What are the socio-economic conditions of local areas affected by wildfires in Portugal?

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The socio-economic context of wildfire distribution is paramount to understand the conditions that influence the vulnerability and resilience levels of different communities exposed to wildfire risk. This research had the main purpose to assess the social and economic dimensions of fire occurrence in Portugal, the country most affected by wildfires in Europe. Differences in fire incidence levels, obtained from number of fire events and burned areas recorded between 2007 and 2014, were examined in relation to socio-economic data from the latest Census at local level, describing conditions regarding exposure levels, sociodemographic patterns, infrastructures, agricultural activities and labour conditions for the civil parishes of mainland Portugal. To identify differences between parishes, two groups were retrieved for fire events and burned areas separately, based on quantiles and keeping only the highest and lowest 20% of wildfire incidence data. The relationships between the wildfire incidence groups and the socio-economic variables were assessed with a stepwise approach based on classification trees. First, irrelevant variables for identifying differences between the groups were removed by an interactive process based on misclassification rates. The second step used random Forest analysis with the selected variables to compute the strength of association and rank variables by importance. The third step applied cluster analysis to determine if the clusters created only with the selected independent variables were equivalent to the initial groups.

Results showed that the social and economic conditions of civil parishes vary with wildfire incidence levels. Population density, proportion of foreigners, overcrowded housing conditions, proportion of houses occupied seasonally, and agricultural variables, such as pastures and livestock density, appeared as relevant to distinguish the two fire incidence groups, although with differences in their level of importance and type of relation (positive or negative) when considering fire density or burned area. The model for fire density showed higher accuracy, revealing a stronger association with the local social and economic dynamics, in comparison with burned area.

Overall, the socio-economic context of wildfire occurrence is framed by the societal settings of the country. Depopulated areas, ageing population and reduction in the ability to intervene in the landscape are some of the patterns that can influence the spatial distribution of wildfires and, therefore, the socio-economic context of communities should not be overlooked in fire management and coping strategies.