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## Vulnerability mapping to Covid-19 of the metropolitan area in central Tuscany

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The COVID-19 pandemic has made urgent the need to improve the resilience of urban system from the effects of different hazards (natural, biological, technological and slow-onset climate change-related) through a multi hazard and multi sector approach that allows a more efficient use of resources and a holistic view of risk, including the interconnectedness across multiple hazards. According to Bangkok Principles for the implementation of the health aspects of the Sendai Framework for Disaster Risk Reduction 2015-2030, systematic integration of health aspects in Disaster Risk Reduction strategies is undelayable.

Building urban resilience means identifying vulnerabilities rapidly and adopting adequate actions to anticipate, resist and recover with the least amount of damage in front hazards impacts.

In this context, a synthetic index to measure vulnerability to COVID-19 is developed, by integrating different levels of information related to demographic characteristics, health profiles and access to resources, in order to identify any situations of fragility and predisposition to the spread of the epidemic, thus constituting a support element for the adoption of an efficient intervention strategy and for the management of any new epidemic waves. The integrated and multi-disciplinary approach that has been chosen allows, indeed, to take into account the complexity and multi-disciplinary nature of the concept of vulnerability. The following information are analysed: demographic characteristics (population density, age, residence in welfare and prisons facilities); health profiles (presence of previous chronic diseases, such as cancer, diabetes, heart disease, lung disease, and particular lifestyles, such as smoking, alcohol consumption, poor diet) and characteristics of the local health infrastructure (number of beds, ratio of population to family doctor, number of health facilities in the area). To construct the vulnerability index, a Geographical Information System is setted up, through which the data are analysed, processed through normalisation, given the different availability and heterogeneity of the information, and combined. The resulting spatial data infrastructure allows us to rapidly identify situations of adversities and possible infrastructural deficiencies.

The first prototypical result provides the implementation of an index of vulnerability to COVID19 and the related information support system, related to the metropolitan area in central Tuscany, in which there is a good availability of open data at different levels of geographical details and for which research on vulnerability to various types of risk is carried out and in progress.

