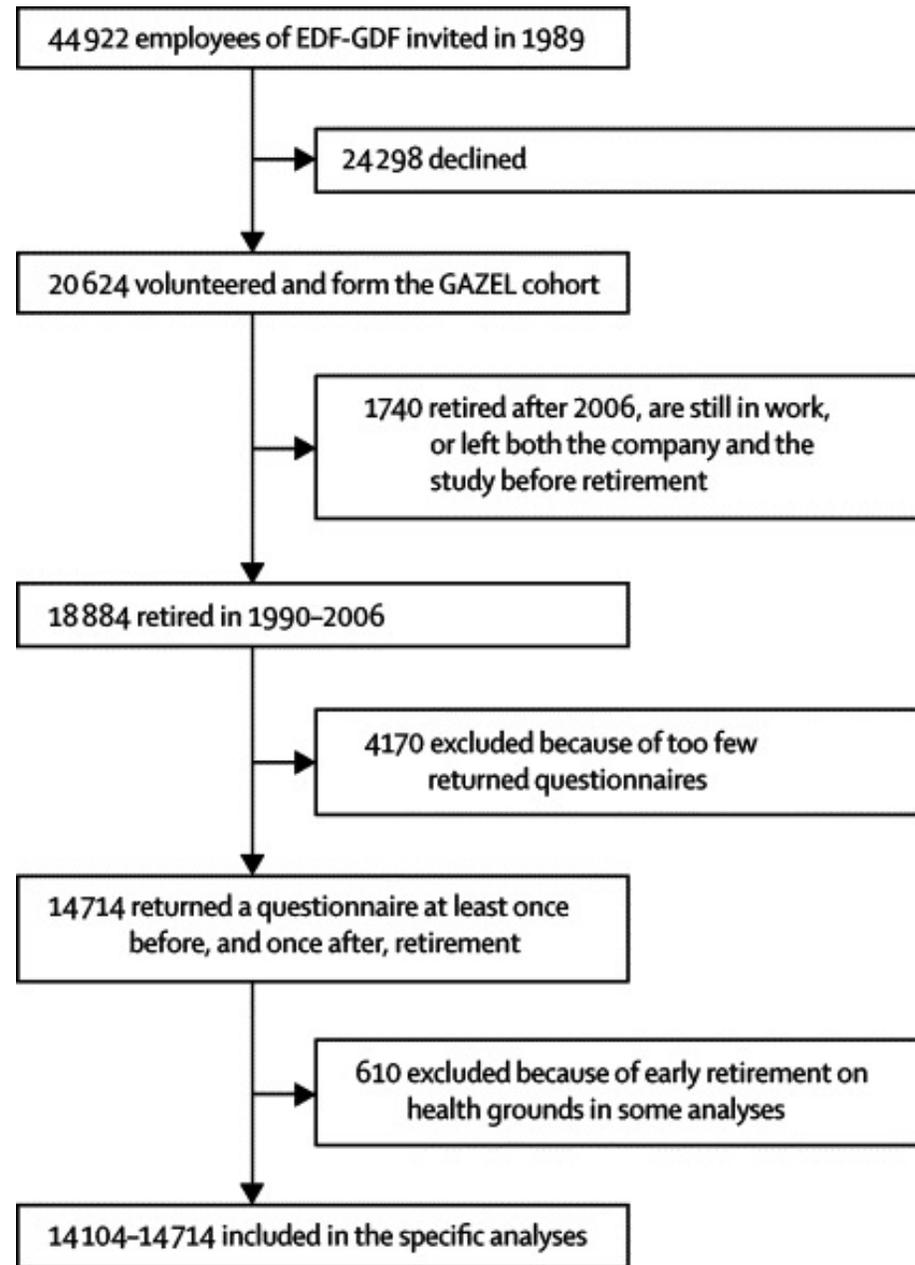


La coorte GAZEL è stata creata nel 1989 dall'Unità 88 dell'**Inserm**, in collaborazione con diversi dipartimenti dell'EDF-GDF.

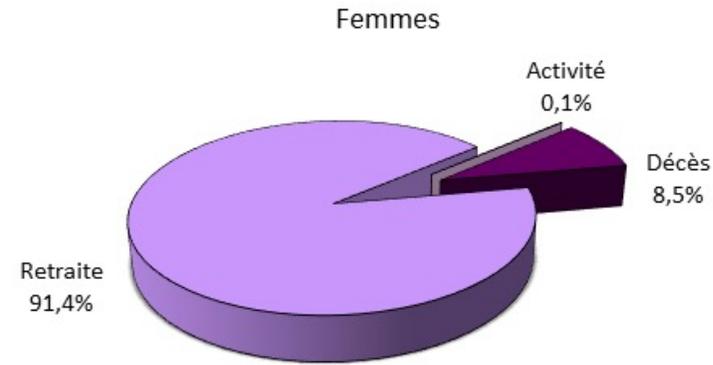
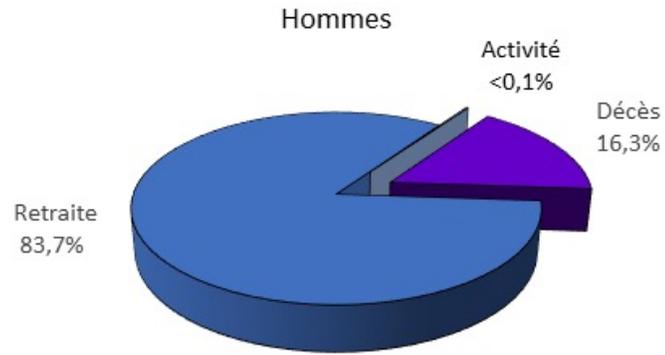
Grazie alla partecipazione dei 20.000 volontari di Electricité de France e Gaz de France che la compongono e al sostegno dei suoi partner, questa coorte è un importante ancora oggi un esempio cruciale di « **laboratorio epidemiologico aperto** », costruito grazie alla collaborazione tra enti di ricerca e grandi aziende.



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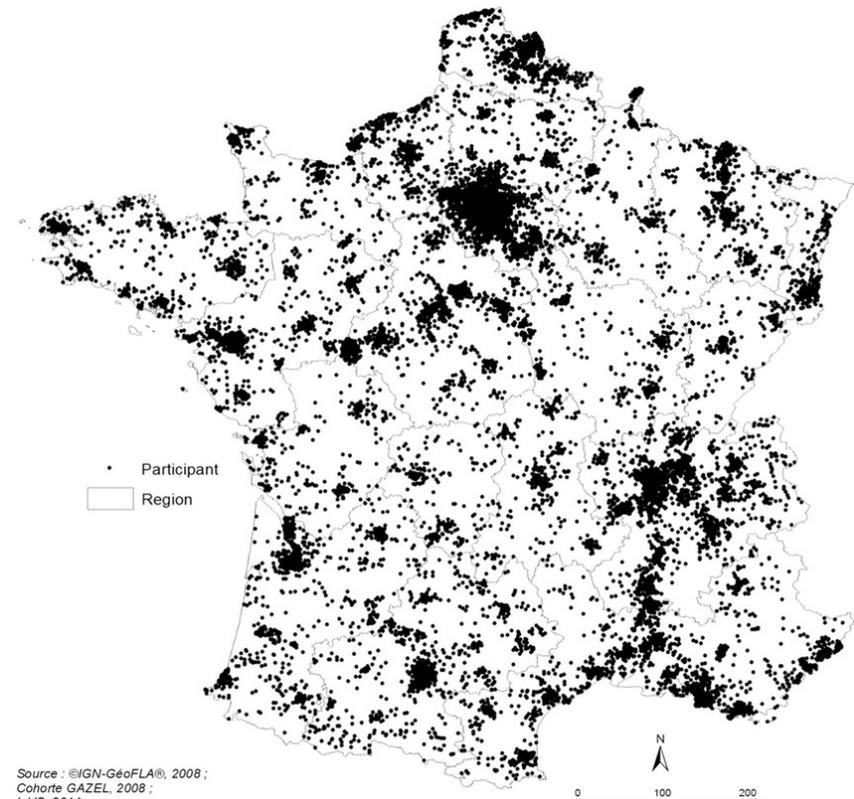


# Lo studio GAZEL: una coorte di lavoratori e pensionati

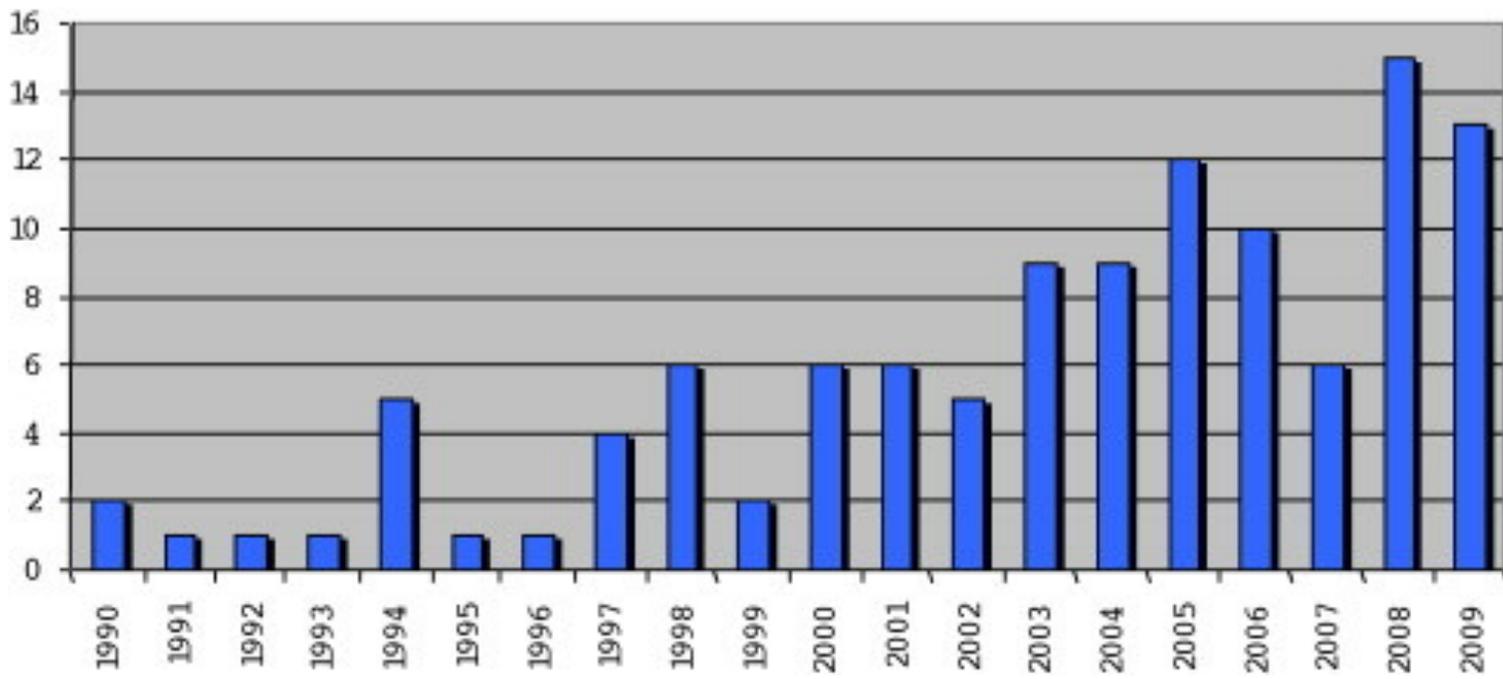


## Fonti dei dati:

- Questionario annuale autosomministrato
- Servizi medici aziendali
- Dipartimenti del personale di EDF e GDF
- Il Centro di Epidemiologia delle Cause Mediche di Morte (CépiDc)



# Lo studio GAZEL: un successo scientifico



Numero di studi pubblicati annualmente



# Whitehall I e II: London civil servants

LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE



## The Whitehall Study Collection

The Whitehall Study was a longitudinal health survey of male civil servants that began in the 1960s. The papers from the collection are available to view by appointment in the LSHTM Library & Archives Service.

Population: **18,403**

Around **75%** of the chosen sample agreed to participate.

middle-aged male Civil Servants in London volunteered for the study.



The sample included civil servants from

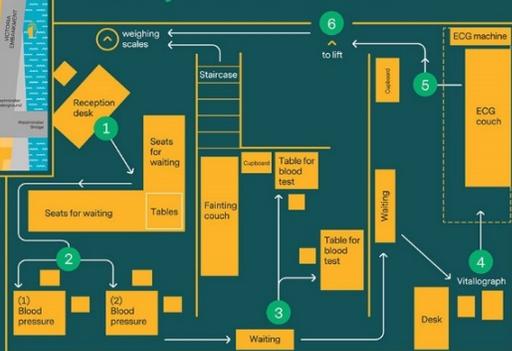
**37**



departments including the British Museum, Diplomatic Service, Inland Revenue, Ministry of Defence, Ministry of Public Building and Works, Ministry of Power, and Scotland Yard.



### Survey in Civil Service



- Station 1:** Check appointment time. Measure height and weight
- Station 2:** Measure blood pressure, triceps skinfold thickness and check questionnaire
- Station 3:** Take blood samples (0.1ml for blood sugar/0.5ml cholesterol)
- Station 4:** Vitalograph (FEV.1.0) F.V.C.
- Station 5:** Electrocardiogram
- Station 6:** X-ray examination

Appointment



2 subjects every 5 minutes



24 subjects every hour



Max 72 per morning



Average 60 per morning



300 per week

### Employment grade and mortality

The article 'Employment grade and coronary heart disease in British Civil Servants by Marmot et al (1982)' was the first paper to show evidence of the effect of the social gradient on mortality rates. Civil Servants in the lowest grade [Messengers] were 3.6 more times likely to have higher coronary heart disease mortality than the highest grade [Administrators].

Those in the lower grade were more likely to display various risks factors associated with the disease such as high blood pressure, high cholesterol and being current smokers. The study also showed that these men were also more likely to be overweight and shorter than their colleagues. Notably, men in the 'other' grade were on average 5cm shorter than men in the administrative grade.



### Car ownership and mortality



Davey Smith et al (1990) showed that by combining the indices of car ownership and employment grades, mortality risk increased further still to 4:3 between the highest grade car owners and the lowest grade non-owners.

### Exercise and mortality

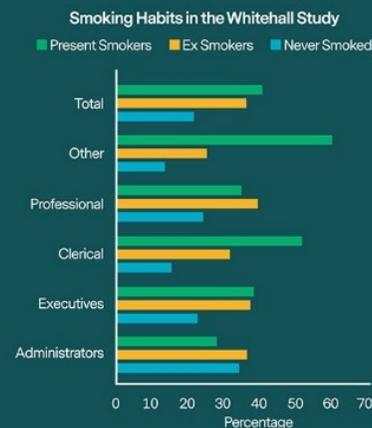
Greater levels of physical activity were associated with an inverse association with mortality in a 40-year follow-up [Batty et al. 2010]. The data was based on the later modified questionnaire that asked subjects about their walking pace and hobbies.



### Smoking and mortality

The number of cigarette smokers in the original cohort of the Whitehall Study was 5,272 with 41.1% classing themselves as active smokers. A group of active cigarette smokers was chosen for the smoking cessation intervention study, with the results after one year showing 63% had quit.

The 10-year follow-up did not show a great difference in the rate of mortality between the control and treatment group. However on the 20-year follow-up, a 3% difference was reported, with the best estimate that out of a hundred men over six to ten would be in consequence alive 20 years later [Rose et al. 1992].



# SHARE: la più grande infrastruttura di ricerca europea

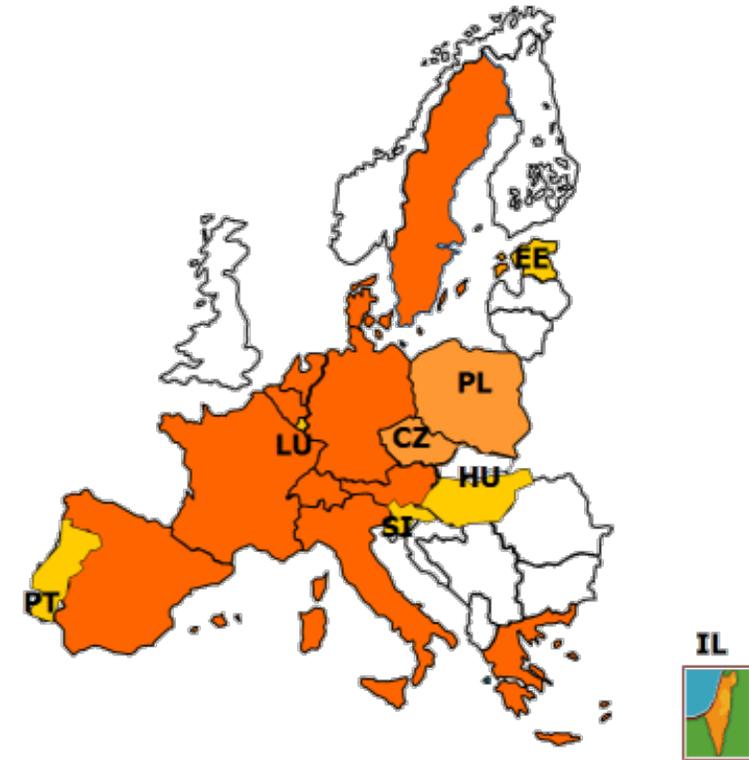


Wave 1 : 2004/05  
**11 countries,**  
32 000 individuals 50+

Wave 2 : 2006/07  
**15 countries,**  
38 000 individuals

Wave 3 : 2008/09  
**16 countries,**  
43 000 individuals

Wave 4 : 2010/11  
**20 countries,**  
60 000 individuals



This project has received funding from the European Union under grant agreements No 101102412 and the European Union's Horizon 2020 research and innovation programme under grant agreements No 870628, No 101015924.

# ATHLOS: come armonizzare la ricerca globale sull'invecchiamento



# ATHLOS



International Journal of Epidemiology, 2019, 1–11  
doi: 10.1093/ije/dyz077  
Cohort Profile



## Cohort Profile

### Cohort profile: The Ageing Trajectories of Health – Longitudinal Opportunities and Synergies (ATHLOS) project

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Editorial decision 21 March 2019; Accepted 1 April 2019

**Table 1.** List of studies included in the ATHLOS project

Studies	Countries/populations <sup>d</sup>	Recruitment <sup>d</sup>	Refreshment	
Acronym	Name			
10/66	The 10/66 Dementia Research Group Population-Based Cohort Study	Cuba, India, China, Dominican Republic, Venezuela, Peru, Mexico and Puerto Rico	All 65+ respondents in a household	No
ALSA	The Australian Longitudinal Study of Aging	Australia: Participants drawn from the South Australian Electoral Roll	All 65+ respondents in a household	No
ATTICA	The ATTICA Study	Greece: Metropolitan Athens area	18+ participants	No
CHARLS	The China Health and Retirement Longitudinal Study	China: All counties except Tibet	45+ participants and spouses	Wave 2
COURAGE	Collaborative Research on Ageing in Europe	Spain and Poland	18+ participants	No
ELSA	The English Longitudinal Study of Ageing	UK and Northern Ireland	50+ participants and spouses	Wave 3, 4, 6
ENRICA	Study on Cardiovascular Health, Nutrition and Frailty in Older Adults in Spain	Spain	60+ participants	No
HAPIEE	The Health, Alcohol and Psychosocial factors in Eastern Europe Study	Poland, Czech Republic and Lithuania	45–69 participants	No
HEALTH 2000-11	The Health 2000–2011 Survey	Finland	30+ participants	Wave 2
HRS	The Health and Retirement Survey	United States: 6 birth sub-cohorts	50+ participants and spouses	All waves
JSTAR	The Japanese Study of Aging and Retirement	Japan: 5 cities sub-cohort, 2 cities sub-cohort and 3 cities sub-cohort <sup>b</sup>	50–75 participants	No
KLOSA	The Korean Longitudinal Study of Ageing	South Korea	45+ participants and spouses	No
MHAS	The Mexican Health and Aging Study	Mexico	50+ participants and spouses	Wave 3
SAGE	WHO Study on Global Ageing and Adult Health	South Africa, Ghana, China, India, Russia and Mexico	All 50+ respondents in a household (small sample 18+)	No
SHARE	The Survey of Health, Ageing and Retirement in Europe	20 countries <sup>c</sup>	50+ participants and spouses	All waves
TILDA	The Irish Longitudinal Study of Ageing	Ireland	50+ participants and spouses	No
UBCOS	The Uppsala Birth Cohort Multigenerational Study	Sweden: Births at the Uppsala Academic Hospital between 1915 and 1929	Hospital records, census records, and register data. Spouses, descendants and spouses of descendants	Descendants cohort

<sup>a</sup>Although several studies were conducted in the same countries, the probability that the same individual participated in more than one study is likely very small because all study designs included a probability sample from the general population.

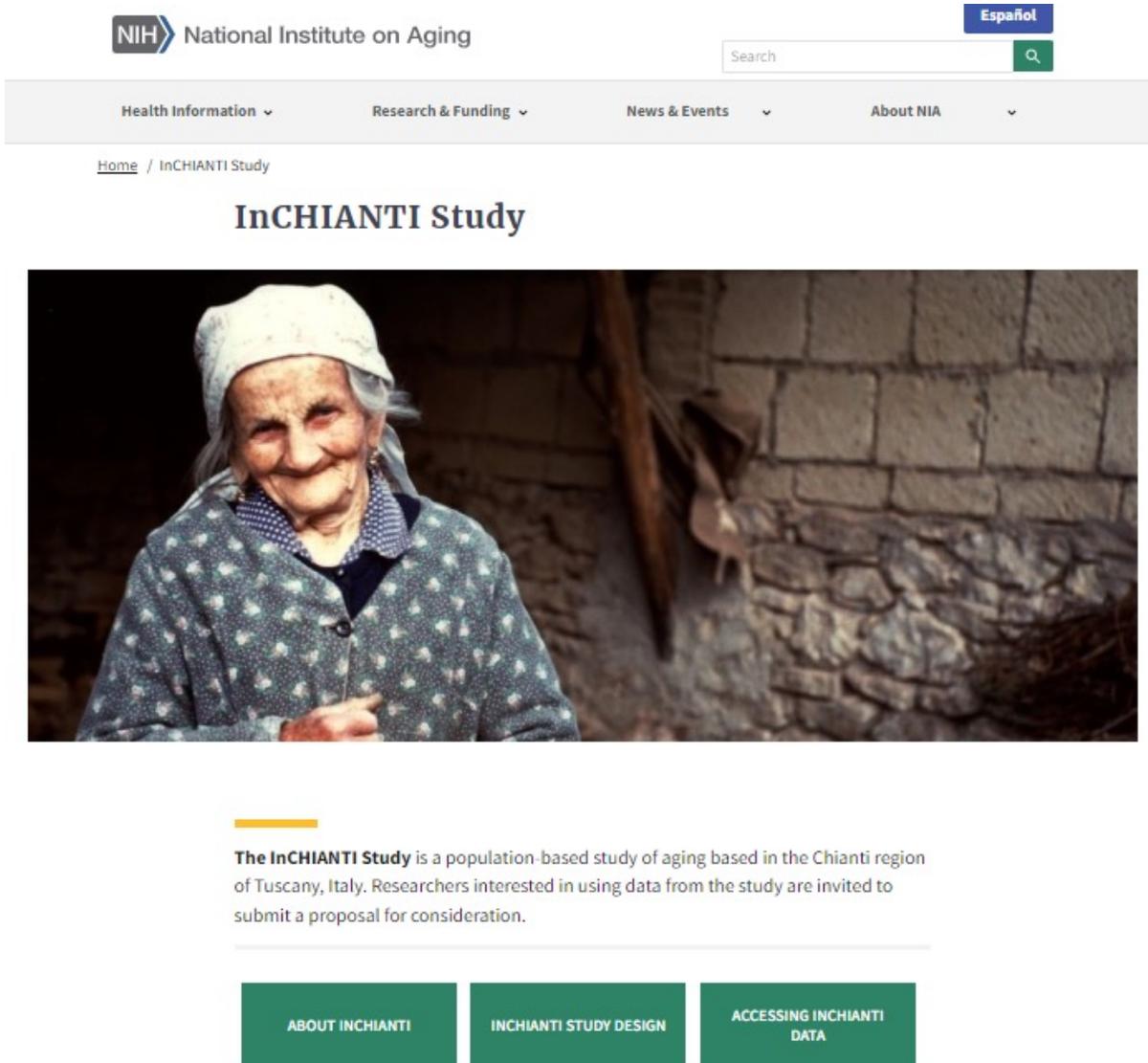
<sup>b</sup>5 cities: Adachi-Kanazawa-Shirakawa-Sendai-Takikawa; 2 cities: Tosu-Naha; 3 cities: Chofu-Tondabayashi-Hiroshima.

<sup>c</sup>Countries included in the SHARE study from waves 1 to 5: Denmark, Sweden, Austria, France, Germany, Switzerland, Belgium, the Netherlands, Spain, Italy, Greece, Israel, Czech Republic, Poland, Ireland, Estonia, Hungary, Slovenia, Portugal and Luxembourg.

<sup>d</sup>Values are ages in years.



# In Italia: INCHIANTI study e ILSA



The screenshot shows the NIH National Institute on Aging website. At the top, there is a search bar and a language selector set to "Español". Below the navigation menu, the page title is "InCHIANTI Study". A large photograph of an elderly woman wearing a white headscarf and a blue patterned cardigan is featured. Below the photo, a text box explains that the InCHIANTI Study is a population-based study of aging based in the Chianti region of Tuscany, Italy. At the bottom, there are three green buttons: "ABOUT INCHIANTI", "INCHIANTI STUDY DESIGN", and "ACCESSING INCHIANTI DATA".

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## InCHIANTI Study



**The InCHIANTI Study** is a population-based study of aging based in the Chianti region of Tuscany, Italy. Researchers interested in using data from the study are invited to submit a proposal for consideration.

[ABOUT INCHIANTI](#) [INCHIANTI STUDY DESIGN](#) [ACCESSING INCHIANTI DATA](#)

> *Aging (Milano)*. 1994 Dec;6(6):464-73. doi: 10.1007/BF03324279.

## The Italian Longitudinal Study on Aging (ILSA): design and methods



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Affiliations + expand

PMID: 7748921 DOI: [10.1007/BF03324279](https://doi.org/10.1007/BF03324279)



Access Options



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### Abstract

The Italian Longitudinal Study on Aging (ILSA) is a population-based, longitudinal study of the health status of Italians aged 65–84 years. The main objectives of ILSA are the study of the prevalence and incidence rates of common chronic conditions in the older population, and the identification of their risk and protective factors. ILSA is also designed to assess age-associated physical and mental functional changes. A random sample of 5632 individuals, stratified by age and gender using the equal allocation strategy, was identified on the demographic lists of the registry office of eight municipalities: Genova, Segrate (Milano), Selvazzano-Rubano (Padova), Impruneta (Firenze), Fermo (Ascoli Piceno), Napoli, Casamassima (Bari), and Catania. An extensive investigation, including interviews, physical exams, and laboratory tests, was conducted at baseline to identify the presence of cardiovascular disease (ischemic heart disease, hypertension, congestive heart failure, arrhythmia, intermittent claudication), diabetes, impaired glucose tolerance, thyroid dysfunction, dementia, parkinsonism, stroke, and peripheral neuropathy, as well as assess physical and mental functional status. The baseline examination was carried out between March 1992 and June 1993; a second comprehensive examination will begin in March 1995. An interim hospital discharge data survey and a mortality survey are currently ongoing to assess the hospitalization rate and the cause-specific mortality rate in this study cohort.

# Altre possibili fonti: Sistema Statistico Nazionale



L'indagine PLUS (Participation, Labour, Unemployment Survey) è una rilevazione campionaria nazionale ricorrente.



## RAPPORTO PLUS 2022

# Il progetto CARIPLO

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Pension reforms and spatial-temporal patterns in healthy ageing in Lombardy:  
quasi-natural experimental analysis of linked health and pension data in  
comparative Italian and European perspective

## Obiettivo generale

Valutare l'impatto dei **determinanti legati al lavoro e al pensionamento** su diverse dimensioni della salute e del benessere della popolazione anziana in Lombardia, rispetto al resto d'Italia e d'Europa, in modo da fornire evidenze utili per pianificare, implementare e valutare **programmi di prevenzione e politiche di welfare mirate**.

# Gli studi condotti

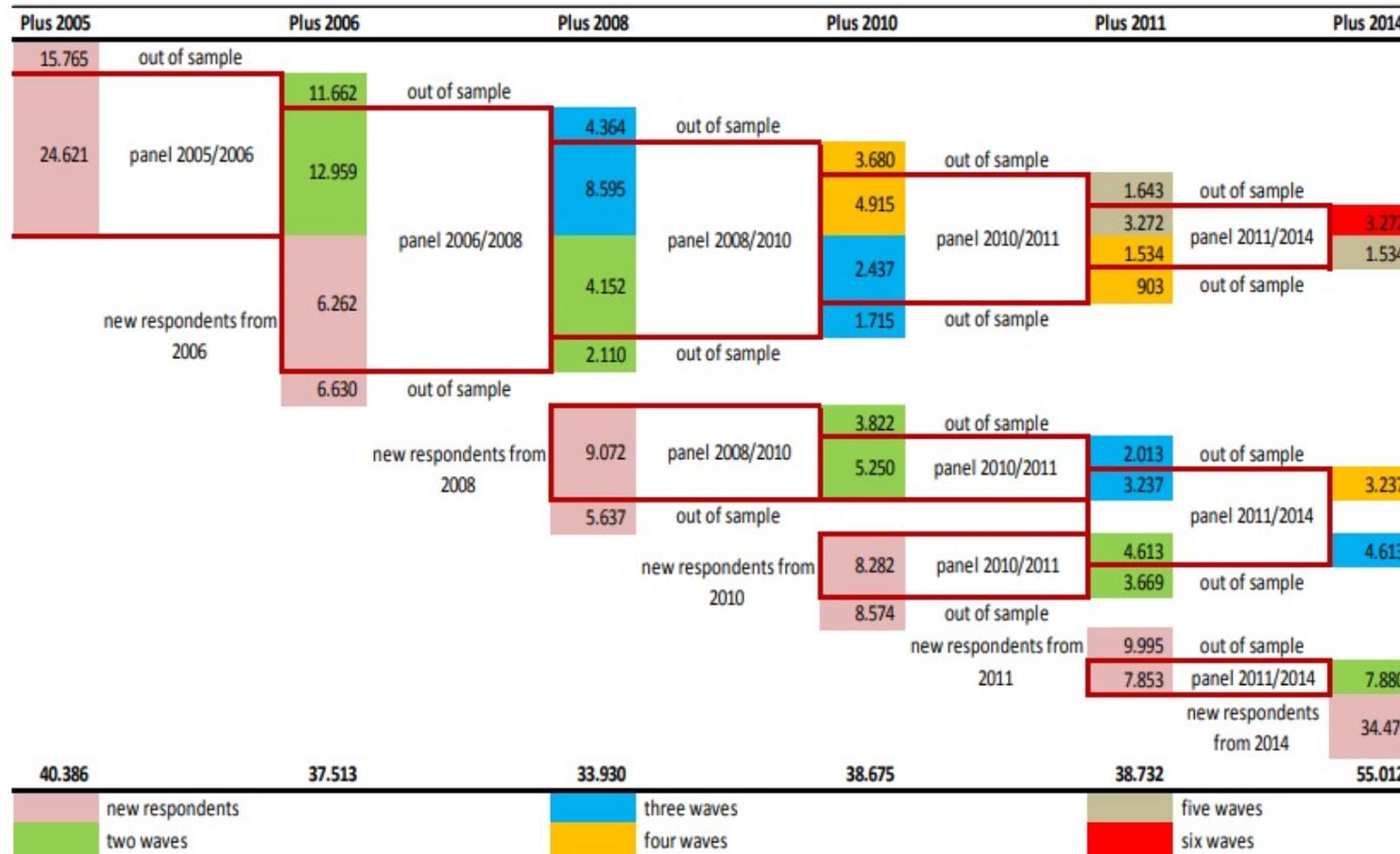
SFIDE E OPPORTUNITÀ PER UN HEALTH AGING 30 NOVEMBRE 2022

- 1. INAPP PLUS: una coorte di pensionati italiana**
- 2. Una coorte SHARE di pensionati: fattori di rischio comportamentali**
- 3. Impatto del pensionamento sulla salute mentale: SR**
- 4. Una coorte SHARE di pensionati: salute mentale**



- 1. INAPP PLUS: una coorte di pensionati italiana**
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# Fonte dei dati: PLUS (Participation, Labour, Unemployment, Survey)



+ wave PLUS 2016

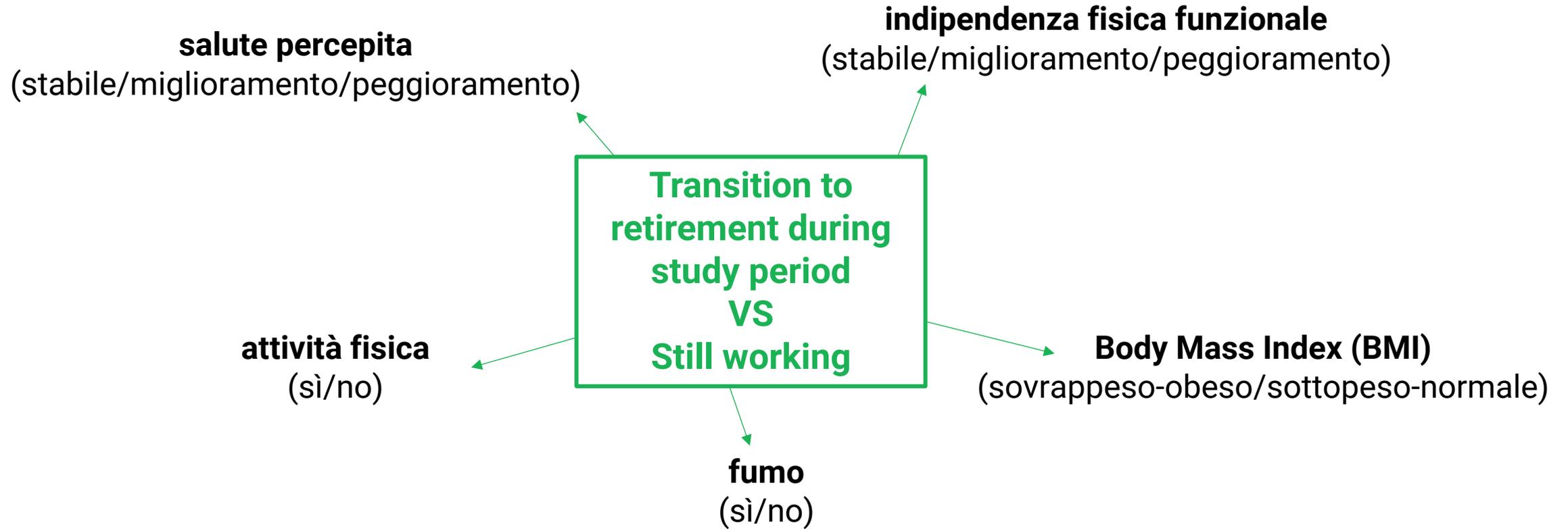
+ wave PLUS 2018

**5.169** soggetti 55-70 anni dal record linkage

**1.653** pensionati tra il 2010 e il 2018 (**esposti**, 32%)

**3.516** che non sono andati in pensione durante il follow-up (**non esposti**, 68%)

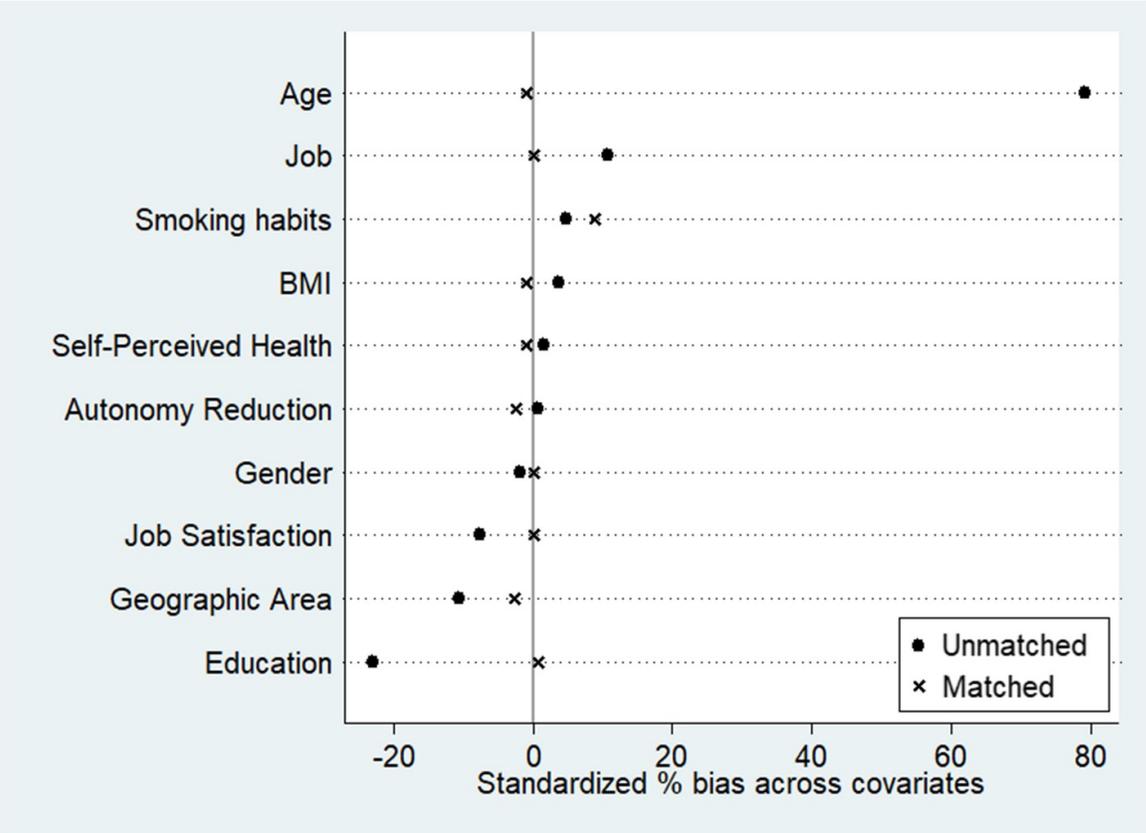
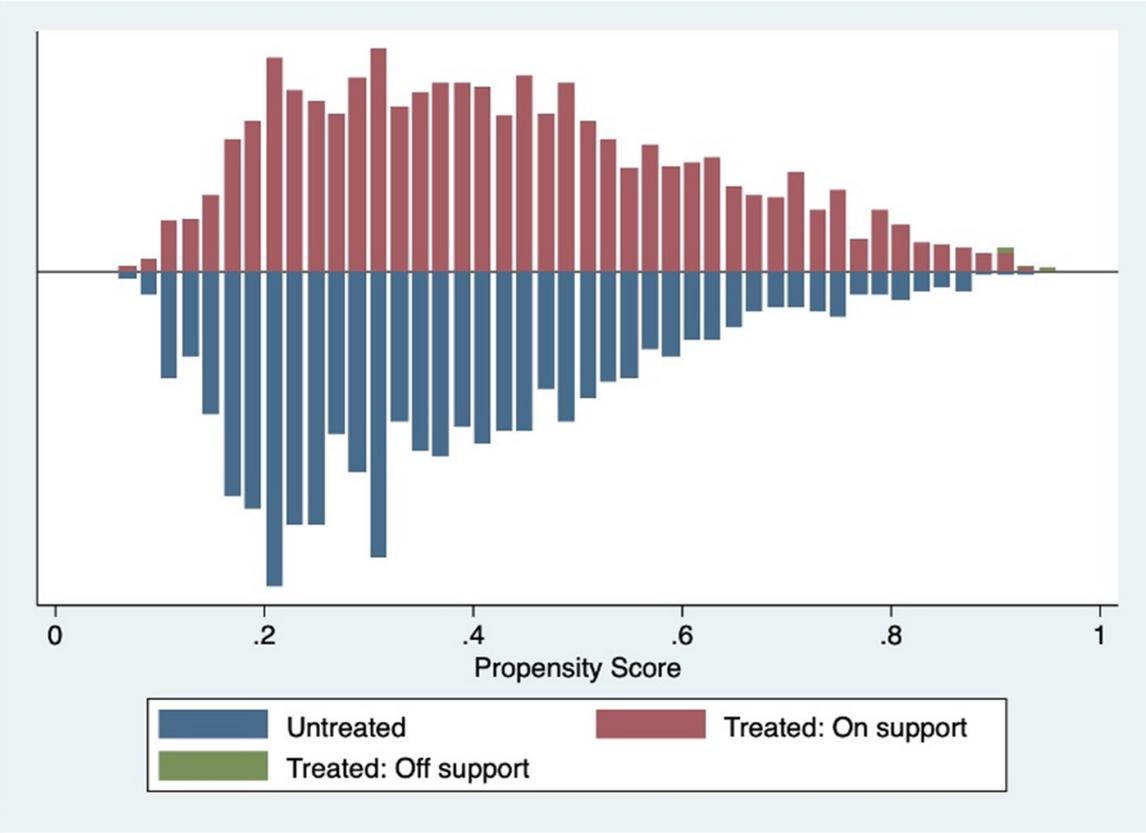
# Esposizione e outcome di interesse



RRR della transizione al pensionamento **confrontando T1 e T0**, usando modelli di regressione logistica multinomiale



# Propensity Score Matching



# Risultati principali

**Table 2** Relative-risk ratios and 95% confidence interval from logistic regression for the association between status and outcomes

Outcomes	Exposed <sup>a</sup> n. (%)	Unexposed n. (%)	RRR	95% CI	p-value
<b>Health status change</b>					
No change	773 (47.3%)	844 (51.6%)	1.00		
Worsening	465 (28.4%)	448 (27.4%)	1.13	0.92–1.40	0.25
Improvement	397 (24.3%)	343 (21.0%)	1.26	1.02–1.58	0.04*
<b>BMI</b>					
Underweight-normal (< 25)	762 (46.6%)	747 (45.7%)	1.00		
Overweight-obese (≥25)	873 (53.4%)	888 (54.3%)	0.96	0.81–1.15	0.68
<b>Current smoker</b>					
No	1284 (78.8%)	1317 (81.4%)	1.00		
Yes	345 (21.2%)	301 (18.6%)	1.18	0.94–1.46	0.15
<b>Sport habit</b>					
No	1022 (62.7%)	1124 (69.5%)	1.00		
Yes	608 (37.3%)	493 (30.5%)	1.36	1.12–1.64	< 0.01*
<b>Physical functioning change</b>					
No change	1464 (89.5%)	1501 (91.8%)	1.00		
Worsening	91 (5.6%)	58 (3.5%)	1.62	1.09–2.40	0.02*
Improvement	80 (4.9%)	76 (4.7%)	1.08	0.73–1.61	0.71

<sup>a</sup>transitioned to retirement

RRR Relative-risk ratio, BMI Body mass index

RRR 1,26 per il miglioramento dello stato di salute percepito

RRR 1,36 per l'attività fisica

RRR 1,62 per il peggioramento dell'indipendenza funzionale



UNIVERSITÀ DI PAVIA

RESEARCH

Open Access



## Transition to retirement impact on health and lifestyle habits: analysis from a nationwide Italian cohort

Giacomo Pietro Vigezzi<sup>1</sup>, Giovanni Gaetti<sup>1</sup>, Vincenza Gianfredi<sup>1</sup>, Beatrice Frascella<sup>1</sup>, Leandro Gentile<sup>2</sup>, Angelo d'Errico<sup>3</sup>, David Stuckler<sup>4</sup>, Fulvio Ricceri<sup>5</sup>, Giuseppe Costa<sup>5</sup>, Anna Odone<sup>6\*</sup>, on behalf of the Italian Working Group on Retirement and Health

### Abstract

**Background:** Retirement is a life-course transition likely to affect, through different mechanisms, behavioural risk factors' patterns and, ultimately, health outcomes. We assessed the impact of transitioning to retirement on lifestyle habits and perceived health status in a nationwide cohort of Italian adults.

**Methods:** We analysed data from a large cohort of Italian adults aged 55–70, derived from linking six waves of the Participation, Labour, Unemployment Survey (PLUS), a national survey representative of the Italian workforce population, conducted between 2010 and 2018. We estimated relative-risk ratios (RRR) of transition to retirement and their corresponding 95% confidence intervals (CIs) for selected behavioural risk factors and health outcomes using multivariable logistic regression models. We used propensity score matching (PSM) to account for potential confounders.

**Results:** We included 5169 subjects in the study population, of which 1653 retired between 2010 and 2018 (exposed, 32%). Transition to retirement was associated with a 36% increased probability of practising sports (RRR 1.36, 95% CI 1.12–1.64). No statistically significant changes were reported for smoking habit (current smoker RRR: 1.18, 95% CI 0.94–1.46) and BMI (overweight/obese RRR: 0.96, 95% CI 0.81–1.15). Overall, retiring was associated with improved self-rated health status (RRR 1.26, 95% CI 1.02–1.58).

**Conclusion:** Individual data-linkage of multiple waves of the PLUS can offer great insight to inform healthy ageing policies in Italy and Europe. Transition to retirement has an independent effect on perceived health status, physical activity and selected behavioural risk factors. It should be identified as a target moment for preventive interventions, with particular reference to primary prevention so as to promote health and wellbeing in older ages.

**Keywords:** Ageing, Retirement, Physical activity, Self-rated health, Cohort study, Health behaviour

- la pensione ha **effetti positivi significativi sull'attività fisica volontaria**
- la pensione potrebbe influenzare il consumo di tabacco, anche se i risultati sono ancora inconcludenti
- gli studi riportano prove contrastanti sul BMI: il BMI sembra aumentare nei gruppi socioeconomici più bassi o non subire variazioni in quelli più alti
- un **effetto positivo del pensionamento sullo stato di salute autopercepito** è stato descritto anche da altri studi europei basati su dati prospettici, come la coorte francese GAZEL e lo studio Whitehall II
- l'indipendenza funzionale sembra declinare senza differenze significative tra i soggetti ancora in attività e quelli in pensione



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# Obiettivi della coorte

Quantificare **l'impatto della transizione verso il pensionamento** sui **fattori di rischio comportamentali** (ad esempio, l'abitudine al fumo), concentrandosi su finestre temporali pre e post-pensionamento e stimando gli **effetti a breve e a lungo termine**, in un'ampia coorte di adulti europei di 50 anni o più.



# Coorte di pensionati – data merge delle ondate da 1 a 8

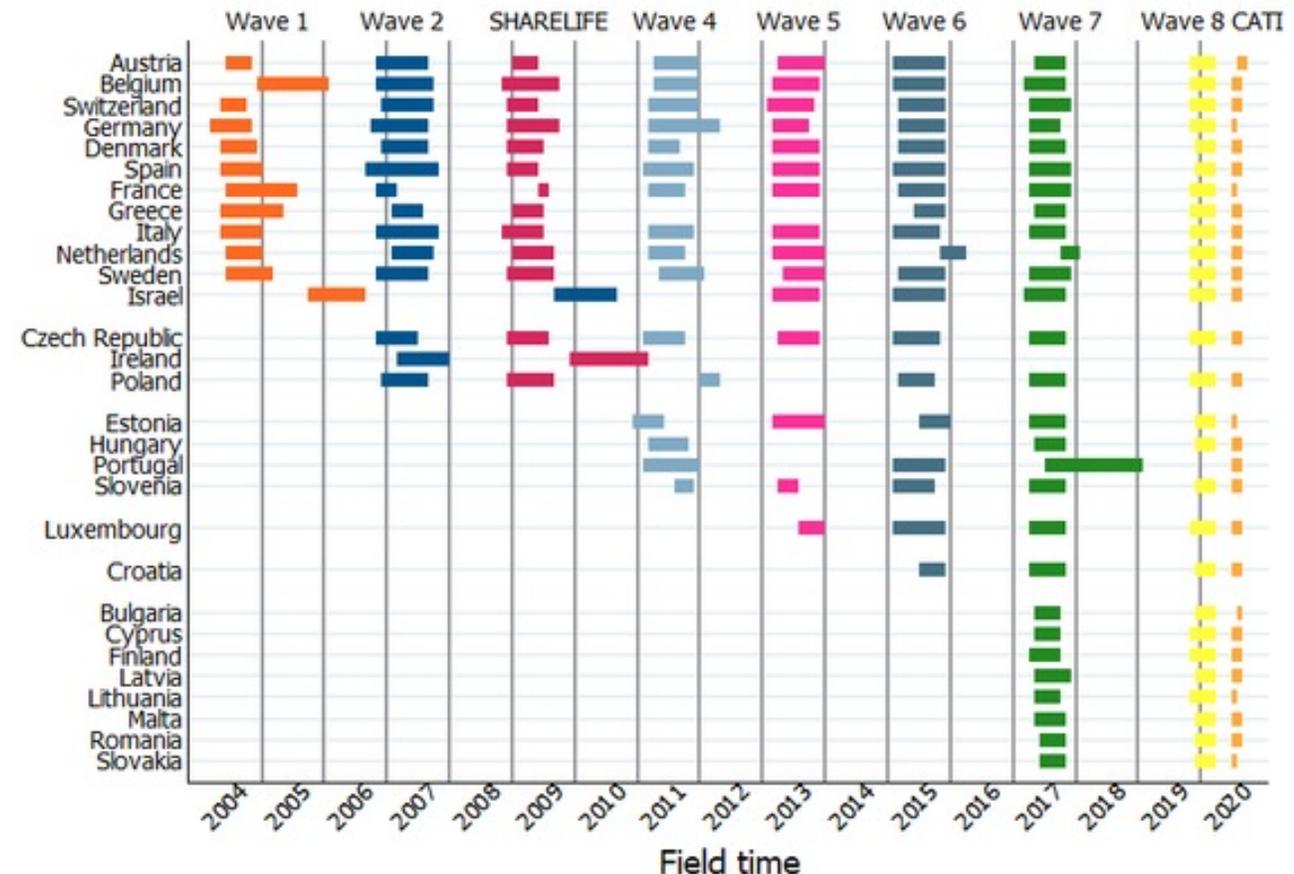


9.998 soggetti inclusi

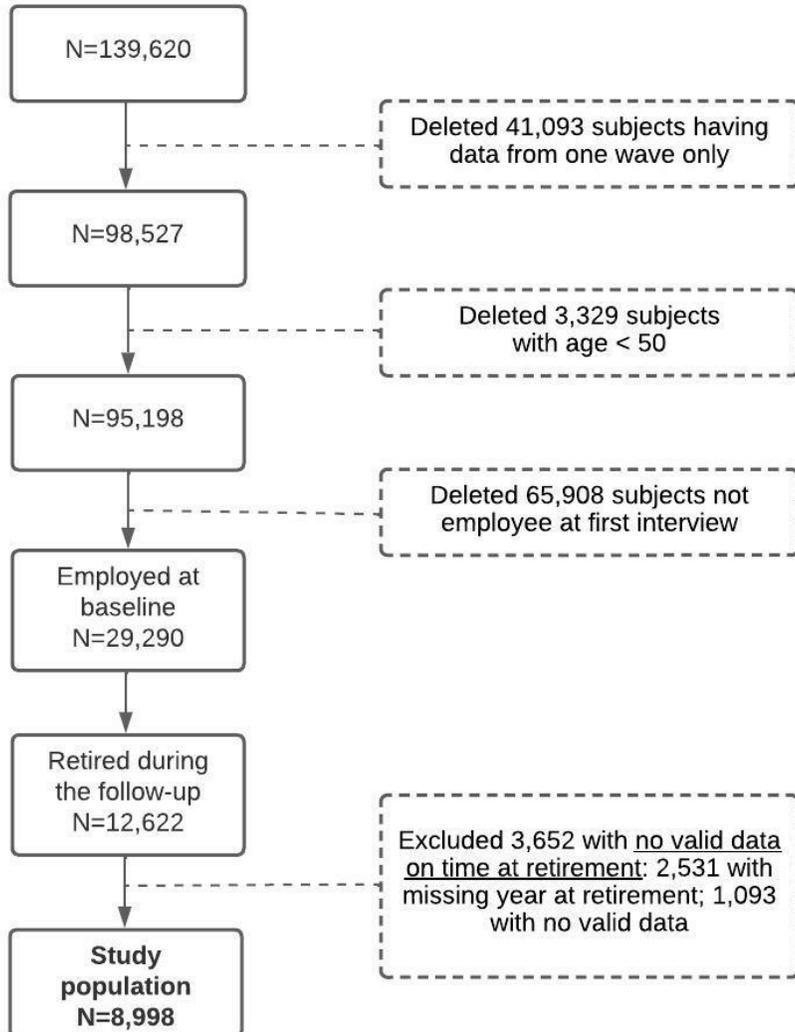
Attraverso una procedura di **record-linkage**, abbiamo unito i dati a livello individuale delle ondate SHARE da 1 a 8 nel **periodo 2004-2020**.

Per ogni ondata, abbiamo unito tre database rilasciati, comprendenti informazioni sulle **caratteristiche sociodemografiche** (modulo DN), sui **fattori comportamentali** (modulo BR) e sulle **variabili occupazionali e pensionistiche** (modulo EP).

Unendo i microdati longitudinali di tutte le ondate da 1 a 8, abbiamo costruito una **coorte di adulti europei di 50 anni o più occupati al basale e andati in pensione durante il follow-up**.



# Coorte di pensionati – caratteristiche



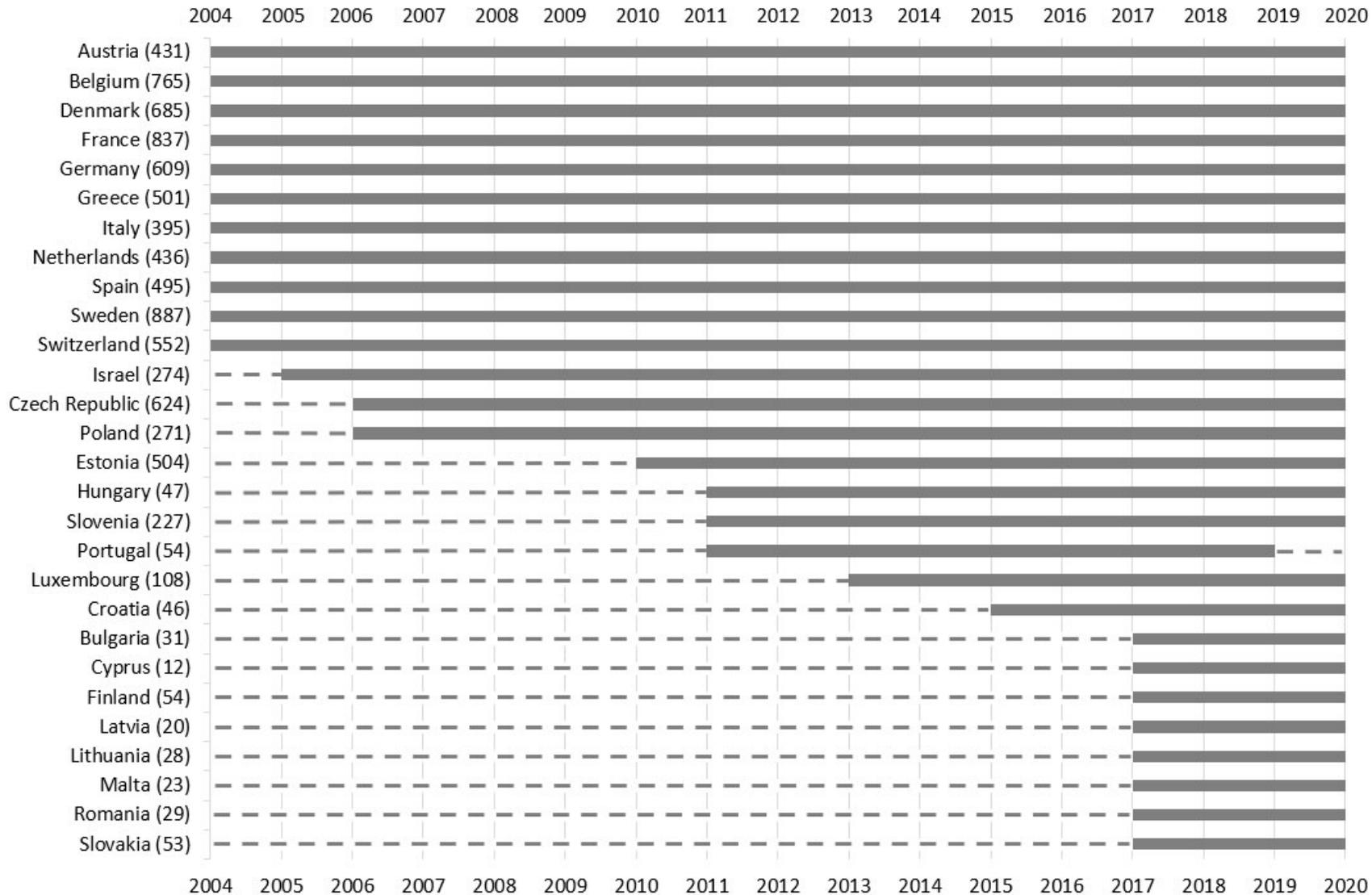
I **professionisti** sono il gruppo occupazionale più frequente (15,5%), seguiti da **tecnici e professionisti associati, impiegati di supporto, addetti ai servizi e alle vendite**, con percentuali di circa il 13,5%, e **dirigenti** (10,5%).

**Table 1** Distribution of the overall study population aged 50 or more ( $n=8998$ ) according to European geographical area and selected baseline characteristics, 2004–2017

	N	%
European area		
North	1626	18.07
West	3738	41.54
South	1480	16.45
East	1880	20.89
Israel	274	3.05
Sex		
Male	4797	53.31
Female	4201	46.69
Age group (years)		
50–54	2504	27.83
55–59	3831	42.58
≥ 60 (max: 83)	2663	29.60
Education level (ISCED)		
Low (0–1)	1044	11.60
Intermediate (2–4)	5102	56.70
High (5–6)	2787	30.97
Missing	65	0.72
Marital status		
Married/Registered partnership	7552	83.93
Divorced/Widowed	1229	13.66
Never married	107	1.19
Missing	110	1.22
Occupation (ISCO categories)		
Managers	944	10.49
Professionals	1397	15.53
Technicians and associate professionals	1230	13.67
Clerical support workers	1209	13.44
Services and sales workers	1223	13.59
Skilled agricultural, forestry and fishery workers	341	3.79
Craft and related trades workers	872	9.69
Plant and machine operators and assemblers	483	5.37
Elementary occupations	715	7.95
Armed forces	88	0.98
Missing	496	5.51

# Coorte di pensionati – follow-up

Paese e numero di individui (n) in base agli anni solari dell'impostazione dello studio (2004-2020).



Il periodo **massimo di follow-up** è di **16 anni** e la mediana di 9 anni.

# Esposizione e outcome di interesse

L'esposizione della nostra analisi è il **tempo** (in anni) **trascorso dal pensionamento** calcolato come la differenza tra l'anno del pensionamento e l'anno dell'intervista. Il tempo trascorso dal pensionamento è stato suddiviso in sette intervalli di tempo. L'**anno di pensionamento** è stato considerato come **categoria di riferimento**.

**fumatore al momento dell'intervista** come variabile dicotomica (1: fumatore; 0: non fumatore)

**Transition to retirement during study period**  
(misure ripetute)

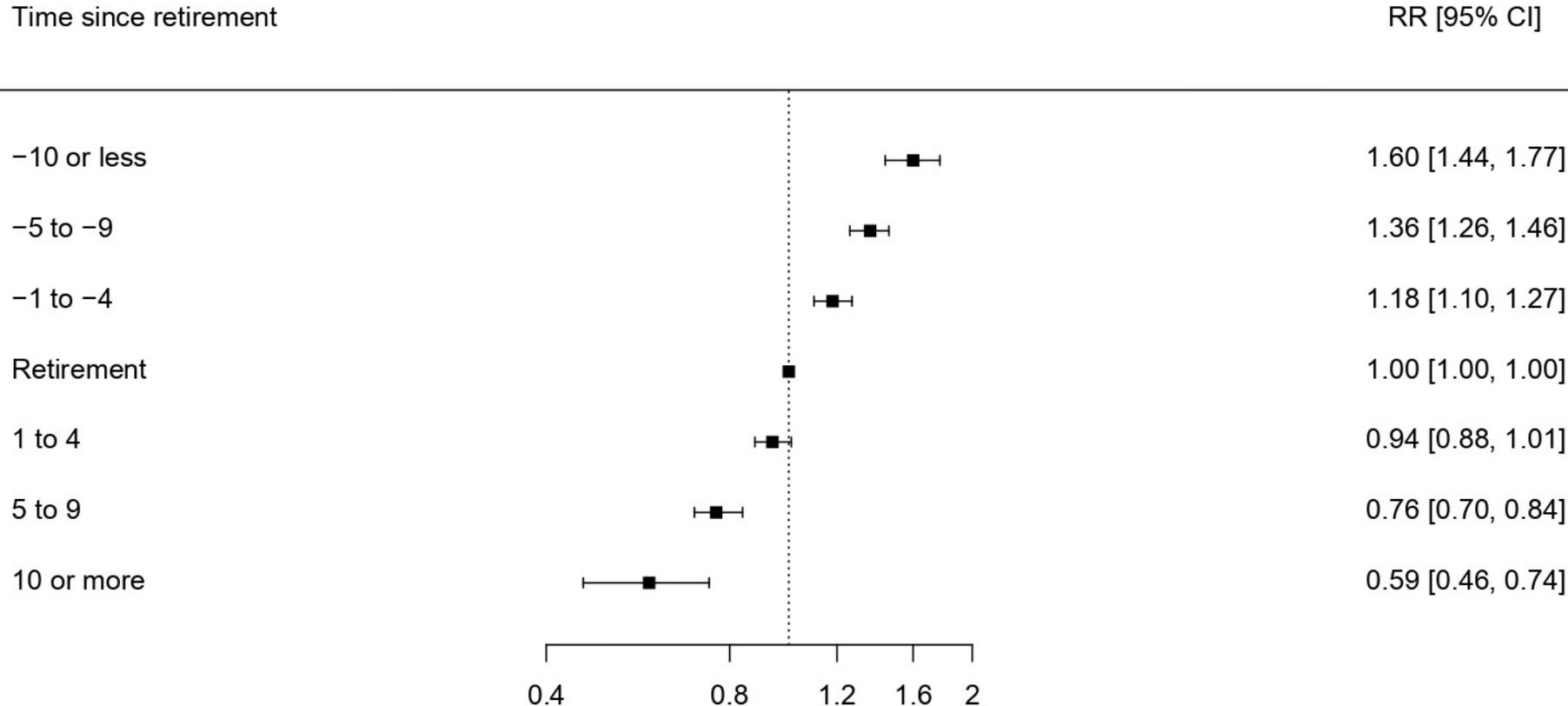
**numero di sigarette fumate al giorno** al momento dell'intervista, considerando solo il sottogruppo di individui che hanno dichiarato di aver fumato durante il periodo di studio

- generalised estimating equation (GEE) per l'outcome binomiale con una funzione log link utilizzando l'"anno di pensionamento" come categoria di riferimento
- modello GEE con distribuzione binomiale negativa e funzione log link utilizzata per modellare il numero medio di sigarette fumate al giorno
- i modelli GEE permettono di specificare una struttura di correlazione within-subject, tenendo così conto delle misure ripetute raccolte per ciascun partecipante all'indagine nelle diverse ondate



# Outcome: abitudine al fumo 1

Forest plot dei rischi relativi (RR) e dei corrispondenti intervalli di confidenza al 95% (CI) per l'abitudine al fumo (sì vs no).



Abbiamo riscontrato una **tendenza lineare significativa alla riduzione del rischio di essere fumatore** in un lungo periodo di vita prima e dopo il pensionamento.

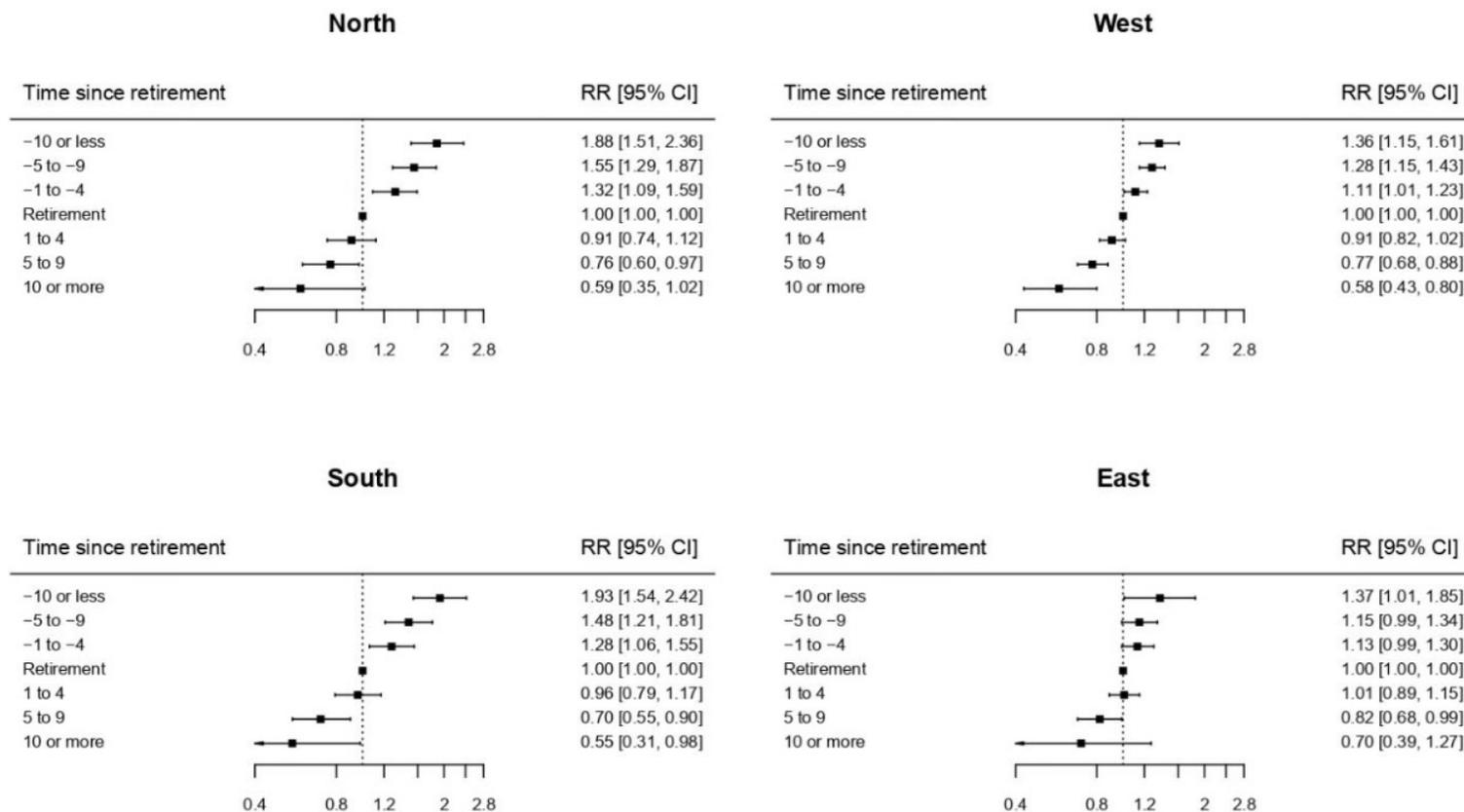
Considerando l'intervallo di tempo di 10 anni o più prima del pensionamento, il **rischio di fumare era più alto del 40% rispetto al momento del pensionamento.**

\*Le stime sono state ottenute da modelli misti lineari generalizzati log-binomiali per misure ripetute, aggiustati per area geografica, sesso, fascia d'età (50-54, 55-59 e 60+), stato civile (coniugato/partner registrato, divorziato/vedovo e mai sposato), livello di istruzione raggiunto (basso, intermedio, alto), occupazione (categorie ISCO) come covariate al basale e con la presenza di almeno una malattia cronica come covariata variabile nel tempo (sì, no).



# Outcome: abitudine al fumo 2

Forest plot del rischio relativo (RR)\* e dei corrispondenti intervalli di confidenza al 95% (IC) per l'abitudine al fumo (sì vs no) in diversi momenti dal pensionamento (categoria di riferimento: anno del pensionamento) stratificato per area geografica.



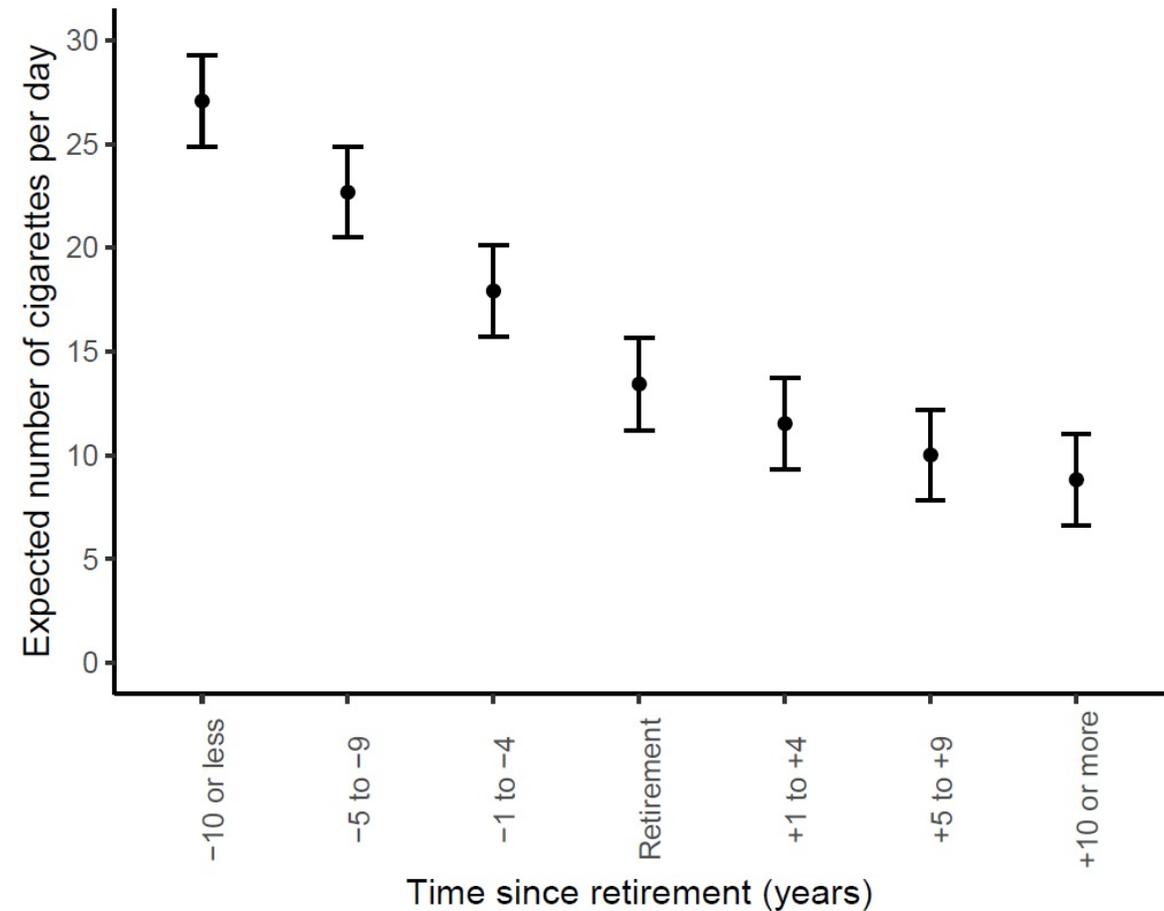
\*Le stime sono state ottenute da modelli misti lineari generalizzati log-binomiali per misure ripetute, aggiustati per area geografica, sesso, fascia d'età (50-54, 55-59 e 60+), stato civile (coniugato/partner registrato, divorziato/vedovo e mai sposato), livello di istruzione raggiunto (basso, intermedio, alto), occupazione (categorie ISCO) come covariate al basale e con la presenza di almeno una malattia cronica come covariata variabile nel tempo (sì, no).



# Outcome: abitudine al fumo 3

Tra i **fumatori**, il **numero di sigarette fumate al giorno è diminuito** da circa 27 sigarette al giorno 10 anni o più prima del pensionamento a circa 9 sigarette al giorno 10 anni o più dopo il pensionamento.

Valori previsti del numero di sigarette fumate al giorno.





## Transition to retirement impact on smoking habit: results from a longitudinal analysis within the Survey of Health, Ageing and Retirement in Europe (SHARE) project

Paola Bertuccio<sup>1</sup> · Giacomo Pietro Vigezzi<sup>1,2</sup> · Giansanto Mosconi<sup>1</sup> · Silvano Gallus<sup>3</sup> · Anna Odone<sup>1</sup> 

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### Abstract

**Background** In an ageing society, retirement impacts on behavioural risk factors and health outcomes should be carefully assessed. Scant evidence exists from longitudinal studies on the short- and long-term consequences of the transition to retirement on smoking habit.

**Methods** We conducted a longitudinal study based on the Survey of Health, Ageing and Retirement in Europe (SHARE) data from 27 European countries plus Israel collected in 2004–2020. To estimate relative risks (RR) and corresponding 95% confidence intervals (CI) for smoking status and intensity at seven time periods before and after retirement, we fitted adjusted generalised estimating equation (GEE) models for repeated measures.

**Results** We selected a cohort of 8998 individuals employed at baseline and retired at follow-up (median follow-up time: 9 years; maximum: 16 years). As compared to the year of retirement, the RR of smoking was 1.59 (95% CI 1.44–1.76) at 10 years or more before retirement, 1.35 (95% CI 1.25–1.46) from 5 to 9 years before retirement, and 1.18 (95% CI 1.10–1.27) from 1 to 4 years before retirement. Smoking steadily decreased after retirement, being 0.94 (95% CI 0.87–1.01) from 1 to 4 years after retirement, 0.76 (95% CI 0.69–0.84) from 5 to 9 years, and 0.58 (95% CI 0.46–0.74) 10 years or more after retirement. In smokers, the estimated number of cigarettes smoked/day decreased from about 27 cigarettes/day at 10 years or more before retirement to 9 cigarettes/day at 10 years or more after retirement ( $p$  trend < 0.001).

**Conclusion** Longitudinal data suggest that lifestyles might favourably change with retirement. Further studies are needed to direct healthy ageing promotion policies better.

**Keywords** SHARE data · Retirement · Smoking · Life-course transitions · Longitudinal studies



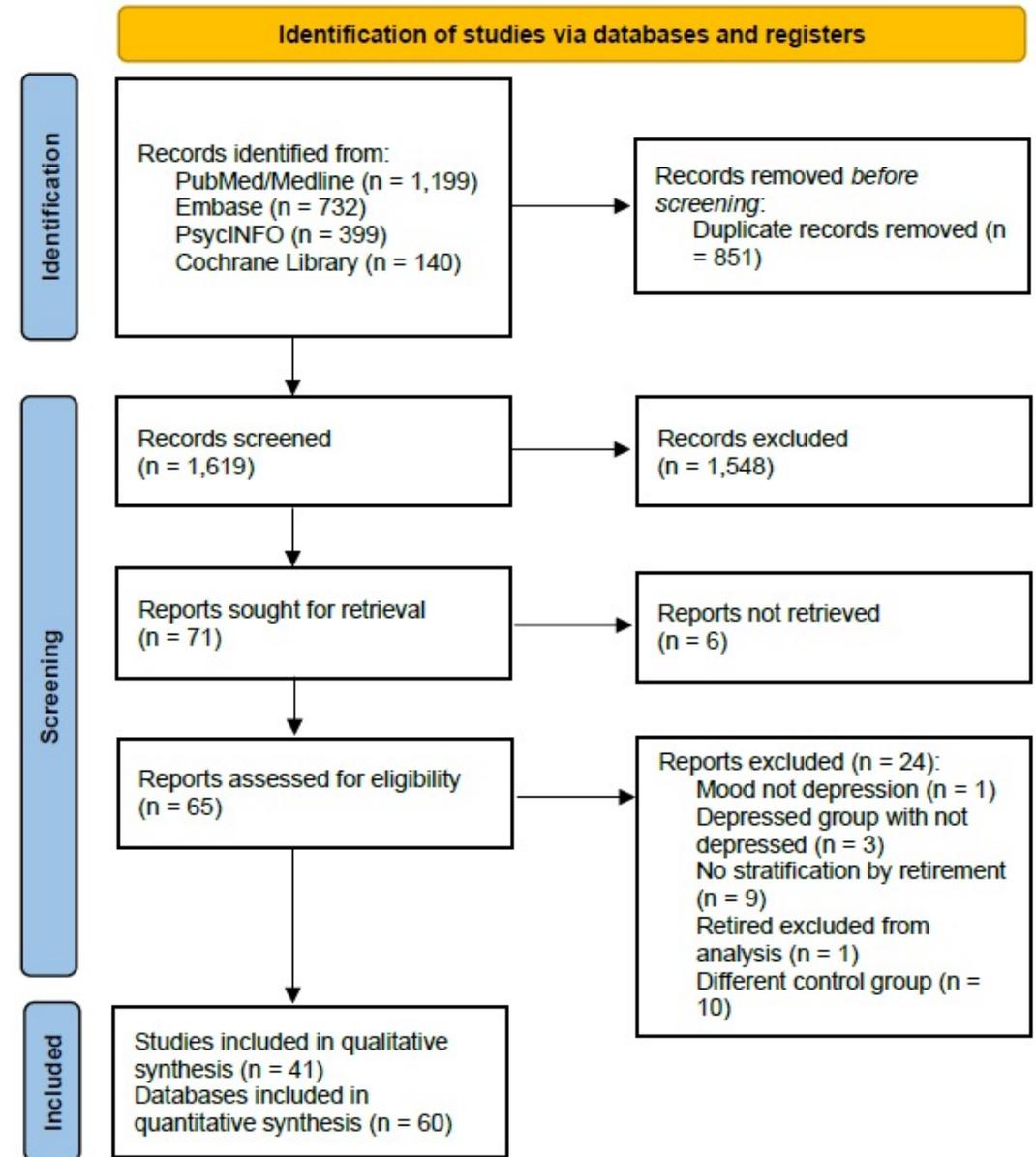


- 1. INAPP PLUS: una coorte di pensionati italiana**
- 2. Una coorte SHARE di pensionati: fattori di rischio comportamentali**
- 3. Impatto del pensionamento sulla salute mentale: SR**
- 4. Una coorte SHARE di pensionati: salute mentale**

# Razionale e obiettivi

1. Il pensionamento è una transizione cruciale che può influire sulla salute mentale dei lavoratori.
2. Gli studi disponibili riportano risultati contraddittori.

Search Strategy	Details
Inclusion criteria	P: general adult population (male and female) E: retirement C: still employed O: depressive symptoms S: original data (all study designs)
Exclusion criteria	E: disability retirement O: other mental health outcomes (including anxiety symptoms, post-traumatic stress symptoms) S: no original data (opinion papers, review articles, commentaries, letters, protocols, studies without quantitative data)
Language filter	English
Time filter	From inception through 4 <sup>th</sup> March 2021
Database	PubMed/Medline; EMBASE, PsycINFO, Cochrane



# Risultati principali: studi inclusi 1

**Periodo di pubblicazione:** tra il 1984 e il 2021, con 12 (29,3%) pubblicati negli ultimi 5 anni

**Paesi:** 21 studi (51,2%) in Europa e 13 (31,7%) negli USA, 4 in Asia, 1 in Brasile, 1 in Australia, 4 multicentrici

## Disegno degli studi:

- 19 studi **longitudinali** (46,3%) (follow-up da 2 a 35 anni) con l'utilizzo di SHARE, HRS, GAZEL
- 21 studi **trasversali** (51,2%)



# Risultati principali: studi inclusi 2

## Popolazione e diagnosi di depressione

- campione incluso tra 30 e 245.082 soggetti (media: 14.423 soggetti; mediana: 4.189 soggetti)
- in 38 studi (92,7%) l'età è compresa tra 45 e 80 anni
- il 90% degli studi utilizza **scale validate per la diagnosi di depressione**, tra cui il CES-D in 17 (41,5%), l'EURO-D in 8 (19,5%), il GDS in 3 (7,1%), lo ZSDS in 2 (4,9%), l'ICD-10 in 3 (7,1%)

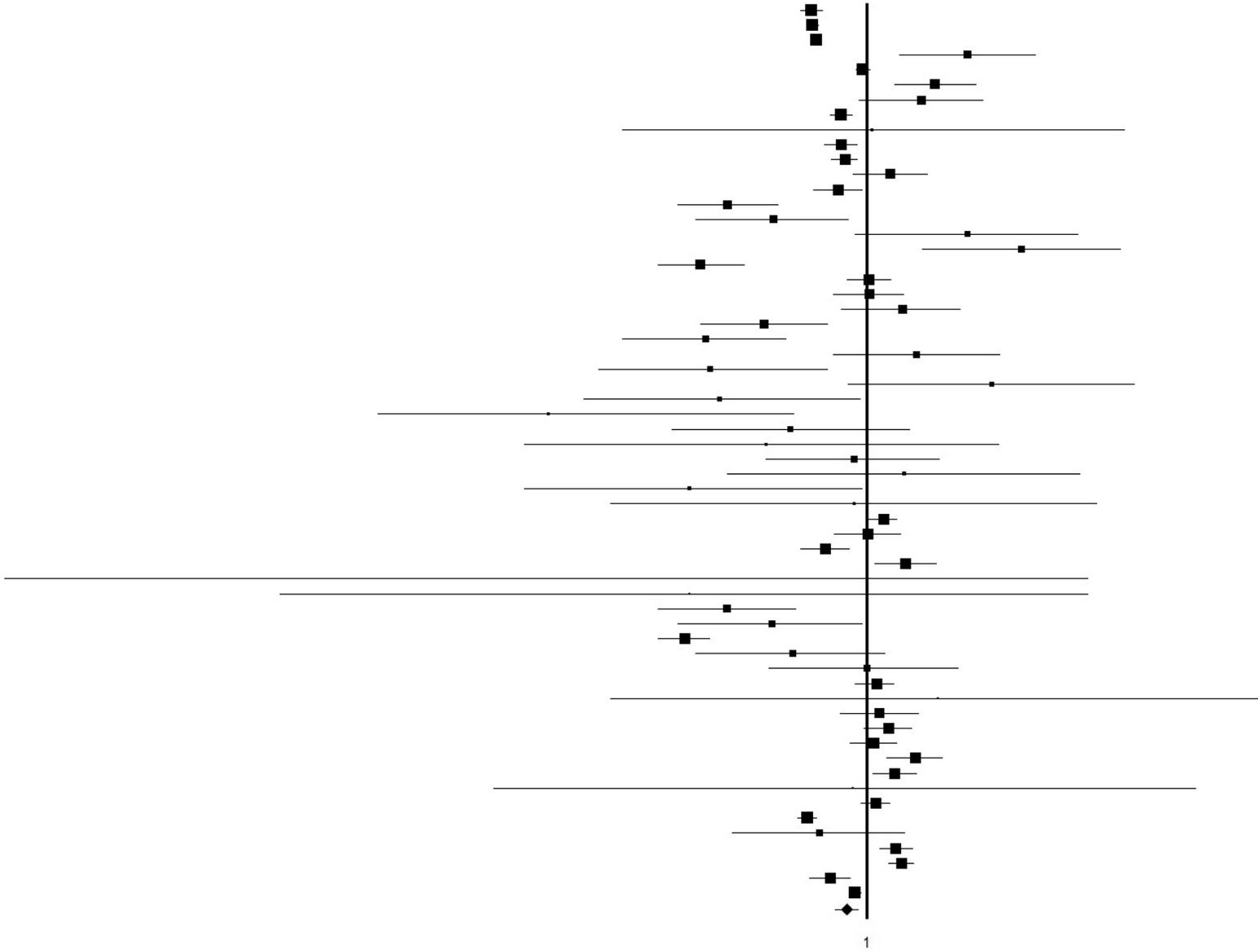
## Associazione tra pensionamento e depressione

- 15 studi (36,6%) riportano un'**associazione negativa significativa**
- 6 studi (14,6%) riportano un'**associazione positiva significativa**
- 20 studi (48,8%) non riportano alcuna associazione significativa



# Risultati principali: forest plot

	ES	95% CI	N
Airagnes (a) 2016	0.60	0.54 , 0.67	2190
Airagnes (b) 2016	0.60	0.57 , 0.64	7052
Airagnes 2015	0.62	0.59 , 0.66	9755
Alavina 2008	2.60	1.37 , 4.94	11462
Anxo 2019	0.97	0.91 , 1.04	3901
Arias-de la Torre (a) 2018	1.91	1.31 , 2.82	11467
Arias-de la Torre (b) 2018	1.68	0.93 , 3.03	10079
Augner 2018	0.79	0.71 , 0.88	13447
Behncke 2012	1.05	0.10 , 11.45	1439
Belloni (a) 2016	0.79	0.67 , 0.92	10541
Belloni (b) 2016	0.82	0.72 , 0.92	11419
Borson 1986	1.26	0.88 , 1.79	404
Bretanha 2015	0.77	0.61 , 0.97	1514
Butterworth (a) 2006	0.27	0.17 , 0.44	0
Butterworth (b) 2006	0.42	0.20 , 0.85	0
Buxton (a) 2005	2.60	0.90 , 7.40	960
Buxton (b) 2005	4.30	1.70 , 11.00	915
Calvo 2013	0.21	0.14 , 0.32	6624
Calvo-Perxas (a) 2016	1.02	0.83 , 1.27	8493
Calvo-Perxas (b) 2016	1.03	0.73 , 1.43	7426
Choi 2013	1.41	0.79 , 2.44	7238
Coursolle (a) 2010	0.38	0.21 , 0.70	1200
Coursolle (b) 2010	0.22	0.10 , 0.47	1466
Fernández-Niño (a) 2018	1.60	0.73 , 3.53	3854
Fernández-Niño (b) 2018	0.23	0.08 , 0.70	3671
Fernández-Niño (c) 2018	3.26	0.84 , 12.60	1489
Fernández-Niño (d) 2018	0.25	0.07 , 0.95	1374
Fernández-Niño (e) 2018	0.05	0.01 , 0.51	1870
Fernández-Niño (f) 2018	0.49	0.16 , 1.52	2101
Fernández-Niño (g) 2018	0.39	0.04 , 3.50	1145
Fernández-Niño (h) 2018	0.89	0.39 , 2.01	1923
Fernández-Niño (i) 2018	1.43	0.27 , 7.54	1122
Fernández-Niño (j) 2018	0.19	0.04 , 0.97	1284
Fernández-Niño (k) 2018	0.89	0.09 , 8.82	881
Gayman (a) 2013	1.18	1.03 , 1.35	2765
Gayman (b) 2013	1.02	0.74 , 1.40	499
Han 2021	0.68	0.54 , 0.86	9347
Heller-Sahlgren 2017	1.45	1.08 , 1.94	4704
Kim (a) 2002	0.12	0.00 , 8.11	176
Kim (b) 2002	0.19	0.00 , 8.11	282
Kolodziej (a) 2019	0.27	0.14 , 0.52	17285
Kolodziej (b) 2019	0.41	0.17 , 0.97	20010
Matta 2020	0.18	0.14 , 0.23	17655
Midanik (a) 2019	0.50	0.20 , 1.20	253
Midanik (b) 2019	1.00	0.40 , 2.40	342
Mojon-Azzi 2007	1.10	0.90 , 1.30	557
Mosca 2014	1.96	0.09 , 41.75	2373
Noh 2019	1.13	0.78 , 1.64	7134
Olesen (a) 2015	1.23	0.98 , 1.54	121214
Olesen (b) 2015	1.07	0.86 , 1.34	123868
Park (a) 2016	1.58	1.22 , 2.06	702
Park (b) 2016	1.31	1.06 , 1.61	1630
Reitzes 1996	0.88	0.03 , 22.46	757
Rhee 2016	1.09	0.96 , 1.26	1195
Schwingel 2009	0.57	0.52 , 0.63	1754
Sheppard 2018	0.64	0.28 , 1.45	80
Shiba (a) 2017	1.32	1.13 , 1.55	33569
Shiba (b) 2017	1.39	1.23 , 1.57	28868
Tuchy 2005	0.71	0.58 , 0.86	1334
van den Bogaard 2018	0.90	0.85 , 0.96	9092
Overall (random-effects model)	0.83	0.74 , 0.93	557111



# Risultati principali: forest plot

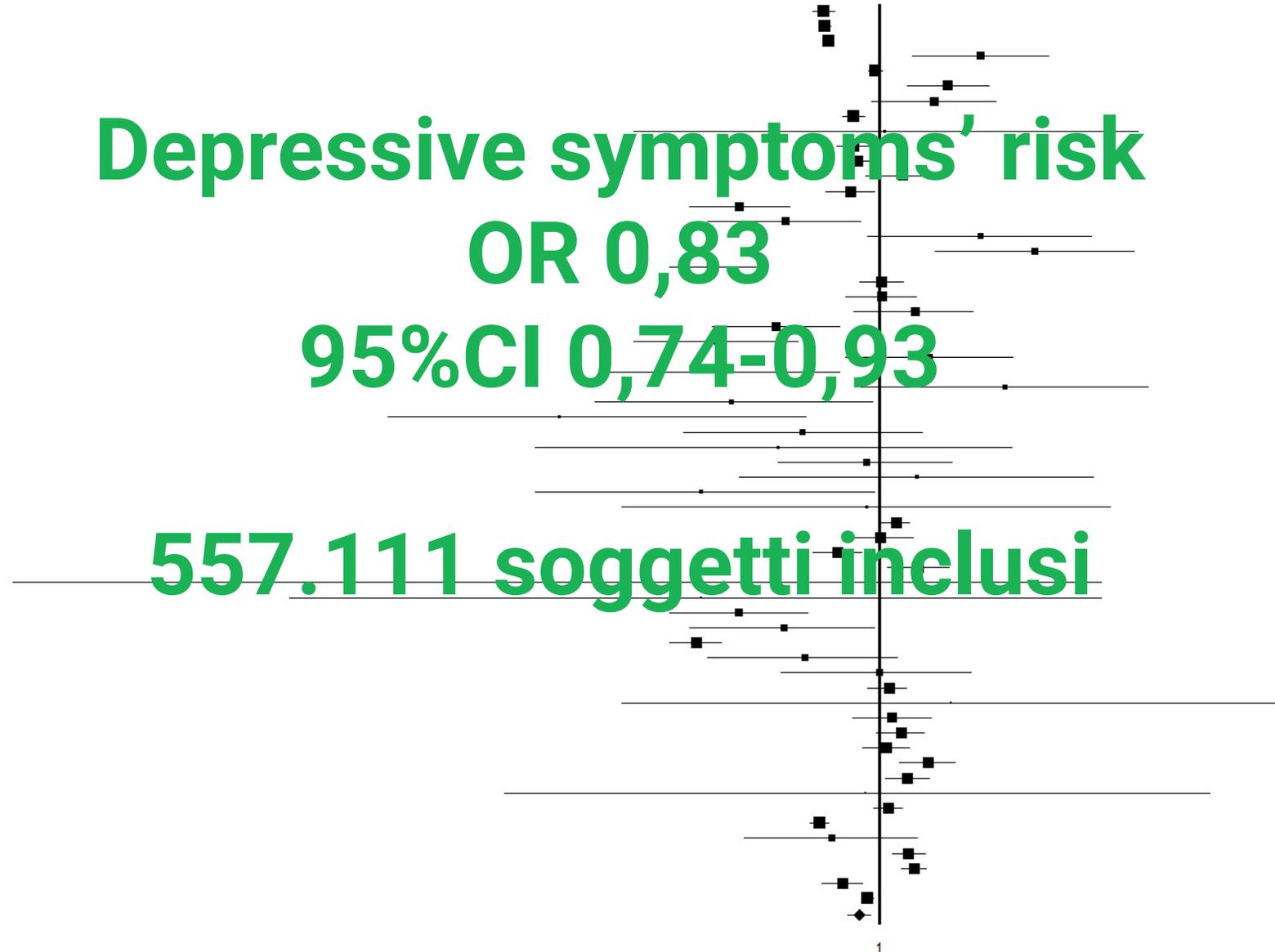
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van den Bogaard 2018	0.90	0.85 , 0.96	9092
Overall (random-effects model)	0.83	0.74 , 0.93	557111

## Depressive symptoms' risk

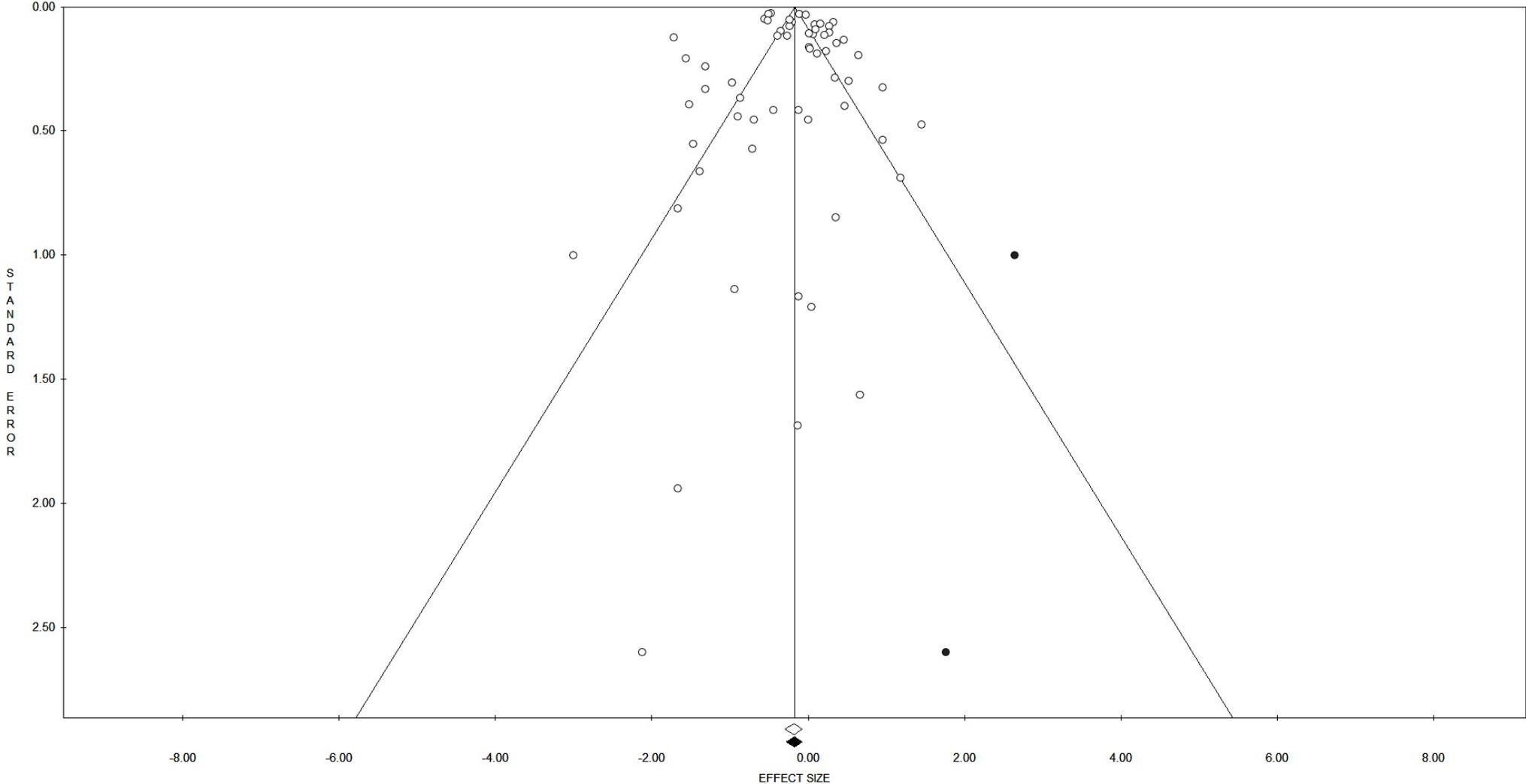
### OR 0,83

### 95%CI 0,74-0,93

### 557.111 soggetti inclusi



# Risultati principali: funnel plot (publication bias)



# Analisi di sensibilità

Type of analysis	N. of included datasets	ES	95% CI, p-value	N. of participants	Chi <sup>2</sup> ; df	I <sup>2</sup>	p-value	Intercept*	t-value*	p-value*
<i>Overall</i>	<b>60</b>	<b>0.83</b>	<b>(0.74; 0.93), 0.001</b>	<b>557,111</b>	895.19; 59	<b>93.41</b>	<b>&lt;0.001</b>	<b>0.53</b>	<b>0.78</b>	<b>0.439</b>
Sensitivity analysis										
<i>QS ≥15</i>	<b>47</b>	<b>0.79</b>	<b>(0.68; 0.91), 0.001</b>	<b>485,092</b>	808.42; 46	<b>94.31</b>	<b>&lt;0.0001</b>	<b>0.52</b>	<b>0.65</b>	<b>0.520</b>
<i>QS ≥15 + validated tool to diagnose depression</i>	<b>44</b>	<b>0.76</b>	<b>(0.65; 0.88), 0.0001</b>	<b>239,453</b>	763.78; 43	<b>94.37</b>	<b>&lt;0.0001</b>	<b>0.33</b>	<b>0.41</b>	<b>0.687</b>
<i>QS ≥15 + validated tool to diagnose depression + longitudinal design</i>	<b>24</b>	<b>0.76</b>	<b>(0.64; 0.90), 0.001</b>	<b>162,004</b>	652.18; 23	<b>96.47</b>	<b>&lt;0.001</b>	<b>0.85</b>	<b>0.52</b>	<b>0.607</b>
Subgroup analysis by study design										
<i>Longitudinal</i>	<b>26</b>	<b>0.79</b>	<b>(0.67; 0.93), 0.004</b>	<b>407,086</b>	681.14; 25	<b>96.33</b>	<b>&lt;0.001</b>	<b>1.18</b>	<b>0.76</b>	<b>0.455</b>
<i>Cross-sectional</i>	<b>33</b>	<b>0.89</b>	<b>(0.76; 1.04), 0.136</b>	<b>139,484</b>	161.43; 32	<b>80.18</b>	<b>&lt;0.001</b>	<b>-0.24</b>	<b>-0.48</b>	<b>0.638</b>
Subgroup analysis by gender										
<i>Women</i>	<b>21</b>	<b>0.79</b>	<b>(0.61; 1.02), 0.074</b>	<b>219,655</b>	189.48; 20	<b>89.44</b>	<b>&lt;0.001</b>	<b>-0.25</b>	<b>-0.25</b>	<b>0.805</b>
<i>Men</i>	<b>20</b>	<b>0.87</b>	<b>(0.68; 1.11), 0.258</b>	<b>223,840</b>	252.80; 19	<b>92.48</b>	<b>&lt;0.001</b>	<b>0.99</b>	<b>0.93</b>	<b>0.366</b>
* Egger's linear regression test; df= degree of freedom; ES= Effect Size; N.= number; QS= quality score										



# Analisi di sensibilità

Type of analysis	N. of included datasets	ES	95% CI, p-value	N. of participants	Chi <sup>2</sup> ; df	I <sup>2</sup>	p-value	Intercept*	t-value*	p-value*
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<i>QS ≥15 + validated tool to diagnose depression + longitudinal design</i>	<b>24</b>	<b>0.76</b>	<b>(0.64; 0.90), 0.001</b>	<b>162,004</b>	652.18; 23	<b>96.47</b>	<b>&lt;0.001</b>	<b>0.85</b>	<b>0.52</b>	<b>0.607</b>
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Original Article

\*These authors contributed equally to this work.

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**Keywords:**  
depression; epidemiology; prevention;  
retirement; social factors; systematic review  
and meta-analysis

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## Does retirement trigger depressive symptoms? A systematic review and meta-analysis

A. Odone<sup>1,\*</sup>, V. Gianfredi<sup>2,\*</sup>, G. P. Vigezzi<sup>2</sup> , A. Amerio<sup>3</sup>, C. Ardito<sup>4</sup>, A. d'Errico<sup>5</sup>, D. Stuckler<sup>6</sup>, G. Costa<sup>7</sup> and on behalf of the Italian Working Group on Retirement and Health<sup>1,\*\*</sup>

<sup>1</sup>Department of Public Health, Experimental and Forensic Medicine, University of Pavia, Pavia, Italy; <sup>2</sup>School of Medicine, University Vita-Salute San Raffaele, Milan, Italy; <sup>3</sup>Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health, Section of Psychiatry, University of Genoa, Genoa, Italy; <sup>4</sup>Department of Economics and Statistics "Cognetti De Martiis", University of Turin, Turin, Italy; <sup>5</sup>Department of Epidemiology, ASL TO3, Piedmont Region, Grugliasco, Turin, Italy; <sup>6</sup>Department of Social and Political Sciences, Bocconi University, Milan, Italy and <sup>7</sup>Department of Clinical and Biological Sciences, University of Turin, Turin, Italy

### Abstract

**Aims.** Retirement is a major life transition that may improve or worsen mental health, including depression. Existing studies provide contradictory results. We conducted a systematic review with meta-analysis to quantitatively pool available evidence on the association of retirement and depressive symptoms.

**Methods.** We applied PRISMA guidelines to conduct a systematic review and meta-analysis to retrieve, quantitatively pool and critically evaluate the association between retirement and both incident and prevalent depression and to understand better the potential role of individual and contextual-level determinants. Relevant original studies were identified by searching PubMed, Embase, PsycINFO and the Cochrane Library, through 4 March 2021. Subgroup and sensitivity meta-analyses were conducted by gender, study design (longitudinal *v.* cross-sectional studies), study quality score (QS) and considering studies using validated scales to diagnose depression. Heterogeneity between studies was evaluated with  $I^2$  statistics.

**Results.** Forty-one original studies met our a priori defined inclusion criteria. Meta-analysis on more than half a million subjects ( $n = 557\,111$ ) from 60 datasets suggested a protective effect of retirement on the risk of depression [effect size (ES) = 0.83, 95% confidence interval (CI) = 0.74–0.93], although with high statistical heterogeneity between risk estimates ( $\chi^2 = 895.19$ ,  $df = 59$ ,  $I^2 = 93.41\%$ ,  $p$ -value < 0.0001). Funnel plot asymmetry and trim and fill method suggested a minor potential publication bias. Results were consistent, confirm their robustness and suggest stronger protective effects when progressively restricting the included studies based on quality criteria: (i) studies with the highest QS [55 datasets, 407 086 subjects, ES = 0.81, 95% CI = 0.71–0.91], (ii) studies with a high QS and using validated assessment tools to diagnose depression (44 datasets, 239 453 subjects, ES = 0.76, 95% CI = 0.65–0.88) and (iii) studies of high quality, using a validated tool and with a longitudinal design (24 datasets, 162 004 subjects, ES = 0.76, 95% CI = 0.64–0.90). We observed a progressive reduction in funnel plot asymmetry. About gender, no statistically significant difference was found (females ES = 0.79, 95% CI = 0.61–1.02 *v.* men ES = 0.87, 95% CI = 0.68–1.11).

**Conclusions.** Pooled data suggested that retirement reduces by nearly 20% the risk of depression; such estimates got stronger when limiting the analysis to longitudinal and high-quality studies, even if results are affected by high heterogeneity. As retirement seems to have an independent and protective effect on mental health and depressive symptoms, greater flexibility in retirement timing should be granted to older workers to reduce their mental burden and avoid

✓ I dati aggregati suggeriscono che il pensionamento determina una riduzione del 20% del rischio di depressione: queste stime sono risultate coerenti limitando l'analisi a studi longitudinali di alta qualità, anche se l'eterogeneità è rimasta elevata.

✓ Il pensionamento sembra avere un effetto protettivo indipendente sulla salute mentale e sui sintomi depressivi.

- 1. INAPP PLUS: una coorte di pensionati italiana**
- 2. Una coorte SHARE di pensionati: fattori di rischio comportamentali**
- 3. Impatto del pensionamento sulla salute mentale: SR**
- 4. Una coorte SHARE di pensionati: salute mentale**

# Obiettivi

Quantificare l'impatto della transizione verso il pensionamento sulla **salute mentale (ad esempio, i sintomi depressivi)**, concentrandosi su **finestre temporali pre e post-pensionamento**, stimando gli effetti a breve e a lungo termine, tra un'ampia coorte di **adulti europei di 50 anni o più**.



# Esposizione e outcome di interesse

L'esposizione della nostra analisi è il **tempo** (in anni) **trascorso dal pensionamento** calcolato come la differenza tra l'anno del pensionamento e l'anno dell'intervista. Il tempo trascorso dal pensionamento è stato suddiviso in sette intervalli di tempo. L'**anno di pensionamento** è stato considerato come **categoria di riferimento**.

**depressione derivata dalla scala EURO-D**, come variabile binaria: un punteggio di 4 o più indica la probabile presenza di un disturbo depressivo

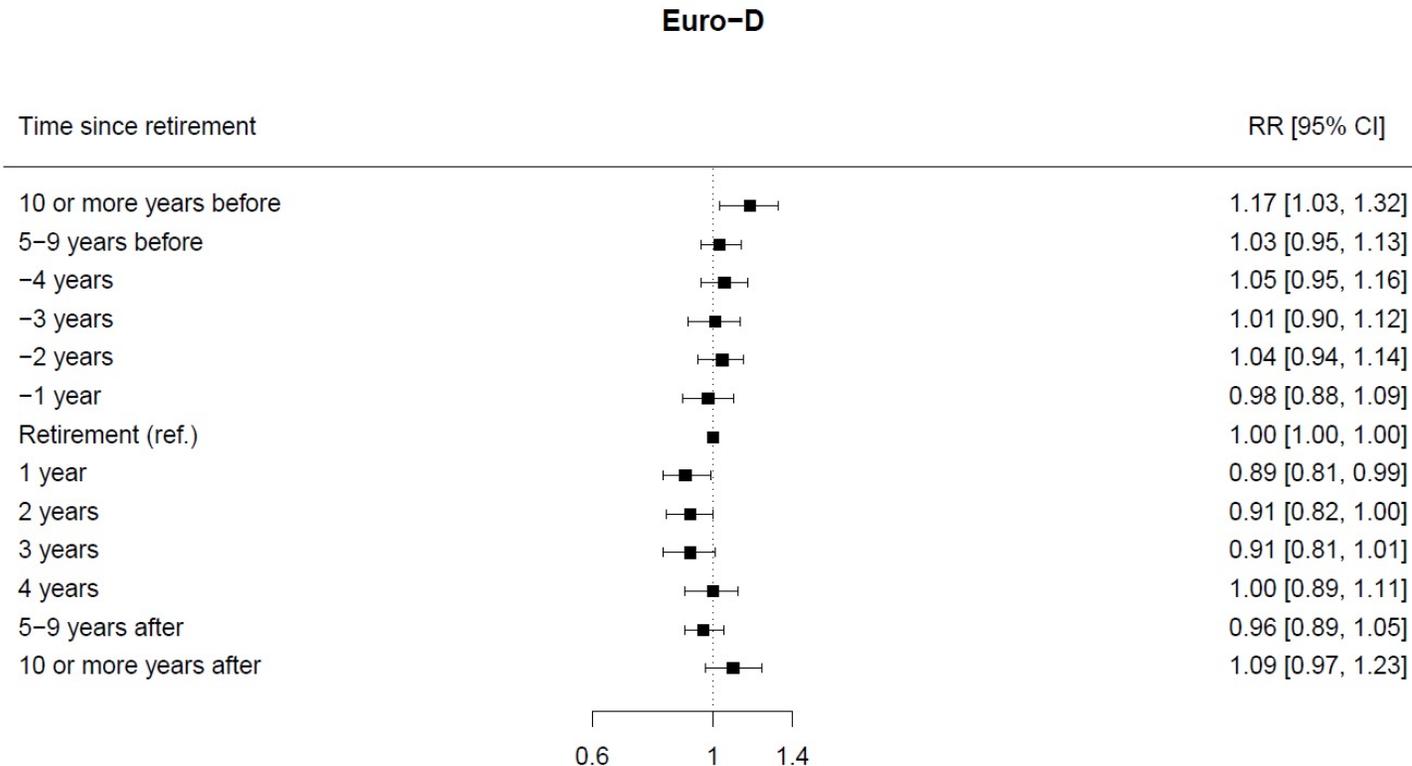
**Transition to retirement during study period**  
**(misure ripetute)**

**Ideazione suicidaria**  
**(suicidality)**

- generalised estimating equation (GEE) per l'outcome binomiale con una funzione log link utilizzando l'"anno di pensionamento" come categoria di riferimento
- i modelli GEE permettono di specificare una struttura di correlazione within-subject, tenendo così conto delle misure ripetute raccolte per ciascun partecipante all'indagine nelle diverse ondate

# Outcome: sintomi depressivi (EURO-D)

Forest plot del rischio relativo (RR)\* e dei corrispondenti intervalli di confidenza al 95% (CI) per sintomi depressivi (EURO-D  $\geq 4$  vs EURO-D  $< 4$ ) prima e dopo il pensionamento (categoria di riferimento: l'anno del pensionamento).



Rispetto all'anno del pensionamento, il rischio di depressione è risultato del **17% più elevato nel periodo a partire da 10 anni prima del pensionamento** (RR: 1,17; 95% CI: 1,03-1,32).

Al contrario, il rischio ha iniziato a **diminuire dopo il momento del pensionamento, dell'11% nell'anno successivo** (RR: 0,89; 95% CI: 0,81-0,99) e del **9%** - anche se non statisticamente significativo - dopo 2 anni (RR: 0,91; 95% CI: 0,82-1,00) e 3 anni (RR: 0,91; 95% CI: 0,81-1,01) dal pensionamento, rispettivamente.

\*Le stime sono state ottenute da modelli misti lineari generalizzati log-binomiali per misure ripetute, aggiustati per area geografica, sesso, fascia d'età (50-54, 55-59 e 60+), stato civile (coniugato/partner registrato, divorziato/vedovo e mai sposato), livello di istruzione raggiunto (basso, intermedio, alto), occupazione (categorie ISCO) come covariate al basale e con la presenza di almeno una malattia cronica come covariata variabile nel tempo (sì, no).

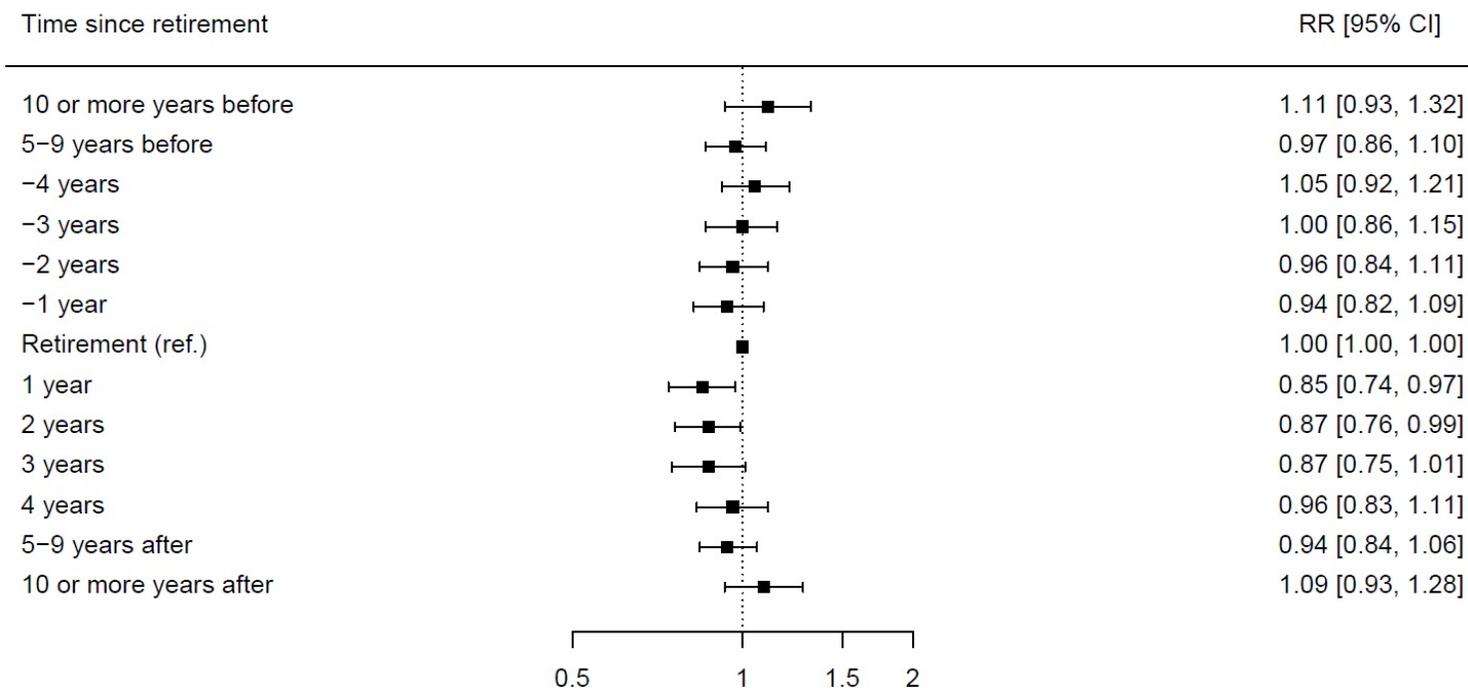


# Outcome: sintomi depressivi (EURO-D): analisi di sensibilità

Forest plot del rischio relativo (RR)\* stratificato e dei corrispondenti intervalli di confidenza al 95% (CI) per **sintomi depressivi** (EURO-D  $\geq 4$  vs EURO-D  $< 4$ ) prima e dopo il pensionamento (categoria di riferimento: l'anno del pensionamento) per **vulnerabilità**.

Il "**gruppo vulnerabile**" è stato identificato come il sottogruppo di **individui che hanno dichiarato di essere stati trattati per depressione da un medico o da uno psichiatra (wave 1, 2, 4) o di aver avuto una diagnosi di disturbo depressivo o emotivo in passato o al momento dell'intervista (wave 5, 6, 7, 8)**.

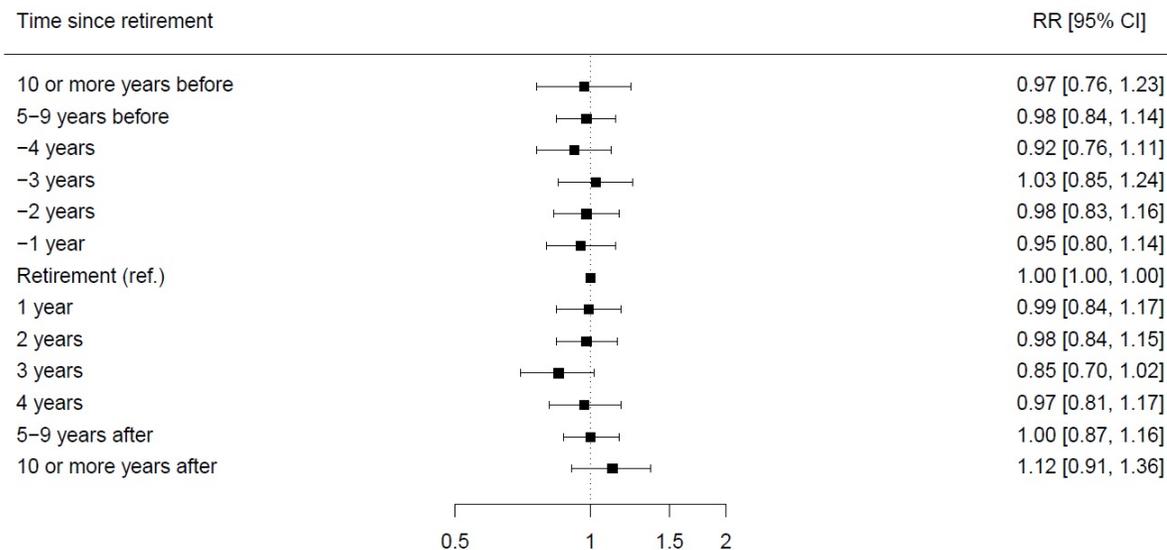
Euro-D – not vulnerable group



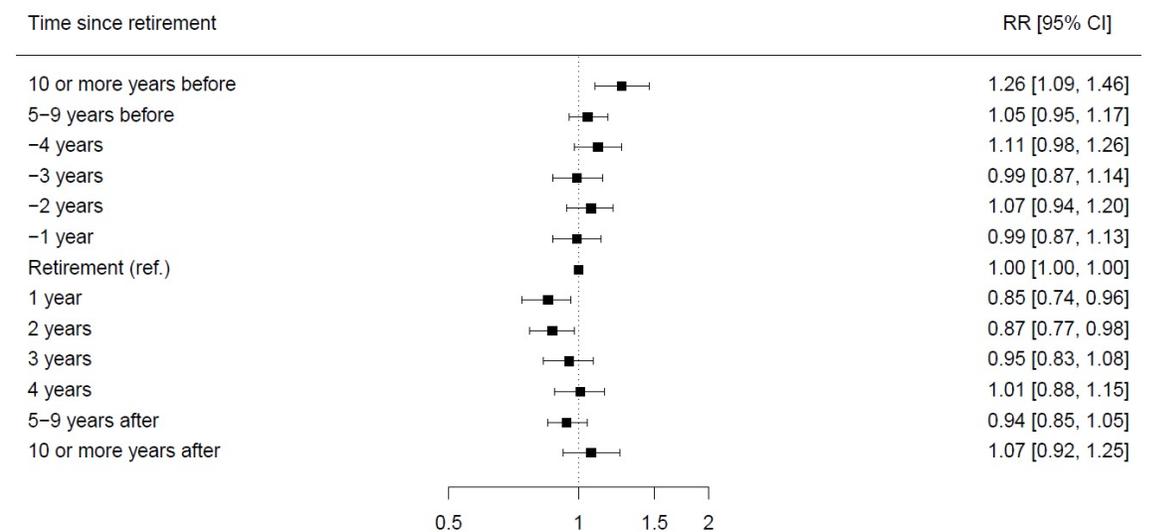
# Outcome: sintomi depressivi (EURO-D): stratificazione per sesso

Forest plot del rischio relativo (RR)\* e dei corrispondenti intervalli di confidenza al 95% (CI) per sintomi depressivi (EURO-D  $\geq 4$  vs EURO-D  $< 4$ ) prima e dopo il pensionamento (categoria di riferimento: l'anno del pensionamento) stratificati per sesso. Pannello a) **uomini**; pannello b) **donne**.

Euro-D – men



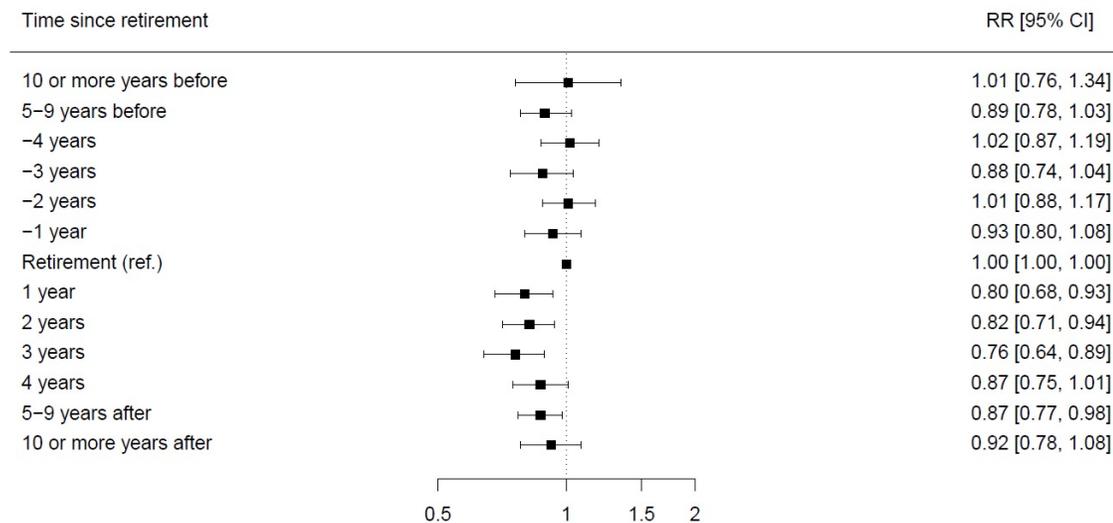
Euro-D – women



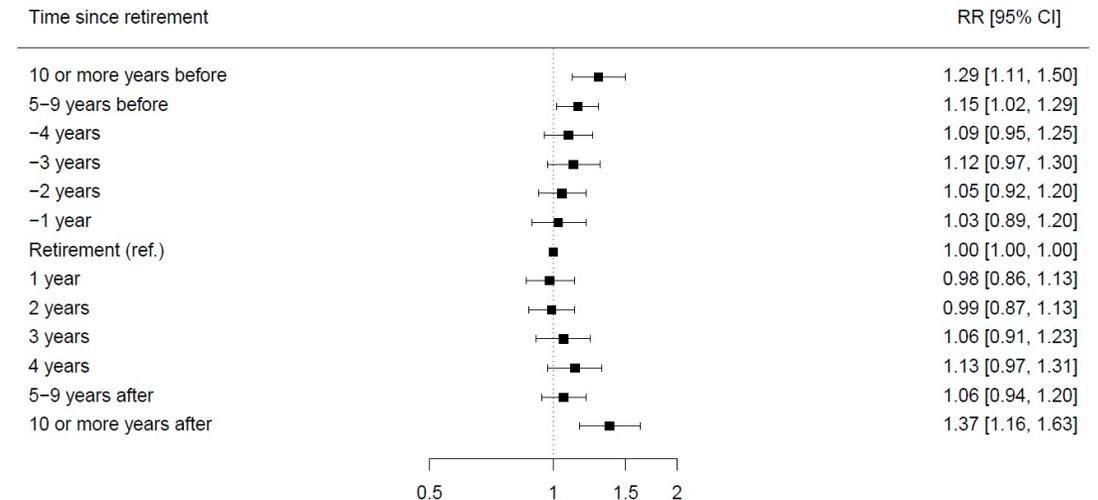
# Outcome: sintomi depressivi (EURO-D): stratificazione per età al pensionamento

Forest plot del rischio relativo (RR)\* stratificato e dei corrispondenti intervalli di confidenza al 95% (IC) per sintomi depressivi (EURO-D  $\geq 4$  vs EURO-D  $< 4$ ) prima e dopo il pensionamento (categoria di riferimento: l'anno del pensionamento) in base all'**età al pensionamento**. Pannello a) **età uguale o inferiore alla mediana specifica del Paese**; pannello b) **età superiore alla mediana specifica del Paese**.

Euro-D – Age at retirement  $\leq$  country-specific median

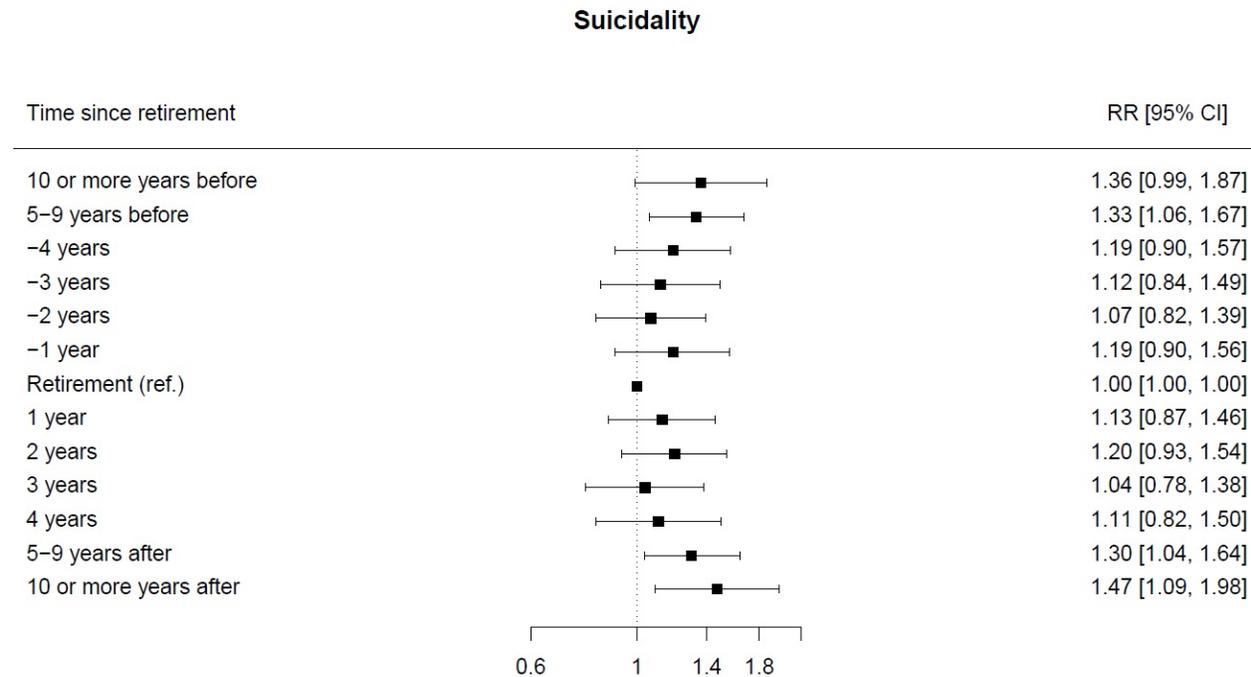


Euro-D – Age at retirement  $>$  country-specific median



# Outcome: ideazione suicidaria

Forest plot del rischio relativo (RR)\* e dei corrispondenti intervalli di confidenza al 95% (CI) per il rischio di **ideazione suicidaria** prima e dopo il pensionamento (categoria di riferimento: l'anno del pensionamento).



## Original Article

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# Transition to retirement impact on risk of depression and suicidality: results from a longitudinal analysis of the Survey of Health, Ageing and Retirement in Europe (SHARE)

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## Abstract

**Aims.** Depression is among the main contributors to older adults' mental health burden. Retirement, one of the major life transitions, has been claimed to influence mental health substantially. Following up on a previous meta-analysis, the study aims to assess from a longitudinal perspective short- and long-term impacts of transitioning to retirement on depression risk and suicidality in older adults across Europe.

**Methods.** We conducted a longitudinal study using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), collected between 2004 and 2020 in 27 European countries plus Israel. To estimate relative risks (RR) and 95% confidence intervals (95% CIs) for depression and suicidality at seven time intervals before and after retirement, we fitted adjusted generalized estimating equation models for repeated measures.

**Results.** We included 8,998 individuals employed at baseline and retired at follow-up (median follow-up time: 9 years; maximum: 16 years). Compared to the year of retirement, the risk of depression was 11% lower in the following year (RR 0.89; 95% CI 0.81–0.99), 9% lower after 2 years (RR 0.91; 95% CI 0.82–1.00) and after 3 years (RR 0.91; 95% CI 0.81–1.01). Significant estimates remained among females, married individuals, those with an intermediate or higher level of education, former manual workers and those who retired at or before their country's median retirement age. A significant increase in depressive symptoms emerged from the tenth year after retirement among former non-manual workers (RR 1.21; 95% CI 1.05–1.40) and late retirees (RR 1.37; 95% CI 1.16–1.63). No heterogeneity emerged among strata. As for suicidality, we reported an increase in risk only 5 years or more after retirement, namely +30% 5–9 years after retirement (RR 1.30; 95% CI 1.04–1.64) and +47% 10 or more years after retirement (RR 1.47; 95% CI 1.09–1.98). Sensitivity analyses excluding subjects who reported a diagnosis of depression over the study period and those retirees who declared to receive a disability pension confirmed the results obtained in the overall analysis.

**Conclusions.** Longitudinal adjusted data suggest an independent effect of retiring associated with a reduction in depression and suicidality risk in the short run, with its effect decreasing in the long run. Such trends are particularly evident among selected subgroups of elderly populations. If greater flexibility in pensionable age may help prevent depression late in life, the transition to retirement is to be accompanied by targeted health promotion interventions. In an ageing society, welfare policies should be evaluated, considering their long-term impact on mental health.

✓ Una **maggiore flessibilità nell'uscita dalla vita lavorativa** dovrebbe essere concessa ai lavoratori anziani per alleviare il burden di salute mentale, evitando lo sviluppo di forme più gravi di patologia.

✓ La transizione verso il pensionamento potrebbe essere identificata come un **momento target per interventi di prevenzione**, sia primaria che secondaria, per promuovere la salute e il benessere degli adulti più anziani, potenziando l'effetto positivo osservato.

# Conclusioni

- La **transizione verso il pensionamento** è una **transizione cruciale nel corso della vita**, seguito da cambiamenti a livello sociale, psicologico e fisico che influenzano profondamente la salute.
- Il pensionamento innesca una **serie complessa di adattamenti** e porta i pensionati a cambiare anche le loro priorità e i loro stili di vita, con **risultati contrastanti presenti in letteratura**.
- Adottare nuovi stili di vita sani non è facile in età avanzata. Pertanto, la promozione della salute in questa fase è una priorità per la sanità pubblica; la transizione verso il pensionamento ha un **effetto indipendente in sé** e, in quanto tale, potrebbe essere identificata come un **finestra di opportunità per la prevenzione**.
- Poiché le transizioni nel corso della vita tendono a portare cambiamenti negli stili di vita, **sincronizzarle con gli interventi di salute pubblica** potrebbe essere un approccio efficace.
- **Studi longitudinali più estesi** potrebbero aiutare a distinguere i diversi elementi che mediano gli effetti del pensionamento sui fattori di rischio e sugli esiti di salute e ad analizzarne l'evoluzione temporale.



# Futuri sviluppi di ricerca

- studiare l'associazione tra **tipo di professione e condizioni di lavoro** ed esiti di salute prima e dopo il pensionamento, analizzando su scala europea il ruolo delle diverse categorie professionali sulla salute in età avanzata
- sviluppare un **framework teorico** che colga i nessi causali tra il processo del pensionamento e l'invecchiamento in salute
- definire il concetto di «**healthy ageing**» e identificare i parametri essenziali da considerare per costruire un indice affidabile per misurare l'invecchiamento in salute
- esplorare le associazioni tra gli **esiti di salute in età avanzata** e le **esposizioni dell'infanzia** (alloggio, famiglia, storia di salute e assistenza sanitaria, prestazioni scolastiche) **e della vita lavorativa**, fornendo evidenze sui determinanti precoci e professionali delle traiettorie di vita in salute



# Di cosa abbiamo bisogno?

- Dare ulteriore priorità all'invecchiamento in salute nel contesto degli obiettivi individuati dall'OMS
- Promuovere la collaborazione tra Università, Sistema Statistico Nazionale, Agenzie Nazionali, Enti locali e imprese, per creare nuove opportunità per la ricerca e l'attuazione di politiche
- Evidenziare il ruolo delle politiche sociali che promuovono l'invecchiamento in salute (*Health in All Policies*) e studiare l'impatto delle politiche sulla salute
- Favorire l'integrazione tra servizi sanitari e sociosanitari, anche in relazione agli obiettivi della Missione 6 dell'PNRR e alle riforme sanitarie regionali
- Porre attenzione alla complessità dei sistemi di welfare e sociosanitari e alle molteplici voci di spesa, sostenute non solo dal sistema ma anche out-of-pocket
- Favorire studi di coorte a partire dai dati e dai sistemi di welfare aziendale, anche in Italia





# LM Day: PaNDA2023

## Pavia - Ngo & Gov Data Analysis

Pavia | Martedì 30 Maggio 2023 | Ore 14:00

Università degli Studi di Pavia | Dipartimento di Scienze Politiche e Sociali  
Aula Foscolo



# Grazie!

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