Influence of Social Factors on Avoidable Mortality: A Hospital-Based Case-Control Study

Daniel Bautista, MD, PhD[a,b]
José Luis Alfonso, MD, PhD[b]
Dolores Corella, MD, PhD[b]
Carmen Saiz, MD, PhD[b]

SYNOPSIS

Objective. The effect of socioeconomic factors on avoidable mortality at an individual level is not well known, since most studies showing this association are based on aggregate data. The purpose of this study was to determine socioeconomic differences between those patients who die of avoidable causes and those who do not die.

Methods. A matched case-control study was carried out regarding in-hospital avoidable mortality (Holland's medical care indicators) that occurred in a university hospital serving a Spanish-Mediterranean population during a 30-month period.

Results. We studied 82 cases of death from avoidable causes and 300 controls matched on medical care indicators and age. The variables that showed a statistically significant association with in-hospital avoidable mortality were number of diagnoses (the greater the number, the higher the risk), length of stay (patients staying seven or more days presented a lower risk), and education. Those patients with low and middle educational levels showed a greater risk of avoidable mortality (adjusted odds ratio=3.57 and 2.82, respectively) than those patients with higher levels of education.

Conclusions. Consistent with the findings of studies based on aggregate data, our case-control analyses indicated that among several socioeconomic variables studied, educational level was significantly associated with the risk of in-hospital avoidable mortality, regardless of age and medical care indicators. Patients with low levels of education (<6 years of schooling) were at highest risk for in-hospital avoidable mortality, followed by those with middle levels of education (7–10 years of schooling).

[a]Department of Preventive Medicine, Dr. Peset University Hospital, Valencia, Spain

[b]Department of Preventive Medicine and Public Health, University of Valencia, Valencia, Spain

Address correspondence to: Daniel Bautista, Banda de Música Círculo Católico, 42 Torrent 46900, Valencia, Spain; tel. +34 96 386 25 49; fax +34 96 386 25 01; e-mail <bautista_dan@gva.es>.

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Avoidable mortality has been proposed as an indicator of the quality of health systems. In 1976, Rutstein et al.[1] developed a method to measure the effectiveness of health services by counting the cases of illnesses, disabilities, and unnecessary and premature deaths. Later, Holland elaborated an atlas series[2,3] that examines a selection of indicators based on mortality due to 17 groups of diseases, which can be separated into national health policy indicators (avoidable through primary prevention) and medical care indicators, which are amenable predominantly to secondary prevention or medical treatment.

In Spain over the last three decades, avoidable mortality has decreased more than mortality rates from non-avoidable causes,[4] especially in the medical care indicators group.[5] Likewise, in Valencia, a city on the East Mediterranean coast, avoidable mortality experienced a more pronounced decline than non-avoidable mortality. This was due to the decrease of mortality attributed to medical care indicators,[6] particularly for hypertensive and cerebrovascular diseases and tuberculosis.[7]

On the other hand, the presence of a mortality gradient among the social classes has been demonstrated, showing lower socioeconomic groups as experiencing higher rates of mortality from all causes,[8] but particularly avoidable causes.[9,10] In addition, socioeconomic disparities have increased in spite of a reduction in mortality rates in all social strata.[11–13]

Although these ecological studies have consistently shown that socioeconomic status is a decisive factor in avoidable and non-avoidable mortality, the effect of this factor on avoidable mortality at an individual level is not well known. Thus, the purpose of this study was to determine socioeconomic differences between those patients who died of avoidable causes (Holland's medical care indicators[2]) in a university hospital serving a Spanish-Mediterranean population and those who did not die.

METHODS

We conducted a matched (by medical care indicators and age) case-control study of avoidable mortality due to medical care indicators that took place in the Hospital Clínico Universitario of Valencia, Spain, from 1998 to 2000. This hospital is a 579-bed tertiary care, public, academic medical center, which provides acute care for a local catchment population of approximately 283,000 inhabitants (205,000 from Valencia city), and it also serves as a reference hospital for three distant areas that generally include towns with less than 25,000 inhabitants. The minimum set of basic data, an administrative database that records International Classification of Diseases (ICD-9-CM) diagnoses, was used to obtain the cases and controls.

All patients who died in the Hospital Clínico Universitario of Valencia during a period of 30 consecutive months, and had any of the diagnoses included in the list of medical care indicators (Table 1) were considered as cases. We attempted to enroll all eligible cases of avoidable mortality. For the patients who had not died at the time of discharge during the same period, after matching on category and type of medical care indicators and on age (five-year groups), we attempted to enroll four controls for each case, or three when four was not possible. When more than four controls were available for one case, four controls were randomly selected. For both cases and controls, we considered only the patient's last hospital admission to avoid selection biases.

To obtain socioeconomic information on the patients, a trained person conducted telephone interviews with close relatives. For cases and controls under 18 years of age, their mothers answered the survey and provided socioeconomic information about themselves. For children, the "occupational" category was assigned to their mothers. Prior to the interviews, an informative letter was sent to the patient's address, requesting cooperation. The same questionnaire was administered to cases and all enrolled controls. Interviewers were not blinded to the status of study subjects, but were blinded to the study's hypotheses and a highly structured questionnaire was used. Each telephone number was dialed on five separate occasions at different hours of the day and evening, including at least once on weekends, until a respondent answered

Study variables were collected from the minimum set of basic data as well as from the socioeconomic questionnaire. Several variables were derived from the minimum set of basic data:

- age;
- sex;
- type of admission (urgent or programmed);
- length of stay;
- health-care provider (Social Security or others);
- population, classified as rural (<5,000 inhabitants), half-urban (5,000–25,000 inhabitants) or urban (>25,000 inhabitants);
- catchment area (local or distant) where the patients came from;
- category of medical care indicators (Table 1);
- type of medical care indicator (whether the medical care indicator was the main diagnosis or a secondary diagnosis);
- the Charlson comorbidity index,[14] adapted by Deyo et al.[15] for use with ICD-9-CM administrative databases, which provides a simple method of estimating risk of death by assigning weights to each comorbid disease that a patient has;
- number of diagnoses;
- number of surgical or obstetrical procedures;
- circumstances at discharge (deceased or not), which is the outcome variable.

When a patient presented two or more medical care indicators as secondary diagnoses, the closest medical care indicator to the main diagnosis was selected.

Through the phone survey, we collected information on the following variables:

- marital status (single, married, widowed, or divorced or separated);
- birthplace (in or outside the Valencian community);
- socioeconomic status in terms of occupation (the last one prior to admission), according to a Spanish version of the British Classification (British Registrar

Table 1. Avoidable mortality due to selected causes (medical care indicators according to Holland's classification), frequency of cases (and percent) in the Hospital Clínico Universitario of Valencia, Spain

Disease	*Age (years)*	*ICD-9 codes*	*Cases (percent) (n=124)*
Tuberculosis	5–64	010–018, 137	19 (15.3)
Malignant neoplasm of cervix uteri	15–64	180	0
Malignant neoplasm of cervix uteri and body of uterus	15–54	179, 180, 182	0
Hodgkin's disease	5–64	201	0
Chronic rheumatic heart disease	5–44	393–398	0
All respiratory diseases	1–14	460-519	6 (4.8)
Asthma	5–44	493	0
Appendicitis	5–64	540–543	1 (0.8)
Abdominal hernia	5–64	550–553	5 (4.0)
Cholelithiasis and cholecystitis	5–64	574–575.19, 576.1	6 (4.8)
Hypertensive and cerebrovascular diseases	35–64	401–405 430–438	74 (59.7)
Typhoid	5–64	002.0	0
Whooping cough	0–14	033	0
Tetanus	0–64	037	1 (0.8)
Measles	1–14	055	0
Osteomyelitis and periostitis	1–64	730	0
Maternal deaths	All years	630–676	1 (0.8)
Perinatal mortality	< 1 week	All	11 (8.9)

General) carried out by Domingo and Marcos[16,17] and divided into six groups (I=directive, professional; II=intermediate occupations; III=skilled occupations, non-manual; IVa=skilled occupations, manual; IVb=partly skilled occupations; V=unskilled occupations; and VI=inadequately described or not stated occupations including housewives);

- employment status at admission (unemployed, self-employed, employees, or labor disability or retirement);
- education level, categorized by years of schooling as low (≤6), middle (7–10), or high (≥11);
- family income (<900 euros, 900–1200 euros, 1201–1500 euros, or >1500 euros), indicating monthly income including the contributions of all family members during the last fiscal year;
- home/property ownership (whether by the person interviewed or another family member);
- vehicle ownership;
- knowledge of the regional language, as indirect indicator of social integration.

Proportions and mean values of the corresponding variables were calculated and compared for interviewed and non-interviewed cases using the Pearson chi-square test or Fisher exact test for proportions and the *t*-test for quantitative variables, taking into account significant p values of <0.05. To compare cases with controls by bivariate matched analysis, we calculated the Mantel-Haenszel odds ratios (MHOR) with 95% confidence intervals (CI) and the Mantel-Haenszel summary chi-square test.[18]

To assess the association of the socioeconomic variables with the risk of avoidable mortality, we performed conditional logistic regression analyses for matched studies, adjusting for the effect of several potential confounders. The maximum-likelihood estimates of regression coefficients were obtained using the Newton-Raphson method.[19] The adjusted odds ratios (OR) with confidence intervals were estimated for an a error of 0.05, and the Wald test was used to evaluate how far each OR differed from 1.

RESULTS

Of the 47,859 discharges during the study period, 124 patients (0.26%) died of some type of avoidable mortality cause (Table 1). The most frequent causes of in-hospital avoidable mortality were hypertensive and cerebrovascular diseases (59.7%) and tuberculosis (15.3%). In 74 cases (59.7%), the medical care indicator corresponded to the main diagnosis and in 50 cases (40.3%), the medical care indicator corresponded to another diagnosis.

Of the 124 eligible cases, 42 (33.9%) were excluded from the analysis, including seven whose relatives declined, 11 who had no known telephone or address, and 24 who did not answer after five calls. The remaining 82 cases (66.1%) were included and interviewed. As shown in Table 2, the baseline characteristics of the enrolled cases were similar to those of the non-interviewed cases, with no significant differences in the analyzed variables.

Of the 422 matched controls who were selected from the 8,972 discharges with criteria of medical care indicators, 16 declined participation, 31 had no known telephone or address, 34 did not respond after five calls, and 41 listed non-working telephone numbers. A total of 300 controls (71%) appropriately answered the survey. Twelve interviewees (six related to cases and six to controls) provided no information about income.

Table 2. Characteristics of interviewed and non-interviewed cases, frequency (and percent), Hospital Clínico Universitario, Valencia, Spain

Variable	*Interviewed (n=82)*	*Non-interviewed (n=42)*	*Statistic*	*p-value*
Charlson index				
0	71 (86.6)	36 (85.7)	$\chi^2 = 0.02$	0.89
≥1	11 (13.4)	6 (14.3)		
Number of diagnoses				
1–2	22 (26.8)	18 (42.8)	$\chi^2 = 4.83$	0.09
3–4	32 (39.0)	9 (21.4)		
≥5	28 (34.2)	15 (35.7)		
Number of procedures				
0	46 (56.1)	26 (61.9)	$\chi^2 = 0.84$	0.65
1	8 (9.8)	5 (11.9)		
≥2	28 (34.1)	11 (26.2)		
Sex				
Male	52 (63.4)	31 (73.8)	$\chi^2 = 1.35$	0.24
Female	30 (36.6)	11 (26.2)		
Kind of admission				
Urgent	69 (84.1)	36 (85.7)	$\chi^2 = 0.05$	0.81
Programmed	13 (15.9)	6 (14.3)		
Health-care provider				
Social Security	82 (100)	41 (97.6)	Fisher exact	0.33
Others	0 (0)	1 (2.4)		
Age (years)				
mean ± SD	46.28 ± 18.99	43.32 ± 21.74	T = 0.78	0.43
Length of stay (days)				
mean ± SD	10.98 ± 12.48	14.95 ± 25.37	T = −0.96	0.34

SD = standard deviation

Of the variables derived from the minimum set of basic data (Table 3), only two showed a significant association with the risk of avoidable mortality: the number of diagnoses (the higher the number of diagnoses, the greater the risk) and length of stay (those patients who stayed seven days or more presented a lower risk [MHOR = 0.51; 95% CI 0.31, 0.84]).

Among the socioeconomic variables (Table 4), education level was the only one associated with avoidable mortality in a statistically significant way. The patients who presented greater risk of mortality were those with low education levels (MHOR=4.25; 95% CI 1.39, 13.02), and next, those with middle education levels (MHOR=2.74; 95% CI 1.18, 6.40). Both groups were compared with those with higher education levels. Cases were more likely to belong to a lower socioeconomic group than controls; however, these estimates were not statistically significant. Likewise, cases were more likely to have an employment situation consisting of disability or retirement than controls (MHOR=1.74), although this estimate did not reach statistical significance. Relevant differences were not observed between cases and controls regarding marital status, birthplace, regional language, home or vehicle ownership, and family income.

According to our multivariate conditional logistic regression analysis, after controlling simultaneously for number of diagnoses and sex (Table 5), the only socioeconomic variable significantly associated with avoidable mortality was level of education. Those patients with low and middle levels of education showed a greater risk for avoidable mortality (OR=3.57 and 2.82, respectively) than those patients with higher levels of education. Moreover, the test for trend was statistically significant with regards to education levels (OR=1.70; 95% CI 1.11, 2.60), indicating, therefore, that the lower the level of education, the greater the risk of avoidable mortality. Slight non-significant differences were observed between cases and controls with regards to the remaining socioeconomic variables.

DISCUSSION

This study is the first carried out in a Mediterranean population to investigate the possible association between social factors and in-hospital avoidable mortality at an individual level. According to our results, those patients whose length of stay in the hospital was seven days or more presented a lower risk, probably because death truncates the hospital stay, and patients who die would inherently have a shorter hospital stay than patients who stay in the hospital until recovery. Among the socioeconomic variables, educational level was significantly associated with the risk of in-hospital avoidable mortality, regardless of age and medical care indicators (matching variables), and even after adjustment for number of diagnoses and sex through logistic regression.

These results are consistent with those of several ecologic

Table 3. Matched analysis of avoidable mortality for the variables derived from the MSBD, Hospital Clínico Universitario, Valencia, Spain

Variable	*Cases (percent)*	*Controls (percent)*	*MHOR (95% CI)*	*MHχ^2*	*p-value*
Sex					
Male	52 (63.4)	172 (57.3)	1.00		
Female	30 (36.6)	128 (42.7)	0.77 (0.47, 1.25)	0.98	0.32
Kind of admission					
Urgent	69 (84.1)	234 (78.0)	1.00		
Programmed	13 (15.9)	66 (22.0)	0.63 (0.31, 1.26)	1.37	0.24
Length of stay					
<7 days	42 (51.2)	102 (34.0)	1.00		
≥7 days	40 (48.8)	198 (66.0)	0.51 (0.31, 0.84)	7.52	0.006
Number of diagnoses					
1–2	22 (26.8)	141 (47.0)	1.00		
3–4	32 (39.0)	96 (32.0)	2.78 (1.38, 5.62)	7.21	0.007
≥5	28 (34.2)	63 (21.0)	3.72 (1.72, 8.05)	10.32	0.001
Number of procedures					
0	46 (56.1)	147 (49.0)	1.00		
≥1	36 (43.9)	153 (51.0)	0.69 (0.41, 1.16)	1.62	0.203
Charlson index					
0	71 (86.6)	259 (86.3)	1.00		
≥1	11 (13.4)	41 (13.7)	1.01 (0.48, 2.13)	0.03	0.86
Population					
<5,000 inhabitants	11 (13.4)	31 (10.4)	1.00		
5,000–25,000	20 (24.4)	63 (21.1)	0.88 (0.34, 2.28)	0.07	0.79
>25,000 inhabitants	51 (62.2)	204 (68.5)	0.70 (0.32, 1.50)	0.53	0.46
Catchment area					
Distant	19 (23.2)	56 (18.7)	1.00		
Local	63 (76.8)	244 (81.3)	0.78 (0.43, 1.40)	0.75	0.38

MSBD = minimum set of basic data

MHOR = Mantel-Haenszel odds ratio

CI = confidence interval

MHχ^2 = Mantel-Haenszel summary chi-square test

studies carried out in Spain[20] and in other developed countries,[13,21,22] which have shown higher mortality rates in those individuals with lower education levels. Furthermore, some studies have found associations between certain socioeconomic factors and avoidable mortality.[10,23,24] In accordance with the results of other studies,[25,26] the Charlson index showed no association with avoidable mortality, confirming its limited predictive value for in-hospital mortality. In contrast, a general index of patient characteristics, such as the number of diagnoses, presented better predictive value, in keeping with the findings of other authors.[27]

On the other hand, some published studies about general mortality have shown results inconsistent with ours. In an intensive care unit,[28] patients aged over 55 who were born outside the Valencian community or who did not know the regional language presented a disadvantage in their relative risk of death. In the present study, there were no significant differences regarding these variables. Another investigation carried out in middle-aged Swedish men[29] concluded that being married seems to have a protective effect with regard to mortality, as opposed to our results, which showed no association between avoidable mortality and marital status.

In our study, a potential source of selection bias derives from the possibility that the local community of the Hospital Clínico Universitario is of low socioeconomic status whereas those from more distant communities generally have higher income levels. Probably, a number of those patients who need more specialized care are referred to the Hospital Clínico Universitario but they may be less ill, because those in more severe condition were locally hospitalized or died before hospitalization. However, since the resident population and the catchment area were not associated with the risk of avoidable mortality, it is not likely that this possible bias could explain our results.

Those deaths with a medical care indicator as main or secondary diagnosis were included in the computation of avoidable mortality, in order to avoid potential biases derived from the selection of the main diagnosis, and assuming that any of the diagnoses a patient presents when dying can contribute somehow to the fatal outcome. Problems related to the accuracy and completeness of the minimum set of basic data diagnostic coding could have produced misclassification biases, especially for the Charlson index, as other authors have pointed out.[27,30] Moreover, the list of medical care indicators does not include all the pathological

Table 4. Matched analysis of avoidable mortality for socioeconomic variables, Hospital Clínico Universitario, Valencia, Spain

Variable	*Cases (percent)*	*Controls (percent)*	*MHOR (95% CI)*	*MHχ^2*	*p-value*
Marital status					
Single	10 (12.3)	40 (13.4)	1.00		
Married	61 (75.3)	225 (75.5)	1.08 (0.47, 2.49)	0.04	0.84
Widower	5 (6.2)	14 (4.7)	0.95 (0.17, 5.22)	0.18	0.67
Divorced or separated	5 (6.2)	19 (6.4)	1.24 (0.26, 5.93)	0.02	0.89
Birthplace					
Valencian community	52 (63.4)	205 (68.3)	1.00		
Outside Valencia	30 (36.6)	95 (31.7)	1.26 (0.76, 2.10)	0.57	0.45
Regional language					
Speaking	30 (36.6)	121 (40.3)	1.00		
Non-speaking	52 (63.4)	179 (59.7)	1.17 (0.70, 1.95)	0.21	0.64
Employment status					
Unemployed	31 (37.8)	115 (38.3)	1.00		
Self-employed	11 (13.4)	36 (12.0)	1.17 (0.5, 2.76)	0.02	0.88
Employees	21 (25.6)	98 (32.7)	0.68 (0.36, 1.28)	1.08	0.29
Disability or retirement	19 (23.2)	51 (17.0)	1.74 (0.85, 3.57)	2.01	0.156
Home/property ownership					
No	20 (24.4)	76 (25.3)	1.00		
Yes	62 (75.6)	224 (74.7)	1.05 (0.58, 1.88)	0.02	0.88
Vehicle ownership					
No	24 (29.3)	97 (32.3)	1.00		
Yes	58 (70.7)	203 (67.7)	1.16 (0.68, 1.97)	0.17	0.68
Family income (euros)					
<900	23 (30.3)	100 (34.0)	1.00		
900–1200	26 (34.2)	90 (30.6)	1.20 (0.63, 2.27)	0.16	0.69
1201–1500	19 (25.0)	58 (19.7)	1.23 (0.62, 2.46)	0.19	0.66
>1500	8 (10.5)	46 (15.6)	0.67 (0.26, 1.72)	0.39	0.53
Education level					
High	7 (8.5)	65 (21.7)	1.00		
Middle	51 (62.2)	166 (55.3)	2.74 (1.18, 6.40)	5.08	0.024
Low	24 (29.3)	69 (23.0)	4.25 (1.39, 13.02)	6.91	0.008
Social status/occupation					
I–II[a]	4 (4.9)	26 (8.7)	1.00		
III[b]	16 (19.5)	53 (17.7)	1.32 (0.38, 4.53)	0.02	0.89
IV–V[c]	36 (43.9)	139 (46.3)	2.11 (0.67, 6.62)	1.03	0.30
VI[d]	26 (31.7)	82 (27.3)	1.79 (0.54, 5.96)	0.44	0.50

CI = confidence interval

MHOR = Mantel-Haenszel odds ratio

MHχ^2 = Mantel-Haenszel summary chi-square test

[a]I = directive, professional; II = intermediate occupations

[b]III = skilled occupations, non-manual

[c]IV = skilled occupations, manual, or partly skilled occupations; V = unskilled occupations

[d]VI = occupation not stated

processes for which death is avoidable through some medical intervention. Hence, new causes of avoidable mortality may be suggested, such as intestinal infections, breast cancer, skin cancer, etc., which were proposed in a supplement of the second edition of the Holland's atlas of avoidable mortality.[2]

As for educational levels, this may vary according to the age cohort to which the individual belongs. This potential limitation was controlled in the study design by including age as a matching variable. Another limitation could be variability in educational systems, but this was addressed by considering years of schooling. Income levels may present important limitations such as the high percentage of nonresponse, the possibility of underreporting, and other reasons related to the difficulty of defining this variable appropriately.[31] In this study, we used a categorical variable (ranges of incomes) because the answer rate usually increases, although the analysis flexibility diminishes.

Table 5. Association between avoidable mortality and socioeconomic variables through conditional logistic regression analyses, adjusting for sex and number of diagnoses, Hospital Clínico Universitario, Valencia, Spain

Variable	*Coefficient*	*Standard error*	*Odds ratio*	*95% CI*	*p-value*
Marital status					0.81
Single			1.00		
Married	−0.012	0.45	0.98	0.40, 2.39	0.96
Widower	0.545	0.70	1.72	0.42, 6.91	0.44
Divorced or separated	−0.057	0.66	0.94	0.25, 3.46	0.92
Birthplace					
Valencian community			1.00		
Outside Valencia	0.198	0.27	1.22	0.72, 2.06	0.46
Regional language					
Speaking			1.00		
Non-speaking	0.186	0.27	1.20	0.70, 2.04	0.49
Employment status					0.35
Unemployed			1.00		
Self-employed	0.071	0.45	1.07	0.44, 2.59	0.87
Employees	−0.322	0.35	0.72	0.36, 1.45	0.36
Disability or retirement	0.388	0.41	1.47	0.65, 3.32	0.34
Home/property ownership					
No			1.00		
Yes	0.083	0.29	1.08	0.60, 1.95	0.78
Vehicle ownership					
No			1.00		
Yes	0.005	0.28	1.006	0.57, 1.76	0.98
Family income (euros)					0.45
<900			1.00		
900–1200	0.215	0.33	1.24	0.64, 2.38	0.51
1201–1500	0.343	0.37	1.41	0.68, 2.91	0.35
>1500	–0.394	0.47	0.67	0.26, 1.71	0.40
Education level					0.030
High			1.00		
Middle	1.039	0.44	2.82	1.18, 6.73	0.019
Low	1.274	0.48	3.57	1.37, 9.31	0.009
Social class/occupation					0.35
I–II[a]			1.00		
III[b]	0.689	0.61	1.99	0.59, 6.69	0.26
IV–V[c]	0.611	0.58	1.84	0.58, 5.81	0.29
VI[d]	1.103	0.65	3.01	0.83, 10.8	0.09

[a]I = directive, professional; II = intermediate occupations

[b]III = skilled occupations, non-manual

[c]IV = skilled occupations, manual, or partly skilled occupations; V = unskilled occupations

[d]VI = occupation not stated

The final sample size of cases was not very high, partly due to a certain number of cases who may have died at home. This could explain that the weak associations between avoidable mortality and some socioeconomic variables were not statistically significant, especially regarding social class and employment status. Nevertheless, the study sample was large enough to show a significant OR of 2.1 and above with a statistical power higher than 80% and a confidence level of 95%, concerning the least favored variables.

The results of this investigation suggest that, in Spain, a low level of education is associated with in-hospital avoidable mortality, in the same way as with general mortality,[20] morbidity, and self-perceived health status, according to the data from population health surveys.[32–34] It has been suggested that those individuals with high educational levels are able to better understand health-promotion information.[35] In addition, people with lower educational levels tend to use preventive services less frequently, probably as a result of cultural barriers that limit access to health information in the lower socioeconomic strata.[36,37]

In Spain, important socioeconomic differences have been demonstrated regarding accessibility to health services, especially delays in hospital admissions.[34] Some authors have indicated that although all individuals theoretically have the

same accessibility to the health care system, those with higher education levels benefit more from health services due to a better knowledge of the operating health system and the bureaucratic problems related to accessibility, or because of their ability to communicate with medical personnel.[38,39]

Since hypertensive and cerebrovascular diseases were the main causes of avoidable mortality, the difference in mortality rates among educational classes may be due to lifestyle factors, case detection, or antihypertensive medication. These factors are amenable to preventive activities provided by primary care and public health programs, which should be focused primarily on lower socioeconomic groups.

As Rutstein et al.[1] point out, if well documented evidence shows that identifiable social, environmental, lifestyle, or economic factors are responsible for illnesses, disabilities, or unnecessary deaths, these risk factors should be eliminated whenever possible. To avoid an excess of avoidable mortality, it is important to promote, formulate, and implement necessary health policies and improve the educational status of the Spanish population.

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