



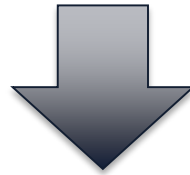
Educational differentials on life expectancy with and without cognitive impairment in Brazil

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Background

- Fast increase in the proportion of older adults
- Gains in life expectancy at older ages



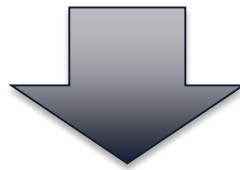
Issues about cognitive health become more salient

Social costs

- One million individuals live with dementia in Brazil, with this number expected to double in the next 20 years (Ferri, 2012).
- Conservative estimates indicate that total costs associated with dementia in Brazil reached \$12.8 billion (U.S.) in 2009, with direct costs accounting for \$4.1 billion, and informal care accounting for \$8.7 billion (Wimo, Winblad, & Jönsson, 2010).

Background

- CIFLE increased from 2000 to 2010 – 1.9 years for men and women at age 65
- Small reduction in CILE - from 3.5 years to 3.1 at age 65



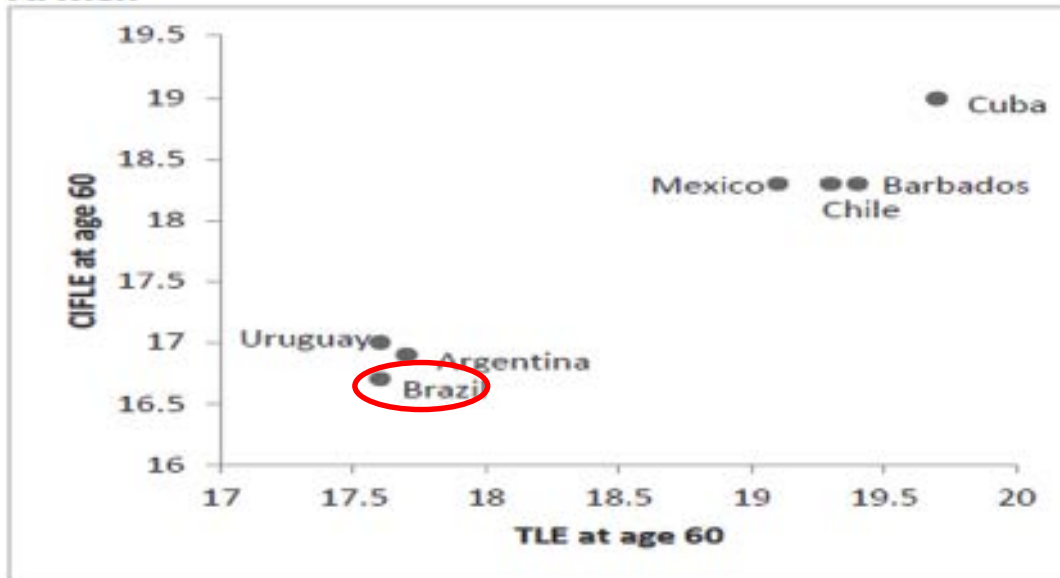
- Gains in LE concentrated in CIFLE
(Andrade et al, 2014)

Background

- Men in São Paulo had better cognitive ability than women
- Gender differences in MMSE scores are largely explained by differences in education levels

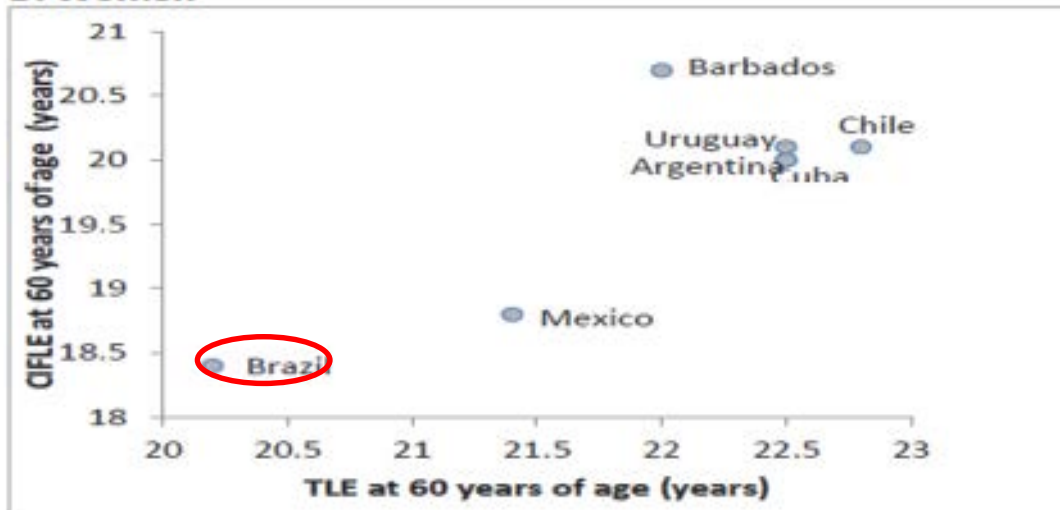
(Maurer, 2011)

A: Men

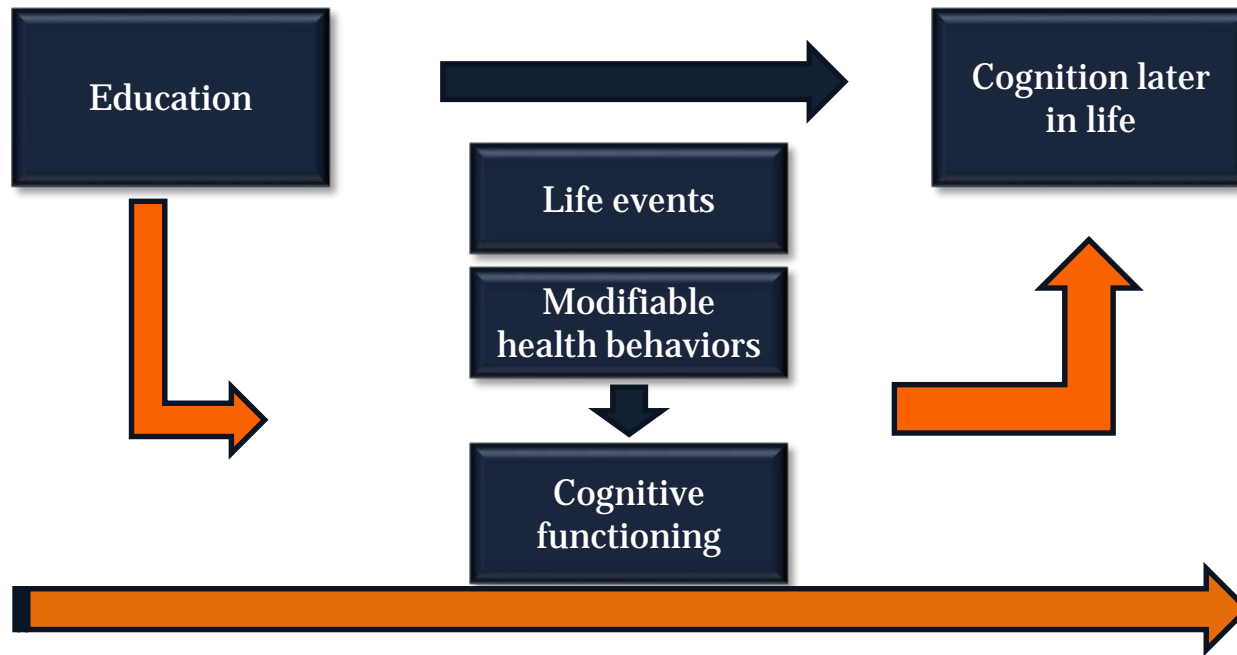


Brazilian men and women with lowest CIFLE in Latin America and the Caribbean

B: Women



Education and cognition



Objective

- Estimate life expectancy with (CILE) and without cognitive impairment (CIFLE) by education in Brazil



Hypotheses

- Older adults with lower education will have shorter lives and with a higher proportion of years with cognitive impairment

Study population

- **SABE survey - Probabilistic sample of older adults (aged 60 years or older) residing in the city of São Paulo, Brazil ($N = 2,143$)**
- **Baseline (2000), with follow-ups in 2006, 2010/2011**
- **Final sample: 2,106**

Outcome measure – cognitive status

- Modified version of the Mini Mental State Exam (MMSE), which was validated for the SABE study.
- 13 items that are less dependent upon educational level (Icaza & Albala, 1999; OPAS, 2001)
- MMSE scores ranged from 0 to 19
- Cognitive impairment - MMSE lower than 12



Education

- Years of formal education – results presented for 0, 4, 8 and 12

Statistical analyses

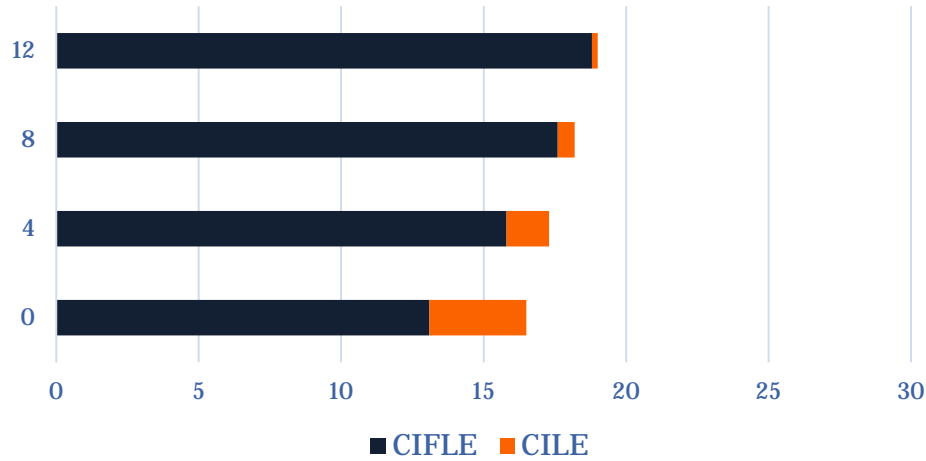
- **IMaCh version 0.99 r14**
- **Monthly estimates**
- **Survey weights used**
- **Sensitivity analyses**

	Total	Men (41.2%)	Women (58.8%)	p-value
Age	69.3 (.41)	68.9 (.49)	69.7 (.39)	0.006
Years of schooling	3.4 (.23)	3.9 (.31)	3.0 (.20)	<0.001
MMSE score	16.5 (.10)	16.6 (.12)	16.4 (.12)	0.149
Cognitive impairment (%)	6.95	6.11	7.53	0.304

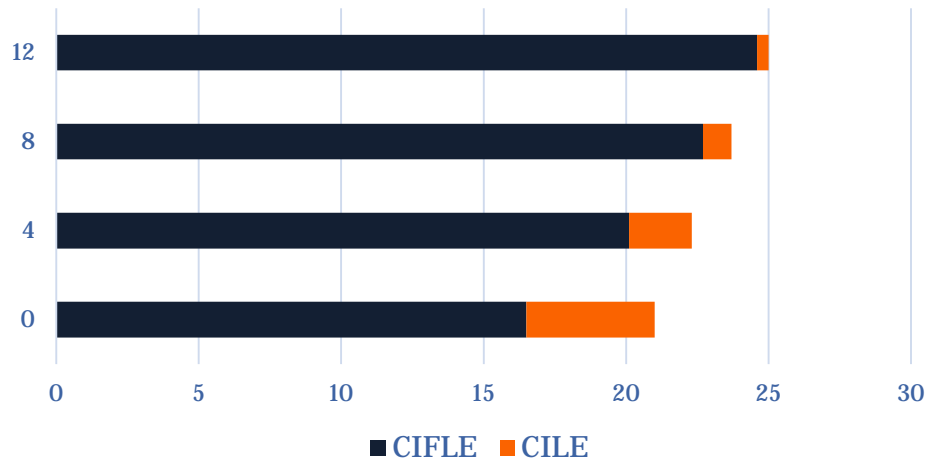
31% illiterate

Population-based results

Men



Women

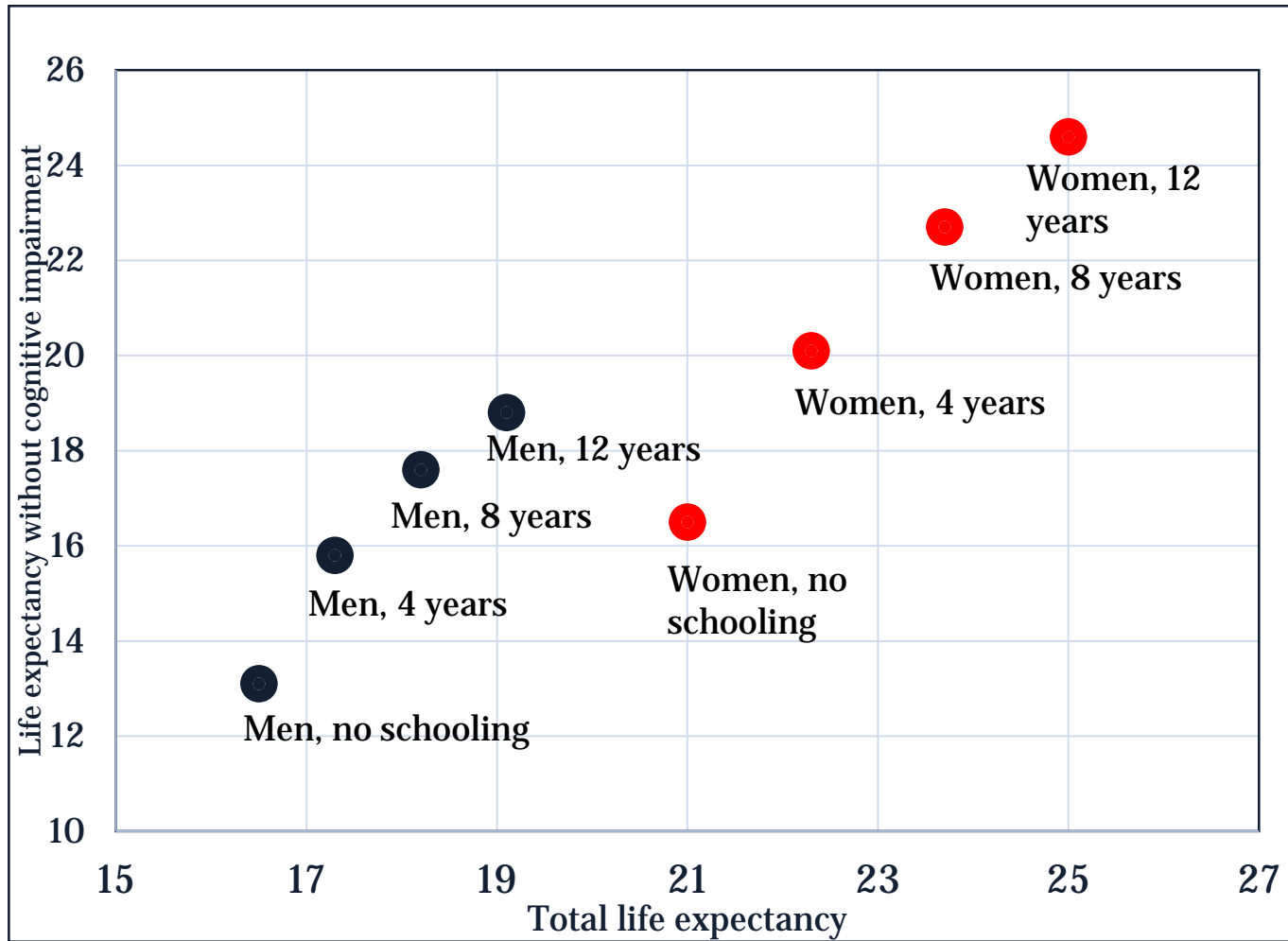


- TLE and CIFLE higher among more educated;
- CILE higher among less educated

Table 2. Men - Estimates of TLE, CIFLE, CILE and 95% confidence intervals by age and years of schooling based on MMSE results from SABE-Brazil

	Years of schooling							
	0		4		8		12	
Age 60								
Total life expectancy	16.5	(15.3,17.7)	17.3	(16.2,18.4)	18.2	(16.8,19.6)	19.1	(16.7,21.5)
CIFLE	13.1	(12,14.2)	15.8	(14.8,16.8)	17.6	(16.2,19)	18.8	(16.5,21.1)
CILE	3.4	(2.5,4.3)	1.5	(1.1,1.9)	0.6	(0.3,0.9)	0.2	(0,0.4)
% with good cognition	79.5		91.2		96.6		98.8	
Age 65								
Total life expectancy	13.5	(12.5,14.5)	14.3	(13.4,15.2)	15.3	(14,16.6)	16.1	(14,18.2)
CIFLE	9.9	(8.9,10.9)	12.7	(11.9,13.5)	14.6	(13.4,15.8)	15.8	(13.7,17.9)
CILE	3.6	(2.7,4.5)	1.6	(1.2,2)	0.7	(0.4,1)	0.3	(0.1,0.5)
% with good cognition	73.4		88.5		95.6		98.4	
Age 70								
Total life expectancy	10.8	(9.9,11.7)	11.6	(10.8,12.4)	10.1	(9,11.2)	13.4	(11.4,15.4)
CIFLE	7.0	(6.1,7.9)	9.8	(9.1,10.5)	9.3	(8.2,10.4)	13.1	(11.2,15)
CILE	3.8	(2.9,4.7)	1.8	(1.4,2.2)	0.8	(0.4,1.2)	0.3	(0.1,0.5)
% with good cognition	65.1		84.8		92.2		97.9	
Age 75						(0,0)		
Total life expectancy	8.3	(7.5,9.1)	9.1	(8.4,9.8)	10.1	(9,11.2)	10.9	(9.1,12.7)
CIFLE	4.5	(3.7,5.3)	7.2	(6.5,7.9)	9.3	(8.2,10.4)	10.6	(8.8,12.4)
CILE	3.8	(2.9,4.7)	1.8	(1.3,2.3)	0.8	(0.4,1.2)	0.3	(0,0.6)
% with good cognition	54.6		79.7		92.2		97.2	

CIFLE

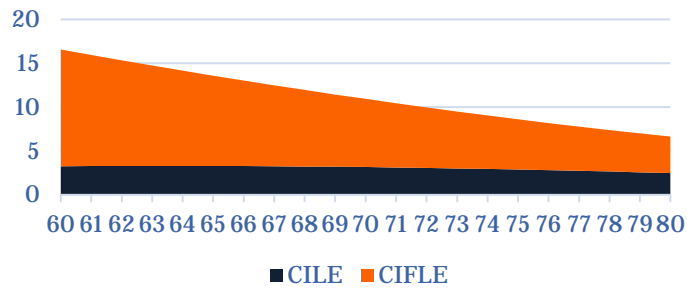


At age
60

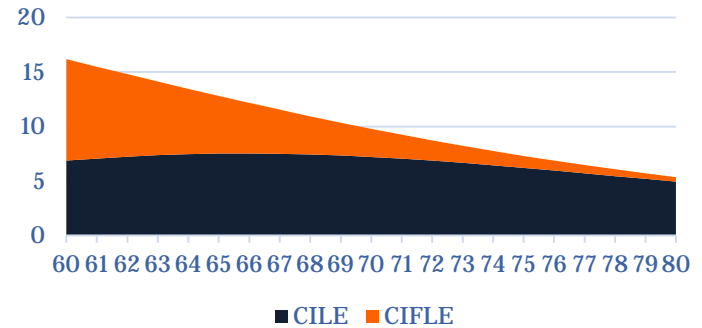
Status-based results

Status-based estimates of TLE, CIFLE, and CILE for men by age and years of schooling based on MMSE results from SABE-Brazil

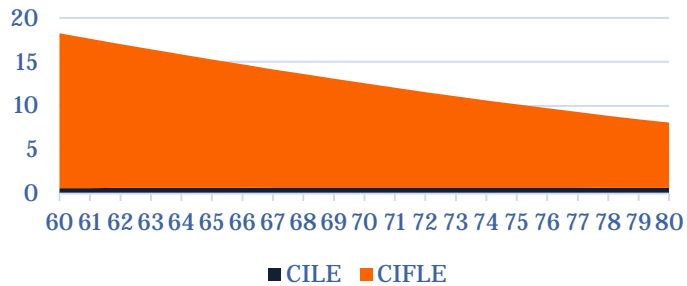
0 years of schooling, no CI baseline



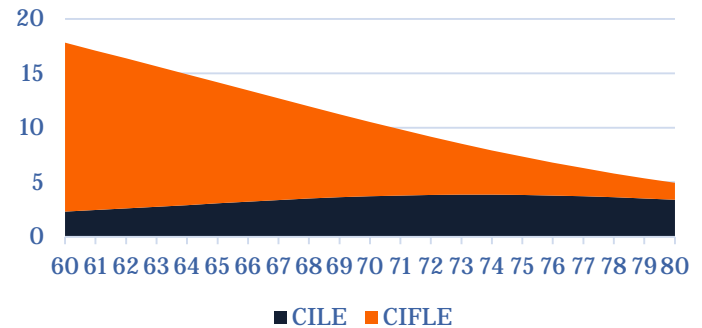
0 years of schooling, CI baseline



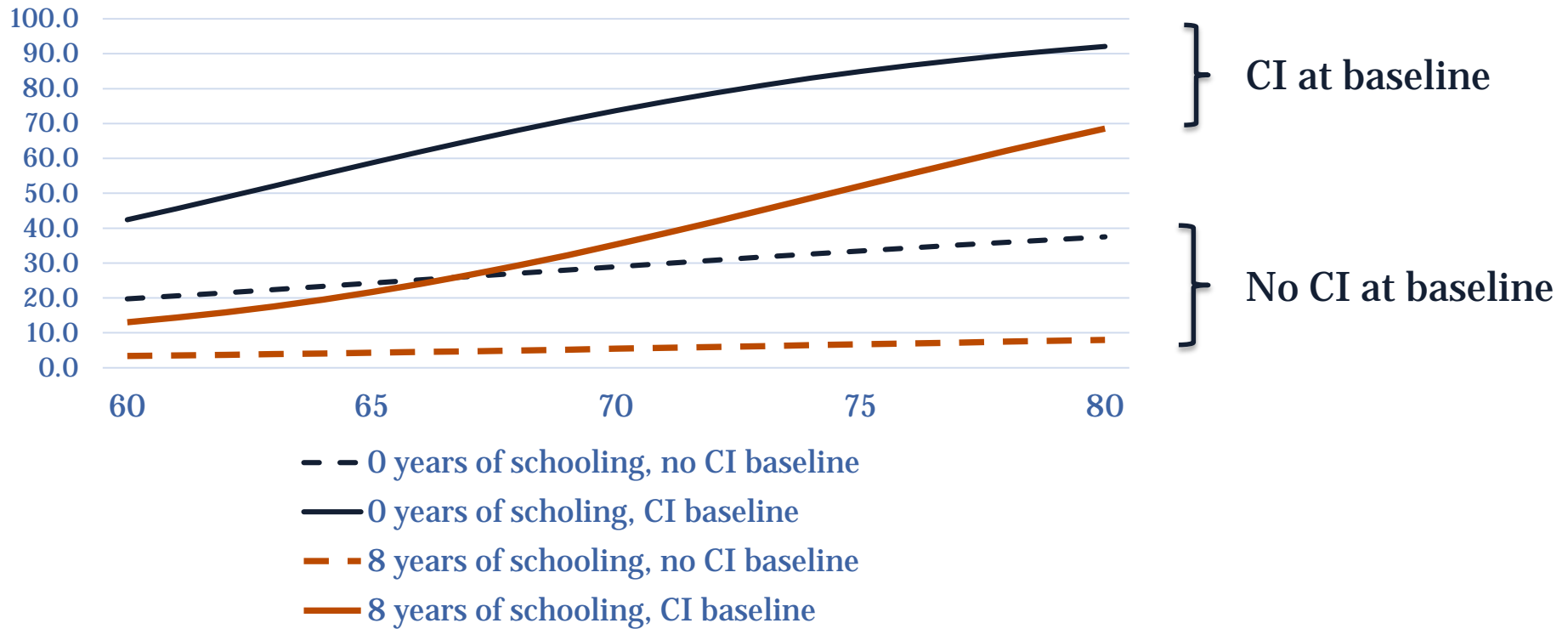
8 years of schooling, no CI baseline



8 years of schooling, CI baseline



Status-based estimates of proportion of remaining years with CILE for men by age and years of schooling based on MMSE results from SABE-Brazil

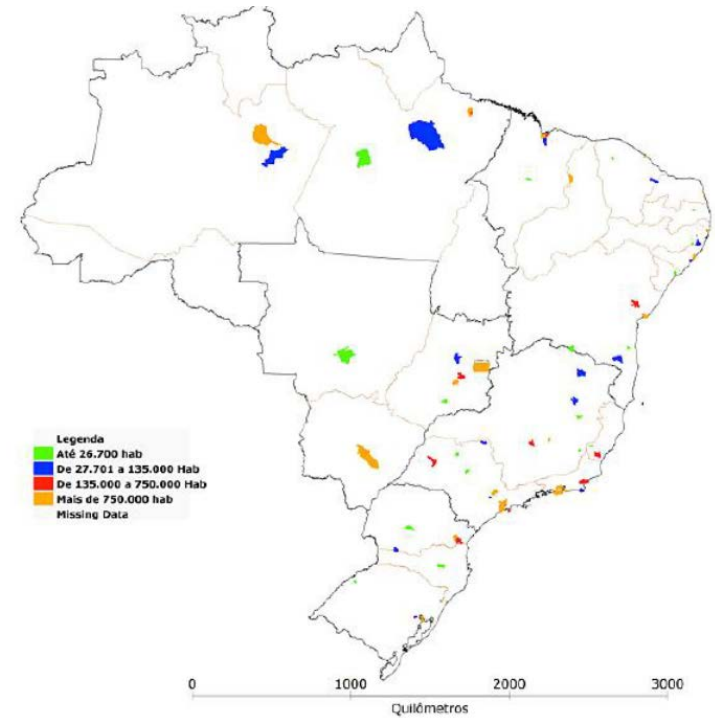


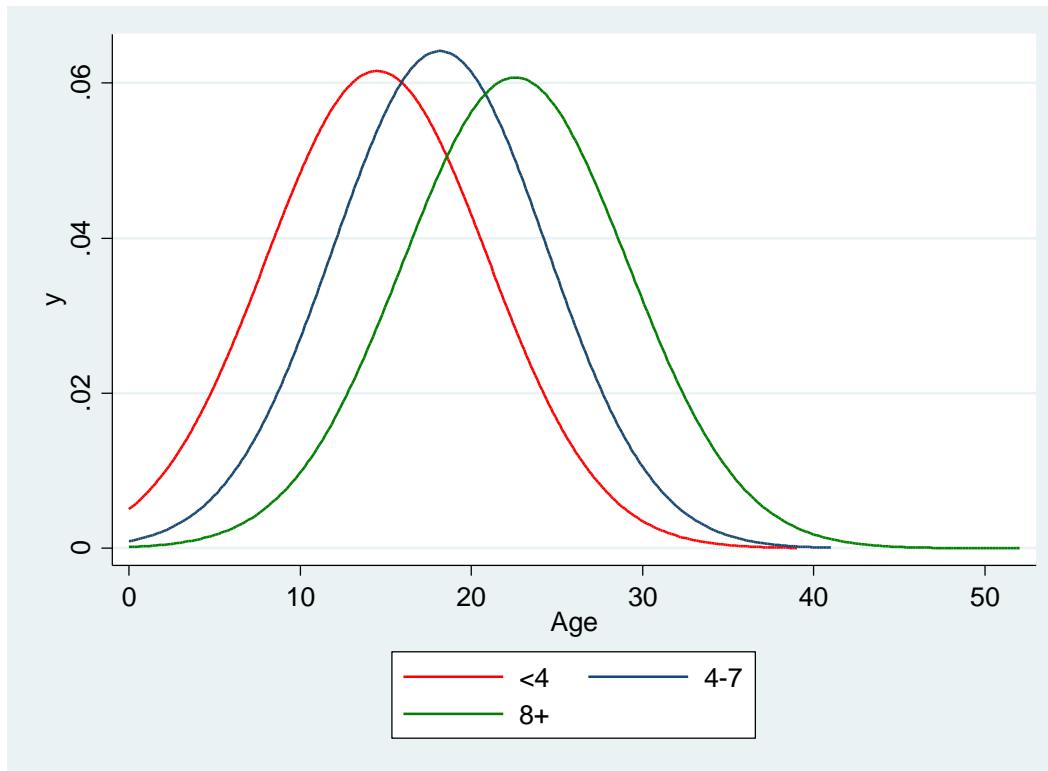
ELSI – Brazilian Longitudinal Study of Aging

Baseline: 2015-16

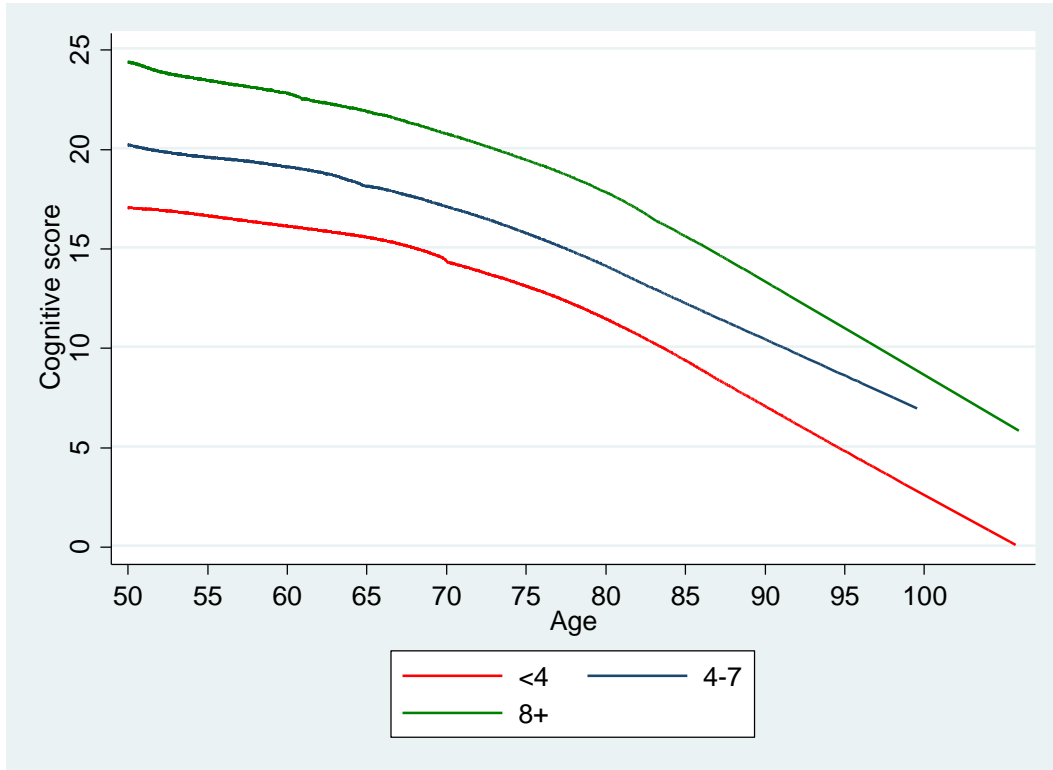
	n	%
<4	3,463	32.9
4-7	2,845	31.4
8+	3,042	35.7
Total	9,350	

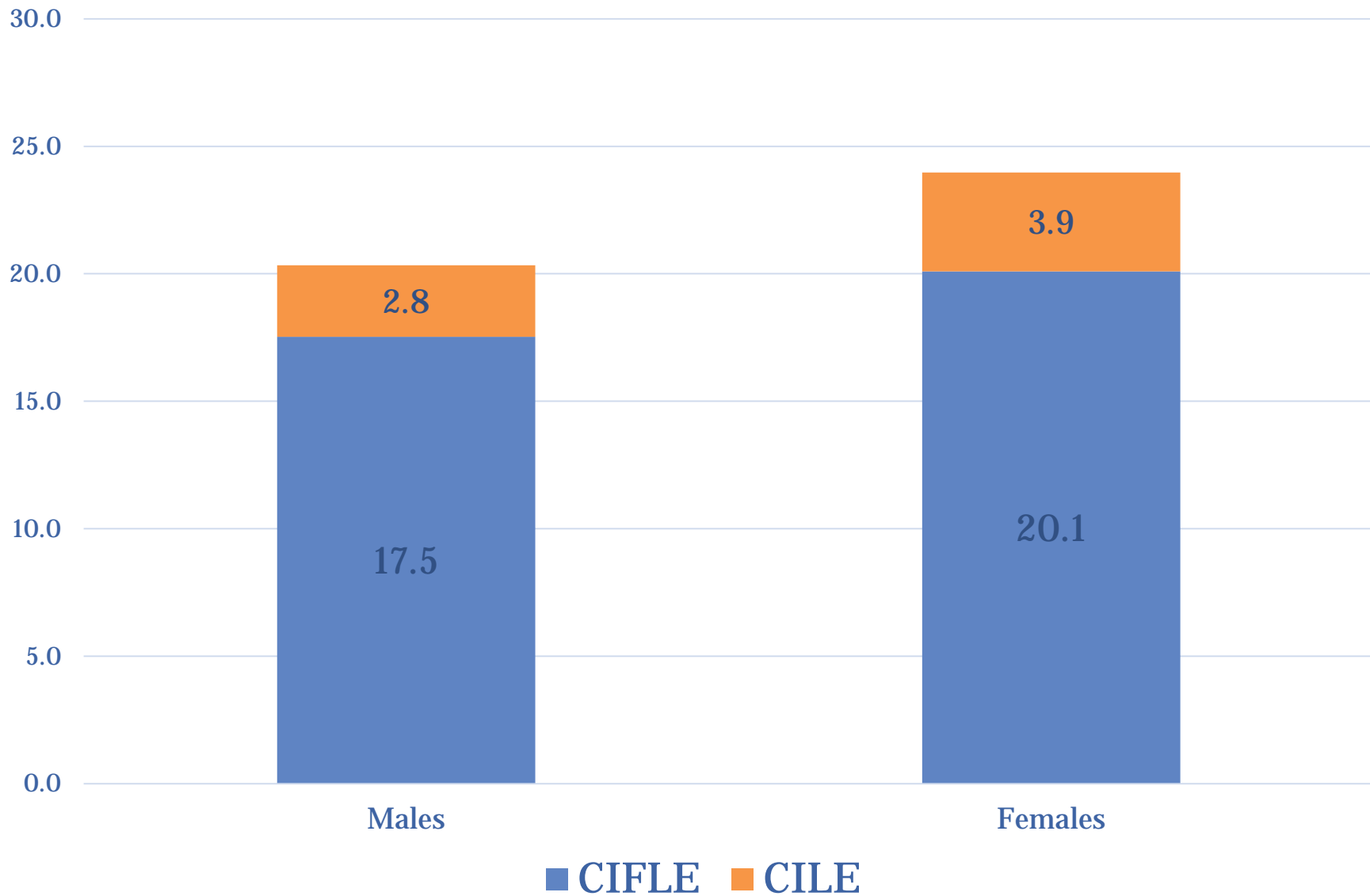
13.3% illiterate; 50 and older
19% among 60 and older





Memory (self-rated memory, orientation in time, word-list learning, prospective memory, names of people and things) and executive function (word-finding/verbal fluency)





Age-education specific
 ≤ -1.0 SD

Summary

- TLE and CIFLE are higher among those with more education.
 - Percentage of years without cognitive impairment is higher among those who have more education.
- CILE is higher among those with less education.
- Gender differences - women live longer lives, with more years with and without cognitive impairment.
- Marked decreases in % of remaining life without cognitive impairment among those with less education.
- Those who develop CI earlier in life, marked by having cognitive impairment at baseline, are expected to live more years with cognitive impairment than those who develop it later.

Limitations

- **SABE**
 - MMSE to measure cognitive health
 - Limited generalizability (older adults in Sao Paulo, major city)

Implications

- Policies aimed at increasing educational levels in Brazil are promising for improving life expectancy without cognitive impairment.
- Differential impact for families across socioeconomic groups.
 - ~2 year difference in CILE for 0 vs. 4 years of schooling
 - Provision of care
 - Professional training
- Family Health Strategy
 - Home health care assistance associated with older age (75+), lower education, widowed, dementia, morbidity and disability (Thume et al., 2010)

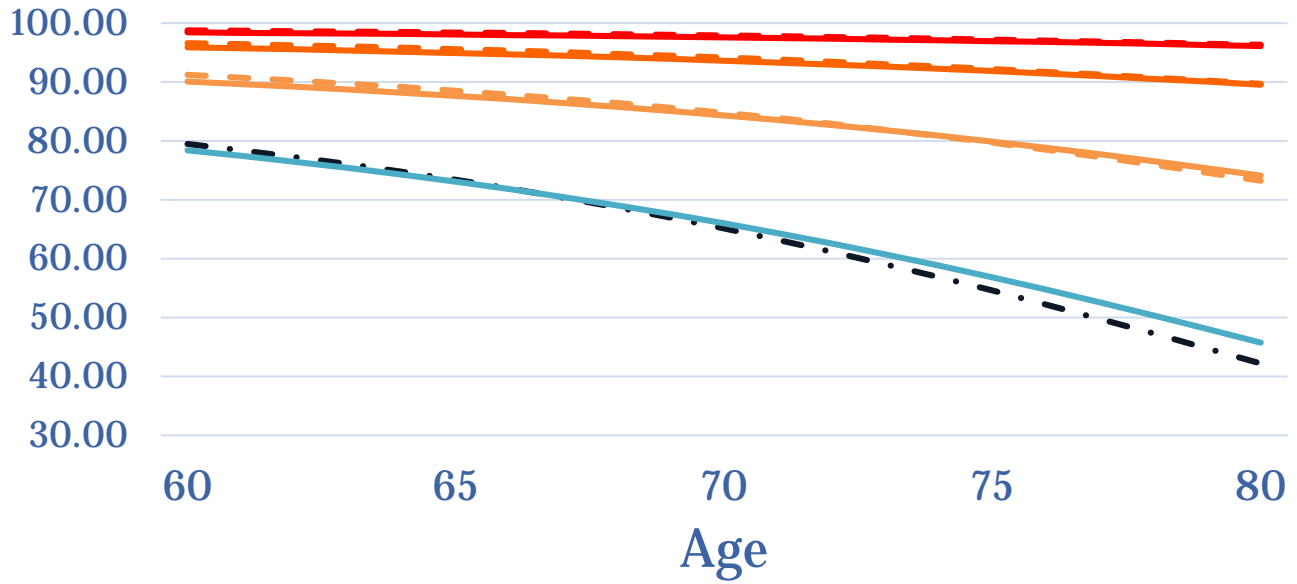
Questions? Suggestions?
Flavia Andrade – fandrade@Illinois.edu

Table 4. Status-based estimates of TLE, CIFLE, CILE and 95% confidence intervals for men by age and years of schooling based on MMSE: Brazil

	Years of schooling							
	0		4		8		12	
Baseline no CI								
Age 60								
TLE	16.5	(15.3,17.7)	17.3	(16.3,18.3)	18.2	(16.8,19.6)	19.1	(16.7,21.5)
CIFLE	13.3	(12.2,14.4)	15.8	(14.7,16.9)	17.6	(16.2,19)	18.8	(16.5,21.1)
CILE	3.3	(2.5,4.1)	1.5	(1.1,1.9)	0.6	(0.3,0.9)	0.2	(0,0.4)
Age 70								
TLE	10.9	(10.1,11.7)	11.7	(10.9,12.5)	12.6	(11.4,13.8)	13.4	(11.4,15.4)
CIFLE	7.8	(7.1,8.5)	10.1	(9.4,10.8)	11.9	(10.8,13)	13.1	(11.2,15)
CILE	3.2	(2.5,3.9)	1.6	(1.2,2)	0.7	(0.4,1)	0.3	(0.1,0.5)
Baseline with CI								
Age 60								
TLE	16.2	(14.7,17.7)	16.9	(15.5,18.3)	17.8	(16.1,19.5)	18.7	(16.3,21.1)
CIFLE	9.3	(6.9,11.7)	12.9	(10.6,15.2)	15.5	(12.8,18.2)	17.2	(14.2,20.2)
CILE	6.9	(4.9,8.9)	4	(2.3,5.7)	2.3	(0.7,3.9)	1.5	(0.3,2.7)
Age 70								
TLE	9.8	(8.3,11.3)	9.9	(8.2,11.6)	10.5	(7.8,13.2)	11.4	(7.4,15.4)
CIFLE	2.6	(1.5,3.7)	4.6	(2.9,6.3)	6.8	(3,10.6)	8.9	(3.1,14.7)
CILE	7.2	(5.8,8.6)	5.3	(4,6.6)	3.7	(1.6,5.8)	2.5	(0.0,5.0)

Table 5. Status-based estimates of TLE, CIFLE, CILE and 95% confidence intervals for women by age and years of schooling based on MMSE: Brazil

	Years of schooling			
	0	4	8	12
Baseline no CI				
Age 60				
TLE	21 (19.9,22.1)	22.3 (21.2,23.4)	23.7 (21.9,25.5)	25 (22.1,27.9)
CIFLE	16.6 (15.6,17.6)	20.1 (19,21.2)	22.7 (21,24.4)	24.6 (21.8,27.4)
CILE	4.5 (3.7,5.3)	2.2 (1.7,2.7)	1 (0.5,1.5)	0.4 (0.1,0.7)
Age 70				
TLE	14.3 (13.4,15.2)	15.5 (14.6,16.4)	16.9 (15.3,18.5)	18.2 (15.6,20.8)
CIFLE	10 (9.2,10.8)	13.2 (12.3,14.1)	15.9 (14.4,17.4)	17.8 (15.3,20.3)
CILE	4.3 (3.6,5)	2.3 (1.8,2.8)	1 (0.5,1.5)	0.4 (0.1,0.7)
Baseline with CI				
Age 60				
TLE	20.5 (19,22)	21.8 (20.4,23.2)	23.3 (21.3,25.3)	24.6 (21.6,27.6)
CIFLE	12.6 (10,15.2)	17.2 (14.6,19.8)	20.7 (17.8,23.6)	23 (19.7,26.3)
CILE	7.9 (5.7,10.1)	4.5 (2.7,6.3)	2.6 (1,4.2)	1.6 (0.5,2.7)
Age 70				
TLE	12.7 (11.1,14.3)	13.3 (11.4,15.2)	14.6 (11.3,17.9)	16.2 (11.5,20.9)
CIFLE	3.9 (2.6,5.2)	7 (4.7,9.3)	10.4 (5.4,15.4)	13.5 (6.5,20.5)
CILE	8.7 (7.2,10.2)	6.3 (4.7,7.9)	4.2 (1.6,6.8)	2.7 (0.2,5.6)



- · - Men 0 - - Men 4 - - Men 8
 - - Men 12 - Women 0 - Women 4
 - Women 8 - Women 12

Tabela 4 - Expectativa de vida aos 65 anos - Brasil - 1940/2016

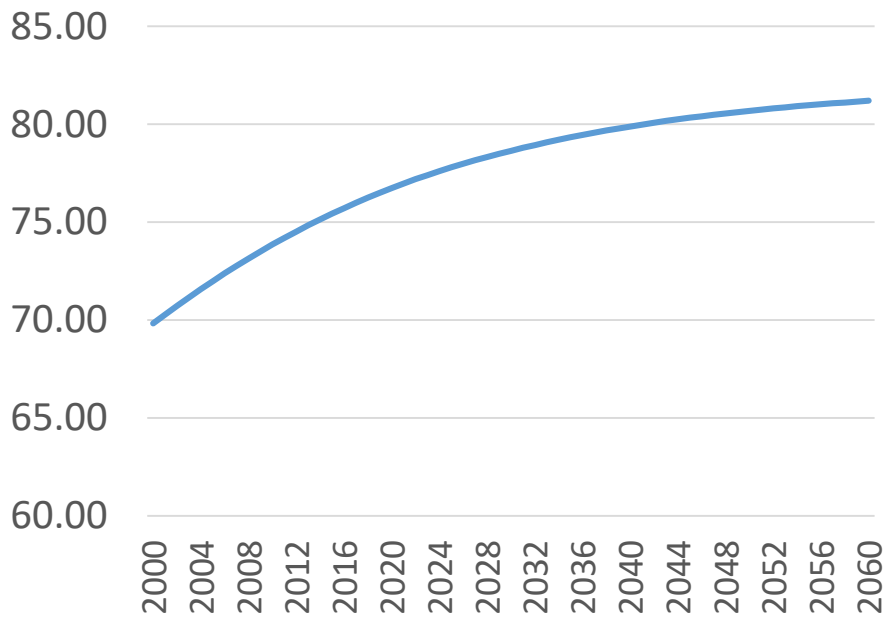
Ano	Expectativa de vida aos 65 anos			Diferencial (anos) (M-H)
	Total	Homem	Mulher	
1940	10,6	9,3	11,5	2,2
1950	10,8	9,6	11,8	2,2
1960	11,4	10,1	12,5	2,4
1970	12,1	10,7	13,4	2,6
1980	13,1	12,2	14,1	1,9
1991	15,4	14,3	16,4	2,0
2000	15,8	14,2	17,2	2,9
2010	17,6	16,0	19,0	3,0
2014	18,3	16,6	19,7	3,1
2016	18,5	16,8	20,0	3,1
$\Delta(1940/2016)$	7,9	7,5	8,5	

Fontes: 1940 1950,1960 e 1970 - Tábuas construídas no âmbito da Gerência de Estudos e Análises da Dinâmica Demográfica.

1980 e 1991 - ALBUQUERQUE, Fernando Roberto P. de C. e SENNA, Janaína R. Xavier "Tábuas de Mortalidade por Sexo e Grupos de Idade - Grandes e Unidades da Federação – 1980, 1991 e 2000. Textos para discussão, Diretoria de Pesquisas, IBGE, Rio de Janeiro, 2005.161p. ISSN 1518-675X ; n. 20

2000 em diante - IBGE/Diretoria de Pesquisas. Coordenação de População e Indicadores Sociais. Gerência de Estudos e Análises da Dinâmica Demográfica. Projeção da população do Brasil por sexo e idade para o período 2000-2060.

Gains in life expectancy



At birth in years:

1940: 45.5

2015: 75.5

2030: 78.6

2060: 81.2

Source: IBGE – Brazilian Projections 2000-2060

Table 2

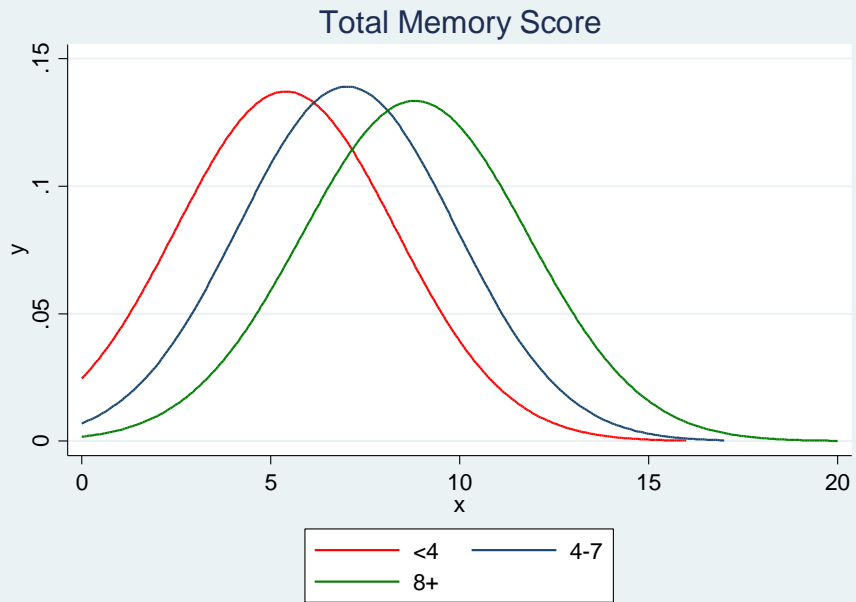
TLE, life expectancy without and with cognitive impairment among older adults in São Paulo, Brazil: 2000 and 2010.

Sex and age	2000					2010				
	TLE	HLE (life expectancy without cognitive impairment)	SE	% healthy years remaining	Life expectancy with cognitive impairment	TLE	HLE	SE	% healthy years remaining	Life expectancy with cognitive impairment
Total										
60	20.0	16.5	0.15	82.5	3.5	21.6	18.6	0.20	86.1	3.0
65	16.5	13.1	0.15	79.4	3.5	17.9	14.9	0.21	83.2	3.1
70	13.4	9.9	0.15	73.9	3.5	14.5	11.4	0.21	78.6	3.1
75	10.5	7.1	0.15	67.6	3.4	11.4	8.4	0.22	73.7	3.1
80	8.1	4.6	0.17	56.8	3.5	8.7	5.6	0.23	64.4	3.2
85	6.1	2.7	0.20	44.3	3.5	6.4	3.5	0.24	54.7	2.9
Men										
60	17.5	14.8	0.20	84.6	2.7	19.4	17.1	0.29	88.1	2.3
65	14.3	11.7	0.20	81.8	2.6	16.0	13.6	0.31	85.0	2.4
70	11.5	8.9	0.20	77.4	2.6	12.8	10.4	0.32	81.3	2.4
75	9.1	6.6	0.18	72.5	2.5	10.1	7.7	0.33	76.2	2.4
80	7.0	4.4	0.21	62.9	2.6	7.7	5.5	0.32	71.4	2.2
85	5.4	2.6	0.27	48.1	2.8	5.7	3.5	0.34	61.4	2.2
Women										
60	22.0	17.9	0.22	81.4	4.1	23.7	20.0	0.28	84.4	3.7
65	18.2	14.1	0.22	77.5	4.1	19.6	16.0	0.28	81.6	3.6
70	14.7	10.6	0.22	72.1	4.1	15.9	12.2	0.29	76.7	3.7
75	11.5	7.4	0.23	64.3	4.1	12.4	8.8	0.29	71.0	3.6
80	8.7	4.7	0.25	54.0	4.0	9.4	5.6	0.31	59.6	3.8
85	6.5	2.7	0.28	41.5	3.8	6.8	3.5	0.32	51.5	3.3

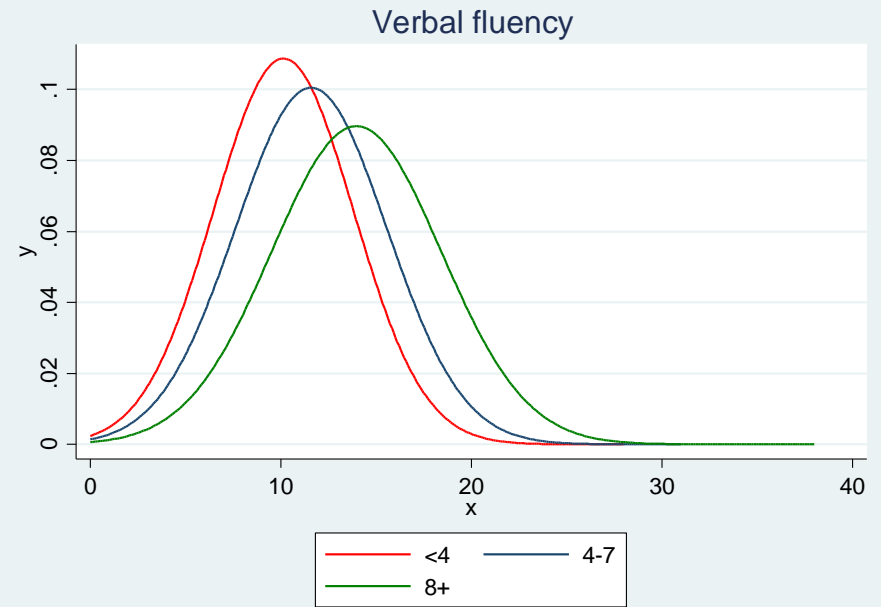
Note: SE, standard error.

Source: Andrade et al.
2014

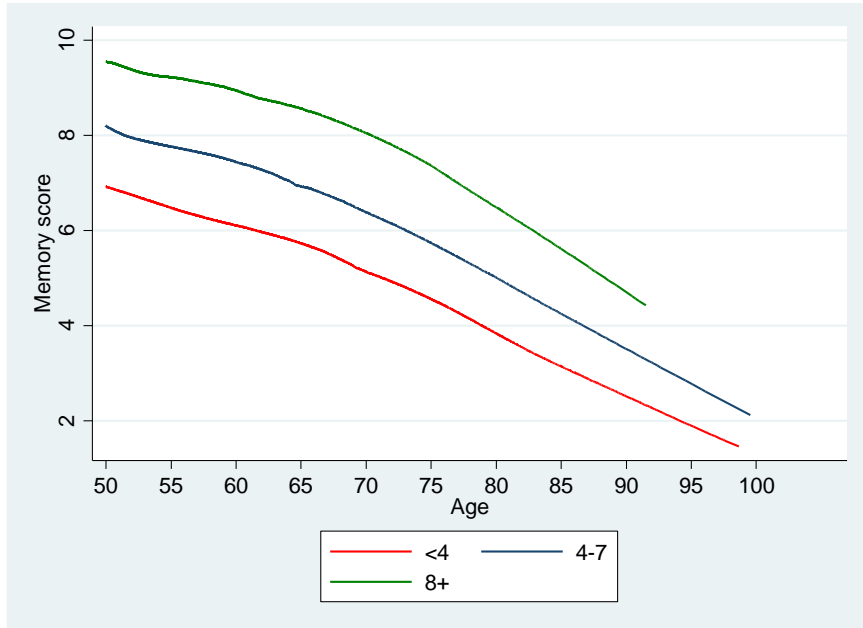
Memory



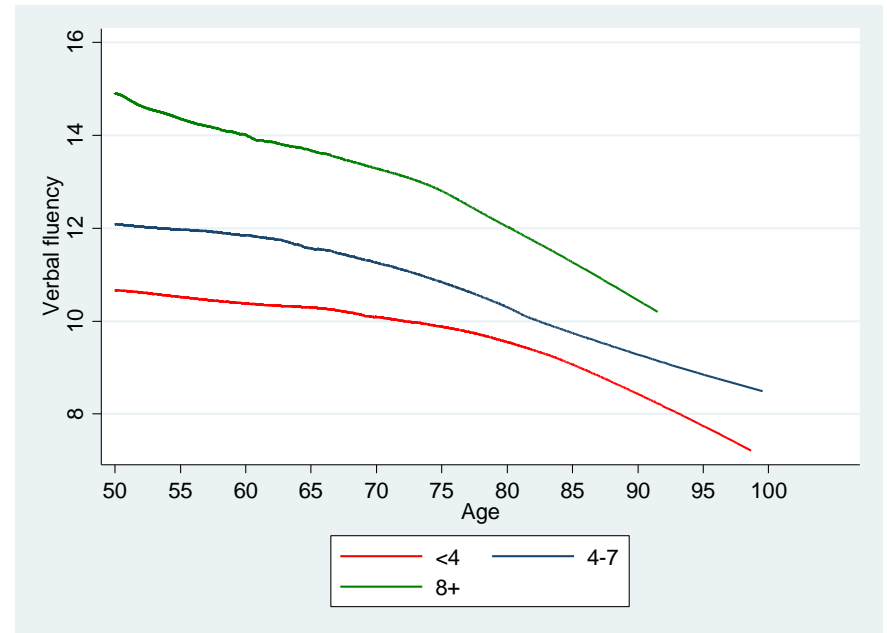
Verbal



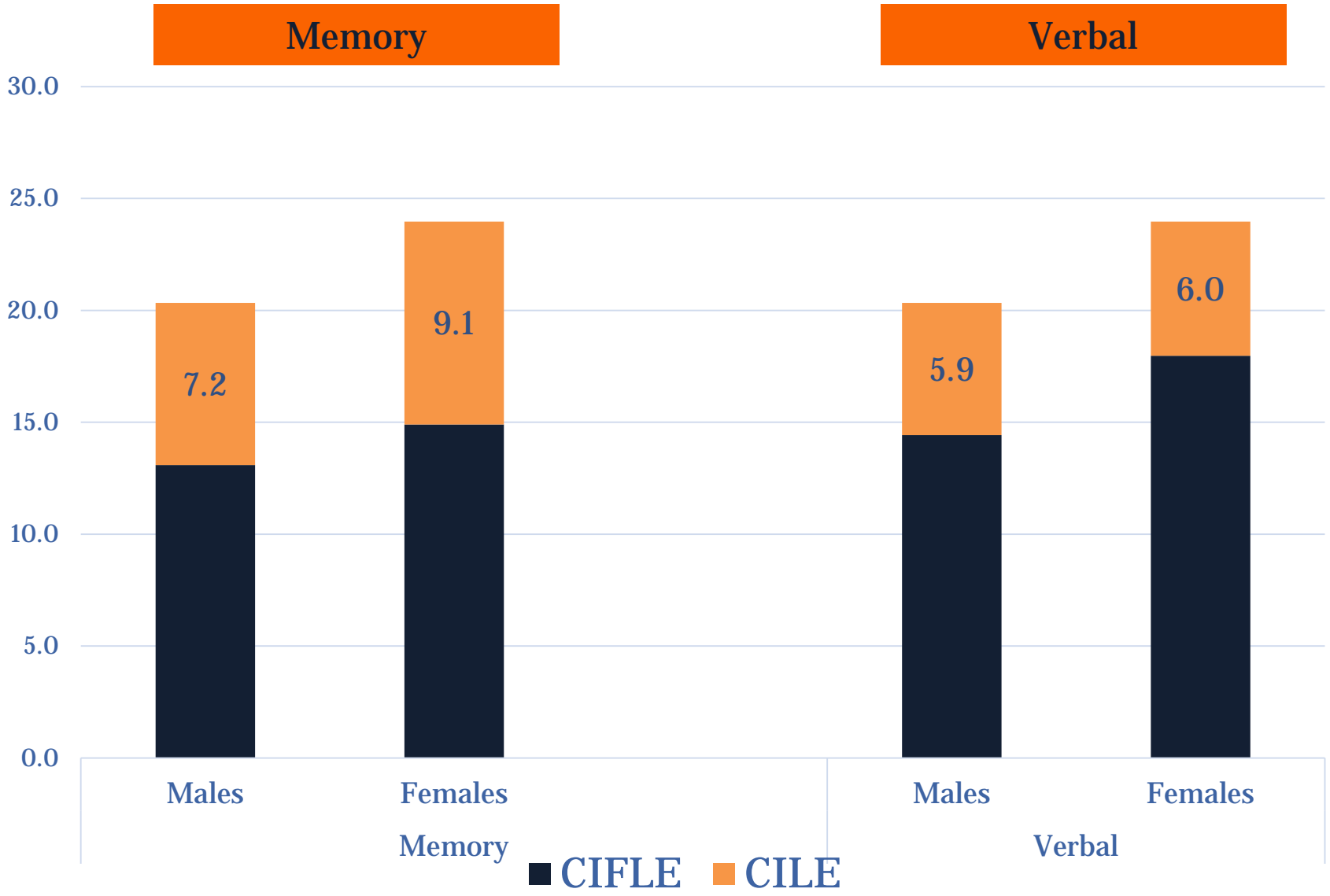
Memory



Verbal



Memory (0-20): 5
Verbal (0-38): 9



Memory (0-20): 5
 Verbal (0-38): 9