

Supplementary material

Additive interaction of disability with chronic conditions on mortality risk in middle-aged and older adults in Spain. *Disabil Health J* 2024.

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Supplementary Table S1. Distribution of baseline characteristics by disability after standardization to the overall community-dwelling Spanish population aged 50 years or older, 2011–12 and 2014 Spanish National Health Surveys.

Characteristic	Overall*	Disability†		P value‡
		No	Yes	
Survey year				0.87
2011–12	48.8	49.0	48.8	
2014	51.2	51.0	51.2	
Age (years)				0.98
50–54	19.7	19.7	19.0	
55–59	17.1	17.0	17.2	
60–64	14.7	14.8	14.7	
65–69	13.7	13.7	13.5	
70–74	11.0	11.1	11.1	
75–79	9.5	9.4	9.4	
80–84	8.0	8.2	8.4	
≥85	6.3	6.1	6.5	
Sex				0.65
Women	53.6	53.3	53.7	
Men	46.4	46.7	46.3	
Educational level				0.97
Less than primary	22.4	22.4	22.9	
Primary	25.3	25.1	24.7	
First-stage secondary	23.0	23.0	22.6	
Second-stage secondary	17.4	17.5	17.6	
University	12.0	12.0	12.2	
No. of comorbidities				0.95
0	26.8	26.8	26.2	
1	25.3	25.3	25.3	
2	19.7	19.7	19.9	
3	12.5	12.5	12.7	
≥4	15.6	15.7	15.9	

* Sampling-weighted percentages.

† Fully-weighted percentages taking into account both sampling and standardization weights.

‡ P value for homogeneity of fully-weighted percentages between people with and without disability.

Supplementary Table S2. Standardized 5-year risks of all-cause mortality (per 1,000 persons) by disability and specific comorbidities in the community-dwelling Spanish population aged 65 years or older, Spanish National Health Surveys, 2011–16 and 2014–2019.

Comorbidity	Without disability*		With disability*		Interaction contrast§ (95% CI)
	Without comorbidity	With comorbidity	Without comorbidity	With comorbidity	
Overall					
No. of deaths/participants	671/6,709		1,520/5,701		
Standardized 5-year risk† (SE)	120.9 (6.2)		223.3 (7.8)		
Standardized risk difference‡ (95% CI)	0.0 (reference)		102.4 (82.9 to 121.8)		
Hypertension					
No. of deaths/participants	346/3,444	322/3,253	655/2,285	856/3,396	
Standardized 5-year risk† (SE)	122.6 (9.3)	116.4 (8.1)	229.7 (11.3)	201.2 (10.3)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	-6.2 (-30.4 to 18.0)	107.1 (78.5 to 135.8)	78.6 (51.4 to 105.8)	-22.3 (-60.8 to 16.2)
Diabetes					
No. of deaths/participants	544/5,700	126/1,001	1,054/4,252	464/1,438	
Standardized 5-year risk† (SE)	114.9 (6.8)	146.0 (15.4)	210.6 (8.7)	277.3 (18.3)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	31.1 (-2.0 to 64.2)	95.7 (74.1 to 117.3)	162.3 (124.0 to 200.7)	35.6 (-16.1 to 87.3)
Acute myocardial infarction					
No. of deaths/participants	619/6,486	51/218	1,346/5,198	173/497	
Standardized 5-year risk† (SE)	115.1 (6.2)	215.1 (40.7)	221.1 (8.0)	286.6 (30.9)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	100.0 (19.2 to 180.7)	106.0 (86.1 to 125.9)	171.5 (109.8 to 233.2)	-34.5 (-136.6 to 67.7)
Other heart diseases					
No. of deaths/participants	558/6,011	113/689	1,067/4,378	448/1,311	
Standardized 5-year risk† (SE)	118.7 (7.0)	141.0 (16.2)	215.3 (8.6)	268.2 (18.8)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	22.3 (-12.3 to 56.9)	96.7 (74.8 to 118.5)	149.6 (110.2 to 188.9)	30.6 (-22.7 to 83.8)
Cerebrovascular disease					
No. of deaths/participants	648/6,582	22/124	1,335/5,248	183/449	
Standardized 5-year risk† (SE)	119.4 (6.2)	180.3 (45.5)	215.4 (7.9)	374.1 (39.8)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	60.9 (-29.0 to 150.9)	96.0 (76.2 to 115.8)	254.7 (175.8 to 333.7)	97.8 (-22.3 to 217.9)

(Table continues)

Supplementary Table S2 (continued).

Comorbidity	Without disability*		With disability*		Interaction contrast§ (95% CI)
	Without comorbidity	With comorbidity	Without comorbidity	With comorbidity	
Cancer					
No. of deaths/participants	602/6,331	67/369	1,334/5,106	184/581	
Standardized 5-year risk† (SE)	110.9 (6.0)	212.7 (29.3)	216.6 (8.1)	300.8 (26.8)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	101.8 (43.2 to 160.5)	105.7 (86.0 to 125.4)	189.9 (136.1 to 243.7)	-17.7 (-98.0 to 62.7)
Chronic obstructive pulmonary disease					
No. of deaths/participants	591/6,289	80/415	1,216/4,849	301/844	
Standardized 5-year risk† (SE)	116.9 (6.7)	166.6 (22.3)	216.4 (8.4)	247.4 (20.4)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	49.7 (4.1 to 95.3)	99.5 (78.5 to 120.6)	130.5 (88.4 to 172.6)	-18.8 (-81.6 to 44.1)
Asthma					
No. of deaths/participants	644/6,456	27/249	1,370/5,203	147/493	
Standardized 5-year risk† (SE)	120.1 (6.4)	157.7 (32.9)	222.5 (8.0)	237.6 (30.2)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	37.6 (-28.1 to 103.3)	102.5 (82.5 to 122.5)	117.6 (57.1 to 178.0)	-22.5 (-112.3 to 67.3)
Chronic liver disease					
No. of deaths/participants	660/6,642	9/63	1,458/5,526	60/168	
Standardized 5-year risk† (SE)	120.9 (6.3)	210.7 (89.0)	219.7 (7.7)	376.5 (73.6)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	89.9 (-85.0 to 264.8)	98.9 (79.3 to 118.4)	255.6 (110.8 to 400.5)	66.9 (-160.4 to 294.1)
Thyroid disease					
No. of deaths/participants	638/6,217	30/485	1,387/5,064	126/617	
Standardized 5-year risk† (SE)	120.4 (6.4)	111.5 (33.1)	223.7 (8.1)	194.1 (27.4)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	-8.9 (-75.1 to 57.2)	103.3 (82.9 to 123.6)	73.7 (18.5 to 128.9)	-20.7 (-107.4 to 66.0)
Urinary incontinence					
No. of deaths/participants	589/6,254	81/450	1,044/4,461	475/1,229	
Standardized 5-year risk† (SE)	115.7 (6.6)	156.9 (20.8)	212.4 (8.4)	270.7 (21.4)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	41.2 (-1.5 to 83.9)	96.7 (75.8 to 117.6)	155.0 (111.1 to 198.8)	17.0 (-45.0 to 79.1)

(Table continues)

Supplementary Table S2 (continued).

Comorbidity	Without disability*		With disability*		Interaction contrast§ (95% CI)
	Without comorbidity	With comorbidity	Without comorbidity	With comorbidity	
Arthritis or osteoarthritis					
No. of deaths/participants	443/4,196	228/2,484	518/1,785	992/3,892	
Standardized 5-year risk† (SE)	136.0 (10.0)	109.9 (8.8)	239.1 (13.2)	206.1 (9.9)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	-26.1 (-52.2 to 0.1)	103.1 (70.6 to 135.6)	70.1 (42.5 to 97.8)	-6.9 (-48.6 to 34.7)
Osteoporosis					
No. of deaths/participants	624/6,123	44/556	1,216/4,502	282/1,136	
Standardized 5-year risk† (SE)	119.2 (6.6)	169.9 (42.6)	224.6 (8.4)	250.1 (26.2)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	50.7 (-33.8 to 135.1)	105.4 (84.6 to 126.2)	130.9 (78.0 to 183.8)	-25.2 (-125.3 to 75.0)
Depression					
No. of deaths/participants	630/6,146	40/556	1,186/4,293	327/1,392	
Standardized 5-year risk† (SE)	118.9 (6.5)	123.9 (21.2)	222.5 (8.4)	261.1 (24.3)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	5.0 (-38.4 to 48.4)	103.6 (82.8 to 124.4)	142.3 (93.0 to 191.5)	33.7 (-32.9 to 100.2)
Anxiety					
No. of deaths/participants	649/6,331	21/373	1,304/4,733	208/956	
Standardized 5-year risk† (SE)	121.3 (6.5)	102.1 (34.8)	224.3 (8.2)	235.1 (29.2)	
Standardized risk difference‡ (95% CI)	0.0 (reference)	-19.2 (-88.6 to 50.2)	103.1 (82.7 to 123.4)	113.9 (55.4 to 172.4)	30.0 (-61.3 to 121.3)

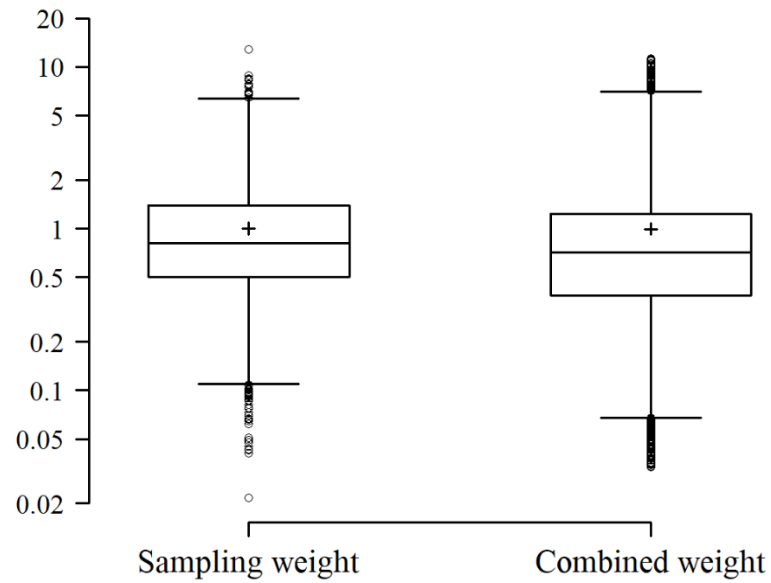
CI, confidence interval; SE, standard error.

* Mild or severe activity limitation in the Global Activity Limitation Indicator.

† Standardized 5-year risks of all-cause mortality (per 1,000 persons) in non-disabled and disabled people with and without each index comorbidity were estimated from spline-based survival models weighted by combined weights and stratified by disability and comorbidity, with SEs of mortality risks derived by applying delta methods to robust SEs of spline coefficients. Combined weights were used to standardize mortality risks in each disability-by-comorbidity category to the weighted distribution of baseline characteristics in the entire community-dwelling Spanish population aged 65 years or older, including survey year (2011 or 2014), age (65–69, 70–74, 75–79, 80–84, or ≥85 years), sex (women or men), educational level (less than primary, primary, first-stage secondary, second-stage secondary, or university), and number of comorbidities other than the index comorbidity (0, 1, 2, 3, or ≥4).

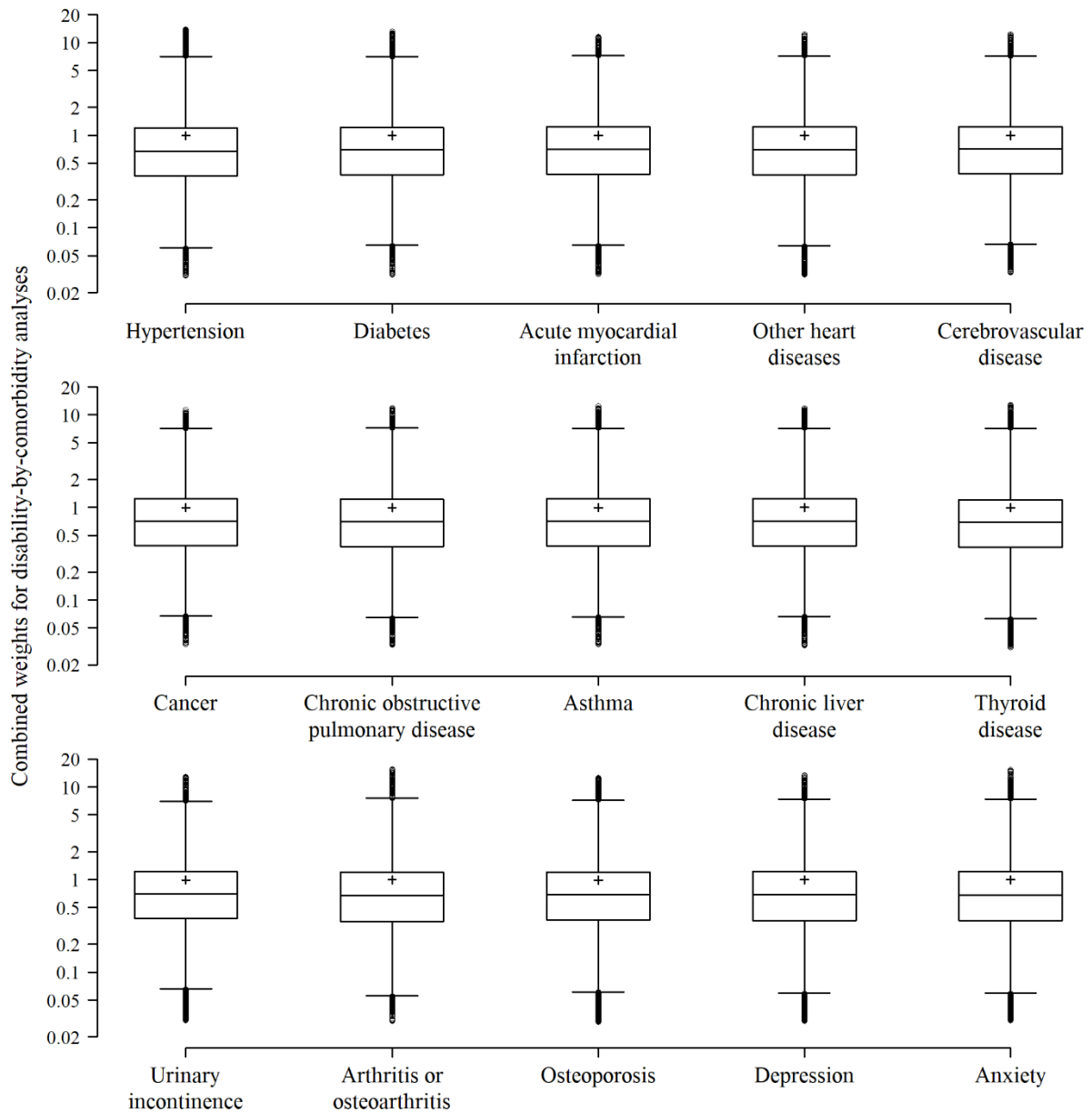
‡ Standardized 5-year risk differences in all-cause mortality (per 1,000 persons) and their 95% CIs comparing each disability-by-comorbidity category with the reference category: people without both disability and the index comorbidity.

§ Interaction contrasts (per 1,000 persons) and their 95% CIs were calculated as departures of the standardized risk difference for people with both disability and comorbidity from the sum of the standardized risk differences for those with disability but no comorbidity and those with comorbidity but no disability.



Supplementary Figure S1. Distribution of sampling weights and combined weights taking into account sampling and standardization of disability categories for baseline characteristics in the entire community-dwelling Spanish population aged 50 years or older, 2011–12 and 2014 Spanish National Health Surveys.

Boxes represent the mean (+), median (middle horizontal line), quartiles (border horizontal lines), and individual outlying weights (circles).



Supplementary Figure S2. Distribution of combined weights taking into account sampling and standardization of disability-by-comorbidity categories for baseline characteristics in the entire community-dwelling Spanish population aged 50 years or older, 2011–12 and 2014 Spanish National Health Surveys.

Boxes represent the mean (+), median (middle horizontal line), quartiles (border horizontal lines), and individual outlying weights (circles). After truncating 0.1% of lower and upper extreme weights, the mean (range) combined weights for disability-by-comorbidity analyses were 0.99 (0.03–13.88) for hypertension, 0.99 (0.03–13.19) for diabetes, 0.99 (0.03–11.51) for acute myocardial infarction, 0.99 (0.03–12.34) for other heart diseases, 1.00 (0.03–12.38) for cerebrovascular disease, 1.00 (0.03–11.38) for cancer, 1.00 (0.03–11.80) for chronic obstructive pulmonary disease, 1.00 (0.03–12.47) for asthma, 1.00 (0.03–11.82) for chronic liver disease, 1.00 (0.03–12.69) for thyroid disease, 0.99 (0.03–12.81) for urinary incontinence, 0.99 (0.03–15.49) for arthritis or osteoarthritis, 0.98 (0.03–12.49) for osteoporosis, 0.99 (0.03–13.31) for depression, and 0.99 (0.03–15.32) for anxiety.