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Heat vulnerability assessment and mapping for a bucolic town in the UK

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With ongoing climate change, the number, frequency, and intensity of events of extremely hot days during summers called heatwaves are progressing. Vulnerability of the population is one aspect responsible for the risk induced by such heatwaves. In society, certain characteristics make one group of people more vulnerable to heatwaves than others, such as poverty, access to cooling facilities, age, gender etc. The current research identifies such vulnerability factors or indicators of population to help in devising heat management strategies. This research focuses on a small bucolic region (Guildford) in Surrey county of the United Kingdom as mostly risk or vulnerability factors are underestimated and ignored in such regions compared to city population. Twelve heat vulnerability factors or indicators (house type, sex, age, ethnicity, place density, access to central heating, residence type: communal, health condition, household composition, disability, accommodation tenure i.e. rented or owned, and education level) were selected after reviewing several literatures to include in the study based on their data availability. Census data on such vulnerability indicators at lower output scale were collected. Principal component analysis was performed, and four major principal components were identified from these 12 factors which explained most of the variance (82 %) in the data. The corresponding loading value of each of these factors were utilised to find heat vulnerability indices for each lower output area and these indices were mapped using QGIS. It was noted that not only people living in town centre which is generally considered hotter and so are highly vulnerable, but outskirts regions were also significantly vulnerable compared to other lesser vulnerable regions. Such a vulnerability map can help authorities for site focused heat mitigation strategies application, early warnings, and preparation during summers, particularly during excessively hot days i.e., heatwaves. Nature-based permanent solution can be encouraged in regions of such highly vulnerable identified regions.