Human factors in the model of urban fire spread in Madrid (Spain) focused on the poor population

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Abstract-

This study aims to highlight the great potential advantages of bringing human and organizational factors (HOF) into the planning for building fire safety in deprived neighbourhoods (whose populations suffer from a lack of safety culture). Physics-based models were used to analyse fire-spread behaviour in a block of the district of Tetuán, located in the centre of Madrid (Spain), in which a high number of substandard dwellings presented a greater fire risk. GIS tools were used to model the real geometry of the buildings. The numerical models introduced more realistic fire load data related to the characteristics of the population living in these dwellings, which is also a parameter that directly affects the probability of ignition, defined as a Poisson distribution. Generally, the results show that vertical fire spread becomes faster for all buildings, which also contributes to increasing the number of affected rooms. The introduction of HOF in these numerical models can help citizens to better understand fire risk in their own dwellings, raising their risk awareness and subsequently improving their resilience to possible fire accidents.

Index Terms- human and organizational factors; fire spread; GIS; urban fires; deprived population; resilience

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