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Small socio-economic differences in mortality in Spanish older people

Enrique Regidor[1,2], Anton E. Kunst[3], Fernando Rodríguez-Artalejo[2,4], Johan P. Mackenbach[5]

1 Department of Preventive Medicine and Public Health, Universidad Complutense de Madrid, Madrid, Spain
2 CIBER Epidemiología y Salud Pública (CIBERESP), Barcelona, Spain
3 Department of Public Health, Academic Medical Centre, University of Amsterdam, Amsterdam, the Netherlands
4 Department of Preventive Medicine and Public Health, Universidad Autónoma de Madrid/IdiPAZ, Madrid, Spain
5 Department of Public Health, Erasmus University Medical Center, Rotterdam, the Netherlands

Correspondence: Enrique Regidor, Department of Preventive Medicine and Public Health, Universidad Complutense de Madrid, Ciudad Universitaria, 28040 Madrid, Spain, tel: +34 913941521, fax: +34913941803, e-mail: enriqueregidor@hotmail.com

Background: Previous studies found smaller mortality inequalities in Southern Europe than in other European populations. This study used a sample of older Spanish adults to identify possible factors explaining these findings. **Methods:** A cohort of 4008 persons aged ≥60 years was selected in 2000–01 and followed prospectively until 2008. At baseline, data were collected on education, occupation and major mortality risk factors: social network, lifestyles, diet, obesity and hypertension. Analyses were conducted with Cox regression, and adjusted for the risk factors at baseline. **Results:** The hazard ratio (HR) and 95% confidence interval (95% CI) for mortality adjusted for age, marital status, region and place of residence in people with low vs. high educational level was 1.13 (0.86–1.50) in men and 1.23 (0.83–1.80) in women. The HR in the manual vs. non-manual occupational class was 0.92 (0.74–1.15) in men and 1.07 (0.86–1.33) in women. Adjustment for the different risk factors decreased or did not change the HR. After full adjustment for all risk factors the mortality HR in those with low education was 0.99 (0.74–1.32) in men and 1.18 (0.80–1.76) in women, while the mortality HR in the manual occupational class was 0.85 (0.68–1.06) in men and 1.04 (0.83–1.30) in women. **Conclusions:** From a European perspective, mortality inequalities in Spanish older adults are small. The ubiquitous presence of social networks and the widespread adherence to the Mediterranean diet may be responsible for this finding.

Introduction

In a landmark study, evaluating the relation of education and occupational class with mortality across various European countries during the 1990s, Italy and Spain showed the smallest socio-economic inequalities in mortality.[1] This finding and similar findings in previous studies[2,3] were surprising because welfare policies in both countries are less developed and widespread than in countries of Northern Europe.

It has been argued that comparing data for Italy and Spain with data from the other countries are inappropriate.[4] The mortality data for countries in Southern Europe came from large urban areas—Turin (Italy), and Madrid and Barcelona (Spain)—and thus did not include health variations across regions. For example, Spain has the highest income inequality and lowest educational level of all the Western European countries included in the study;[1,5] in contrast, Madrid and Barcelona are located in the wealthiest regions of Spain.[6] However, indirect evidence suggests that the situation in these large urban areas probably differs little from the national average. For example, a comparative study using data from a national unlinked cross-sectional mortality study also showed small inequalities in mortality in Spain.[7]

Given that the socio-economic pattern of risk factors for mortality like smoking, lack of physical activity, excessive alcohol consumption, obesity and hypertension is similar in Spain and other European populations—except for smoking in women,[8] other intermediate determinants of health strongly related to cultural factors, such as diet or social support, could explain the small inequalities in mortality observed in the Spanish population. High adherence to the Mediterranean diet and wide social networks in most of the Spanish population may buffer the impact of unequal distribution of other risk factors for mortality.[9,10] In women, the socio-economic pattern of smoking may also have contributed to the small mortality inequalities. The Southern European countries are in an earlier stage of the smoking epidemic than those in the north, and in Spain this is reflected in the fact that smoking was more frequent in women in high socio-economic position.[11,12]

The lack of longitudinal studies with representative population samples has hindered ascertainment of socio-economic differences in mortality and the factors that explain these differences in Spain. To date, there is only one prospective study in a nationally representative sample of Spanish older adults. This study was used in the present investigation to assess the association of education and occupational class with mortality over 8 years of follow-up and to identify possible factors explaining this relation.

Methods

Study participant and design

A cohort of 4008 persons, representative of the non-institutionalized Spanish population aged ≥60 years, was selected between 1 October 2000 and 31 March 2001 and was followed prospectively to 31 October 2008. At baseline, subjects were selected using probabilistic sampling with

multistage clusters. The clusters were obtained according to region of residence and size of municipality. Census sections were chosen randomly within each cluster, and the households where information was obtained were chosen within each section. Study participants were selected in age and sex strata. The study response rate was 71%. Baseline information was collected in the home through personal interviews and physical examination conducted by trained and certified personnel. Full details of the participants and the measurements have been previously reported.[13]

Variables

Mortality was obtained from the National Death Index, a computerized database with information on the vital status of all residents in Spain. Up to 31 October 2008, the vital status of 3991 individuals (99.6% of the cohort) had been identified. A total of 972 deaths occurred during this period.

The measures of socio-economic position used were education and social class based on current or last occupation. Educational level was grouped into three categories based on the highest educational level attained: low (illiterate persons and those with incomplete primary education), medium (completed primary education) and high (completed secondary or higher education). Information on education was not available for 80 men and 92 women. For social class, we used an occupational classification with 16 categories based on two criteria: capital assets with reference to employment status (employer, self-employed or employed), and skill and credential assets. Occupational social class was grouped into three categories: non-manual workers (professionals, managers, proprietors and clerical workers), manual workers (skilled and unskilled) and farm workers. Self-employed farm workers were landowners, but in reality worked long hours of heavy manual labour and had a low standard of living; therefore, we decided to group them into a single category with paid farm workers. The husband's occupation was used for women because most women in this age group had never had paid employment. Information on occupational social class was unavailable for 40 men and 191 women.

We used standard questionnaires to collect baseline information on risk factors shown to be associated with mortality in the literature. Included in the analysis were social network, behavioural risk factors (smoking, alcohol consumption and physical activity), diet (consumption of vegetables, fruit, fish and olive oil), obesity and hypertension. Other baseline variables used in the analyses were age, marital status, region and place of residence.

Social network was evaluated by the frequency with which the respondent saw family members or friends and was grouped into the following categories: daily or almost daily, once or twice a week and less often. With regard to smoking, subjects were classified as never smokers, former smokers and current smokers. Individuals were also asked to state which of the following alternatives best reflected their alcohol consumption frequency: never drinker, former drinker, occasional drinker or regular drinker. For leisure-time physical activity, participants were classified into three categories: none, occasional and regular. Subjects were also asked about weekly intake of fruit, vegetables, fish and olive oil, each of which was grouped into three categories according to frequency of consumption: daily, one or more days per week and less than once a week.

Information on obesity and hypertension was obtained by physical examination. Body mass index (BMI) was calculated as weight divided by height squared. Participants were considered to be obese if their BMI was $\geq$30 kg m^{-2}. Subjects were deemed to be hypertensive when their systolic blood pressure was $\geq$140 mmHg or their diastolic blood pressure was $\geq$90 mmHg or if they were on current antihypertensive drug treatment.

Age was categorized into 5-year intervals up to the age of 85 years, with persons >85 years included in a single group. Marital status was categorized as married, widowed or single/divorced. Region of residence was defined as one of the 17 regions of Spain. Since previous research was conducted in large cities, place of residence was categorized into two groups: persons who live in large urban areas (>500 000 population) and all others.

Statistical analysis

The association between education or occupational class and mortality was summarized with hazard ratios (HRs) and their 95% confidence interval (95% CI) obtained from Cox regression models. Reference categories in the analyses were high education and non-manual occupation. Basic Cox models were adjusted for age, marital status and region and place of residence. We subsequently added to the basic Cox models social network, diet, smoking, other behavioural risk factors, obesity and hypertension and, lastly, all these risk factors together. We previously evaluated the association between these risk factors and mortality and tested for heterogeneity in the socio-economic distribution of the risk factors at baseline. Finally, given that high adherence to the Mediterranean diet and widespread social networks could cushion the effect of other risk factors, we artificially created a Mediterranean and non-Mediterranean background: subjects who visit friends or relatives daily vs. those who do not, subjects who consume fruit daily, vs. those who do not, and subjects who consume olive oil daily vs. those who do not. We then estimated socio-economic differences in mortality in each group and tested the significance of the effect modification.

Results

Table 1 shows the association of education and occupational class with mortality. The HR in the different categories of these two variables did not differ significantly from the reference category. The HR for mortality adjusted for age, marital status, region and place of residence in people with low educational level with respect to those with high educational level was 1.13 (95% CI 0.86–1.50) in men and 1.23 (95% CI 0.83–1.80) in women. The HR in the manual with respect to the non-manual occupational class was 0.92 (95% CI 0.74–1.15) in men and 1.07 (95% CI 0.86–1.33) in women.

Table 2 shows the relation between the risk factors investigated and mortality. A high risk of mortality was observed—either in men, women or in both sexes—among those who less frequently saw family or friends, who had ever been smokers, who were sedentary, who did not consume vegetables, fruit, fish or olive oil at least once a week or who had hypertension. Conversely, occasional drinking and obesity were associated with a reduced risk of mortality.

Table 1 Person-years, deaths and age-adjusted mortality rates per 100 person-years according to education and occupational class, and HR for the association between each measure of socioeconomic position and mortality adjusted for age, marital status, region and place of residence

Measures of socio-economic position	Person-years	Deaths	Rate	Adjusted HR (95% CI)
Education				
Men (n = 1650)				
High	2033.4	76	4.3	1.00
Middle	4051.9	149	4.5	1.02 (0.77–1.36)
Low	4904.2	222	4.6	1.13 (0.86–1.50)
Women (n = 2169)				
High	1279.4	29	2.5	1.00
Middle	5189.2	130	2.6	1.13 (0.75–1.69)
Low	8430.4	309	3.1	1.23 (0.83–1.80)
Occupational class				
Men (n = 1691)				
Non-manual	3995.1	160	4.7	1.00
Manual	5035.4	196	4.5	0.92 (0.74–1.15)
Farm	2215.1	107	4.8	0.99 (0.76–1.29)
Women (n = 2069)				
Non-manual	4959.7	153	2.8	1.00
Manual	6005.3	181	2.9	1.07 (0.86–1.33)
Farm	3222.8	116	2.8	1.11 (0.85–1.43)

Table 2 Age-adjusted HRs and 95% CIs for mortality according to risk factors studied

	Men ($n = 1650$)	Women ($n = 2169$)
Visit friends or relatives		
Daily or almost daily	1.00	1.00
Once or twice a week	0.96 (0.99–1.37)	1.30 (1.01–1.20)
Less than once a week	1.56 (1.01–2.40)	2.10 (1.46–3.02)
Smoking		
Never smoker	1.00	1.00
Former smoker	1.50 (1.18–1.90)	1.22 (0.76–1.96)
Current smoker	2.06 (1.55–2.73)	1.42 (0.67–3.04)
Alcohol consumption		
Never drinker	1.00	1.00
Former drinker	1.28 (0.97–1.63)	0.98 (0.69–1.38)
Occasional drinker	0.81 (0.61–1.06)	0.62 (0.45–0.85)
Regular drinker	0.97 (0.75–1.25)	0.89 (0.62–1.27)
Physical activity		
Regular	1.00	1.00
Occasional	1.10 (0.63–1.90)	1.33 (0.48–3.68)
None	1.67 (0.96–2.91)	2.78 (1.02–7.64)
Weekly vegetable consumption		
Yes, every day	1.00	1.00
Yes, some days	1.13 (0.93–1.38)	1.16 (0.97–1.40)
No	1.66 (1.09–2.56)	2.06 (1.38–3.07)
Weekly fruit consumption		
Yes, every day	1.00	1.00
Yes, some days	1.14 (0.90–1.44)	1.18 (0.92–2.23)
No	1.67 (1.00–2.90)	1.48 (0.98–2.23)
Weekly fish consumption		
Yes, every day	1.00	1.00
Yes, some days	0.79 (0.63–0.99)	1.11 (0.83–1.45)
No	1.11 (0.70–1.78)	1.96 (1.25–3.08)
Weekly olive oil consumption		
Yes, every day	1.00	1.00
Yes, some days	1.06 (0.81–1.38)	1.07 (0.82–1.65)
No	2.25 (1.35–3.73)	2.27 (0.80–2.00)
Obesity (Yes vs. No)	0.75 (0.59–0.94)	0.89 (0.72–1.09)
Hypertension (Yes vs. No)	1.12 (0.92–1.37)	1.25 (1.02–1.53)

The distribution of the risk factors by educational level and occupational social class is shown in table 3. In men, visiting friends or relatives and weekly consumption of olive oil were not significantly associated ($P > 0.05$) with either education or occupational class; weekly vegetable consumption was not significantly associated with education; and smoking, obesity and hypertension were not significantly associated with occupational class. In women, only smoking was not significantly related ($P > 0.05$) to education or occupational class, while weekly consumption of fish and obesity were not related to education.

Table 4 presents the multivariable association between the two indicators of socio-economic position and mortality adjusted for the different risk factors. The HR changed little with respect to the estimates in the basic model, except after adjusting for lifestyles: the magnitude of the HR decreased, except in women in whom it increased after adjusting for smoking. The HR in women also increased after adjusting for visiting friends or relatives. In men, the fully-adjusted HRs for mortality were similar across categories of education, and the HR in manual workers was 0.85 (95% CI 0.68–1.06). In women, after full adjustment, the mortality HR was 1.18 (95% CI 0.80–1.76) in those with low education and 1.04 (95% CI 0.83–1.30) in the manual occupational class.

The web table in Supplementary Data shows the HRs for subjects in whom a Mediterranean vs. non-Mediterranean background was artificially simulated. Due to the small number of subjects, the measures of socio-economic position were grouped into two categories. Except for fruit consumption by education and visiting friends or relatives by occupational class in women, the HRs were higher in subjects with a non-Mediterranean background, although the interaction terms were no significant.

Discussion

In this national cohort of older adults in Spain, we found that visiting with friends or relatives, smoking, frequency of alcohol consumption, physical activity, frequency of consumption of vegetables, fruit, fish and olive oil, obesity and hypertension are predictors of the risk of mortality. However, we found no significant socio-economic differences in the risk of mortality.

Previous studies have found smaller mortality inequalities in older Spanish adults from large urban areas than in other European populations.[1–3] Our findings suggest that mortality inequalities in Spain also appear to be relatively small when national data are used. Specifically, in men and women aged ≥60 years from countries of Northern and Western Europe, the estimated mean relative risk of mortality in subjects with low vs. high educational level is 1.30–1.35 in most populations.[3] We even found the reverse of what would be expected for mortality inequality by occupational class in men.

Our results differ from those of most previous studies in this field. Except for the Alameda County Study,[14] low socio-economic position has been associated with increased mortality. Although, in some populations no socio-economic differences in mortality were found for educational level, they were nevertheless registered for other indicators of socio-economic position.[15,16] These mortality inequalities have been observed even in the oldest old.[15–24] However, due to the wide 95% CIs in the HR by education in women, we cannot rule out the possibility that mortality inequality by education in Spanish women is similar to that found in other populations of European women.[3]

In Western Europe, a north–south gradient has been observed for family support[9] and the consumption of some healthy foods,[10] with Southern European countries (Spain, Italy and Greece) showing greater family support and higher adherence to the Mediterranean diet. It has been noted that cultural factors like social networks and dietary patterns might explain the smaller mortality inequalities in Southern Europe, despite their large income inequalities and limited presence of universal welfare policies in comparison with the Nordic countries.[1]

Our study supports this explanation for the small mortality inequalities in older adults in Spain. In most educational or occupational groups, the percentage of persons who see family or friends daily or almost daily, and the percentage of those who consume fruit or olive oil daily is between 80% and 90%. Widespread social networks and high adherence to these components of the Mediterranean diet may buffer the impact of the unequal distribution of other risk factors for mortality. In fact, when separate analyses are made to simulate a Mediterranean and a non-Mediterranean background, the HRs were higher in subjects in the non-Mediterranean group, with some exceptions in women. Biochemical properties of the Mediterranean diet and physiologic pathways of social support may compensate for the reduced levels of antioxidants produced by smoking, excessive alcohol consumption or physical inactivity.

Studies on health inequalities in Spain during the 1980s and 1990s, in birth cohorts to which the subjects of the present study belonged at ages 45–64 years, have also found small or no socio-economic differences in mortality.[7,25,26] Subjects in these birth cohorts have most likely maintained the components of the Mediterranean diet as a fundamental part of their eating pattern since childhood; this could have helped to reduce the effect of socio-economic position on the risk of mortality over the life course. In fact, the traditional Mediterranean diet, which existed in many regions of Southern Europe until the 60 s,[27] was maintained with few changes in Spain until the 1980s.[28]

It has been suggested that the socio-economic pattern of smoking in women from Western Europe[12,29] has contributed to the smaller socio-economic differences in mortality in Southern Europe.[1] Our results support this explanation since the highest prevalence of current and former smokers was found among women in high socio-economic position. Whereas 15% of the women with high education and 8% of the women belonging to the non-manual occupational class had smoked at some time in their lives, the percentage was 4% in women with low education and in those belonging to the manual occupational class. This explains why the HR increased after adjusting for smoking.

Table 3 Distribution of men and women included in the study according to risk factors studied in the different categories of education and occupational class

Sample size	Men								Women							
	Education				Occupational class				Education				Occupational class			
	High	Middle	Low		Non-manual	Manual	Farm		High	Middle	Low		Non-manual	Manual	Farm	
	303	602	745	*P*-value*	602	751	338	*P*-value*	180	738	1251	*P*-value*	721	871	477	*P*-value*
Visit friends or relatives	Percent distribution			0.721	Percent distribution			0.251	Percent distribution			0.015	Percent distribution			<0.001
Daily or almost daily	88.4	90.1	88.4		87.1	90.2	88.7		81.7	90.6	83.5		82.4	87.2	90.9	
Once or twice a week	9.6	6.9	9.1		9.8	7.5	9.0		16.0	7.8	12.8		13.6	10.5	7.3	
Less than once a week	2.0	3.0	2.5		3.1	2.3	2.3		2.3	1.6	3.7		4.1	2.3	1.8	
Smoking				0.022				0.079				0.613				0.977
Never smoker	32.5	28.4	28.6		29.8	26.1	31.7		85.2	92.9	96.2		92.0	95.8	97.0	
Former smoker	43.1	51.9	52.1		48.4	52.0	52.2		8.2	4.7	2.6		5.2	2.2	2.9	
Current smoker	24.4	19.7	19.3		21.8	21.9	16.1		6.6	2.4	1.2		2.8	2.0	0.1	
Alcohol consumption				<0.001				<0.001				<0.001				<0.001
Never drinker	21.9	23.6	25.6		21.4	23.1	28.8		57.9	65.6	74.7		65.3	69.6	75.6	
Former drinker	8.5	17.9	26.0		13.9	21.8	25.5		6.3	6.2	6.4		6.7	4.6	8.4	
Occasional drinker	38.4	29.6	23.8		33.7	26.5	21.5		23.6	20.2	14.2		19.2	19.3	9.2	
Regular drinker	31.2	29.0	24.6		31.0	28.6	24.2		12.1	8.0	4.7		8.8	6.5	6.8	
Physical activity				<0.001				<0.001				<0.001				0.003
Regular	5.4	3.5	3.5		4.3	5.1	1.9		5.1	3.2	2.1		4.1	2.4	0.7	
Occasional	70.1	67.1	49.8		64.3	59.5	54.0		53.5	54.0	40.3		48.1	46.6	45.2	
None	24.5	29.4	46.7		31.4	35.4	44.1		41.4	42.8	57.6		47.8	51.0	54.1	
Weekly vegetable consumption				0.069				0.007				0.014				<0.001
Yes, every day	63.2	62.5	57.8		64.0	59.9	54.4		65.6	63.1	59.1		64.1	62.1	52.7	
Yes, some days	33.6	33.5	38.1		32.7	35.6	41.9		30.9	34.4	36.5		33.0	34.7	43.1	
No	3.2	4.0	4.1		3.3	4.5	3.7		3.5	2.5	4.4		2.9	3.2	4.2	
Weekly fruit consumption				0.010				0.010				0.020				<0.001
Yes, every day	85.9	79.1	77.4		83.0	78.2	76.0		84.3	86.7	80.5		86.0	83.7	76.1	
Yes, some days	12.4	17.7	19.9		14.9	18.6	21.0		12.9	9.7	16.0		11.3	13.3	19.0	
No	1.7	3.2	2.7		2.1	3.2	3.0		6.8	3.6	3.5		2.7	3.0	4.9	
Weekly fish consumption				0.038				<0.001				0.286				<0.001
Yes, every day	22.2	14.4	16.5		18.2	18.4	9.1		19.8	14.1	15.7		18.8	13.8	10.7	
Yes, some days	76.4	80.4	79.2		79.0	78.1	82.3		76.3	83.6	80.0		78.0	82.5	85.3	
No	1.4	5.2	4.3		2.8	3.5	8.6		3.9	2.3	4.3		3.2	3.7	4.0	
Weekly olive oil consumption				0.808				0.694				0.005				<0.001
Yes, every day	85.1	87.3	84.2		86.0	85.2	86.5		86.6	83.7	79.7		85.1	82.7	75.8	
Yes, some days	11.3	10.8	13.8		11.4	12.8	11.7		11.3	13.9	16.7		12.4	13.8	21.7	
No	3.6	1.9	2.0		2.6	2.0	1.8		5.6	2.5	3.6		2.5	3.5	2.5	
Obesity	27.1	23.2	33.3	0.004	29.3	28.7	27.1	0.491	28.3	37.5	36.8	0.160	32.8	37.4	40.7	0.004
Hypertension	59.3	61.8	66.5	0.017	61.6	65.2	62.0	0.683	63.6	63.7	68.3	0.040	63.3	67.7	68.5	0.045

*Based on the chi-square for heterogeneity

Table 4 Relation of education and occupational class with mortality. HRs and 95% CIs for the association between education and mortality and between occupational class and mortality adjusted for several risk factors

Measures of socio-economic position	Adjusted covariates[a]						
	Basic model[b]	Basic model and social network	Basic model and diet	Basic model and smoking	Basic model and the other lifestyles	Basic model and obesity and hypertension	All covariates
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Education							
Men							
High	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Middle	1.02 (0.77–1.36)	1.01 (0.76–1.34)	1.01 (0.76–1.35)	0.98 (0.74–1.30)	0.95 (0.71–1.26)	1.01 (0.76–1.35)	0.99 (0.74–1.32)
Low	1.13 (0.86–1.50)	1.13 (0.85–1.49)	1.12 (0.84–1.49)	1.03 (0.78–1.36)	0.93 (0.70–1.24)	1.14 (0.86–1.51)	0.98 (0.72–1.31)
Women							
High	1.00)	1.00	1.00	1.00	1.00	1.00	1.00
Middle	1.13 (0.75–1.69)	1.14 (0.75–1.71)	1.13 (0.75–1.70)	1.16 (0.77–1.75)	1.07 (0.71–1.61)	1.14 (0.75–1.71)	1.12 (0.74–1.70)
Low	1.23 (0.83–1.80)	1.19 (0.81–1.75)	1.21 (0.82–1.78)	1.33 (0.89–1.96)	1.21 (0.82–1.79)	1.23 (0.84–1.82)	1.18 (0.80–1.76)
Occupational class							
Men							
Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Manual	0.92 (0.74–1.15)	0.92 (0.74–1.15)	0.91 (0.73–1.13)	0.89 (0.72–1.10)	0.89 (0.71–1.10)	0.90 (0.72–1.12)	0.85 (0.68–1.06)
Farm	0.99 (0.76–1.29)	0.99 (0.76–1.29)	0.96 (0.74–1.26)	0.97 (0.75–1.23)	0.94 (0.72–1.23)	0.96 (0.73–1.25)	0.93 (0.70–1.22)
Women							
Non-manual	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Manual	1.07 (0.86–1.33)	1.10 (0.88–1.38)	1.04 (0.83–1.30)	1.08 (0.87–1.29)	1.04 (0.83–1.29)	1.06 (0.85–1.32)	1.04 (0.83–1.30)
Farm	1.11 (0.85–1.43)	1.15 (0.88–1.49)	1.07 (0.82–1.39)	1.13 (0.87–1.40)	1.08 (0.84–1.40)	1.09 (0.74–1.41)	1.09 (0.84–1.42)

a: Social network (contact with family/friends), other lifestyles (alcohol consumption and physical activity), diet (weekly consumption of vegetables, fruit, fish and olive oil)
b: Basic model includes age, marital status, region and place of residence

Besides smoking, the small socio-economic differences in mortality in women in this study can also be explained in some measure by obesity: its prevalence is lower in those in high socio-economic position, but obese persons have lower mortality, as has been observed in other older populations.[30] In fact, the magnitude of the HR changes little after adjusting for obesity and hypertension, despite the increased risk of mortality in women of low socio-economic position due to their higher prevalence of hypertension.

The socio-economic differences in mortality may have been underestimated due to survival bias. A lower survival bias in women than in men, due to their lower risk of death before age 60, could explain the larger differences observed in women. Furthermore, in men, the differences by occupational social class are in the opposite direction, since manual and farm workers have lower mortality than non-manual workers. We cannot rule out a selective survival bias related to occupation in men. Manual and farm workers who reach older ages may have better health than those who die prematurely due to work-related risk factors, whereas those in non-manual occupations would include a large number of men in poor health who have survived longer because of their better working conditions throughout life.

When interpreting our results we must also take into account that the distribution of the study population by age, sex and educational level was similar to that of the sampling framework, except in the case of women, among whom the percentage of those with low educational level (60%) was higher than in the sampling framework (54%). We do not know if this overrepresentation of women with low educational level is related to health status, although its impact on the results was probably minimal. Another aspect to consider is the possible misclassification of occupation, since it was based on individual recall. However, this is unlikely to have produced a substantial bias in the study results because occupation was grouped into broad categories.

It should also be noted that most risk factors were measured using broad classes and/or measuring only one aspect of the risk factor. As a result, the contribution of some risk factors to the explanation of inequalities in mortality may have been underestimated. Nonetheless, when some measures such as BMI were disaggregated into various categories, the results were similar. Other measures, like visits with friends or relatives, could not be disaggregated, but it is unlikely that separating 'daily' and 'almost daily' would modify the findings.

Although the magnitude of the socio-economic differences in mortality differed between subjects in the simulated 'Mediterranean vs. non-Mediterranean background', most of the results were non-significant, probably due to the small sample size. A more valid test of the Mediterranean hypothesis would require comparisons among countries. Likewise, future Spanish cohorts should be studied to determine whether possible changes in adherence to the Mediterranean diet could lead to a change in the observed results.

We conclude that, from a European perspective, mortality inequalities in Spanish older adults are small, although due to the wide CI in the HR, we cannot completely rule out the possibility that they may be similar to other European populations. Widespread social networks and high adherence to components of the Mediterranean diet may be responsible for this finding. In the case of women, a higher prevalence of smoking and lower level of social relationships in those in high socio-economic position may also have been contributing factors.

Conflicts of interest: None declared.

Supplementary data

Supplementary data are available at *Eurpub* online.

Key points

- Visiting with friends or relatives, smoking, alcohol consumption, physical activity, frequency of consumption of vegetables, fruit, fish and olive oil, obesity and hypertension are predictors of the risk of mortality in Spanish older people.
- However, we found no significant socio-economic differences in the risk of mortality.
- Widespread social networks and high adherence to components of the Mediterranean diet may be responsible for this finding.
- In the case of women, a higher prevalence of smoking and lower level of social relationships in those in high socio-economic position may also have been contributing factors.

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Medically certified sickness absence with insurance benefits in women with and without children

Birgitta Floderus[1], Maud Hagman[1], Gunnar Aronsson[2], Staffan Marklund[1], Anders Wikman[1]

1 Department of Clinical Neuroscience, Division of Insurance Medicine, Karolinska Institutet, Stockholm, Sweden
2 Department of Psychology, Stockholm University, Stockholm, Sweden

Correspondence: Birgitta Floderus, Department of Clinical Neuroscience, Division of Insurance Medicine, Karolinska Institutet, S-171 77 Stockholm, Sweden, tel: +46 8 5248 3229, fax: +46 8 5248 3205, e-mail: birgitta.floderus@ki.se

Background: Sickness absence in Sweden is high, particularly in young women and the reasons are unclear. Many Swedish women combine parenthood and work and are facing demands that may contribute to impaired health and well-being. We compared mothers and women without children under different conditions, assuming increased sickness absence in mothers, due to time-based stress and psychological strain. **Methods:** All women born in 1960–79 (1.2 million) were followed from 1993 to 2003. Information on children in the home for each year was related to medically certified sickness absence with insurance benefits the year after. We used age and time-stratified proportional hazard regression models accounting for the individual's changes on study variables over time. Data were retrieved from national