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Education and mortality in Spain: a national study supports local findings

Enrique Regidor · Laura Reques · María J. Belza · Anton E. Kunst · Johan P. Mackenbach · Luis de la Fuente

Abstract

Objectives To estimate educational inequalities in mortality in Spain and in three Spanish areas: Madrid, Barcelona, and the Basque country.

Methods A national prospective study was carried out including all persons aged 25–74 years living in Spain in 2001 and followed up for mortality over 7 years. The mortality rate ratio and difference from all causes and from leading causes of death were estimated for the entire Spanish population and for the above three geographical areas.

Results With respect to people with the highest education, the mortality rate ratios in the entire population of Spain in people with the second highest, second lowest and lowest education were, respectively, 1.09, 1.10, 1.39 in women and 1.19, 1.27 and 1.54 in men. The mortality rate differences per 100,000 person-years were, respectively, 24.8, 28.3, 108.2 in women and 116.7, 162.5 and 319.1 in men. These estimates were intermediate in magnitude compared to those seen in the three geographical areas.

Conclusions The results provide further evidence that educational inequalities in mortality are smaller in the south of Europe than in other European countries.

E. Regidor (✉)
Department of Preventive Medicine and Public Health, Faculty of Medicine, Universidad Complutense de Madrid, Ciudad Universitaria, 28040 Madrid, Spain
e-mail: enriqueregidor@hotmail.com

E. Regidor · M. J. Belza · L. de la Fuente
CIBER Epidemiología y Salud Pública (CIBERESP), Madrid, Spain

E. Regidor
Instituto de Investigación Sanitaria del Hospital Clínico San Carlos (IdISSC), Madrid, Spain

L. Reques · M. J. Belza
National School of Public Health, Instituto de Salud Carlos III, Madrid, Spain

A. E. Kunst
Department of Public Health, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

J. P. Mackenbach
Department of Public Health, Erasmus MC, Rotterdam, The Netherlands

L. de la Fuente
National Epidemiology Center, Instituto de Salud Carlos III, Madrid, Spain

Introduction

Studies of the relationship between education and mortality in several European countries during the 1990s showed that Italy and Spain had the smallest socioeconomic inequalities in mortality (Huisman et al. 2004, 2005; Mackenbach et al. 2008). These studies were based on data from national populations, except for Italy, where the data were from Turin only; and Spain, which used data from Madrid, Barcelona, and the Basque country only. That is, the estimates from Italy and Spain were conducted in mainly urban populations. Some authors have pointed out that the results obtained for the southern European countries may not accurately reflect what happens at the national level (De Vogli et al. 2008).

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However, a new comparative study for the 2000s with the same populations found that the patterns of smaller inequalities in the south observed in the 1990s still hold (Eikemo and Mackenbach 2012; Mackenbach et al. 2014). Likewise, a recently published longitudinal study carried out in a representative sample of the Italian population estimated mortality by education for the period 1999–2007. The results are similar to those obtained in comparative studies in which the data for Italy were taken only from Turin (Federico et al. 2013; Marinacci et al. 2013). Different estimates of life expectancy in various European countries also show that another two countries in southern Europe—Malta and Portugal—are among those with the smallest differences in life expectancy according to education in the first decade of the twentieth century (Eurostat 2014).

The objective of this study was to estimate and compare educational differences in mortality from all causes and from leading causes of death in the entire Spanish population and in the three areas traditionally investigated—Madrid, Barcelona, and the Basque country.

Methods

The source for the data was the cohort of the entire Spanish population at the time of the 2001 census on 1 November. The data were compiled by the National Institute of Statistics and based on individual census records linked to the national population register and the national mortality register using personal identifiers. Deaths refer to persons who died between the date of the census and 31 December 2008. The 2001 population census was made up of 40,844,371 persons, but 1.7 % of records could not be linked to the population register or the mortality register, so these persons were excluded from the follow-up cohort. The National Institute of Statistics provided the investigators with the final data file after eliminating information referring to personal characteristics to guarantee protection of confidentiality.

This study included subjects whose age range was similar to that used in the Italian study: persons who were between 25 and 74 years of age on the date of the census. 180 million person-years and 1,047,322 deaths were analysed.

Educational level referred to the highest academic degree completed by the subject. Each person was classified into one of the following four categories according to the International Standard Classification of Education (ISCED) 1997: lowest (primary or less education), second lowest (low secondary education), second highest (high secondary education) and highest education (tertiary or university education). The lowest educational level included people who were illiterate or who had completed less than 5 years of schooling as well as those who had 5 or more years but had not completed the first cycle of secondary school (levels 0 and 1 of ISCED), while the second lowest level included people who had completed the first cycle of secondary school (level 2 of ISCED). The second highest educational level included people who had completed the second cycle of secondary school and those who had not completed tertiary education (levels 3 and 4 of ISCED), while the highest level referred to people who had completed the first or second stage of tertiary education (levels 5 and 6 of ISCED).

Age-adjusted mortality rates from all causes were first estimated for each of the four categories of education in women and men, using the European standard population. Using the method of direct standardisation, the age-specific mortality rates were applied to the standard population. The sum of the expected number of deaths in each age stratum was then divided by the total for the standard population to obtain the age-adjusted mortality rates. We then calculated the mortality rate ratio and the mortality rate difference, with 95 % confidence intervals (significance level of 0.05), according to education, taking the highest education as the reference category. This analysis was performed for the total national population, and a separate analysis was then made for each of the following four areas: Madrid, Barcelona, the Basque country and the rest of Spain. Education was also grouped into two categories—low (lowest and second lowest) and high (second highest and highest education)—to estimate the mortality rate ratio and the mortality rate difference from the leading causes of death in the total national population and the other four geographical areas. The confidence intervals for the mortality rate ratios and the mortality rate differences were calculated from the variance estimated by the Mantel–Haenszel method for person-time data (Greenland and Rothman 1998). We considered that mortality rate ratios and differences in each geographic area were significantly different from those at the national level when the confidence intervals of the point estimates did not overlap.

Results

Tables 1 and 2 show the person-years of follow-up, deaths, age-standardised mortality rates, mortality ratios and mortality differences from all causes by education for each of the geographical areas studied in women and men, respectively. The age-standardised mortality rates in each category of education for all of Spain were intermediate in magnitude compared to those observed in Madrid, the Basque Country and Barcelona, and they were similar to the rates observed for the rest of Spain. Compared to subjects

Table 1 Person-years of follow-up, number of deaths, age-standardised mortality rates, mortality rate ratios and mortality rate differences (95 % confidence intervals) according to education in Spain, Madrid, Basque Country, Barcelona and rest of Spain. Women. Spanish National Longitudinal Study, 2001–2008

| | Education | | | |
	Highest	Second highest	Second lowest	Lowest
Spain				
Person-years (thousands)	14821.0	16666.8	24407.1	360247.0
Deaths	17240	23713	56653	260355
Age-standardised mortality rate[a]	274.8	299.5	303.1	383.0
Mortality ratio (CI 95 %)	1.00	1.09 (1.07–1.11)	1.10 (1.09–1.12)	1.39 (1.37–1.41)
Mortality difference (CI 95 %)[a]	0.00	24.8 (12.4–35.1)	28.3 (17.9–38.8)	108.2 (96.7–119.8)
Madrid				
Person-years (thousands)	2953.6	2851.4	3074.6	3786.0
Deaths	3541	4548	7388	24423
Age-standardised mortality rate[a]	269.6	297.7	293.8	346.5
Mortality ratio (CI 95 %)	1.00	1.10 (1.05–1.13)	1.09 (1.05–1.13)	1.29 (1.24–1.33)
Mortality difference (CI 95 %)[a]	0.00	28.1 (17.2–39.0)	24.2 (13.3–35.0)	76.9 (64.3–89.5)
Basque Country				
Person-years (thousands)	943.5	1076.7	1391.5	1527.6
Deaths	993	1676	4257	10903
Age-standardised mortality rate[a]	277.1	302.3	301.3	365.4
Mortality ratio (CI 95 %)	1.00	1.09 (1.02–1.16)	1.08 (1.02–1.16)	1.32 (1.24–1.40)
Mortality difference (CI 95 %)[a]	0.00	25.2 (3.7–46.8)	24.2 (5.7–44.7)	88.3 (72.9–108.0)
Barcelona				
Person-years (thousands)	1853.1	2287.3	2835.2	4031.0
Deaths	2052	3470	7354	28274
Age-standardised mortality rate[a]	269.2	296.2	308.6	370.8
Mortality ratio (CI 95 %)	1.00	1.10 (1.05–1.15)	1.14 (1.10–1.20)	1.38 (1.32–1.44)
Mortality difference (CI 95 %)[a]	0.00	27.1 (16.0–38.3)	39.6 (28.0–57.4)	101.7 (87.4–116.2)
Rest of Spain				
Person-years (thousands)	9070.8	10451.4	17105.8	26901.4
Deaths	10654	14019	37654	196755
Age-standardised mortality rate[a]	277.5	300.9	305.4	392.1
Mortality ratio (CI 95 %)	1.00	1.08 (1.06–1.12)	1.10 (1.08–1.12)	1.41 (1.39–1.44)
Mortality difference (CI 95 %)[a]	0.00	23.4 (13.0–33.9)	27.9 (17.4–38.1)	114.7 (102.5–126.9)

[a] Per 100,000 person-years

with the highest education, the mortality rate ratios in people with the second highest, second lowest and lowest education were, respectively, 1.09, 1.10 and 1.39 in women and 1.19, 1.27 and 1.54 in men. The mortality rate differences per 100,000 person-years in people with second highest, second lowest and lowest education were, respectively, 24.8, 28.3 and 108.2 in women and 116.7, 162.5 and 319.1 in men. In women, the magnitude of the mortality rate ratios and differences in the two intermediate categories of educational level were not statistically different, as shown in the overlapping confidence intervals. Except in women with lowest education, these mortality rate ratios and differences were intermediate in magnitude compared to those observed in Madrid, the Basque Country and Barcelona, and similar to those observed for the rest of Spain.

The mortality rate ratios and differences for the leading causes of death by education in the geographical areas studied, after grouping education into two categories, are shown in Table 3 in women and in Table 4 in men. In Spain, the mortality rate ratios for cancer, cardiovascular diseases, respiratory diseases, digestive diseases and external causes were, respectively, 1.01, 1.57, 1.40, 1.46 and 1.22 in women, and 1.19, 1.21, 1.65, 1.63 and 1.78 in men. The mortality rate differences per 100,000 person-years for these causes of deaths were 2.1, 31.9, 5.8, 6.1 and 2.9 in women, and 54.9, 36.1, 28.1, 20.8 and 25.7 in men.

Table 2 Person-years of follow-up, number of deaths, age-standardised mortality rates, mortality rate ratios and mortality rate differences (95 % confidence intervals) according education in Spain, Madrid, Basque Country, Barcelona and rest of Spain. Men. Spanish National Longitudinal Study, 2001–2008

	Education			
	Highest	Second highest	Second lowest	Lowest
Spain				
Person-years (thousands)	13729.6	19094.6	24799.2	30801.1
Deaths	47057	69681	131941	440682
Age-standardised mortality rate[a]	585.6	702.4	748.2	904.8
Mortality ratio (CI 95 %)	1.00	1.19 (1.18–1.21)	1.27 (1.26–1.29)	1.54 (1.53–1.56)
Mortality difference (CI 95 %)[a]	0.00	116.7 (112.7–119.8)	162.5 (155.1–168.0)	319.1 (306.2–324.0)
Madrid				
Person-years (thousands)	2900.1	2926.1	2829.0	2815.7
Deaths	9696	10838	15528	38541
Age-standardised mortality rate[a]	542.9	680.7	733.7	856.5
Mortality ratio (CI 95 %)	1.00	1.25 (1.23–1.28)	1.35 (1.32–1.38)	1.58 (1.55–1.61)
Mortality difference (CI 95 %)[a]	0.00	137.8 (125.0–152.6)	190.8 (177.0–206.6)	313.6 (297.4–332.5)
Basque Country				
Person-years (thousands)	861.6	1435.8	1261.7	1197.7
Deaths	3170	5865	9393	20021
Age-standardised mortality rate[a]	642.0	716.1	810.3	946.6
Mortality ratio (CI 95 %)	1.00	1.12 (1.08–1.16)	1.26 (1.22–1.31)	1.47 (1.42–1.53)
Mortality difference (CI 95 %)[a]	0.00	74.0 (68.7–82.7)	168.2 (157.5–182.2)	304.6 (283.2–331.4)
Barcelona				
Person-years (thousands)	1755.6	2644.8	2779.1	3235.2
Deaths	5606	9968	16462	47303
Age-standardised mortality rate[a]	548.5	692.3	756.4	909.8
Mortality ratio (CI 95 %)	1.00	1.26 (1.23–1.30)	1.38 (1.34–1.42)	1.65 (1.62–1.70)
Mortality difference (CI 95 %)[a]	0.00	143.8 (130.0–157.6)	207.9 (192.5–233.4)	361.2 (341.9–390.8)
Rest of Spain				
Person-years (thousands)	8212.3	12087.9	17929.4	23552.3
Deaths	28585	43010	90558	334817
Age-standardised mortality rate[a]	604.1	708.8	743.8	908.7
Mortality ratio (CI 95 %)	1.00	1.17 (1.16–1.19)	1.23 (1.22–1.25)	1.50 (1.49–1.52)
Mortality difference (CI 95 %)[a]	0.00	104.7 (97.4–109.9)	139.7 (133.1–148.3)	304.6 (293.1–313.2)

[a] Per 100,000 person-years

The mortality rate ratios and differences for the total Spanish population were intermediate in magnitude compared to those observed in Madrid, the Basque Country and Barcelona, and most of the estimates in these three geographic areas showed no significant differences with regard to the national estimates. The exceptions in women were mortality from cardiovascular diseases in Madrid and the Basque Country and mortality from external causes in Madrid, as the mortality rate ratios and differences were significantly lower than those observed at the national level. The exceptions in men were cancer mortality in Madrid and Barcelona, as the mortality rate ratios and differences were significantly greater than those observed at the national level, and mortality from cardiovascular diseases and external causes in Madrid, as the mortality rate ratios and differences were significantly lower than those observed at the national level.

The magnitude of the mortality rate ratio by cause of death in the three study areas was more heterogeneous in women than in men. In women, it ranged from 1.31 (Madrid) to 1.60 (Barcelona) for cardiovascular diseases, from 1.34 (Barcelona) to 1.76 (the Basque Country) for respiratory diseases, and from 1.19 (the Basque Country) to 1.61 (Barcelona) for digestive diseases.

Table 3 Mortality rates ratios and differences (with 95 % confidence intervals in brackets) of low versus high education from all causes of death and from the leading causes of death in Spain, Madrid, Basque Country, Barcelona and rest of Spain. Women. Spanish National Longitudinal Study, 2001–2008

	All causes	Cancer[a]	Cardiovascular diseases[a]	Respiratory diseases[a]	Digestive diseases[a]	External causes[a]	All other causes
Rate ratios							
Spain	1.24 (1.23–1.26)	1.01 (1.00–1.03)	1.57 (1.53–1.61)	1.40 (1.33–1.47)	1.46 (1.40–1.59)	1.22 (1.18–1.27)	1.43 (1.40–1.47)
Madrid	1.13 (1.11–1.16)	0.99 (0.96–1.03)	1.31 (1.23–1.38)	1.35 (1.22–1.49)	1.36 (1.23–1.52)	0.93 (0.85–1.02)	1.26 (1.20–1.33)
Basque Country	1.15 (1.10–1.20)	0.97 (0.91–1.02)	1.24 (1.13–1.37)	1.76 (1.39–2.22)	1.19 (1.00–1.43)	1.36 (1.19–1.57)	1.45 (1.31–1.61)
Barcelona	1.22 (1.18–1.25)	0.98 (0.95–1.02)	1.60 (1.49–1.71)	1.34 (1.15–1.53)	1.61 (1.42–1.83)	1.27 (1.15–1.41)	1.41 (1.32–1.51)
Rest of Spain	1.28 (1.26–1.29)	1.03 (1.01–1.05)	1.65 (1.55–1.65)	1.45 (1.36–1.54)	1.48 (1.39–1.58)	1.24 (1.19–1.30)	1.44 (1.40–1.48)
Rate differences[b]							
Spain	70.2 (67.9–73.5)	2.1 (0.1–4.0)	31.9 (25.3–38.8)	5.8 (4.5–7.3)	6.1 (5.1–7.0)	2.9 (2.4–3.3)	22.1 (18.8–25.4)
Madrid	39.1 (31.2–47.8)	−0.8 (−1.6 to 3.8)	16.4 (11.9–21.8)	6.1 (4.1–8.0)	4.7 (3.5–5.9)	−0.8 (−2.3 to 0.7)	13.4 (9.5–17.3)
Basque Country	44.0 (28.3–57.7)	−5.2 (−12.2 to 2.6)	13.5 (7.1–21.6)	7.4 (5.1–9.9)	2.8 (0.1–5.2)	4.7 (2.4–6.9)	20.8 (14.6–27.0)
Barcelona	62.9 (54.7–69.3)	−2.9 (−8.1 to 2.5)	28.6 (23.1–34.2)	4.9 (2.1–8.2)	8.1 (5.1–11.0)	3.4 (2.2–4.7)	20.9 (17.7–24.1)
Rest of Spain	77.9 (73.1–81.3)	4.3 (1.9–5.7)	35.0 (32.3–38.1)	6.3 (5.5–7.0)	6.3 (5.4–7.1)	3.2 (2.6–3.7)	22.7 (18.9–25.8)

[a] The codes for the causes of death taken from the 10th International Classification of Causes of Death were:

Cancer: C00–C97, cardiovascular diseases: I00–I97, respiratory diseases: J00–J99, digestive diseases: K00–K93, external causes: V00–Y99

[b] Per 100,000 person-years

Table 4 Mortality rates ratios and differences (95 % confidence intervals) of low versus high education from all causes of death and from the leading causes of death in Spain, Madrid, Basque Country, Barcelona and rest of Spain. Men. Spanish National Longitudinal Study, 2001–2008

	All causes	Cancer[a]	Cardiovascular diseases[a]	Respiratory diseases[a]	Digestive diseases[a]	External causes[a]	All other causes
Rate ratios							
Spain	1.30 (1.29–1.31)	1.19 (1.18–1.20)	1.21 (1.20–1.24)	1.65 (1.60–1.69)	1.63 (1.59–1.67)	1.78 (1.74–1.82)	1.35 (1.33–1.37)
Madrid	1.31 (1.29–1.33)	1.25 (1.23–1.28)	1.15 (1.12–1.19)	1.60 (1.51–1.68)	1.61 (1.51–1.71)	1.57 (1.49–1.66)	1.41 (1.36–1.46)
Basque Country	1.28 (1.24–1.31)	1.18 (1.15–1.22)	1.21 (1.16–1.26)	1.68 (1.52–1.86)	1.49 (1.33–1.63)	1.75 (1.63–1.84)	1.28 (1.21–1.36)
Barcelona	1.35 (1.32–1.37)	1.25 (1.22–1.28)	1.26 (1.22–1.30)	1.67 (1.57–1.78)	1.69 (1.58–1.81)	1.70 (1.60–1.81)	1.40 (1.35–1.46)
Rest of Spain	1.29 (1.27–1.30)	1.17 (1.16–1.19)	1.18 (1.17–1.20)	1.68 (1.63–1.73)	1.63 (1.57–1.68)	1.84 (1.79–1.88)	1.35 (1.32–1.38)
Rate differences[b]							
Spain	197.7 (195.6–198.9)	54.9 (53.5–56.4)	36.1 (33.7–38.6)	28.1 (20.9–35.7)	20.8 (15.2–26.4)	25.7 (22.7–28.6)	32.0 (29.4–34.6)
Madrid	189.4 (178.6–201.3)	66.7 (61.7–71.6)	21.6 (17.2–27.1)	29.9 (17.8–41.2)	19.3 (12.5–27.2)	13.8 (8.9–17.9)	39.0 (31.4–46.5)
Basque Country	188.7 (169.9–207.2)	59.4 (50.1–68.7)	34.4 (26.1–42.8)	23.9 (12.8–35.0)	18.3 (10.5–25.3)	27.8 (19.9–36.6)	25.8 (17.9–33.1)
Barcelona	218.3 (203.8–235.6)	71.9 (63.5–79.3)	40.1 (34.7–45.6)	28.9 (19.7–37.1)	20.8(14.7–26.1)	19.6 (14.7–24.5)	36.9 (27.1–45.7)
Rest of Spain	189.5 (181.3–197.5)	49.2 (46.6–51.7)	32.5 (29.6–35.4)	28.9 (20.4–37.4)	21.0 (18.3–23.8)	26.6 (21.5–30.7)	31.4 (28.3–34.2)

[a] The codes for the causes of death taken from the 10th International Classification of Causes of Death were: cancer: C00–C97, cardiovascular diseases: I00–I97, respiratory diseases: J00–J99, digestive diseases: K00–K93, external causes: V00–Y99
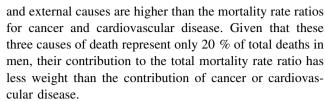
[b] Per 100,000 person-years

Discussion

Educational inequalities in mortality in the entire Spanish population are intermediate in magnitude compared to those observed in Madrid, the Basque Country and Barcelona. Given that these three geographic areas have traditionally been included in comparative studies of mortality inequalities across several European countries (Huisman et al. 2004, 2005; Mackenbach et al. 2008), the findings support the validity of the estimates in these studies to reflect the situation in Spain. Thus, the findings confirm that the inequalities in mortality from all causes of death in Spain are smaller than those observed in other European countries, and similar to those observed in Italy (Eikemo and Mackenbach 2012; Federico et al. 2013; Marinacci et al. 2013). Furthermore, the analysis by cause of death shows that the magnitude of inequality in mortality from some causes of death cannot be considered small.

As noted in a recent study using data from the 1990s for these three areas and for several European populations, the low magnitude of relative inequalities in total mortality in Spanish people is due mainly to the absence of inequalities in cancer mortality in women and to the small inequalities in cancer and cardiovascular mortality in men (Kulhánová et al. 2014a). Using data from the first decade of this century, the present study confirms previous findings in these three areas and shows that the same is true at the national level. Indeed, although cancer deaths represent a quarter of all deaths in women, the mortality rate ratios from cancer are around unity. And deaths from cancer and cardiovascular disease account for two-thirds of all deaths in men, but mortality rate ratios for both causes of death are small. Specifically, in men the mortality rate ratios of low versus high education from cancer and from cardiovascular diseases in these three areas are not higher than 1.26.

The above study also noted that the relative inequalities in mortality from most other causes of death in Spain are not small (Kulhánová et al. 2014a). The findings of the present study allow us to refine these conclusions because the pattern in women and men differs, as clearly seen in the results on inequalities in mortality by cause of death. In women, at national level, the mortality rate ratio for low versus high education is lower for respiratory diseases and external causes than for cardiovascular disease, which is the cause of death with the highest relative inequalities in mortality. In addition, the mortality rate ratio for external causes in Madrid, for digestive diseases in the Basque Country, and for external causes in Barcelona is lower than the mortality rate ratio for cardiovascular disease. In contrast, in men, both at national level and in the three the geographical areas, the mortality rate ratios for low versus high education for respiratory diseases, digestive diseases

and external causes are higher than the mortality rate ratios for cancer and cardiovascular disease. Given that these three causes of death represent only 20 % of total deaths in men, their contribution to the total mortality rate ratio has less weight than the contribution of cancer or cardiovascular disease.

Finally, it should be mentioned that mortality rate ratios and differences from some causes of death were significantly different from those observed at the national level. That is, the regional pattern of inequalities in mortality by cause of death is not uniform. This is an important finding since the possible areas of intervention to reduce total inequalities in mortality may vary from one region to another. Specifically, mortality rate ratios and differences from cardiovascular diseases in Madrid (women and men) and in the Basque Country (women), and mortality rate ratios and differences from external causes (women and men) in Madrid were smaller than those observed at the national level. Moreover, mortality rate ratios and differences from cancer in Madrid (men) and Barcelona (men) were greater than those observed at the national level. Although the reasons for these findings are unknown, a plausible explanation might be a greater geographical variation in exposure to risk factors for these causes of death among people with low versus high educational level.

Strengths and weaknesses

Previous comparative studies of various European populations have used different data sources from Madrid, the Basque Country and Barcelona to estimate inequalities in mortality in those three areas (Huisman et al. 2004, 2005; Mackenbach et al. 2008; Kulhánová et al. 2014a; Mackenbach et al. 2014). Likewise, the period of analysis in those studies differs from one area to another. However, our study uses the same data source to estimate educational inequalities in mortality in residents in these areas in 2001 after 7 years of follow-up.

A previous study estimated the inequalities in general and cause-specific mortality for the entire Spanish population in order to calculate the contribution of the leading causes of death to the differences in total mortality (Reques et al. 2014). The present investigation is the first study in Spain to obtain national estimates of mortality differences by education for the entire Spanish population and in three regional areas.

Population samples have been used to estimate inequalities in mortality in some countries. In such studies, the validity of the findings depends on the representativeness of the survey (e.g. surveys generally do not include the institutionalised population) and on the possible differential bias between responders and non-responders (e.g. with

respect to health status and educational level) (Federico et al. 2013; Marinacci et al. 2013; Kulhánová et al. 2014b). However, the present study has no problems of representativeness and has strong statistical power since it includes all subjects who resided in Spain at the time of the 2001 population census. Even though 1.7 % of census subjects could not be found through the population and mortality registers, the possible bias introduced is negligible, even supposing that mortality in those persons was higher than observed in the subjects included.

The use of education allows comparisons with estimates previously obtained in comparative studies of European populations. Other mortality studies have also used occupation (Toch-Marquardt et al. 2014). However, occupation does not allow classification of individuals who are unemployed or are not part of the labour force, such as housewives or retired people.

Since the follow-up period ended on 31 December 2008, it was not possible to evaluate the probable impact of the economic crisis in that year on subsequent socioeconomic differences in mortality in Spain. One study has observed that the total mortality rate and the mortality rate from several causes of death showed statistically significant downward trends during the recession, and that the decrease observed in the period 2008–2011 was similar to that seen in the period 2004–2007 (Regidor et al. 2014). This finding suggests that the magnitude of the mortality differences by education is unlikely to have changed substantially.

It is also important to note that this was a descriptive study; therefore, it was not possible to explain the heterogeneity of the findings in the study regions. Further studies are needed to investigate why the magnitude of inequalities in mortality by cause of death varies among regions.

Conclusions

Our study results show that mortality inequalities in the whole Spanish population are similar to those obtained in the three Spanish areas traditionally investigated. They provide further evidence that inequalities in total mortality are smaller in the south of Europe than in most other European countries. Some of our findings can also help identify possible areas of intervention, given that inequalities in mortality from some causes of death vary substantially among the study areas.

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