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AN ESTIMATE OF LIFE EXPECTANCY OF PERSONS WITH DISABILITY IN ITALY

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BACKGROUND

Estimates of survival of people with disabilities in Italy are rare and mainly concern people with specific diseases.

Even at the international level, survival data are available concerning specific disability-inducing conditions, while estimates concerning the condition of disability, regardless of the specific cause of disability, are scarce.

Previous studies

A study conducted in the Netherlands between 2001 and 2006 with more than 60 thousand respondents completing the "health module" of the Ongoing Population Survey (OPS) investigated the survival of people with disabilities, where disability status was defined according to the inability to perform at least one five activities daily living (ADLs) "normally“.

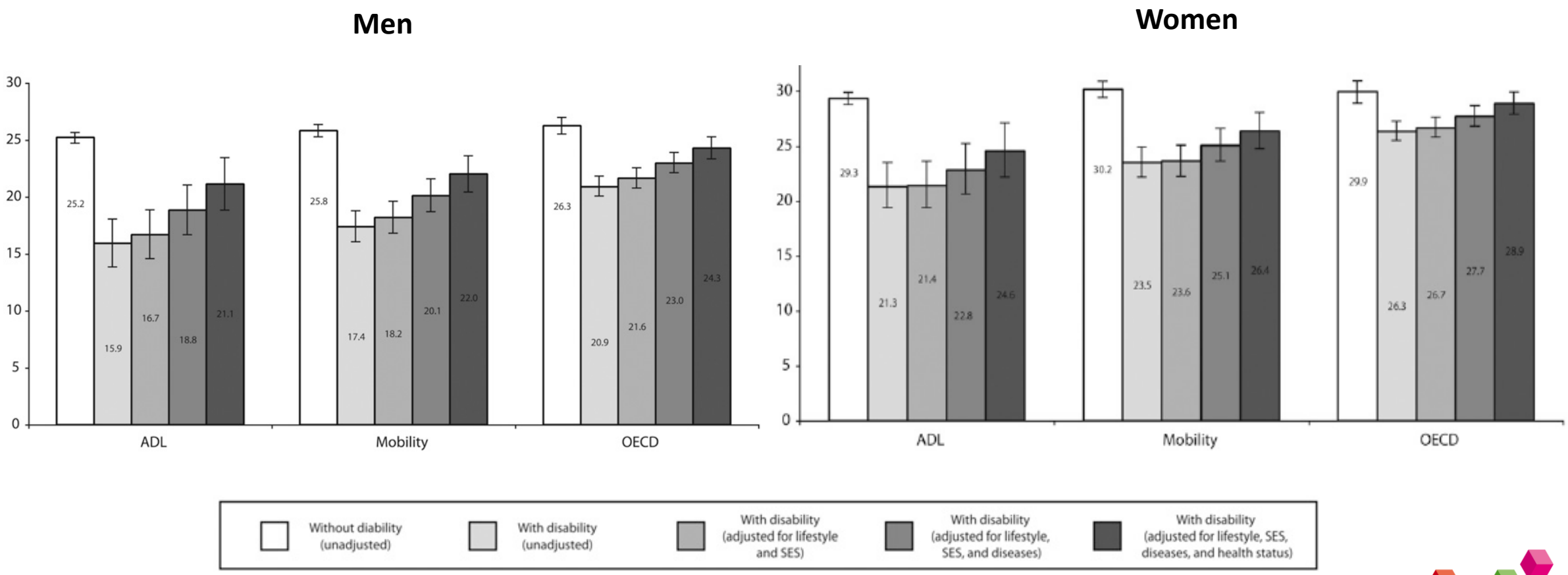
Previous studies

The Hazard Ratio (HR) (the risk of death of people with disabilities compared with that of people without disabilities) and life expectancy at age 55 separately for men and women were calculated using a Cox regression model.
The HR for men was 7.8 and life expectancy was 15.9 year; for women the HR was 6.1 and life expectancy was 21.3 years.

Majer IM, Nusselder WJ, Mackenbach JP, Klijs B and van Baal PHM. Mortality risk associated with disability: a population-based record linkage study. Am J Public Health. 2011;101:e9-15.

Previous studies

Remaining life expectancy at age 55 years for nondisabled and disabled populations by disability measure: POLS Health Survey of the Netherlands, 2001–2006.



Majer IM, Nusselder WJ, Mackenbach JP, Klijs B and van Baal PHM. Mortality risk associated with disability: a population-based record linkage study. Am J Public Health. 2011;101:e9-15.

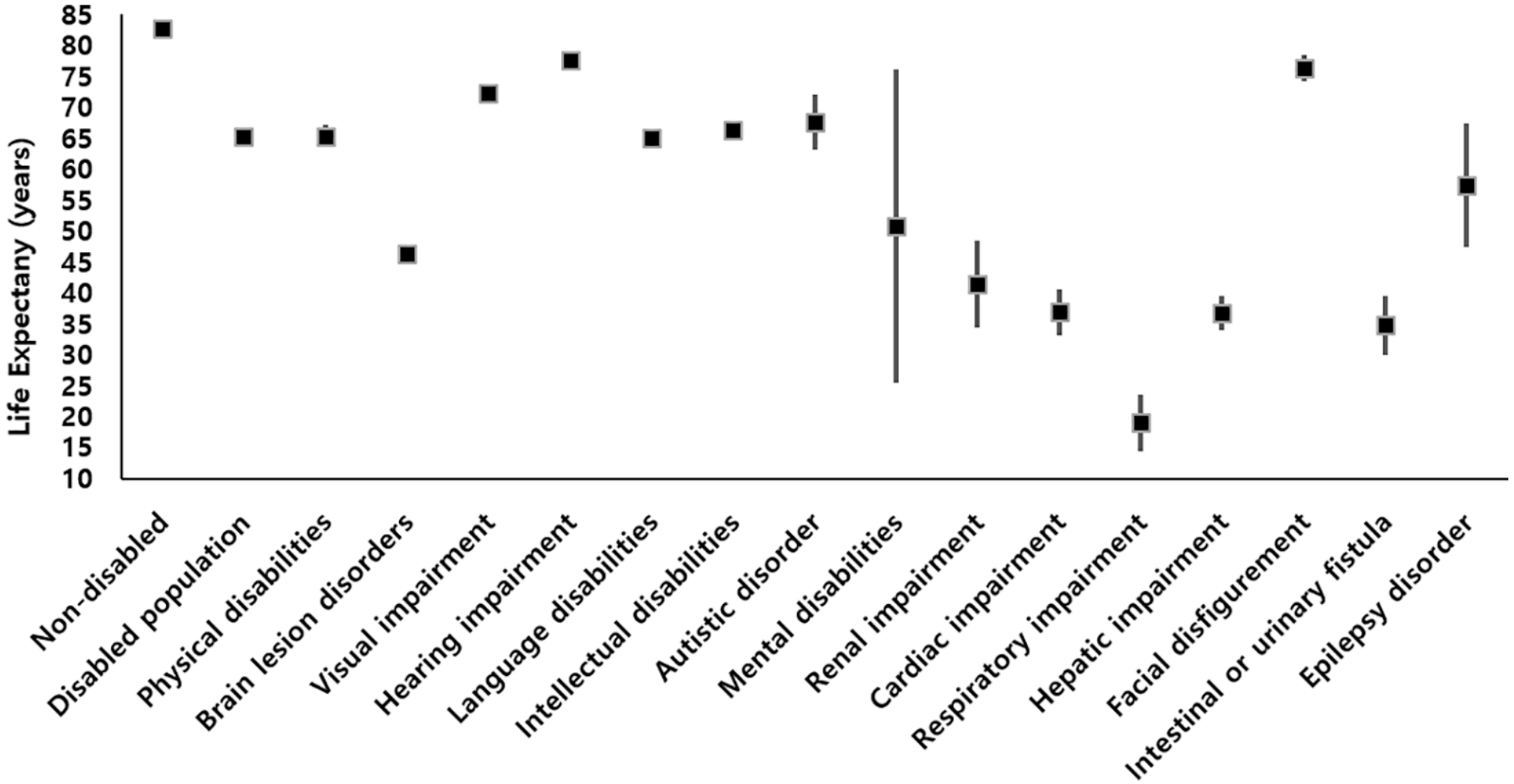
Previous studies

A study conducted in South Korea from 2008 and 2017 covering the whole Korean population (around 50 M) investigated, among other outcomes, the mortality rate and life expectancy of people with disabilities, by type of disability, with disabilities defined according to following definition “a person whose daily life or social activity is substantially hampered by physical or mental disability over a long period of time”.

LE gap at birth between disabled and non-disabled people was **17.6 years** (65.0 vs 82.6)

Previous studies

LE according to disability type. South Korea 2007-2018



Bahk J, Kang H, Khang Y. Disability type–specific mortality patterns and life expectancy among disabled people in South Korea using 10-year combined data between 2008 and 2017. Preventive Medicine Reports. 2022

OBJECTIVE

Objective of the study: to estimate the life expectancy of people with severe disabilities in Italy.

RATIONALE

- Hence, the objective is to build a period-based life table of persons with severe disabilities and to estimate the life expectancy (LE) at different ages.
- Period-based life tables describe the hypothetical survival experience of a synthetic or fictitious cohort. Estimated life expectancies from this kind of tables are in fact the average length of life of the fictitious generation represented in the life table.
- Actually, building a current life table of persons with severe disabilities (and estimating LEs at different ages) cannot answer to the question 'how long a person with severe disability at age x can expect to live?' (we would need mortality data of a cohort to build a generational life table)
- Life tables are one form of combining mortality rates of a population at different ages into a single statistical model. They can be used to measure the level of mortality of the population involved and provide a reliable snapshot of population health status and mortality.

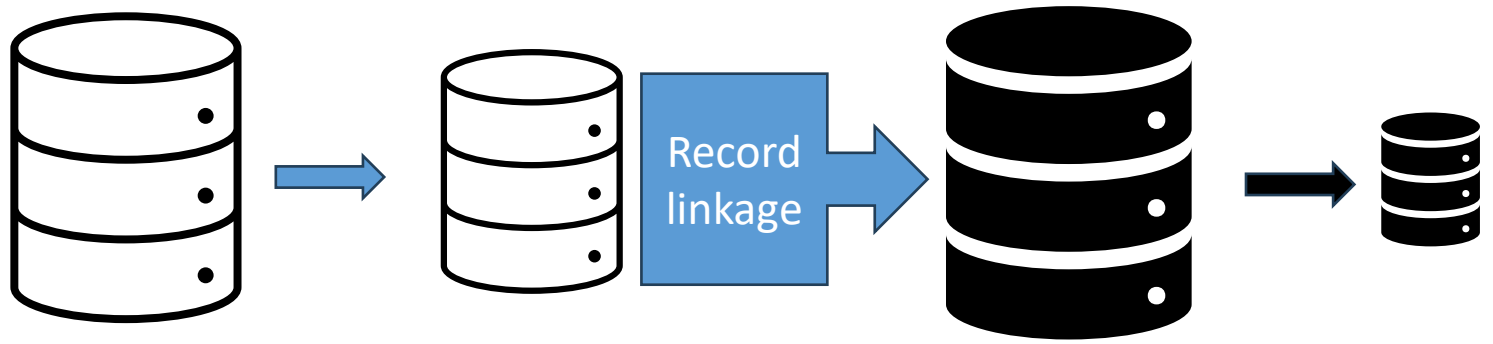
Data source

Health Interview Survey (HIS) 1999-2000

based on a sample of approximately 52,300 households (140k individuals) carried out by the Italian National Institute of Statistics (ISTAT) in four quarterly waves from September 1999 to March 2000.

Causes of Death Register 1999-2012

It is an administrative register including information on the cause(s) of death of all individuals residing in Italy.



Data & Methods

Disability definition:

The condition of disability was ascertained by using a battery of questions prepared by an OECD working group based on the World Health Organization's International Classification of Impairments, Disabilities and Handicaps (ICIDH) classification (McWhinnie, 1981). Included in the battery of questions is the scale for measuring the level of difficulty in Activities of Daily Living (ADL).

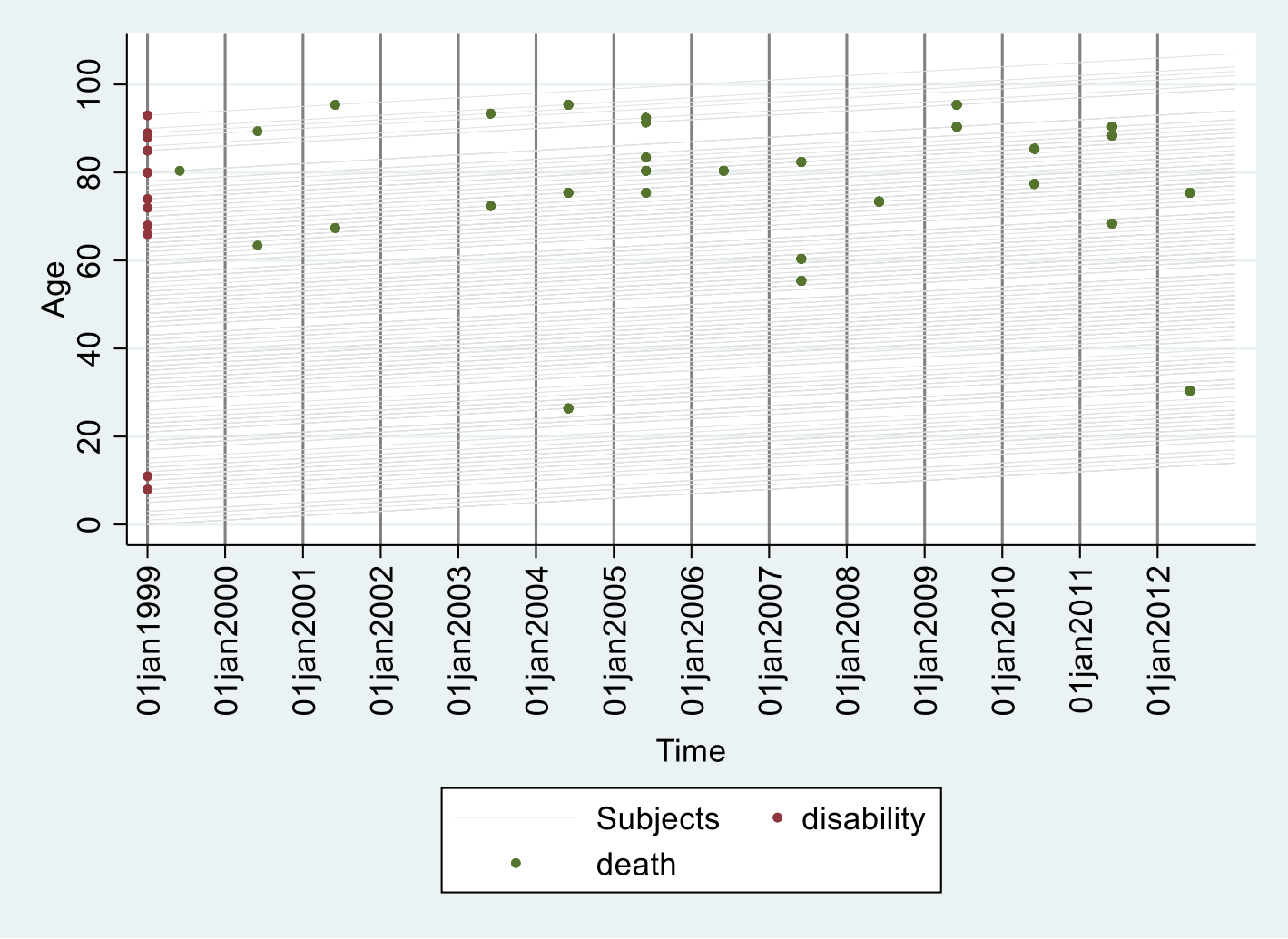
People with severe disabilities were those who are unable to perform at least one of the functions of daily living at all.

Essential functions of daily living include activities of daily living (independence in walking, climbing stairs, stooping, lying down, sitting, dressing, washing, bathing, eating) and sensory difficulties (hearing, seeing, speaking)

In addition, confinement in bed, in a chair (not a wheelchair) or at home was considered.

This was the definition adopted in Italy until 2007, after that it was replaced by the GALI (Global Activity Limitation Indicator)
For the purposes of the study, the definition has been considered appropriate (and directly applicable)

Data and methods



Data description

- 128,818 subjects enrolled at 1999
- 5,908 with severe disability
- Follow-up: 13 years (until 31/12/12)
- Observed deaths: 14,912 (3,694 with disabilities)
- Total person-time: 1,585,357

Data & Methods

- The death probabilities were calculated by attributing the death event occurring during the observation period (1999-2012) to the different age groups to which the subjects belong along the study period.
- Survival of the subjects was analyzed by using a Cox regression model. A bootstrap procedure (with 500 replications) was used to estimate pointwise confidence intervals.
- We also compared the predicted survival probabilities between subjects with and without disability (as ascertained at the starting point) along the observation time (13 years), by age-class.

Data & Methods

Cox regression model : $H(t)=H_0(t) \times \exp [b_1x_1+b_2x_2+b_3x_1x_2]$.

where x_1 x_2 represent the predictor variables (1=age-class, 2=presence of disability) and $H_0(t)$ is the baseline hazard at time t, which is the hazard of an individual having the predictors set to zero.

By computing the exponential of the regression coefficient b_3 of the interaction term we obtained the Hazard Risk (HR) of disability by age groups through the estimation of the margins of response of HRs.

The HRs by age groups were then transformed into RRs (the risk of dying for disabled persons compared to the risk in the general population).

Because RRs were calculated only for some ages (15,25,35,45,55,65,75,85) in order to estimate the RR for all ages the distribution of RR by age was interpolated using a spline cubic equation

Estimated RRs were then used as multiplicative factor of death probabilities (q_x) in the life table of the general population, as provided by the Italian National Institute of Statistics for the year 2012

RESULTS

Number of subjects, number of deaths and person-years by disability status and age group. Study period:1999-2012

	Persons with disability			Persons without disability		
Age class	#subjects	# deaths	person-years	#subjects	# deaths	person-years
6-14	156	0	2,028	12,668	27	164,540
15-24	125	6	1,576	16,569	84	214,880
25-34	151	11	1,859	19,955	159	258,560
35-44	172	24	2,096	20,420	386	263,613
45-54	275	54	3,260	18,654	869	238,419
55-64	565	212	5,932	15,060	1,855	186,557
65-74	1,253	721	11,734	12,234	3,727	140,565
75-84	1,841	1,436	14,099	5,406	3,277	52,718
85+	1,370	1,230	7,304	966	832	6,913
Total	5,908	3,694	49,888	122,910	11,218	1,539,469

RESULTS

ESTIMATED HAZARD RATIOS

Age class	HR	LL	UL
6-14	N.C.		
15-24	9.35	0.00	13.97
25-34	9.31	4.51	11.44
35-44	7.59	5.49	8.56
45-54	4.35	3.67	4.68
55-64	3.67	3.46	3.77
65-74	2.41	2.43	2.39
75-84	1.72	1.70	1.74
85+	1.47	1.45	1.47

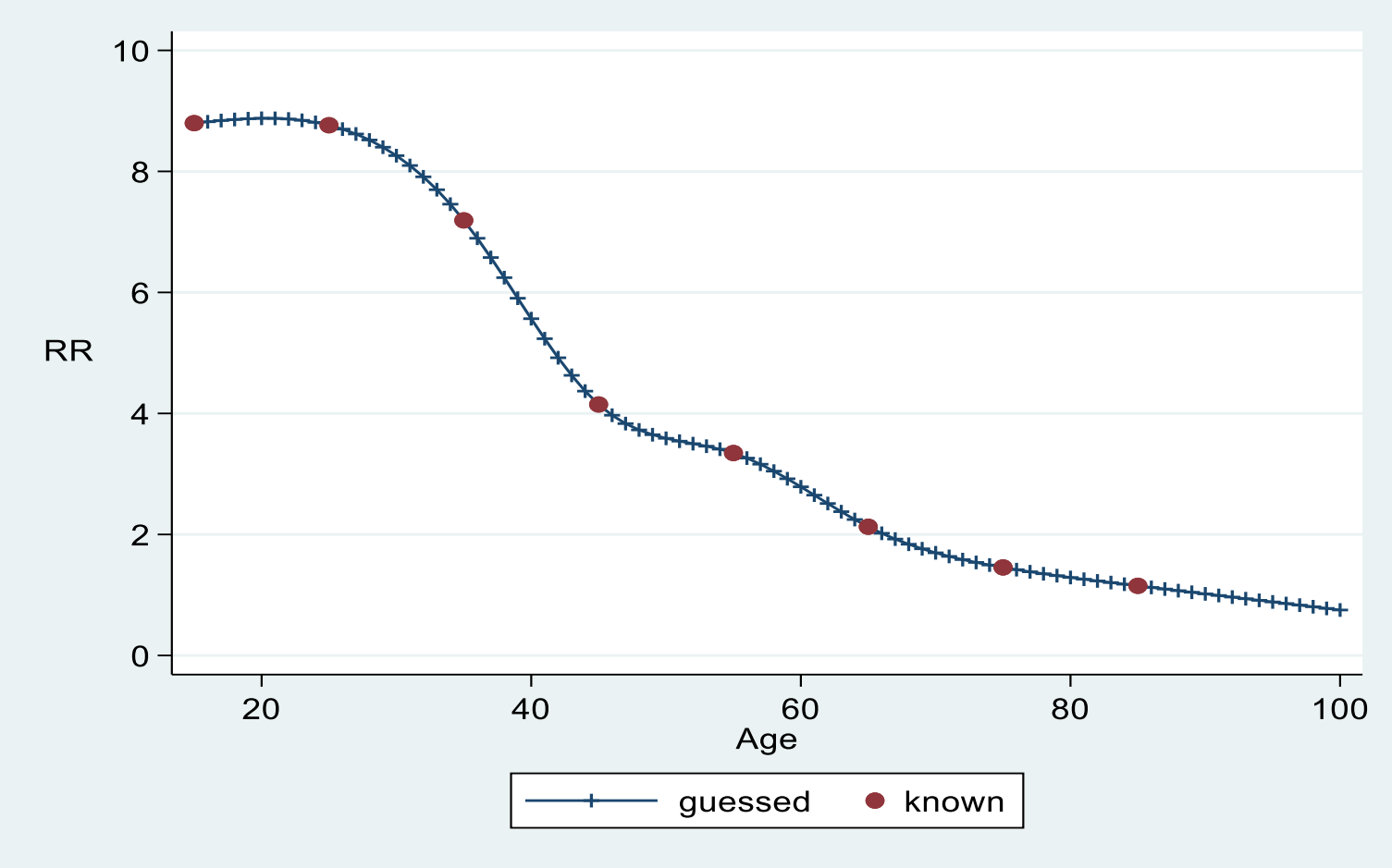
RECALCULATED AS RELATIVE RISKS

Age class	RR	LL	UL
6-14	N.C.		
15-24	8.80	0.00	12.74
25-34	8.76	4.39	10.60
35-44	7.19	5.29	8.05
45-54	4.15	3.54	4.44
55-64	3.35	3.18	3.43
65-74	2.13	2.15	2.12
75-84	1.46	1.44	1.46
85+	1.15	1.15	1.15

Comparison of death probabilities between non-disabled and disabled persons

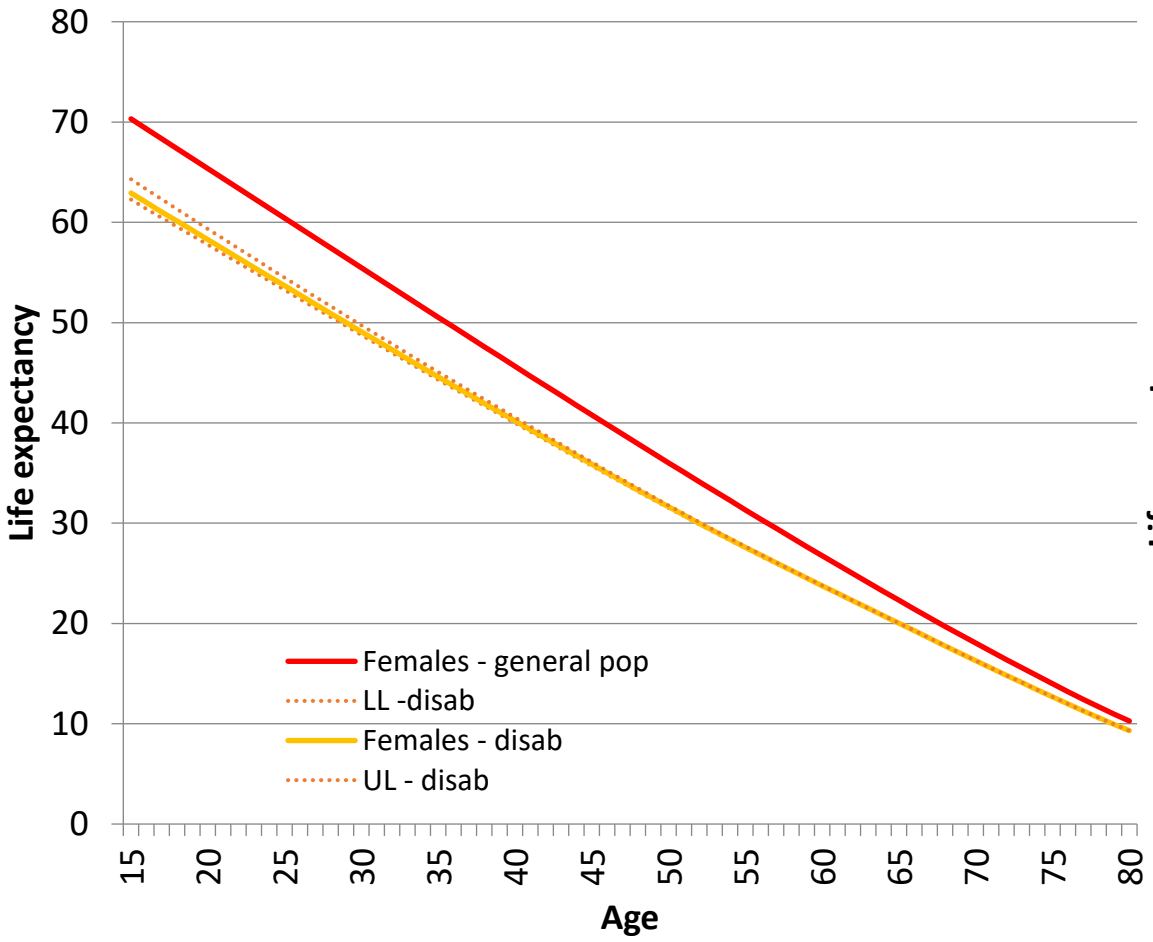
RESULTS

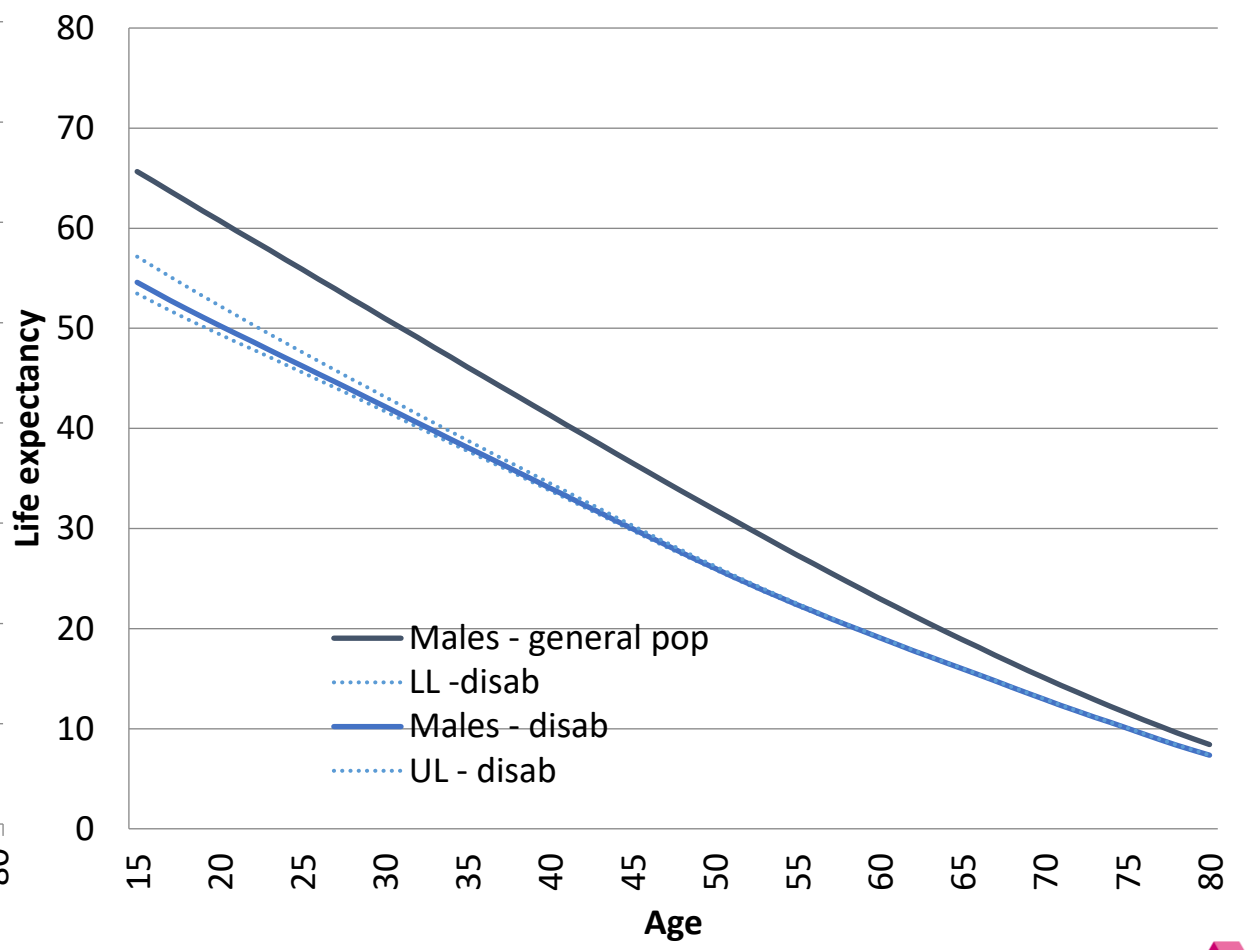
INTERPOLATION OF RRs WITH A SPLINE CUBIC EQUATION



RESULTS

LIFE EXPECTANCY (LE) OF GENERAL POPULATION AND OF PERSONS WITH DISABILITIES, WITH 95 P.C. CONFIDENCE INTERVALS





RESULTS

LIFE EXPECTANCY (LE) OF GENERAL POPULATION AND PERSONS WITH DISABILITIES, WITH 95 P.C. CONFIDENCE INTERVALS

- Life expectancy at 15 years for people with disability was 54.6 years for men and 62.9 for women. The gap of LE at 15 years between persons with disability and general population was **11.1** years for men and **7.4** years for women
- Life expectancy at 30 years for people with disability was 42.2 years for men and 49.1 for women., with a gap **8.8** years for males and **6.4** year for females.
- The gap in LE tends to be lower in later ages, as expected: -**4.9** at 55 years, -**2.9** at 65 years and -**1.5** at 75 year among males; -**3.7** at 55 years, -**2.3** at 65 years and -**1.3** at 75 year among males.

DISCUSSION

Life expectancy at 15 years showed a gap with general population of 11.1 years for men and 7.4 years for women. The RR of death at the same age was 8.8

Life expectancies of persons with physical disability in China were lower than that of the general population: gaps of male and female life expectancy at birth were 17.1 years and 12.7 years, respectively. (Zheng, 2011)

A recent study investigated the life expectancy among people with disabilities in Korea estimated LE at birth of people with disability was 65.2 with a gap between the disabled and non-disabled population of 17.6 years. (Bahl, 2022)

The Dutch study by Majer (2011) estimated a life expectancy among people with disabilities at 55 years of 15.9 for men and 21.3 for women.

Data from our study estimated a survival at 55 years of 16.0 years for men (95% C.I.:12.6-18.4) and 22.5 years for women (95% C.I.:20.5-24.1).

STRENGTHS AND LIMITATIONS

LIMITATIONS

- Disability data were self-reported, which can result in either under- or overreporting of disability, which, in turn, may bias the outcomes.
- It is assumed that the disability status remains the same along the follow-up period as that identified at the time of entry time. The probability of such misclassification is higher if the follow-up time is longer, given constant incidence and recovery intensities.
- Data do not allow accurate estimates of RRs below 15 years of age.
- It was not possible with the available data to consider many factors that interact with life expectancy
- The linkage procedure between the basis of the survey population and the death records was successful for 92% of the cases. A possible selection bias in the remaining 8% of the study population could be possible.

STRENGTHS AND LIMITATIONS

STRENGTHS

- the first study providing estimates in Italy of the life expectancy of persons with disabilities using data from a national survey, and it is also one of the few studies available worldwide
- The large representative survey of free-living people followed up for 13 years that constitutes the base of the estimation of the survival measures.

DISCUSSION

- The probabilities of death for people with (and without disability) were not calculated for one-year period, as usually done for ordinary (current) life tables, but collecting the events (deaths) from entry time to the following 13 years. Hence, they are based on an average of age-specific death rates calculated on the basis of a 13-year time period. This aspect may introduce some bias in case of presence of period effect

- The relationship between the risk of death among people with disabilities and the entire observed population was modelled by using a Cox proportional model, therefore assuming the proportionality of risks throughout the observation period.

CONCLUSIONS

- This study provides valid and robust information on the life expectancy gap between people with and without disabilities. The data presented are representative at the population level and provide a valuable reference for policy evaluation with respect to interventions for people with disabilities.
- We can conclude that the health status of persons with disabilities in Italy is comparable to the of the Netherlands and North Korea.
- In future studies the limitation of disability ascertained only at the entry time can be overcome by using multi state life tables, predicting the change of state, say from the condition of absence of disability to the condition of presence.

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THANKS FOR YOUR ATTENTION

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