



**PRESS RELEASE**

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## **Milan under stress due to heat waves: study reveals districts most at risk of cardiovascular emergencies**

**Buenos Aires-Porta Venezia and Loreto-Casoretto among the most at-risk districts: extreme heat increases cardiovascular emergencies by 22%**

Milano, 11 December 2024 – A new study conducted by **D-Hygea Lab** of the Department of Electronics, Information and Bioengineering of the **Politecnico di Milano**, in collaboration with the Regional Emergency Agency (AREU), has analysed the impact of heat waves on the cardiovascular health of Milan residents. The results show that in 18 highly vulnerable districts, home to 23% of the city's population, the risk of cardiovascular emergencies increases by 22% during days of extreme heat compared to normal days. In contrast, in 20 low vulnerability districts, the increased risk is not significant.

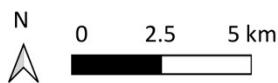
Among the most vulnerable districts, with a high percentage of elderly residents, are Buenos Aires - Porta Venezia and Loreto-Casoretto. Districts like Gorla-Precotto and Porta Magenta, featuring the presence of public fountains and green areas, are more resilient. A higher percentage of elderly and high educated residents is associated with increased cardiovascular risk. In contrast, the density of public fountains and a higher percentage of female residents are linked to a lower risk of emergencies during hot weather.

The study analysed 64,881 cardiovascular emergencies recorded between 2017 and 2022, identifying 114 days of extreme heat, defined as those with an apparent temperature above the 95th percentile. The hottest day was 27 June 2019, with an average temperature of 36° C. Using artificial intelligence, Milan was divided into three homogeneous socio-urban clusters – Central, Residential and Suburban – highlighting how factors such as the percentage of elderly, density of fountains and greenery significantly affect cardiovascular vulnerability.

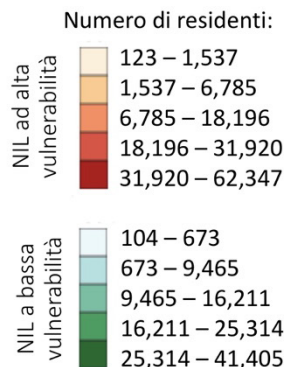
*“This study allows us to clearly visualize where and how extreme heat affects the cardiovascular health of residents,”* explains **Enrico Gianluca Caiani**, professor of Bioengineering at the Politecnico di Milano. *“These data can guide targeted policies, such as increasing green areas in the most vulnerable districts.”*

The resulting framework can be applied in other cities, using local variables or data. The research team, composed of Professor Caiani and researchers Julia Nawaro and Lorenzo Gianquintieri, has recently started collaborations with the Municipality of Milan and participated in international projects, such as URBANA of the European Space Agency, which explores the theme of urban heat through satellite data.

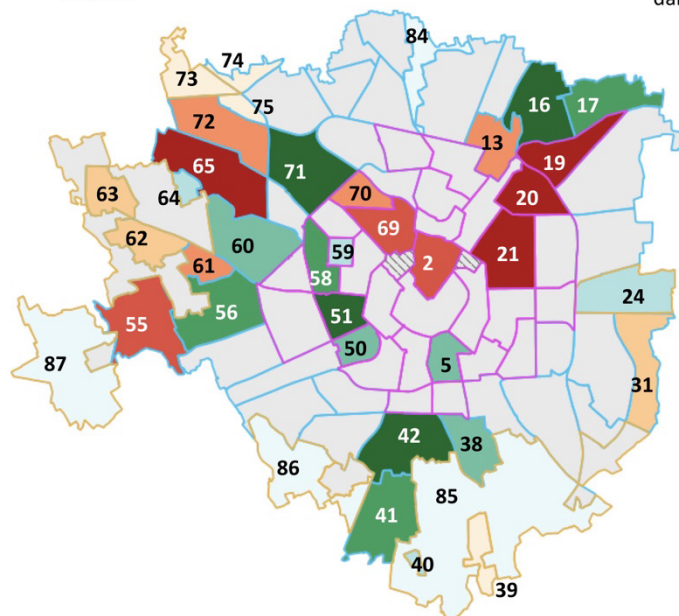
The entire study was published in the journal *Population and Environment*: [link to study](#).



**1** NIL (sono indicati solo i NIL ad alta e bassa vulnerabilità)



Cluster socio-urbano: ■ Centrale ■ Residenziale ■ Periferico  NIL esclusi dall'analisi



Map of the surveyed districts: 18 NILs (Local Identity Nuclei - administrative divisions recognized by the Municipality of Milan <https://www.pgt.comune.milano.it/psschede-dei-nil-nuclei-di-identita-locale/nuclei-di-identita-locale-nil>) highly vulnerable to heat in cardiovascular contexts and 20 low vulnerability NILs were identified. Among the NILs with high vulnerability and high number of residents are those of Buenos Aires - Porta Venezia- Porta Manforte, Loreto Casoretto Nolo, via Padova - Turro- Crescenzago and Quartiere Gallarate - Quartiere San Leonardo - Lampugnano. The districts with many residents and low vulnerability are Gorla Precotto, Villapizzone, Porta Magenta, Chiesa Rossa. Milan has also been divided into three socio-urban clusters: Central, Residential and Suburban. In these clusters, five key variables - surface temperature, fountain density, percentages of seniors, women and high educated residents - have a significant impact on cardiovascular vulnerability during hot weather. Regarding highly vulnerable NILs, over 210,000 residents (66% of total residents in high vulnerability NILs) are concentrated in the Central cluster, while in low vulnerability NILs almost 200,000 residents (70% of the population of the least vulnerable NILs) reside in the Residential part of the city.

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