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Effect of climate change on West Nile virus transmission in Italy: a systematic review

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Background: West Nile Virus (WNV) is a pathogen transmitted by mosquitoes of the Culex genus, affecting both humans and animals such as horses and birds. The prevalence of WNV infection has increased dramatically in recent years in Europe, especially in Italy, and has been related to climate and environmental changes linked to global warming. Our review aims to assess the relation between the spread of WNV in Italy and the different climate change-related factors.

Methods: We conducted a literature search in the PubMed, Web of Science, Embase and Scopus databases, actualised as of 20 February 2024, using as search terms WNV, its vectors and climate change, and limiting our analysis to studies conducted in to avoid an overly heterogeneous setting. We registered the review in PROSPERO (CRD42023430636).

Results: Of the 252 unique records retrieved, we eventually included 25 articles after full-text screening. These studies were published between 2011 and 2023 and evaluated the distribution of WNV or its vectors according to various climatic and environmental factors. Despite rather heterogeneous results, we found a consistently positive association with temperature, especially spring temperature, agricultural land use, demography, and soil moisture, and a negative one with evapotranspiration and wind, while the relationship with other environmental variables and water cycle-related factors was weak, null or conflicting.

Conclusions: Despite some inconsistencies in the results, likely related to differences in study methodologies as well as complex environmental interactions, we found unequivocal evidence that climate change-related factors, such as the lengthening of the warm season, extensive farming, and invasive human activities towards natural environments, favour WNV spread in Italy. Consequently, actions against global warming and preservation of natural environments may counteract the WNV epidemic.

Key messages:

- WNV epidemic seems to be linked to specific climate change-related factors, such as the lengthening of the warm season, extensive farming, and invasive human activities towards natural environments.
- Actions against global warming and preservation of natural environments may counteract WNV spread.