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Socio-economic inequalities in tobacco-related diseases in Portugal: an ecological approach

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ABSTRACT

Objectives: The existence of socio-economic (SE) inequalities in smoking is well demonstrated, but less is known about its consequences. This study measures SE inequalities in the prevalence of tobacco-related diseases (TRD) in Portugal, using a new area-based SE indicator.

Study design: Ecological study.

Methods: In-patient data were used to identify TRD discharges at all Portuguese NHS hospitals for the year 2011. The definition of TRD incorporates malignant cancers, cardiovascular diseases, cerebrovascular diseases and respiratory diseases. We created an area-based SE indicator on the basis of census data, using factor analyses. The association between the prevalence of TRD and the SE indicators was measured using Generalized Linear Models. The spatial correlation of this indicator was assessed using variograms.

Results: Two area-based SE factors were identified at the parish level, reflecting (i) social position (education and occupation); and (ii) deprivation (overcrowding and manual occupations). Upper-social-class areas were associated with a lower prevalence of malignant cancers, cardiovascular, and respiratory diseases.

Conclusion: We found significant inequalities in TRDs across Portuguese parishes using a newly created area-based SE indicator reflecting several SE dimensions. This result emphasizes that inequalities in smoking are reflected in inequalities in health, and should be tackled through equality-oriented area-based tobacco policies.

Introduction

The literature shows that 22% of male all-cause deaths and 6% of female all-cause deaths are due to tobacco-related diseases (TRDs).[1] Also, the likelihood of survival is greater among never smokers than among ever smokers.[2] In Portugal, 11.7% of deaths and 11.2% of Disability Adjusted Life Years are attributable to smoking, with a very uneven distribution across genders, probably due to the different patterning of risk behaviours.[3,4]

Meanwhile, there is much evidence that tobacco is socially patterned,[5] related to the unequal access to information, to the unequal ability to process information and adapt

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behaviours, or to the unequal access to smoking cessation programmes.[6] If the worse-off are more likely to smoke, they are potentially more at risk of developing TRDs, and die earlier. From a theoretical viewpoint, Adler and Stewart posit that unhealthy lifestyles are a major mediating factor between SE conditions and health outcomes.[7] Using an indirect approach, Jha et al. establish this link between SE inequalities in smoking and the SE patterning of mortality.[8] In Portugal, however, the SE inequalities in smoking have emerged very recently, and, to our best knowledge, there is no evidence on the SE inequalities in tobacco-related morbidity.[4,9] This paper measures the SE inequalities in the prevalence of TRDs in Portugal using a newly created SE area-based indicator for the lowest administrative level in Portugal (parishes).

Area-based SE indicators are widely used in health since they capture several dimensions of SE status. Some well-known examples are the Townsend Index, Jarman Index, and Carstairs Index, based on census indicators.[10–12] Area-based SE indicators influence health outcomes such as mortality and cancer incidence, preterm birth and low birth weight, cardiovascular disease incidence, and several causes of death including heart disease, malignant neoplasms, and others.[13–16] From a theoretical viewpoint, SE area-based indicators are proxies for individual socio-economic status. For example, Krieger et al. concluded that single and composite area SE variables (at census tract and block group levels) provided similar information regarding mortality and cancer incidences.[13] In the absence of individual data on SE status, area-based SE indicators are useful substitutes to the usual markers of SE conditions such as education and income, whose causal effects on health have been well established.[17] Area-based SE indicators also proxy the neighbourhood conditions where people live, and the relation of these conditions with health has also been well demonstrated.[18]

Methods

Creating an SE indicator for Portuguese parishes

Census data from Statistics Portugal was used to compose an SE indicator.[19] Data refer to 4050 mainland Parishes (with an average of 2480 inhabitants) and include the following SE factors: education (percentage of people older than 15 years with no education, secondary education, and higher education), income (percentage of houses with monthly costs with acquisition higher than €500, percentage of people more than 15 years old living with guaranteed minimum income), occupation (percentage of unemployed people more than 15 years old, percentage of residents employed in intellectual, scientific, and technical occupations, industry, trade, and services occupations, industrial and manual occupations, and primary sector occupations), housing conditions (percentage of buildings more than 50 years old, percentage of buildings damaged and with great repairing needs, percentage of households with parking or garage, and percentage of overcrowded houses), and family environment (percentage of people more than 65 years old living alone).

The choice of the SE variables was guided by theoretical insights from the literature and by the availability of information. From a theoretical viewpoint, education, income, and occupation have been regarded as major influences on health conditions because they refer to 'what resources individuals hold and what sort of life chances they have' (Lynch and Kaplan, page 19).[17] According to Glymour et al., 'socioeconomic status is typically characterized along three dimensions: education, employment, and money' (page 17).[20] Education is related to future success (and thus access to economic resources and prestige), and to capacity to learning and gathering information. Occupation signals the working environment (and thus exposure to risks, including psychosocial ones), and also the income and prestige. Finally, income relates directly to the material conditions (housing, food, medical care, neighbourhood, etc.). In order to complete the relatively limited information on material resources, we added variables related to housing, which is a marker of wealth and living conditions. Also, according to the model of SE inequalities proposed by Adler and Stewart, the living conditions mediate the relationship between the SE primary indicators (education, income, and occupation) and the health outcomes.[7] The family environment also completes the picture of resources and constraints, as the family potentially provides social and material support that are beneficial for health (see also Adler and Stewart).[7]

We used factor analysis to explore the relation between variables from the 2011 Portuguese Census. Our analysis explores the correlation of a given set of variables in order to find a small number of underlying variables named principal component. The aim is to capture the shared relationships, structure, and highest percentage of the total variance of the original variables, and get other variables not as correlated with each other as the original ones.[21,22] We selected the number of components whose eigenvalue is higher than one. We then repeated factor analysis in two sub-samples selected randomly from the general sample. These analyses were performed using SPSS, version 20.

Using the indicator to characterize SE inequalities in the prevalence of TRDs

To measure the association with TRDs, we used data for all in-patient discharges at Portuguese NHS hospitals for the year 2011 (Administração Central do Sistema de Saúde [Central Administration of the Health System] – ACSS, IP.). Data on in-patient stays included 576,687 fully-comparable observations, with information on primary diagnosis, secondary diagnosis, interventions, length of stay, age, gender, and area of residence (parish). The main TRDs were selected according to Borges and Gouveia, and are listed in Table 1.[3]

We computed the prevalence rate for the selected TRDs for each parish. Then, we estimated the determinants of the prevalence rate of in-patient cases for those diseases using multivariate analyses. Given that the dependent variable was a prevalence rate, which varies between 0 and 1, we modelled this variable using a generalized estimating equation approach assuming a binomial distribution.[23] The explanatory variable was the SE indicator for the Portuguese parishes,

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