Association of Socioeconomic Status With Ischemic Stroke Survival

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Background and Purpose—The aim of the study was to determine the impact of individuals’ socioeconomic status and their Primary Care Service Area Socioeconomic Index on survival after ischemic stroke.

Methods—We conducted a nationwide population-based cohort study in Catalonia, Spain. We included all patients with first ischemic stroke admitted to a public hospital between January 1, 2015, and December 31, 2016. We measured both individual socioeconomic status (categorized as exempts, ≤€18 000 [$US 20 468] income per year, and >€18 000 income per year) and Primary Care Service Area Socioeconomic Index (from 0 to 100 categorized in quartiles). We used mixed-effects logistic and survival models to estimate odds ratios and hazard ratios for the short- (30 days) and the long-term (3 years) all-cause case fatality rates by individuals’ socioeconomic status groups.

Results—The cohort consisted of 16 344 ischemic stroke patients with 24 638 person-years of follow-up. We did not find an association between the lowest socioeconomic individual status and short-term survival (odds ratio, 1.03; 95% CI, 0.76–1.40), although we found it in patients with ≤€18 000 income/year (odds ratio, 1.26; 95% CI, 1.10–1.45). At long-term, after adjustment, we observed a gradient in mortality risk with decreasing individual socioeconomic status (hazard ratio, 1.52; 95% CI, 1.30–1.77). The Primary Care Service Area Socioeconomic Index had only an influence on short-term survival (odds ratio, 1.19; 95% CI, 1.03–1.37).

Conclusions—Individuals’ socioeconomic status was associated with short- and long-term survival in patients with ischemic stroke. Conversely, Primary Care Service Area Socioeconomic Index measures had an influence only in short-term survival. A small fraction of this association is due to differences in comorbidity and cardiovascular risk factors. Interventions addressing both individuals’ and primary care service socioeconomic aspects might eventually affect differently short- and long-term survival.

Key Words: cohort studies ■ outcome assessment ■ poverty ■ stroke ■ survival analysis

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stroke is the second leading cause of death worldwide. Although in the last 2 decades, mortality rates have decreased in both high-income and low/middle-income countries, absolute number of related deaths are increasing, mainly because of the expanding and aging population.1

The latest evidence shows that there are socioeconomic disparities in survival after stroke2–4 both in high-income and low/middle-income countries. However, there are still several areas of uncertainty on that association that should be addressed. Mortality studies have focused mainly on short-term outcomes, and the relation between socioeconomic status and long-term survival is scarce and still inconclusive.2

The majority of studies used either individual factors (such as income, occupation, or social class) or neighborhood deprivation index as measures of patients’ socioeconomic status. Conversely, few studies have tested the multilevel aspects of socioeconomic status in a single model to assess the influence of each aspect in survival, showing heterogeneous results.5

This aspect is crucial, as potential interventions to improve survival in stroke might depend on the mechanisms (or mediators) of the association between socioeconomic status (at different levels) and health.6 On the contrary, possible explanations for the association between socioeconomic status and worse prognosis point to conventional cardiovascular risk factors,7 although they would not fully explain the underlying mechanisms.

To overcome the limitations of the previous studies, we performed a nationwide population-based cohort study of patients with ischemic stroke admitted to public hospitals in Catalonia in 2015 to 2016 to compare both short- and long-term survival across different individual socioeconomic categories and tested the influence of comorbidities, cardiovascular risk factors, and the Primary Care Service Area Socioeconomic Index (PCSA index; deprivation index).

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Methods

Data Availability Statement
The data that support the findings of this study are available from the corresponding author on reasonable request.

Data Sources
The Catalan Central Registry of Insured Persons collects sociodemographic information of all residents of Catalonia (7.5 million people) and identifies them with a unique healthcare ID code. This healthcare ID code allows for keeping track of Catalan residents across several health administration databases including the Catalan Central Registry of Insured Persons dataset, which aside of sociodemographic data includes date (but not cause) of decease, the acute hospitals discharge dataset (CMBD-HA, Conjunt Mínim Bòsic de Dades d’Hospitalitzats d’Aguts), the Pharmacy claims databases, and the database for primary care (CMBD-AP, Conjunt Mínim de Dades d’Atenció Primària) that records information on comorbidity and date of diagnosis. Both CMBD databases register the information using International Classification of Diseases (ICD) codes (ICD, Ninth Revision, for CMBD-AP and ICD, Tenth Revision [ICD-10], for CMBD-HA), and Pharmacy Claims Databases use WHOCC–ATC/DDD Index codes (World Health Organization Collaborating Centre–Anatomical Therapeutic Chemical/Defined Daily Dose). The registry has an automated data validation system to check consistency of data and identify potential errors, and external audits are performed periodically to ensure quality and reliability of data.

Detailed descriptions of the ascertainment methods for incident stroke cases, cardiovascular risk factors, comorbidities, and deaths are described elsewhere.8

Study Population and Design
Using the CMBD-AP database, we identified first ischemic stroke patients (ICD, Ninth Revision, codes 433.x1, 434.xx, and 436.5) hospitalized from January 1, 2015, to December 31, 2016. Patients were followed up from admission until death or until October 1, 2018 (end of follow-up).

Table 1. Patients’ Characteristics at the Start of Follow-Up (Discharge) According to Their Individual Socioeconomic Status and by PCSA Index (Quartiles)

| PCSA Index (Quartiles) | Individual Socioeconomic Status | Total | Valid | Exempts | <18 000 | ≥18 000 | PValue |
|------------------------|---------------------------------|-------|-------|---------|---------|---------|--------|
| 20 000 – 100 000       |                                 | n=16 344 | n=679 | n=12 396 | n=3269 | 0.001   |
| ≥100 000               |                                 | n=4444  | n=4004 | n=3731   | n=4045 | <0.001  |
| PCSA index             |                                 | 16 224 | 0–37  | 37–46   | 46–55   | 55–100  |
| Women                  |                                 | 7596 (46.5) | 16344 | 406 (59.8) | 6153 (49.6) | 1036 (31.7) | <0.001 |
| Age, y, mean (SD)      |                                 | 75 (13.2) | 16344 | 67.6 (14.7) | 76.1 (13.1) | 72.3 (12.6) | <0.001 |
| ≥18 000                |                                 | 1215 (37.4) | 793 (24.4) | 640 (19.7) | 597 (18.4) |          |
| <18 000                |                                 | 3086 (25.1) | 3064 (24.9) | 2922 (23.8) | 3230 (26.3) |          |
| Exempts                |                                 | 143 (21.1) | 147 (21.7) | 169 (29) | 218 (32.2) |          |
| Reperpusion therapy    |                                 | 2636 (16.1) | 16344 | 113 (16.6) | 1920 (15.5) | 603 (18.5) | <0.001 |
| IVT                    |                                 | 1679 (63.7) | 2636 | 76 (63.7) | 1238 (64.5) | 365 (60.5) | 0.093  |
| EVT                    |                                 | 501 (19) | 2636 | 18 (15.9) | 371 (19.3) | 112 (18.6) |          |
| IVT/EVT                |                                 | 456 (17.3) | 2636 | 19 (16.8) | 311 (16.2) | 126 (20.9) |          |
| Diabetes mellitus      |                                 | 5191 (35.8) | 16344 | 227 (33.4) | 4613 (37.2) | 1006 (30.8) | <0.001 |
| Dyslipidemia           |                                 | 1114 (69.8) | 16344 | 440 (64.8) | 8597 (69.4) | 2377 (72.7) | <0.001 |
| Hypertension           |                                 | 13 405 (82) | 16344 | 504 (74.2) | 10 380 (83.7) | 2521 (77.1) | <0.001 |
| Arrial fibrillation    |                                 | 2890 (17.7) | 16344 | 87 (12.8) | 2334 (18.8) | 469 (14.4) | <0.001 |
| Obesity                |                                 | 4296 (26.3) | 16344 | 178 (26.2) | 3405 (27.5) | 713 (21.8) | <0.001 |
| AMG, mean (SD)         |                                 | 18.4 (14.6) | 16273 | 17.7 (14.7) | 19.3 (14.7) | 15.2 (13.4) | <0.001 |

AMG indicates Adjusted Morbidity Groups; EVT, endovascular therapy; IVT, intravenous thrombolysis; and PCSA index, Primary Care Service Area Socioeconomic Index.

Individual Socioeconomic Status
In Catalonia, all residents are granted universal healthcare by law and the use of the health system services is free at the point of use, with the only exception of drug dispensation.9 Drug dispensation follows a system of copayment calculated according to individuals’ income or to the social security benefits received. Individual socioeconomic status was derived from the information used to calculate the levels of copayment and these appeared in categories predefined in the Catalan Central Registry of Insured Persons as follows: exempts (nonworking population or people receiving noncontributory pension), €18 000 (US$20 468) income per year; €18 000 to €100 000 (US$113 710) income per year; ≥€100 000 income per year.

PCSA Index
To strengthen territorial equity in the allocation of primary care resources, in 2015, the Catalan Health Department developed a socioeconomic deprivation indicator representative of the primary care service areas and linked to adverse health outcomes. The 13 variables used in this index of deprivation are related to the presence of social inequalities on which the primary care has a mitigating effect. The indicator score ranges from 0 (less deprived) to 100 (more deprived).10

Cardiovascular Risk Factors, Comorbidity Index, and Other Covariables
Information regarding cardiovascular risk factors was obtained by combining patients’ active diagnoses from the CMBD-AP (hypertension ICD-10 codes I10 and I15.9; dyslipidemia ICD-10 codes E78–78.9; diabetes mellitus ICD-10 codes E10–14.9; and atrial fibrillation.
ICD-10 code I48) and patients’ active medication from Pharmacy Claims Databases (C02, C02K, C02L, C02N, and C02LX codes for antihypertensive agents; A10A, A10B, and A10X codes for insulin and other blood glucose-lowering drugs; C10A and C10B codes for lipid modifying agents).

The comorbidity index (Adjusted Morbidity Groups [AMGs]) score was also collected from the CMBD-AP. The AMG index is a morbidity measurement recently developed and adapted to the Spanish healthcare system, which enables classification of the population into 6 morbidity groups. AMG is comparable to other co-morbidity measures, and its explanatory value has been checked by comparing it with morbidity measures such as the Charlson index or the number of chronic diseases.

Information regarding reperfusion therapies (ICD, Ninth Revision, codes 99.10 and 39.74 for thrombolytic and endovascular treatment, respectively) was collected from CMBD-HA.

### Standard Protocols, Registrations, and Patients’ Consent

No patients were involved in setting the research question or the outcome measures, nor were they involved in the design or implementation of the study. No patients were asked to advise on interpretation or writing up of results. This observational study used retrospective deidentified data from different health-administrative databases. Therefore, neither informed consent nor ethical committee approval was required according to the current legislation in Catalonia.

### Statistical Analysis

Descriptive statistics were estimated by individual socioeconomic categories and PCSA index quartiles. Because of the low number of patients in the individual socioeconomic category of ≥€100000 income per year (50 cases), we decided to merge the categories €18000 to €100000 income per year and ≥€100000 income per year. Quartile 1 of PCSA index represents the least deprived area, whereas quartile 4 represents the most deprived.

### Survival Analysis

We estimated survival using crude fatality rates (at 30 days, 1 year, 2 years, and 3 years) and Kaplan-Meier curves, to examine survival rates adjusted by sex, AMG, and age between individual socioeconomic categories and according to primary care service area quartiles.

Because we were interested in evaluating the impact of individual socioeconomic status on short- (30 days) and long-term survival after stroke, and socioeconomic status varies between PCSA, we fitted mixed-effects logistic and survival models, which take into account random effects because of clustering of patients in PCSA.

|               | Total (n=16 344) | Exempts (n=679) | <18 000 (n=12 396) | ≥18 000 (n=3269) |
|---------------|------------------|-----------------|-------------------|-----------------|
| 30 d          | 0.25 (0.24–0.26) | 0.20 (0.17–0.23) | 0.27 (0.26–0.28)  | 0.18 (0.16–0.19) |
| 1 y           | 0.26 (0.25–0.27) | 0.21 (0.18–0.25) | 0.28 (0.27–0.29)  | 0.18 (0.17–0.20) |
| 2 y           | 0.34 (0.33–0.35) | 0.29 (0.25–0.32) | 0.37 (0.36–0.38)  | 0.25 (0.23–0.26) |
| 3 y           | 0.49 (0.48–0.51) | 0.48 (0.38–0.60) | 0.53 (0.51–0.55)  | 0.36 (0.32–0.39) |

**Table 2. Crude Mortality Rates and 95% CIs at 30 d and 1, 2, and 3 y, According to Individual Socioeconomic Status**

Figure 1. Kaplan-Meier curves of death after ischemic stroke by individual socioeconomic status categories (adjusted by age, sex, and Adjusted Morbidity Groups).
We fitted 4 a priori models including potential confounding variables in successive steps to assess the changes in the magnitude of association between the individual socioeconomic status and survival: model 1, individual socioeconomic status categories plus sex, age, and reperfusion therapy; model 2, model 1 plus AMG index; model 3, model 2 plus cardiovascular risk factors; model 4, model 3 plus PCSA index.

All 2-way interactions with individual socioeconomic status were tested. We checked the proportional hazards assumption for all covariates using graphical methods (inspection of log minus log plot of survival).

We used Stata statistical software, version 15, for all analyses.

**Results**

From January 1, 2015, to December 31, 2016, 16,790 patients where admitted to public hospitals with the diagnosis of ischemic stroke. A total of 426 cases were excluded because of missing copayment data. We followed-up 16,344 patients for a median follow-up time of 18 months (interquartile range, 9.4–27.2), resulting in 24,638 person-years for the analyses. During hospitalization, 1,826 cases died. Table 1 shows patients' characteristics at admission according to their individual socioeconomic status and by PCSA index quartiles. Patients in the lowest individual socioeconomic status category (exempts) were younger and had less comorbidities comparing to the other categories. Compared with patients in the least socioeconomically deprived PCSA (first quartile), patients in the most deprived PCSA (fourth quartile) were more likely to be younger, have more cardiovascular risk factors and comorbidities, and belong to the lowest individual socioeconomic category.

The crude 1-year case fatality rate for the whole cohort was 26% (95% CI, 25–27). Table 2 shows crude case fatality rates at 30 days and 1, 2, and 3 years according to individual socioeconomic status.

Figure 1 shows differences between individual socioeconomic status categories survival curves (adjusted by sex, age, and AMG). No differences were observed in survival curves when categorized for PCSA index quartiles (Figure 2).

Tables 3 and 4 show the adjusted odds ratios and hazard ratios for all-cause case fatality at 30 days and overall, respectively. In the short-term survival analysis, after adjusting for sex, age, and reperfusion therapies (model 1), we observed that patients with income <€18,000 had higher odds of death (odds ratio, 1.60; 95% CI, 1.19–1.55) than patients with income ≥€18,000. This association was attenuated after adjustment for comorbidities (model 2) and cardiovascular risk factors (model 3). We did not find a significant association between the lowest individual socioeconomic status (exempts) and survival. Conversely, we observed a PCSA index gradient effect, with those patients belonging to the most deprived areas presenting higher odds of death than the least socioeconomically deprived areas (odds ratio, 1.19; 95% CI, 1.03–1.37).

In the long-term survival analysis, after adjusting for sex, age, and reperfusion therapies (model 1), we observed...
a gradient in mortality risk with decreasing socioeconomic status, with the poorest patients having a 68% higher risk of death (hazard ratio, 1.68; 95% CI, 1.44–1.96). This gradient was mildly attenuated after adjustment for comorbidities (model 2) and cardiovascular risk factors (model 3). The addition of PCSA index, in this case, did not meaningfully change the magnitude of the association. The adjusted effect of the lowest individual socioeconomic status versus the highest was 1.52 (95% CI, 1.30–1.77).

We performed a sensitivity analysis (online-only Data Supplement) to overcome possible data limitations of variables that could eventually influence stroke survival (like stroke severity). We excluded those cases that died during hospitalization (assuming that more severe cases would die in the hospital). Results were similar to those showed in Table 4.

### Discussion

#### Principal Findings

We analyzed the association between the socioeconomic status (at individual and PCSA levels) and all-cause deaths in patients with ischemic stroke in a nationwide population-based cohort. We found evidence of an individual socioeconomic status gradient in long-term survival that persisted after adjustment for comorbidities and cardiovascular risk factors. PCSA index seemed to influence short-term survival only but not long-term survival.

#### Comparison With Other Studies

The association between socioeconomic status and mortality after stroke has been widely described in the literature. Studies show that low socioeconomic status is associated with increased stroke mortality, although evidence is inconsistent in some countries with universal healthcare systems.

Area-based and individual socioeconomic indicators independently contribute to several important health outcomes, such as mortality and cardiovascular risk burden. Many studies assessing stroke mortality have used either area-based or individual measures of socioeconomic status to assess the association with survival after stroke, which leads to inadequate adjustment for confounding and different interpretation and implication of the findings depending on the type of measure. The individual socioeconomic status indicators used in previous studies varied from educational, occupational, income, and medical insurance status measurements, with its corresponding disadvantages and different association with outcomes.

Individual income seems to be the individual socioeconomic characteristic that better correlates with mortality in patients with stroke. We found that patients in the lowest individual income category had a 52% higher risk of death in the long-term follow-up compared with those in the highest category.

Most studies that have applied area-based measurements used index composites of several variables corresponding to

| Copayment | Model 1 n=16,342 | Model 2 n=16,271 | Model 3 n=16,271 | Model 4 n=16,152 |
|------------|------------------|------------------|------------------|------------------|
| ≥18,000    | 1 (ref)          | 1 (ref)          | 1 (ref)          | 1 (ref)          |
| <18,000    | 1.60 (1.19–1.55) | 1.29 (1.13–1.47) | 1.30 (1.13–1.48) | 1.26 (1.10–1.45) |
| Exempts    | 1.19 (0.88–1.60) | 1.11 (0.82–1.51) | 1.06 (0.78–1.44) | 1.03 (0.76–1.40) |
| Women      | 1.05 (0.95–1.15) | 1.08 (0.98–1.19) | 1.11 (1.00–1.22) | 1.12 (1.02–1.24) |
| Age, y     | 1.09 (1.08–1.10) | 1.09 (1.09–1.09) | 1.08 (1.07–1.08) | 1.08 (1.07–1.08) |
| Reperfusion therapy | 1.32 (1.17–1.50) | 1.41 (1.25–1.60) | 1.42 (1.25–1.61) | 1.43 (1.26–1.62) |
| AMG index  | 1.02 (1.02–1.02) | 1.02 (1.02–1.03) | 1.02 (1.02–1.03) | 1.02 (1.02–1.03) |
| Diabetes mellitus | 1.06 (0.96–1.17) | 1.06 (0.96–1.17) |                   |                   |
| Hypertension | 0.87 (0.75–1.01) | 0.86 (0.74–0.99) |                   |                   |
| Atrial fibrillation | 1.41 (1.26–1.57) | 1.40 (1.25–1.56) |                   |                   |
| Dyslipidemia | 0.57 (0.51–0.63) | 0.57 (0.52–0.63) |                   |                   |
| Obesity    | 0.73 (0.65–0.81) | 0.72 (0.64–0.80) |                   |                   |
| PCSA index |                   |                   |                   |                   |
| First (least) | 1 (ref)          |                   |                   |                   |
| Second     |                   | 1.05 (0.91–1.20)  |                   |                   |
| Third      |                   | 1.20 (1.04–1.38)  |                   |                   |
| Fourth (most) | 1.19 (1.03–1.37) |                   |                   |                   |

AMG indicates Adjusted Morbidity Groups; LR, likelihood ratio; PCSA index, Primary Care Service Area Socioeconomic Index; and ref, reference.
small geographic areas. Those indexes usually reflect an overall marker of neighborhood conditions and may even determine access to primary healthcare. We decided to use an area-based deprivation index that reflects the socioeconomic differences in health necessities among PCSA. This is currently being used to assign resources to improve territorial equity in Catalonia. We found that this index contributed to short-term survival in our cohort of patients but not to long term.

The majority of previous studies have focused on in-hospital and short-term mortality, and few studies have assessed long-term survival, showing heterogeneous results. The original contribution of the present study is that we analyzed the influence of both socioeconomic indexes (individual and PCSA) in short- and long-term survival in the same cohort of patients. We found that, in our population, socioeconomic factors might have a different influence on ischemic stroke survival depending on the length of the follow-up. That would mean that short-term case fatality might be influenced by healthcare system factors related to PCSA, and those health factors that depend more directly on individual socioeconomic factors would determine the long-term prognosis. Additional research is needed to determine which individual (behavioral) factors mediate in this relation. Our results of short-term survival are in line with those from a previous study set in France, where there is also universal access and where the influence of the neighborhood socioeconomic status was evident only in the latter period of the acute care. However, the role of the individual socioeconomic status was not assessed.

Stroke subtype is another important factor to take into account. It is well described that prognosis, and risk factors associated, vary between ischemic and hemorrhagic stroke, with higher short-term mortality rate and higher prevalence of hypertension in patients with intracranial hemorrhage than in ischemic strokes. Therefore, because stroke subtype is important to study the influence of socioeconomic status in survival, we focused on patients with ischemic stroke only.

We observed that individual cardiovascular risk factors, and especially comorbidity, mildly attenuated the magnitude of the relation between socioeconomic status and survival. Cardiovascular risk factors play an important role in stroke incidence. Some studies have shown in other contexts that the burden of cardiovascular risk factors is higher among patients with lower socioeconomic status and there are multiple potential explanations for this finding, including its association with lifestyle factors. However, we found that these factors explained only partially the mechanism of worse outcomes in our population.

### Strengths and Limitations

This study has several strengths. Its nationwide population-based approach reduces the risk of ascertainment bias. Analyzing individual socioeconomic status clustering by PCSA avoids the ecological fallacy that is present in

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**Table 4. Adjusted Hazard Ratios and 95% CIs for All-Cause Mortality (Random-Effects Values Are Variance and 95% CIs)**

|                    | Model 1  | Model 2  | Model 3  | Model 4  |
|--------------------|----------|----------|----------|----------|
| Copayment          |          |          |          |          |
| ⩾18,000            | 1 (ref)  | 1 (ref)  | 1 (ref)  | 1 (ref)  |
| <18,000            | 1.30 (1.20–1.40) | 1.23 (1.15–1.33) | 1.26 (1.17–1.35) | 1.25 (1.16–1.35) |
| Exempts            | 1.68 (1.44–1.96) | 1.62 (1.39–1.89) | 1.54 (1.32–1.80) | 1.52 (1.30–1.77) |
| Women              | 0.92 (0.88–0.98) | 0.96 (0.91–1.02) | 1 (0.95–1.06) | 1.01 (0.95–1.06) |
| Age, y             | 1.09 (1.09–1.10) | 1.09 (1.09–1.09) | 1.08 (1.08–1.09) | 1.08 (1.08–1.09) |
| Reperfusion therapy| 0.95 (0.88–1.03) | 1.02 (0.95–1.10) | 1.01 (0.94–1.09) | 1.02 (0.94–1.10) |
| AMG index          | 1.02 (1.02–1.03) | 1.02 (1.02–1.03) | 1.02 (1.02–1.03) | 1.02 (1.02–1.03) |
| Diabetes mellitus  | 1.09 (1.03–1.16) | 1.10 (1.04–1.16) |          |          |
| Hypertension       | 0.86 (0.79–0.93) | 0.86 (0.79–0.94) |          |          |
| Atrial fibrillation| 1.21 (1.14–1.29) | 1.21 (1.14–1.29) |          |          |
| Dyslipidemia       | 0.64 (0.61–0.68) | 0.64 (0.60–0.67) |          |          |
| Obesity            | 0.73 (0.68–0.78) | 0.72 (0.68–0.77) |          |          |
| PCSA index         |          |          |          |          |
| First (least)      | 1 (ref)  |          |          |          |
| Second             |          | 1.03 (0.94–1.13) |          |          |
| Third              |          | 1.07 (0.98–1.18) |          |          |
| Fourth (most)      |          | 1.08 (0.99–1.19) |          |          |
| Random effects     | 0.17 (0.13–0.22) | 0.19 (0.15–0.23) | 0.19 (0.15–0.2) | 0.19 (0.15–0.23) |

AMG indicates Adjusted Morbidity Groups; PCSA index, Primary Care Service Area Socioeconomic Index; and ref, reference.
several studies. A priori models allow us to analyze the influence of comorbidity and cardiovascular risk factors in this association.

Limitations must also be acknowledged. We did not have data regarding initial stroke severity—an important predictor of acute survival—although its impact is of less importance in predicting long-term survival. Besides, the negative influence of socioeconomic deprivation on initial stroke severity has been described previously. To overcome this limitation, we excluded those patients who died during acute hospitalization in a sensitivity analysis, and results did not change meaningfully. We did not have information about patients attending private health services. As in Catalonia, there is a universal healthcare coverage, and >90% of the population uses the public system, we would estimate a low number of lost cases. We have to mention that individuals are assigned to a particular copayment group on the basis of the income stated in individual income tax declarations. Thus, within a family unit, there could be different incomes. Besides, intragroup differences might exist in the ≥€18000 income per category that could not be detected with this classification. Nevertheless, the distribution of the stroke patients in the copayment categories is similar to the general population of Catalonia.

Conclusions and Implications

This nationwide study provides further evidence of the relation between socioeconomic status and short- and long-term survival in patients with ischemic stroke and reinforces the idea that factors other than clinical or healthcare related do play a role in the survival after the disease. Both primary healthcare area and individual socioeconomic aspects should be addressed to achieve equal outcomes in populations with universal healthcare coverage.

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Disclosures

None.

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