



ORIGINAL ARTICLE

## Area deprivation and trends in inequalities in self-rated health in Spain, 1987–2001

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### Abstract

**Aims:** This study examined the impact that individual social position and municipal area deprivation levels had on trends in inequalities in self-rated health in Spain, between 1987 and 2001. **Methods:** The study was based on cross-sectional data of the National Health Surveys of Spain for the years 1987, 1993, 1995, 1997, and 2001 ( $n=84,567$ ). The indicators used were educational level and occupational class, and deprivation level as the indicator of municipal areas. Multilevel logistic regression models were made, with individuals nested into municipal areas. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated. To evaluate trends, the relative index of inequality was calculated. **Results:** At the individual level, the likelihood of less-than-good health between those with no formal education as compared to those with graduate-level education increased from OR=2.66 (95% CI: 2.06–3.38) in 1987 to OR=3.62 (95% CI: 2.95–4.63) in 2001 among women. The values for men were OR=2.27 (95% CI: 1.89–2.72) and OR=2.94 (95% CI: 2.36–3.68) respectively. Living in areas with the highest deprivation levels as compared to the lowest systematically increased the likelihood of less-than-good health. The likelihood of reporting less-than-good health among women with no formal education as compared to women with graduate-level education in municipal areas with the highest deprivation levels increased from OR=3.61 (95% CI: 2.39–5.45) in 1987 to 4.85 (95% CI: 3.06–7.69) in 2001. Among men, the corresponding magnitudes were OR=2.07 (95% CI: 1.39–3.08) and OR=4.16 (95% CI: 2.52–6.89). **Conclusions:** Inequalities in self-rated health increased in Spain in this period. These inequalities may be explained by the social conditions existing throughout the period of reference, and the pattern varies according to gender, municipal area deprivation levels, and the individual indicator of social position used.

**Key Words:** Deprivation, inequalities, multilevel analysis, self-rated health, Spain, trends

### Background

A considerable amount of evidence suggests that a relationship exists between an individual's social position and diverse aspects related to his or her personal health, as well as between a population's health and the socioeconomic characteristics of the area in which that population resides [1]. More recent evidence, based on multilevel studies, seems to indicate that a person's health is determined both by his or her social position and by the socioeconomic

characteristics of the setting in which he or she lives [2]. Although most of these studies have focused on mortality, some have also explored how the socioeconomic context characterizing an individual's area of residence affects self-rated health [3,4].

On the other hand, relatively few studies have explored trends in social inequalities in self-rated health. Most of these have been conducted in a very small number of countries [5–7]. What their results actually reflect is that the evolution of inequalities in self-rated health depends on socioeconomic

conditions and their local evolution, on the magnitude of social inequalities, and on the impact that these inequalities have on perceived health. The interest of such studies lies precisely in assessing the impact that social changes and specific economic and social policies may have on the health status of people from different social classes.

In the period 1987–2001 many political, social and economic aspects have changed in Spain. Principal among them are consistently higher economic growth than the European Union average [8], the implementation of progressive welfare policies, including universal access to educational and health services, and a significant reduction of unemployment since the mid-1990s. On the other hand, by the end of the period under study, in Spain there still remained strong socioeconomic contrasts between geographical areas, very high rates of insecure employment, and persistent gender inequalities, and about 20% of citizens were living in poverty. Thus, Spain may represent a good example of the effects that deep and fast social, economic and political changes may have on health, because the changes undergone during 1987–2001 are likely to have had an impact on health inequalities [9,10].

For this study, health status was measured using self-rated health, one of the most frequently used measures for the evaluation of health status, and considered to be a good indicator of general health and well-being for individuals and populations [11,12].

To evaluate the impact of the characteristics of individuals and the characteristics of the context where they live on individual's self-rated health, a multilevel approach was used. In this study, individuals were nested into municipal areas. In Spain, the municipality represents the most basic unit for political action, the distribution of social and economic resources, and the delivery of public services, and in general, defines the living conditions of residents.

The objectives of this study were to assess trends in inequalities in self-rated health in Spain, according to gender and to the individual's social position, to estimate the impact of Spanish municipal areas' socioeconomic characteristics on their residents' self-rated health, and to explore the shape and magnitude of trends in inequalities in self-rated health for residents in municipalities with different socioeconomic contexts.

## Material and methods

### *Study population*

The study population was the non-institutionalized Spanish population aged 16 years and older.

Subjects were the respondents to the Spanish National Health Surveys (NHS) [13] for the years 1987, 1993, 1995, 1997, and 2001, designed and managed by the Health Ministry of Spain. The sampling methodology was similar for all surveys, although sampling sizes have varied. Surveys used multistage, stratified, randomized sampling. The numbers of persons interviewed the surveys were 29,647 in 1987, 21,062 in 1993, 6395 in 1995, 6396 in 1997, and 21,067 in 2001. Because samples in 1995 and 1997 were considerably smaller, surveys for these years were combined for the analysis.

### *Individual-level variables*

The dependent variable, self-rated health, was obtained for all subjects from an identical question in all surveys. Subjects could report their health as very good, good, fair, poor, or very poor. This was dichotomized into those who reported their health as good (very good and good) and those who reported their health as less than good (fair, poor, or very poor). Respondents to the NHS were asked for their current or previous occupation. Occupation was classified into a corresponding occupational class, following a four-level occupational social class classification system used previously in Spain [9]. Those without a current or previous occupation were classified according to the occupational class of the head of the household.

All surveys collected data on educational level in a similar way, using the highest level of formal education attained and/or the age at which the respondent left school. Respondents were classified into four groups: No studies includes illiterate subjects and those with no formal education; primary studies refers to respondents who attended primary school or left school at 14 or 15 years of age; secondary studies includes those who formally attended secondary education or completed schooling at the age of 16–19 years; and graduate studies includes all respondents who completed university or higher than secondary education.

Other sociodemographic variables included were: age, labour status, size of municipality of residence, and marital status. Lifestyle variables included in the analysis were smoking status, physical activity, alcohol consumption, and body mass index.

### *Contextual-level variables*

Municipal areas' deprivation level was calculated using a modified Townsend Index of material deprivation, previously used in Spain [14]. It is based on each municipality's rates of unemployment, illiteracy, and private vehicles, and was

calculated in accordance with the procedure described by Phillimore et al. [15]. Unemployment and illiteracy data were obtained from the Spanish national census of 1991 [16]. The rate of private car ownership was obtained from the national motor vehicle authority for the year 1991 [17]. Deprivation tertiles were estimated and applied to all surveys, in order to classify municipalities into three levels: lowest, medium and highest deprivation.

#### *Analytical method*

Men and women were analysed separately, in the light of evidence that the relationship between self-rated health and level of education or occupational class may differ between genders [18]. To evaluate trends in inequalities in self-rated health according to occupational class or educational level, odds ratios (ORs) were calculated in two ways for each survey: for each occupational class and educational level, and as the relative index of inequality (RII). The RII can be interpreted as the odds of having less-than-good health for those in the most disadvantaged occupational class (class IV) or educational level (no studies) as compared to those in the most advantaged occupational class (class I) or educational level groups (graduate studies). In our study, the RII enables the comparison of inequalities during the period under study, adjusting for the effects of changes in the size of occupational class or educational level groups occurring between 1987 and 2001. This index eliminates bias due to the different sizes of socioeconomic groups at different points of time, ensuring that the ORs are comparable during the period [19]. Individual-level models include age, labour status, smoking status, body weight, physical exercise, alcohol consumption, and occupational class or educational level.

Given the structure of the data, i.e. individuals grouped in municipalities, a multilevel logistic analysis with two hierarchical levels, subjects and municipal areas, was used to estimate ORs [20]. The inclusion of random parameters for occupational class and level of education was allowed in order to evaluate whether the impact on self-rated health was dependent on the level of deprivation in municipal areas, rather than being fixed [21]. The OR models estimated through multilevel models of random effects include lifestyle and other individual-level variables, such as age, labour status, smoking status, body mass index, physical exercise, alcohol consumption, and occupational class or educational level, and municipal area deprivation level and the interaction between occupational class or educational level with deprivation level for the municipal areas. These analysis was done separately for each

survey. To avoid the problem of small numbers, municipalities with a population of under 10,000 were grouped by province and according to population size [22]. A routine developed for the software S+ was used for the analysis [23]. Only results estimated as the RII for the multivariate analysis are reported in this article.

#### **Results**

Overall, 84,567 subjects nested in a total of 445 municipal areas responded to the different surveys. The distribution of the variables included in the analysis is shown in Table I. The percentage of subjects with less-than-good health remained stable from 1987 to 2001. However, there were changes in the distribution of occupational class and educational level, and other sociodemographic variables. For instance, the percentage of subjects with no studies among males decreased from 26.6% in 1987 to 10.2% in 2001; among women, this decrease was from 37.3% in 1987 to 15.1% in 2001. Similarly, the percentage of unemployed men decreased from 9.5% in 1987 to 6.8% in 2001. However, the percentage of unemployed women increased from 4.9% in 1987 to 8.2% in 2001.

Table II shows selected characteristics of municipal areas. In general, municipal areas with the highest deprivation levels had higher proportions of men and women in occupational class IV, in the group of no studies, and unemployed. The decrease of the proportion of individuals in class IV or with no studies occurred in all areas, and this reduction appeared to be larger in areas with the highest deprivation levels than in areas with the lowest deprivation levels. For instance, from 1987 to 2001, the reduction in the proportion of men in class IV was 15.2% (27.3% as compared to 12.1%) in areas with the lowest deprivation, and 20.2% (42.4% as compared to 22.0%) in areas with the highest deprivation. The proportion of unemployed individuals followed the same pattern among men. In contrast, among women there was an increase from 1987 to 2001; this increase tended to be higher in municipal areas with the highest deprivation. Finally, there was a higher percentage of subjects reporting less-than-good health in areas with greater deprivation (Table II).

The impact of area deprivation levels on self-rated health is shown in Table III. For all years studied, and adjusting for individual social position (occupational class or educational level), subjects residing in areas with the highest deprivation were more likely to have reported less-than-good health in than

Table I. Distribution of variables by sex for each survey.

	Men								Women							
	1987		1993		1995-97		2001		1987		1993		1995-97		2001	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Self-rated health																
Good	9696	73.2	7458	73.5	4431	71.7	7655	75.4	9057	63.1	6934	63.9	4190	63.5	6947	64.0
Less than good	3542	26.8	2692	26.5	1748	28.3	2494	24.6	5301	36.9	3917	36.1	2405	36.5	3913	36.0
Occupational class																
Class I	1623	12.6	1745	17.6	1231	20.2	1542	15.7	1462	11.1	1521	15.6	1086	17.5	1469	14.1
Class II	2340	18.2	2150	21.7	1177	19.3	1713	17.4	2472	18.8	2330	23.8	1296	20.9	2056	19.7
Class III	4424	34.5	3302	33.4	2176	35.7	4999	50.8	4446	33.7	2787	28.5	1845	29.8	4265	40.9
Class IV	4452	34.7	2698	27.3	1511	24.8	1585	16.1	4802	36.4	3137	32.1	1962	31.7	2646	25.4
Educational level																
Graduate studies	1670	12.6	1917	18.9	1019	16.6	1492	14.7	1257	8.7	1461	13.5	928	14.2	1342	12.4
Secondary studies	3648	27.6	2124	21.0	1573	25.6	2739	27.0	3117	21.7	1724	16.0	1327	20.3	2483	22.9
Primary studies	4378	33.1	4828	47.7	3007	49.0	4884	48.1	4631	32.2	5491	50.9	3467	53.1	5392	49.7
No studies	3519	26.6	1252	12.4	542	8.8	1041	10.2	5356	37.3	2113	19.6	813	12.4	1643	15.1
Labour status																
Worker	7899	60.3	5812	57.8	3222	52.4	5932	58.6	3192	22.4	2675	24.7	1588	24.2	3377	31.2
Retired	2469	18.8	2074	20.6	1487	24.2	2529	25.0	1019	7.1	1512	14.0	1056	16.1	1809	16.7
Unemployed	1240	9.5	1089	10.8	720	11.7	688	6.8	699	4.9	875	8.1	664	10.1	890	8.2
Homemaker	-	-	-	-	-	-	-	-	8007	56.1	4660	43.1	2563	39.0	3843	35.5
Student	1495	11.4	1088	10.8	718	11.7	981	9.7	1354	9.5	1089	10.1	702	10.7	905	8.4
Age																
16-24 years	2969	22.3	2078	20.8	1282	20.8	1705	16.8	2931	20.3	1991	18.6	1186	18.0	1626	15.0
25-44 years	4791	36.0	3607	36.0	2258	36.6	3952	38.8	4808	33.3	3622	33.8	2257	34.3	3943	36.3
45-64 years	3773	28.3	2916	29.1	1711	27.7	2720	26.7	4294	29.7	3152	29.4	1842	28.0	2870	26.4
> 65 years	1774	13.3	1406	14.0	926	15.0	1795	17.6	2403	16.6	1956	18.2	1303	19.8	2431	22.4
Marital status																
Married	8254	62.2	6152	60.6	3658	59.2	5916	58.1	8796	61.1	6712	61.9	3911	59.3	6280	57.8
Other	5010	37.8	3998	39.4	2518	40.8	4258	41.9	5606	38.9	4134	38.1	2681	40.7	4592	42.2
Municipal size																
< 10,000	3747	28.2	2611	25.7	1509	24.4	2539	24.9	3806	26.3	2789	25.6	1641	24.9	2683	24.7
10,000-100,000	3302	24.8	2566	25.2	2013	32.5	3536	34.7	3557	24.6	2715	25.0	2077	31.5	3784	34.8
> 100,000	6263	47.0	4996	49.1	2665	43.1	4108	40.3	7083	49.0	5370	49.4	2882	43.7	4417	40.6
Alcohol consumption																
No	3402	26.6	3359	34.0	1896	30.8	3195	31.5	8318	59.1	7263	68.4	4179	63.6	6810	62.8
Yes	9408	73.4	6522	66.0	4256	69.2	6941	68.5	5748	40.9	3357	31.6	2388	36.4	4033	37.2
Body mass index																
Normal	10,679	91.5	8390	91.3	5069	89.1	8390	87.9	8806	85.9	7454	85.0	4398	83.2	7558	80.3
Obesity	992	8.5	799	8.7	619	10.9	1158	12.1	1447	14.1	1313	15.0	891	16.8	1854	19.7
Smoking status																
Never-smoker	3462	26.2	3079	30.5	1929	31.5	3356	33.0	10,175	70.9	7443	69.0	4258	65.3	6881	63.3
Former smoker	2459	18.6	2094	20.7	1377	22.5	2519	24.8	873	6.1	710	6.6	491	7.5	1020	9.4
Smoker	7275	55.1	4937	48.8	2823	46.1	4284	42.2	3301	23.0	2637	24.4	1776	27.2	2964	27.3
Physical exercise																
Regular exercise	6078	46.3	5331	52.7	3706	60.1	5971	58.8	4165	29.3	4038	37.5	3140	47.8	5166	47.8
No exercise	7054	53.7	4779	47.3	2460	39.9	4179	41.2	10,059	70.7	6733	62.5	3435	52.2	5635	52.2
Deprivation																
Lowest	4413	33.3	3341	33.3	2143	34.6	3084	30.4	4799	33.4	3621	33.8	2328	35.3	3322	30.6
Medium	4410	33.3	3325	33.2	2166	35.0	3825	37.7	4787	33.3	3550	33.2	2302	34.9	4071	37.5
Highest	4412	33.3	3353	33.5	1880	30.4	3239	31.9	4787	33.3	3536	33.0	1972	29.9	3458	31.9
Total (n)	13,312		10,176		6189		10,222		14,445		10,877		6602		10,837	

residents in the least deprived areas. Among women in the lowest positions of the occupational hierarchy, the likelihood of reporting less-than-good health varied was 19% (OR=1.19 in 1993) to 33% (OR=1.33 in 1995-97) higher among those in municipal areas with the highest deprivation than

among those in the least deprived areas (OR=1 for all years). For those at the lowest level of the educational hierarchy, this range was 16-25%. Among men, these values ranged between 20% in 1987 and 30% in 1995-97, and between 10% and 27% respectively. Multilevel models were

Table II. Distribution (%) of selected characteristics of the population by sex and deprivation level of municipal areas, Spain 1987-2001.

	Men												Women												
	Lowest				Medium				Highest				Lowest				Medium				Highest				
	1987	1993	1995-97	2001	1987	1993	1995-97	2001	1987	1993	1995-97	2001	1987	1993	1995-97	2001	1987	1993	1995-97	2001	1987	1993	1995-97	2001	
Subjects (n)	4413	3341	2143	3084	4410	3325	2165	3825	4412	3353	1879	3239	4799	3621	2327	3322	4787	3550	2300	4071	4787	3536	1972	3458	
Self-rated health																									
Good	74.3	76.5	76.0	76.4	73.7	73.4	72.3	76.9	71.6	70.4	66.2	72.7	65.8	66.2	66.5	65.1	62.7	64.1	65.0	66.3	60.8	61.3	58.4	60.2	
Less than good	25.7	23.5	24.0	23.6	26.3	26.6	27.7	23.1	28.4	29.6	33.8	27.3	34.2	33.8	33.5	34.9	37.3	35.9	35.0	33.7	39.2	38.7	41.6	39.8	
Occupational class																									
Class I	16.8	25.0	25.4	20.9	11.3	16.6	19.2	15.9	9.9	11.7	15.3	10.5	14.6	21.3	22.4	17.9	9.3	13.8	17.3	13.9	9.5	11.5	12.0	10.6	
Class II	21.1	22.4	21.7	18.8	16.4	24.4	19.6	17.1	17.1	18.3	16.3	16.2	22.3	26.0	24.1	23.6	16.9	25.4	20.8	19.7	17.1	19.8	17.2	16.0	
Class III	34.8	32.4	33.4	48.2	38.0	34.9	38.8	52.6	30.5	33.0	34.7	51.3	34.1	28.8	28.5	37.9	37.5	30.3	31.8	43.9	29.5	26.6	29.1	40.2	
Class IV	27.3	20.2	19.5	12.1	34.3	24.2	22.4	14.4	42.4	37.0	33.7	22.0	29.0	23.8	25.0	20.5	36.3	30.4	30.1	22.5	43.9	42.0	41.6	33.3	
Education level																									
Graduate	17.5	26.3	21.6	19.5	10.8	19.2	15.9	14.1	9.7	12.0	11.7	10.8	11.8	18.0	18.1	16.7	7.4	18.9	13.8	12.2	7.1	9.0	10.1	8.4	
Secondary	31.3	23.7	28.0	29.6	28.5	21.7	27.9	29.1	23.0	17.5	20.3	21.9	25.0	18.9	23.9	25.9	21.7	29.8	20.4	23.8	18.4	12.4	16.0	19.0	
Primary	32.0	42.1	45.7	44.8	35.0	46.9	48.6	48.1	32.6	53.7	53.2	51.3	34.6	48.4	50.2	47.1	33.7	33.6	55.4	50.6	28.4	53.1	53.6	51.0	
No studies	19.3	7.9	4.7	6.1	25.7	12.2	7.6	8.7	34.7	16.8	14.9	16.0	28.6	14.7	7.8	10.3	37.2	17.6	10.4	13.5	46.1	25.5	20.3	21.6	
Labour status																									
Worker	63.5	60.5	56.9	59.3	60.5	58.4	51.9	59.3	56.8	54.5	47.8	57.0	28.1	27.7	27.2	35.7	21.5	25.6	25.2	32.1	17.4	20.9	19.3	26.0	
Retired	18.1	19.1	21.7	27.1	19.1	20.6	24.4	24.4	19.3	22.1	26.8	23.7	8.0	14.1	16.4	17.8	7.0	14.7	15.1	17.1	6.4	13.2	16.8	15.3	
Unemployed	7.0	8.0	9.7	5.1	8.4	9.6	10.5	6.2	13.1	14.7	15.4	9.1	4.2	7.0	9.6	7.1	5.6	7.8	9.3	7.9	4.9	9.4	11.6	9.7	
Homemaker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Student	11.4	12.4	11.7	8.6	12.0	11.4	13.2	10.1	10.8	8.7	9.9	10.2	9.7	10.9	11.3	7.2	9.6	9.9	11.0	9.1	9.2	9.5	9.6	8.5	

Table III. Odds ratios (ORs) for less-than-good-health, according to individuals' occupational class and educational level, and municipal area deprivation level, for men and women, Spain 1987-2001.

	1987	1993	1995-97	2001	p-value for trend <sup>d</sup>
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	
Women					
Occupational class <sup>b</sup>					NS (<0.05) <sup>c</sup>
Deprivation level					
Lowest	1	1	1	1	
Medium	1.18 (1.02-1.37)	1.10 (0.91-1.32)	1.05 (0.86-1.28)	1.02 (0.87-1.20)	
Highest	1.31 (1.13-1.51)	1.19 (0.99-1.43)	1.33 (1.08-1.63)	1.21 (1.02-1.43)	
p-value <sup>d</sup>	<0.001	<0.001	NS	<0.001	
Educational level <sup>e</sup>					<0.05
Deprivation level					
Lowest	1	1	1	1	
Medium	1.15 (0.99-1.33)	1.06 (0.88-1.28)	1.01 (0.82-1.24)	1.02 (0.84-1.16)	
Highest	1.22 (1.06-1.41)	1.16 (0.96-1.40)	1.25 (1.01-1.55)	1.18 (0.99-1.39)	
p-value <sup>d</sup>	0.0043	<0.001	NS	<0.001	
Men					
Occupational class <sup>b</sup>					NS
Deprivation level					
Lowest	1	1	1	1	
Medium	1.01 (0.86-1.18)	1.12 (1.01-1.28)	1.04 (0.85-1.27)	1.03 (0.83-1.21)	
Highest	1.20 (1.01-1.42)	1.29 (1.07-1.56)	1.30 (0.92-1.59)	1.23 (1.02-1.49)	
p-value <sup>d</sup>	<0.001	<0.001	NS	<0.001	
Educational level <sup>e</sup>					<0.05
Deprivation level					
Lowest	1	1	1	1	
Medium	1.01 (0.85-1.17)	1.19 (0.99-1.44)	1.06 (0.88-1.28)	1.03 (0.78-1.24)	
Highest	1.10 (0.97-1.28)	1.26 (1.05-1.52)	1.27 (1.05-1.53)	1.11 (0.91-1.34)	
p-value <sup>d</sup>	<0.001	0.022	<0.001	<0.001	

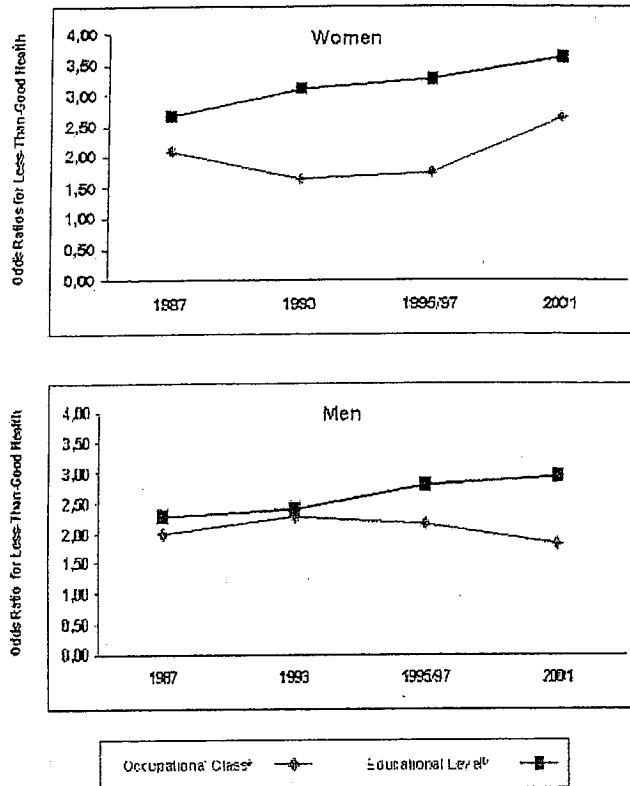
CI, confidence interval; NS, not significant. ORs estimated as the relative index of inequality. <sup>a</sup>p-value. Individual-level models. <sup>b</sup>Occupational class: ORs for less-than-good health for those in class IV as compared to those in class I. <sup>c</sup>Test for trend 1993-2001. <sup>d</sup>p-value multilevel models. <sup>e</sup>Educational level: ORs for less-than-good health for those with no studies as compared to those with graduate studies.

statistically significant for all years studied, except for 1995-97, when several models missed significance.

Figure 1 presents trends on individual-level inequalities in self-rated health for men and women, from 1987 to 2001. The lower the level of education or occupational class, the greater the likelihood of less-than good health, in all years studied. Among men, inequalities according to occupational class remained in the same range of values during the entire period, although they were slightly higher for 1993 and 1995-97 (OR=1.98; 95% CI: 1.67-2.36 in 1987; OR=1.83; 95% CI: 1.49-2.66 in 2001; *p* for trend >0.05). However, ORs according to educational level increased significantly from 2.27 (95% CI: 1.89-2.72) in 1987 to 2.94 (95% CI: 2.36-3.68) in 2001 (*p* for trend <0.05). Among women, inequalities according to educational level significantly increased from 1987 (OR=2.66; 95% CI: 2.06-3.38) to 2001 (OR=3.62; 95% CI: 2.95-4.63). According to occupational class, inequalities increased from 1987 to 2001, although

not significantly (in 1987, OR=2.08, 95% CI: 1.78-2.44; in 2001, OR=2.64, 95% CI: 2.16-3.23; *p* for trend >0.05). This increase became statistically significant when changes in ORs between 1993 and 2001 were tested (*p* for trend <0.05). The resulting pattern is an increase in health inequalities according to educational level for both men and women, and an increase in inequalities according to occupational class for women only.

Results for interactions between individual social position and municipal area deprivation levels are included in Table IV. The likelihood of reporting less-than-good health among women with no studies in comparison to women with graduate studies in the highest-deprivation municipal areas increased from OR=3.61 (95% CI: 2.39-5.45) in 1987 to OR=4.85 (95% CI: 3.06-7.69) in 2001. For women in the lowest-deprivation municipal areas, this likelihood increased from OR=2.27 (95% CI: 1.48-3.49) in 1987 to OR=3.82 (95% CI: 2.32-6.30) in 2001. Among men in the highest-deprivation



Odds Ratios adjusted by age, labor status, smoking, physical exercise, alcohol consumption, and body weight

Odds Ratios estimated as the Relative Index of Inequality

<sup>a</sup> Likelihood of less-than-good health among those in occupational class IV vs. occupational class I

<sup>b</sup> Likelihood of less-than-good health among those with no studies vs. graduate studies

Figure 1. Odds ratios for less-than-good health, according to occupational class and educational level, by gender, for Spain 1987–2001.

municipal areas, inequalities between those with no studies and those with graduate studies increased from OR=2.07 (95% CI: 1.39–3.08) in 1987 to OR=4.16 (95% CI: 2.52–6.89) in 2001. However, no such increase was seen among males in the lowest-deprivation municipal areas. These results are graphically represented in Figure 2. This includes the models for trends among men and women in the highest- and lowest-deprivation municipal areas, according to the individual-level indicator of social position. Among women, the intensity of these increases, shown by the slope of the lines, is very similar between the highest- and lowest-deprivation areas, although inequalities were systematically larger among women in the highest-deprivation areas. In contrast, among men, the pattern was different. Inequalities between those at the bottom and those at the top of the educational or occupational hierarchy increased at a higher rate in the highest-deprivation municipal areas than in the lowest-deprivation areas. Inequalities among the

lowest-deprivation municipal areas increased (according to educational level) or decreased (according to occupational class) very slightly during the period.

## Discussion

The results of this study suggest that subjects residing in the highest-deprivation municipal areas are more likely to report worst self-rated health than those in the lowest-deprivation areas. They also suggest that inequalities in self-rated health according to educational level increased in Spain during the study period; however, inequalities according to occupational class did not seem to have increased among men, and increased only partially among women. However, when both individual-level social position and municipal area deprivation levels are taken into account, a different pattern emerges. This suggests that inequalities in self-rated health increased in Spain from 1987 to 2001 in the

Table IV. Odds ratios (ORs), estimated through multilevel models of random effects, of less-than-good health, according to individual occupational class or educational level, and municipal area deprivation level, Spain 1987-2001.

Deprivation	Men						Women									
	1987		1993		1995-97		2001		1987		1993		1995-97		2001	
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	
Occupational class <sup>a</sup>																
Lowest	1.86 (1.26-2.76)	1.43 (0.99-2.06)	1.64 (1.08-2.49)	1.42 (0.93-2.17)	1.66 (1.13-2.44)	1.39 (1.06-1.83)	1.28 (0.92-1.80)	2.13 (1.49-3.05)								
Highest	1.65 (1.18-2.31)	1.89 (1.32-2.71)	1.78 (1.19-2.64)	1.73 (1.14-2.62)	1.67 (1.20-2.31)	1.70 (1.21-2.38)	1.49 (1.00-2.23)	3.27 (2.24-4.78)								
Educational level <sup>b</sup>																
Lowest	2.95 (1.91-4.56)	1.96 (1.17-3.29)	3.05 (1.71-5.45)	1.97 (1.13-3.43)	2.27 (1.48-3.49)	3.55 (2.16-5.83)	2.75 (1.56-4.84)	3.82 (2.32-6.30)								
Highest	2.07 (1.39-3.08)	2.34 (1.54-3.55)	2.82 (1.72-4.61)	4.16 (2.52-6.89)	3.61 (2.39-5.45)	2.91 (1.84-4.60)	2.56 (1.50-4.34)	4.85 (3.06-7.69)								

CI, confidence interval. <sup>a</sup>ORs of less-than-good health for individuals in class IV as compared to individuals in class I. <sup>b</sup>ORs of less-than-good health for individuals with no studies as compared to individuals with graduate studies.

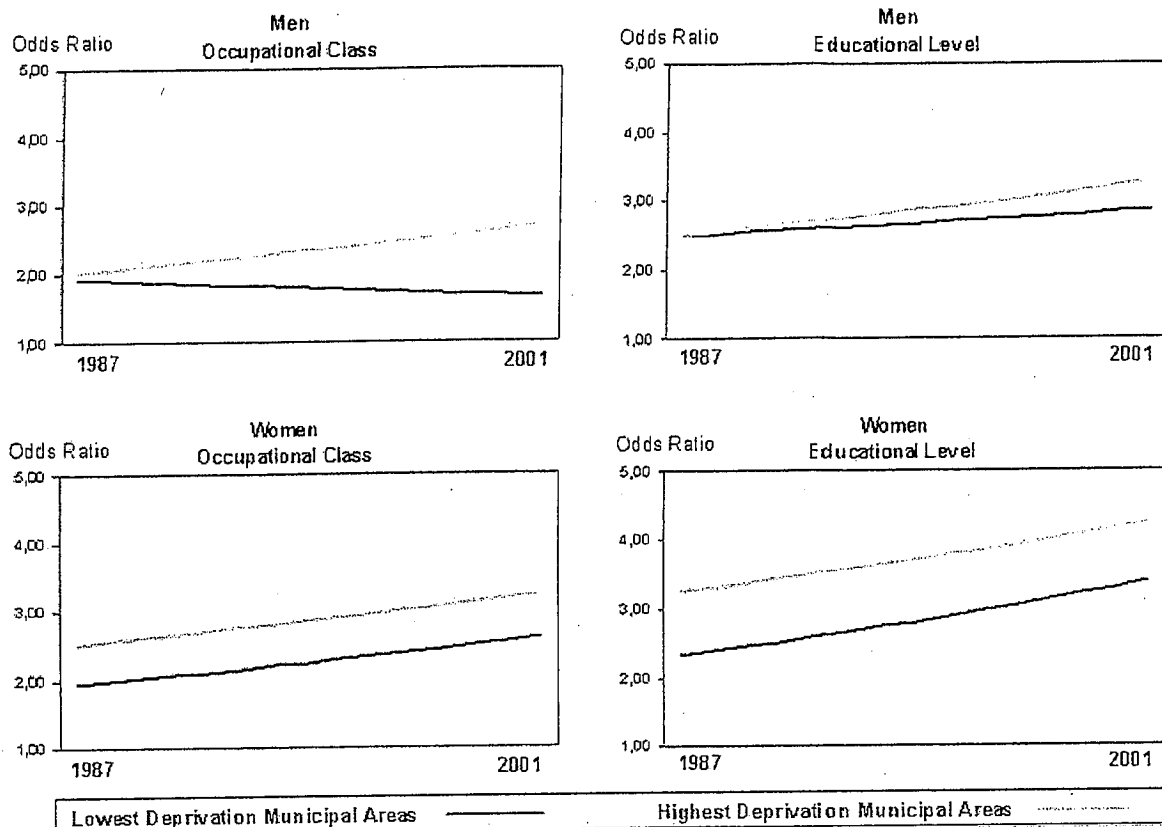
highest-deprivation municipal areas, among men and women, irrespective of the individual indicator of social position used. In contrast, inequalities in the lowest-deprivation municipal areas increased among women, but not among men. Also, inequalities were consistently higher in the highest-deprivation municipal areas.

#### The impact of area deprivation levels

This association between self-rated health and indicators of the socioeconomic features characterizing areas has been reported in studies in other countries [2-4,24]. As in those studies, the magnitude of the effect of area deprivation levels is smaller than the effect of individual social position. However, this study also suggests that trends, the form in which inequalities evolve along time, might be in a different direction in the lowest- and highest-deprivation areas. In this study, this happens to inequalities among males.

At least three possible explanations for these results can be suggested. First, as a recent paper proposed, the main mechanism mediating this relationship could be that less affluent individuals depend on collective resources in the community to maintain health status [4]. As those municipal areas with a higher degree of deprivation have fewer collective resources, the social inequalities stemming from the social position of individuals would have a greater impact on an individual's health. Second, since collective resources may range from employment to housing, transportation or public and private services, the distribution of collective resources between areas is directly dependent on the economic activities within areas, and on the policies addressing socioeconomic inequalities between them [25]. In Spain, inequalities between the different areas of the country have been traditionally large [26]. On the other hand, expenditures on public resources, the major expression of policies, are distributed overwhelmingly according to area population size. Thus, inequalities in collective resources are hardly addressed. The potential effect of applying more egalitarian policies to the territorial distribution of collective resources on health has been recently shown for Spain. Premature mortality during the 1990s decreased more in those Spanish regions that undertook healthcare reform more intensively, a consequence of differential power relationships between regions (the impact of different types of regional government) [27]. Finally, there is evidence that insecure employment conditions have a permanent effect on individuals' self-reported health [28]. Since, in more deprived areas,





Lines represent odds ratios for less-than-good health of lowest to highest occupational class or educational level

Figure 2. Models for trends in inequalities in self-rated health, according to occupational class or educational level, and municipal area deprivation level, Spain 1987–2001.

more individuals are affected by insecure employment, and insecure employment has more effect on individuals in a less advantaged social position, inequalities may be partially due to a compositional cumulative effect over time.

*A different pattern of inequality increase among women and men*

The association between self-rated health and educational level or occupational class at the individual level was already reported for Spain and some Spanish regions in studies published in the 1990s [7,29]. In our study, however, there is a contrast in trends between men and women: among women, inequalities increased in the highest- and lowest-deprivation municipal areas, whereas among men, the increase only occurred in the highest-deprivation areas. Also, at the individual level, the results of our study suggest an increase in inequalities according to occupational class for women, but

not for men. Also, they suggest an increase in inequalities according to educational level for both men and women from 1987 to 2001. The difference in results between occupational class and educational level in males, and the different pattern as compared to women, may be due to different factors. First, distinct meanings and populations are covered by these indicators. The level of education attained is an indicator of the socioeconomic circumstances in adult life, is influenced by childhood circumstances, is a determinant of future occupational and income opportunities, and includes all population groups. Occupational class reflects life experience more accurately, but is particularly linked to the labour market and to the work and socioeconomic conditions affecting different occupations, and is thus more suited to those linked to the job market [30]. Second, in this study the greatest inequalities in self-rated health according to occupational class among men occurred in the period between 1993 and 1995–97, when

unemployment rates soared to their highest peak in the last 20 years. Since then, unemployment has decreased slowly; in this study, inequalities in self-rated health according to occupational class among men also seemed to decrease by the end of the period. Furthermore, by the end of the period, there was close to full employment in the lowest-deprivation municipal areas, and unemployment was almost twice as high in the highest-deprivation areas as in the lowest-deprivation areas.

However, for women, lower unemployment rates did not seem to be accompanied by a decrease in the magnitude of inequalities. This might be because far fewer women were in the job market, and because job opportunities were lower for women, as expressed by unemployment rates: 7.5% for men and 15.2% for women in 2001. In fact, unemployment among women increased from 1987 to 2001 in both the lowest- and highest-deprivation municipal areas. It might also be because they hold positions on the lowest rungs of the labour ladder [31]. However, it is also important that, in a recent study in Spain, factors mediating the impact of social class on self-rated health were found to be different for men and women [32]. For men, self-rated health was associated primarily with working conditions and job insecurity. For women, it was determined by household material conditions and the amount of household labour, in addition to working conditions. In the current work, the presence of homemakers is very high, even though it diminishes throughout the period under study. Spanish women have been increasingly participating in the job market, but still, women devote much more time than men to supporting family demands [33]. This double exposure to job conditions and domestic responsibilities may act in a synergic way on women's health [34]. This situation is aggravated in Spain by the absence of social policies addressed at the needs of family and dependants [35].

Moreover, by the end of the period under study, one-third of workers were in insecure employment. Almost half of these became unemployed once their contract was finished [36]; this had more effect on women and lower social classes. In fact, unemployment is systematically cited as the country's main problem [37]. In addition, about 20% of the active population were self-employed [31]. Thus, about half of the Spanish active population could be at risk of chronic job insecurity, which has been shown to affect self-reported health.

Finally, although Spain grew economically at rates consistently higher than the EU average during the 1990s, indicators such as income, unemployment or poverty were worse in Spain. In addition,

inequalities in wealth distribution among individuals and areas were larger in Spain; also, the amount of public expenditure consistently decreased during the 1990s [35,38].

#### *Limitations*

At the individual level, this study was based on cross-sectional data. Some degree of "health selection bias" may be present, but in longitudinal studies, the impact of this bias has been proven to be very limited [39]. Moreover, this bias is very unlikely to occur for educational level, since this is achieved at early ages.

Another potential source of bias arises from the procedures used to assign individuals to educational level or occupational class groups in the different surveys. Some degree of misclassification bias may be present if the criteria used to assign individuals to different occupational or educational groups varied from 1987 to 2001.

Compositional bias is the principal source of bias in multilevel studies. One possible source is the unit of analysis, the municipal area in this study. First, municipal areas have larger internal variability than smaller units such as neighbourhoods or census tracts. This large variability, together with the large variability in deprivation between municipal areas, will tend to bias estimates downwards [39]. On the other hand, the fact that an effect has consistently been found for deprivation suggests that the effect of living in more deprived municipal areas on self-rated health may be larger than estimated, given the large heterogeneity within municipalities.

Compositional bias is also said to occur when areas do not have a detrimental effect on health, but, rather, unhealthy people concentrate within those areas. The effects of this type of bias in this study cannot be ruled out, although it should be rather limited, given that municipal areas are more stable than smaller geographical units as regards population mobility.

In this study, the deprivation index used was estimated on the basis of three characteristics of the areas. There is some degree of variation between surveys in the estimated impact that the level of deprivation may have on self-rated health. Aside from the lack of precision, these variations may be due to the fact that the level of deprivation has been assigned on the basis of information from a single year (1991 census). If, throughout the period, there have been major changes in the characteristics of the municipalities that determine their level of deprivation, this may well affect the precision of the estimates. This effect should be overcome, however, by grouping municipal areas into three levels of

deprivation. On the other hand, although Spain has experienced important economic growth as a whole, the differences between the poorest and richest municipalities have hardly changed in recent decades [40]. The accuracy of the results may also be affected by insufficient control of areas' internal heterogeneity [41].

## Conclusions

Inequalities in self-rated health have increased in Spain in this period, and this trend may be explained by the social conditions in Spain and social policies, over a recent and relatively lengthy period of time, the different impacts that social conditions have on men and women, and the social indicators used.

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