Research in Social Sciences
ISSN: 2641-5305
Volume 8, Issue 4, pp. 66-72
2025
DOI: 10.53935/2641-5305.v8i4.468

And those Beyond the Gaussian? Looking After the Elderly and Disabled During Heat Waves in Cities

Letizia Cremonini: *Institute for the BioEconomy – CNR Via Gobetti 101, 40129 Bologna, Italy.*

Federico Carotenuto: *Institute for the BioEconomy – CNR Via Gobetti 101, 40129 Bologna, Italy.*

Daniela Famulari: *Institute for the BioEconomy – CNR Via Gobetti 101, 40129 Bologna, Italy.*

Edoardo Fiorillo: *Institute for the BioEconomy – CNR Via Gobetti 101, 40129 Bologna, Italy.*

Marianna Nardino: *Institute for the BioEconomy – CNR Via Gobetti 101, 40129 Bologna, Italy.*

♣***Teodoro Georgiadis***: *Institute for the BioEconomy – CNR Via Gobetti 101, 40129 Bologna, Italy.*

ABSTRACT: *Urban heat waves are emerging as a significant public health issue, especially considering their regularity and growing severity, partly induced by climate change. Described as an extended period of very hot weather, which can stretch over several days and weeks, urban heat waves tend to present an increase in occurrence and intensity over time. The elderly and disabled are at greater risk among these populations due to a complex of physiologic, socio-economic, and environmental predisposing conditions. It is essential to know what problems members of these populations face during periods of extreme heat, as the implications are not simply uncomfortable but also involve adverse health effects and higher mortality rates. Even though devoted policies for the elderly and disabled have been developed, they appear mostly sectoral, without a clear link to the structure of the cities and the regenerative policy approaches necessary to properly implement Target 11 of the UN Agenda 2030. European policies often refer to the 'no one left behind'; the needs of the elderly and the disabled should be deeply considered, and a multidisciplinary approach should be applied in any single step of the urban design.*

***Key words**: Disabled, elderly, health effects, heat wave, policies.*

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

♣*Corresponding Author: Teodoro Georgiadis*

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

Older individuals, who also may reflect changes in physiology as a function of aging and comorbidity, are most susceptible to heat-related conditions, including heat exhaustion and heat stroke. A drop-off related to thermoregulatory age associated with less-than-optimal cardiovascular functioning and a decrease in mobility, which can limit the capacity of an individual to respond to extreme temperatures, has been observed. There is also the fact that many seniors live alone, which increases isolation and reduces the availability of support networks and access to the resources they need in extreme temperatures. Moreover, socio-economic barriers such as being on a fixed income, reliance on public transportation, and barriers to health care services counterbalance these vulnerabilities, thus making older adults more vulnerable and reticent to take precautions against an increase in temperature. Disability exacerbates the risks of heat. Many disabled people can depend on support devices or networks that are not helpful in an extreme heat situation. Staying in fresh spaces, such

as air-conditioned buildings, can be an essential barrier for people with limited mobility, particularly in city areas with poor or no public transportation (Holland et al., 2024). Mental disorders can also impair judgment and responsiveness, making it less likely that a person in distress can acknowledge symptoms of overheating or request assistance.

The urban environment is home to a high percentage of elderly and disabled people (Holland et al., 2024) who may struggle with mobility limitations to reach cooling centers or other public services. Moreover, social determinants of health may further contribute to these vulnerabilities.

Considering these factors, a worldwide strategy is essential to address the susceptibilities of the elderly and disabled during urban heat episodes (WHO, 2021a; WHO, 2021b). These should not simply address immediate health needs but relatively long-term system changes to enhance resilience, such as regenerative approaches in the city's design. It should contain community programs that nurture support networks and ease access to cooling resources and educational programs that help these communities understand the risks of heat and the available resources. The development of town planning and public health policy will ultimately be needed to adequately attenuate the effects of climate change on the most vulnerable sectors of the population, with specific attention to the physiological and socio-economic determinants that make them more susceptible to these extreme events. Aging is associated with several physiological changes that compromise thermoregulation and render the elderly more susceptible to heat-related health problems. Specific age-related health issues, such as cardiovascular conditions, respiratory conditions, and diabetes, can amplify the harmful effects of temperature extremes (Dardin, 2024). These diseases are frequently accompanied by medications that compromise thermoregulation and hence predispose the patient to thermal stress and consequent illness [5]. Furthermore, loss of mobility, concerning heat waves, is a key issue for the elderly. The physical functioning of many older people may be declining, limiting their ability to access air-conditioned facilities or evacuating to safer locales. Motility issues can also keep them from asking for help, and thus increase dependence on caregivers or emergency services, which are not readily available for heat issues. In a city setting, where systematic allocation of public resources may not reach the vulnerable easily, such a limitation is particularly relevant (Dardin, 2024).

There's an extra layer of challenge for the elderly during heat waves: social isolation. One common situation that can compound the risk of unavailable health results during thermal events is that many elderly people live alone. These individuals may face barriers to obtaining information about local heat-health advice or cooling centers, reducing their ability to mitigate excessive heat exposure. The National Institute of Aging indicated that both physical and social isolation can predict psychological distress experienced during heat waves and associated with increased morbidity and mortality (Park et al., 2025).

Moreover, sociodemographic characteristics, especially in industrialized countries, are associated with the magnification of heat-related difficulties among the aged. Many older adults live in low-income neighborhoods where the infrastructure may be insufficient for extreme heat, like public cooling spaces or resources for people who require assistance moving around. These environmental injustices limit access to necessary cooling devices to mitigate the dangers of oppressive heat (Dardin, 2024). Also, living on a fixed income means the elderly cannot afford to purchase air conditioning, which is another necessary asset during extreme heat. A lot of older people also have the challenge of choosing between life-saving drugs and healthcare for survival, and public services like cooling.

2. Toward Inclusive Policies

The overlap of these physiological, mobility, social, and economic challenges then increases the vulnerability of the elderly to urban waves. Studies on the hospital admission rate in cities during severe heat suggested a significant increase in heat-related diseases in the elderly [5]. Comprehensive approaches that involve community engagement, enhanced social services, modification in infrastructure, and targeted education regarding heat risks are needed to mitigate their risk and long-term well-being during these climatic events. The increasing frequency and severity of urban heat have considerable risks to at-risk populations, particularly the elderly and disabled with underlying comorbidities that amplify their susceptibility to environmental exposures. Of primary interest is the overlap of disabilities with physiological responses to extreme heat, which may impede successful thermal management and emergency preparedness. Studies such as Chakraborty 2025) and Kang et al. (2024) have shown that individuals with disabilities suffer from a specific thermal deprivation that negatively characterizes their reactions to heat waves: this is a substantial

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

♣*Corresponding Author: Teodoro Georgiadis*

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

effect that alters the cognitive perception, leading to interferences with decision-making processes, confusing what to do during times of heat exposure. These constraints could lead to greater vulnerability to heat effects in disabled subjects due to a reduced ability of the individual to perceive the first warning signals of thermal stress or to understand how to act (Padhy et al, 2015); Repke et al., 2018). Such assessments emphasize the importance of focusing on interventions that address these populations' specific vulnerabilities.

As the effects of heat waves in cities go beyond simple discomfort and assume relevance for the mental, this nexus must be made explicit to implement real policies that should "leave no one behind."

Prina et al. (2024) have identified an association between climate-related stress and an increased prevalence of anxiety and depression disorders in the oldest old, which might have a long-term effect on their physical well-being (Meadows et al., 2024; Sisodya et al., 2024; Baecker et al., 2025). Preventive anxiety is common when people prepare for encounters that they are likely to experience, such as the expected higher temperatures, as people plan for the difficulties that they may confront, including increased health and disability challenges. This constant worry is not just bad for their quality of life; it may also take a toll on their physical health, because of the physical effects associated with stress, such as elevated heart rate and blood pressure, or inflammation processes (Ursano et al., 2017; Somoza-Moncada et al., 2023). Many elderly and disabled individuals might not be able to ask for help or company in case of intense heat, making them feel lonely and hopeless.

The effects are broader than initial physical health issues, however, as psychosocial consequences of isolation can compound the existing problems that disabled people experience during heat waves. Many disabled people live alone or in independent living environments, which can decrease social exposure and access to community resources for coping with extreme weather. The risk for social isolation rises during thermal waves as individuals are more removed from the support networks that might support better adaptive strategies. The literature to date (Cacioppo & Cacioppo, 2022; Guolo et al., 2022) has demonstrated a large void in infrastructure to support heat-vulnerable elderly and disabled urban populations. Establishing psychological services and community awareness programs is helpful to mitigate some of the anxiety and emotional turmoil claiming victims among these already vulnerable population groups. Finally, by integrating mental health resources into physical health interventions, the holistic needs of vulnerable populations such as older and disabled adults may be met, so that during heat waves, the temperature is not the only thing that can cause them harm; structural obstacles also contribute to the dystopian conditions experienced by disabled people in heat waves. Current emergency preparedness templates often fail to accommodate disability considerations, which may result in under-resourced or unclear communication procedures during a heat event (Kang et al., 2024). During crises, emergency management agencies may fail to consider the specific needs of disabled people, fail to communicate with them, or offer them the relevant aid, thus making them even more vulnerable.

3. Multisectoral Adaptation Actions

The framing of heat events among disabled people highlights the multitiered nature of challenges disabled individuals face during urban heat waves. It is crucial to develop successful adaptations and bolster the resilience of this population to extreme heat events, so a more sophisticated understanding of the intersections between them is needed. Urban environments dominate the experience and intensity of heat waves, particularly for high-risk groups such as the elderly and disabled. Multiple geographic and environmental factors play pivotal roles in magnifying the risk of extreme heat events. Within the latter, urban infrastructures such as provisioning of green spaces, the type of built environment, and the presence of shelter are proving to have an impact that does not proportionally affect the well-being of the most vulnerable during heatwaves (CARMINE, 2024).

The housing environment, which is composed of building materials, and the level of energy efficiency in buildings, which, when scarce, can bring fuel poverty, play a significant role in maintaining heat within habitation areas. The oldest homes, often found in urban areas with high-risk population groups, are expected to lack proper isolation and air conditioning, aggravating the possible thermal stress. Vulnerable populations, such as those with restricted mobility or disabilities, will face increasing challenges to access climate-controlled, air-conditioned public spaces (e.g., libraries, community centers), particularly during extreme heat events in which adaptation in such environments is essential for survival (De Gea Grela et al., 2024). In the meantime, insufficient provision of green spaces exacerbates the risks of heat waves in the urban context.

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

♣*Corresponding Author: Teodoro Georgiadis*

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

According to the literature, plants can induce a moderate pattern of low temperatures because of the local shading effect and regional cooling caused by latent heat loss from evapotranspiration (Foshang et al., 2024) and through the adiabatic cooling offered by the vegetation facing hot walls. Here, green parks with their effects are necessary; they not only can cut off the space temperature but also provide a refuge for people seeking cool in the blazing heat. Only in many cities, especially in low-income areas where a large share of elderly and disabled people live, are the green spaces few and often poorly maintained. Furthermore, in the absence of parks or shaded sites and the isolated location created by uneven terrain and narrow paths, playing outside is no longer an option for many during extreme heat. Moreover, the interaction of socio-economic conditions and location is a key factor for the vulnerability of elderly and physically challenged people during urban heat episodes. The disadvantaged groups, who already have higher levels of heat exposure under the combined effects of hygiene and heat stress mentioned, also tend to suffer from systemic social inequities in access to public health, transport, and cooling centers. Residents of these regions may also have fixed incomes. They cannot afford to fight heat stress (air conditioning, for example), heightening their vulnerability to extreme temperatures (Foshang et al., 2024). The combination of geographic and environmental factors (UHI effect, and lack of green spaces and infrastructures) exposes elderly and disabled persons to high vulnerability during urban heat waves. The nature of these challenges calls for a transnational investigation into how urban planning and politics can deal with these systemic challenges to protect the well-being of these frail groups.

As cities manage the impacts of urban heat, and the heat waves become more frequent and severe, the inclusion of considerations about mental health in emergency preparedness and response plans will be critical to enhancing the security and well-being of groups such as those who are particularly vulnerable to these types of climatic events. The adversity-related complexities of safety and well-being of older and disabled populations during urban heat waves demand comprehensive approaches. One promising tactic allows for the creation of community cooling centers that serve as a haven during dangerous heat waves. These centers must be geographically distributed across communities, especially in neighborhoods with high-density, high-risk populations. The design and utilization of these structures may need to reflect barriers to access, and include ramps, lifts, and conspicuous signs to welcome people with mobility impairment (Tschakert et al., 2025). Further, these cooling centers should be equipped to offer vital services like hydration, medical intervention, and social support systems, which can foster a sense of community and stimulate usage among seniors and those with disabilities.

These novel urban planning interventions are needed to build heat-resilient neighborhoods where older adults and persons with disabilities can thrive. Green spaces provide shade and contribute to the general resilience in urban areas, which urban planners must prioritize. This can be achieved by integrating several trees, green roofs, and public gardens within heavily populated neighborhoods. Green space acts as a passive cooling system and encourages social exchange to create links within a community of dwellers. Furthermore, these spaces must be equipped with ADA-compliant pathways and seat arrangements to ensure usability for all people, especially people with disabilities. Simultaneously, enhancing building codes and standards to incorporate heat-resistant elements can make meaningful contributions to protecting the high-risk population. For example, installing air conditioning units or heat reflection materials in the houses, especially the homes of the elderly or disabled, can reduce impacts from extreme temperatures. Providing low-income families with incentives to update living conditions through financial subsidies can also promote such needed changes. Furthermore, as a widely adopted practice, Community alert systems can help inform the elderly and disabled of an impending heat wave. Such systems will ideally be able to relay alerts through voice, SMS, and social media, and accommodate varying technological familiarity in the target population. Projects, such as, for example, CARMINE (https://carmine-project.eu/), now intend to link the different disciplines precisely in function of the best 'everyday' defense of the weak primarily through the design of urban adaptation actions to foster as much as possible the autonomy of people bearing physical and mental problems generated by urban determinants (CARMINE, 2024; Kang et al., 2024; Sanchez-Gonzalez & Osorio-Arjona, 2025).

Partnerships among authorities, health organizations, and non-profit organizations can result in establishing heat control mechanisms to control well-being and awareness programs and training for the prevention of heat diseases based on the needs of elderly and disabled people (Tschakert et al., 2025). By methodically implementing these global strategies, urban areas can maximize the protection of their most vulnerable populations from the risks of extreme heat., Cooperation between public health policies and local

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

♣*Corresponding Author: Teodoro Georgiadis*

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

government initiatives is essential for protecting vulnerable populations, including the elderly and the disabled, during urban waves. These demographics have specific vulnerabilities in extreme heat events, including aggravation of heat-sensitive pre-existing morbidity, impacts on mobility, and reduced general resilience (Bethan & Harwood, 2023). Therefore, medical care systems and communities must tailor interventions focusing on these vulnerabilities to enhance safety and well-being during heat episodes.

Public health education is essential to inform affected individuals and their caregivers about the perils of heat waves. Meaningful forms of communication should also consider the diverse health literacy and accessibility requirements of the elderly and disabled populations. A study by Håkansson et al. (Hakansson et al., 2018) underscores the critical need for a broad range of dissemination methods, such as home visits, telephone verifications, and online platforms, to reach caregivers of young children with information regarding thermal safety and available resources. This approach could help more people identify the signs of heat-related illnesses and how to respond, reducing adverse health outcomes.

Adaptations are needed for the elderly and disabled in emergency response planning. Emergency services must be prepared to meet the needs of these populations during heat waves. This would involve establishing transparent protocols for identifying at-risk individuals in community centres, residential institutions, and private households, and ensuring that blue light services respond swiftly to mobilizing resources, such as cooling centres or home visits Bethan & Harwood, 2023). Local government should encourage partnerships with social service agencies, often already serving vulnerable populations, to streamline access to cooling, transport, and health check stations.

Moreover, prompt cooling measures are essential to any disaster response. Establishing official cooling centers requires considering accessibility features, such as ramps, modes of transportation, and specialized medical care. In extreme heat, the centers provide more than just relief—they are a place for social engagement and community care, which can combat the feelings of loneliness often felt by those at risk. Furthermore, public health programs across these centers may provide food services, health screenings, and hydration stations to meet the multiple needs of occupants (Hakansoon et al., 2018).

Training for health officials, emergency responders, and volunteers can improve the efficiency of such matters. The training tools to enhance sensitivity to the needs of older and disabled people could contribute to a more inclusive approach to emergency preparedness (Bethan & Harwood, 2023). Moreover, involving community members in developing and implementing such programs increases the effectiveness of all dissemination efforts, builds trust, and facilitates participation among at-risk populations. Building on targeted public health campaigns, as well as sound emergency responses and strong engagement of the communities, it is possible to work to reduce the negative impacts of urban waves on these marginalised populations. The identification of special vulnerabilities presented by the elderly and disabled during urban heat events has emphasized the importance of access to, consciousness about, and education on comprehensive strategies as a basis for steps to ensure safety and well-being in future heat conditions (Hutton et al., 2025). Examining the specific issues posed to the elderly and disabled segments of the community in this threat scenario also brought these special vulnerabilities to the fore, and the need for prompt attention to them. It is implied that social isolation, common among these populations, increases their risk during heat waves. Without family members living near enough to help care for them in the immediate aftermath of these events, many seniors and disabled individuals are forced to live on their own personal support network to monitor their health and well-being. Moreover, this population frequently has prior conditioning regarding access obstacles to transportation amenities (cooling centers, health services). The spatial structure of cities, especially services like parks, public transport, and housing, determines the vulnerability of these groups concerning heat stress (Cremonini et al, 2022; Nardino et al., 2021; Nardino et al., 2022; Xu et al., 2025).

Given these challenges, this emergency calls upon the urban planning and disaster preparedness communities to adopt an intersectional approach. Specifically, policy-makers and urban planners should prioritize the inclusive approaches that acknowledge the different needs of marginalized groups in the design of resources and common efforts in heat waves. Public policy to ensure fair access to temperature-regulated spaces is essential, especially in areas with significant temperature variations. This involves better access and availability to public cooling centers, accessible transportation for people with mobility limitations, and expanding existing social assistance programs to reduce isolation.

Furthermore, implementing local heat action plans with input from the community's elderly and disabled populations can lead to a more efficient response. Such plans must be based on evidence that has captured the

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

♣*Corresponding Author: Teodoro Georgiadis*

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

experiences and needs of such populations. Additional studies are warranted regarding the efficacy of these public health messages with different demographic data during heat emergencies to help municipalities identify communication strategies that will appeal to and inform people correctly.

4. Conclusions

A comprehensive understanding of the issues facing old people and people with disabilities during urban heat waves is essential to promote sustainable communities. Such adoption of an intersectional urban planning lens and the preparedness towards catastrophes will not only mitigate the immediate threats to the safety and well-being of these populations during heat events but also lay the foundations for a more inclusive, climate-resilient approach. With the urgency of climate change, it will be important that research efforts are responsive to proactive policies that place vulnerable communities at the center of political concern. These approaches will ultimately pave the road toward sustainable cities where health, in addition to dignity, is the priority of every inhabitant. Future research avenues should pursue the longer-term adaptations required to address the impacts of climate change on exposed people. This includes the analysis of complex infrastructure solutions, such as water-sensitive urban design and green spaces that can lower temperatures and offer respite during extreme heat. The role of new technology in detecting real-time ambient conditions and personalizing health statuses for the elderly and disabled will also be explored.

References

Baecker, L., Iyengar, U., Del Piccolo, M. C., & Mechelli, A. (2025). Impacts of extreme heat on mental health: Systematic review and qualitative investigation of the underpinning mechanisms. *The Journal of Climate Change and Health, 22*, 100446. https://doi.org/10.1016/j.joclim.2025.100446

Cacioppo, S., & Cacioppo, J. T. (2022). *Introduction to social neuroscience*. Raffaello Cortina Editore.

CARMINE EU Project. (2024). *CARMINE resilient development pathways in metropolitan regions of Europe* (EU Grant Agreement No. 101137851).

Chakraborty, J. (2025). The frequency of heatwave and disability status: A case of thermal inequities in the US South. *Disability and Health Journal, 18*, 101400. https://www.sciencedirect.com/science/article/pii/S1936657424001043

Cremonini, L., Nardino, M., & Georgiadis, T. (2022). The utilization of the WMO-1234 guidance to improve citizen's wellness and health: An Italian perspective. *International Journal of Environmental Research and Public Health, 19*(22), 15056. https://doi.org/10.3390/ijerph192215056

Dardin, A. A. (2024). *Heat waves and thermal comfort levels of the elderly in the city of Sao Paulo, Brazil: A Mapp Corporation (Urban Redevelopment and Projects Manager) development of web-based GIS evaluation parameters* [Doctoral dissertation, University of São Paulo]. https://www.teses.usp.br/teses/disponiveis/16/16132/tde-04022025-095128/en.php

Davies, B., & Harwood, R. H. (2023). The climate and biodiversity crises–Effects and opportunities for older people. *Age and Ageing, 52*(11), afad213. https://doi.org/10.1093/ageing/afad213

De Gea Grela, P., Sánchez-González, D., & Gallardo Peralta, L. P. (2024). Heat waves: Their impact on the health of elders in urban and rural areas and the role of the general practitioner. *Land, 13*(9), 1378. https://www.mdpi.com/2073-445X/13/9/1378

Foshag, K., Fürle, J., Ludwig, C., Fallmann, J., Lautenbach, S., Rupp, S., Burst, P., Betsch, M., Zipf, A., & Aeschbach, N. (2024). How to assess the needs of vulnerable population groups towards heat-sensitive routing? An evidence-based and practical approach to reducing urban heat stress. *Erdkunde, 78*(1), 1–33. https://doi.org/10.3112/erdkunde.2024.01.01

Guolo, F., Stivanello, E., Pizzi, L., Georgiadis, T., Cremonini, L., Musti, M. A., Nardino, M., Ferretti, F., Marzaroli, P., Perlangeli, V., Pandolfi, P., & Miglio, R. (2022). Emergency department visits and summer temperatures in Bologna, Northern Italy, 2010–2019: A case-crossover study and geographically weighted regression methods. *International Journal of Environmental Research and Public Health, 19*(23), 15592. https://doi.org/10.3390/ijerph192315592

Håkansson, M., Durgun, Ö., & Eriksson, K. (2018). "'None of us was prepared'"—Providing care to a vulnerable group during a heat wave in Sweden. *Journal of Emergency Management, 21*(1). https://wmpllc.org/ojs/index.php/jem/article/view/3485

Holland, A. B., Markides, K. S., & Milani, S. A. (2024). The intersection of climate change and aging and disability. In *The Palgrave Encyclopedia of Disability* (pp. 1–9). Springer Nature. https://doi.org/10.1007/978-3-031-40858-8_132-1

Hutton, A., Maud, K., Giggins, H., Skipp, M., & Verdon-Kidd, D. (2025). Are we educating enough about climate change adaptation to tackle the rising heatwaves impacting the elderly? *International Journal of Disaster Risk Science*, 1–8. https://doi.org/10.1007/s13753-025-00620-x

Kang, Y., Baek, I., & Park, J. (2024). A study on the impact of the heatwave on the disabled in South Korea. *Scientific Reports, 14*(1), 3459. https://doi.org/10.1038/s41598-024-54015-x

Kang, Y., Park, J., & Jang, D.-H. (2024). Joint effects of heatwaves on vulnerable populations by age, income, and disability. *Scientific Reports, 14*(1), 24732. https://doi.org/10.1038/s41598-024-75224-4

Meadows, J., Mansour, A., Gatto, M. R., Li, A., Howard, A., & Bentley, R. (2024). Mental illness and increased vulnerability to negative health effects from extreme heat events: A systematic review. *Psychiatry Research, 332*, 115678. https://doi.org/10.1016/j.psychres.2023.115678

Nardino, M., Cremonini, L., Georgiadis, T., Mandanici, E., & Bitelli, G. (2021). Microclimate classification of Bologna (Italy) as a support tool for urban services and regeneration. *International Journal of Environmental Research and Public Health, 18*(9), 4898. https://doi.org/10.3390/ijerph18094898

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

♣*Corresponding Author: Teodoro Georgiadis*

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

Nardino, M., Cremonini, L., Crisci, A., Georgiadis, T., Guerri, G., Morabito, M., & Fiorillo, E. (2022). Mapping daytime thermal patterns of Bologna municipality (Italy) during a heatwave: A new methodology for cities adaptation to global climate change. *Urban Climate, 46*, 101317. https://doi.org/10.1016/j.uclim.2022.101317

Padhy, S. K., Sarkar, S., Panigrahi, M., & Surender, P. (2015). Mental health effects of climate change. *Indian Journal of Occupational and Environmental Medicine, 19*(1), 3–7. https://doi.org/10.4103/0019-5278.156997

Park, J., Kim, A., Al-Aly, Z., Ebi, K. L., Kim, H., & Lee, W. (2025). Risk of heat and hospitalisation: An appropriateness study in the disabled population in South Korea. *Nature Communications, 16*(1), 4040. https://doi.org/10.1038/s41467-025-59270-8

Prina, M., Khan, N., Khan, S. A., Caicedo, J. C., Peycheva, A., Seo, V., Xue, S., & Sadana, R. (2024). Climate change and healthy ageing: Assessing the impact of climate hazards on older people. *Journal of Global Health, 14*, 04101. https://doi.org/10.7189/jogh.14.04101

Repke, M. A., Berry, M. S., Conway, L. G., Metcalf, A., Hensen, R. M., & Phelan, C. (2018). How does nature exposure make people healthier? Evidence for the role of impulsivity and expanded space perception. *PLOS ONE, 13*(8), e0202246. https://doi.org/10.1371/journal.pone.0202246

Sánchez-González, D., & Osorio-Arjona, J. (2025). Mobility behaviors of elderly people during heat waves in the city of Madrid. *Urban Science, 9*(7), 236. https://doi.org/10.3390/urbansci9070236

Sisodiya, S. M., Gulcebi, M. I., Fortunato, F., Mills, J. D., Haynes, E., Bramon, E., Chadwick, P., Ciccarelli, O., David, A. S., De Meyer, K., Fox, N. C., Wetton, J. D., Koltzenburg, M., Kullmann, D. M., Kurian, M. A., Manji, H., Maslin, M. A., Matharu, M., Montgomery, H., Romanello, M., … Hanna, M. G. (2024). Climate change and disorders of the nervous system. *The Lancet Neurology, 23*(6), 636–648. https://doi.org/10.1016/S1474-4422(24)00087-5

Somoza-Moncada, M. M., Turrubiates-Herrnandez, F. J., Munoz-Valle, J. F., Gutierrez-Brito, J. A., Diaz-Perez, S. A., Aguayo-Arelis, A., & Hernandez-Bello, J. (2023). Vitamin D in depression: A potential bioactive agent to reduce suicide and suicide attempt risk. *Nutrients, 15*(7), 1765. https://doi.org/10.3390/nu15071765

Tschakert, P., Ogra, A., Sharma, U., Karthikeyan, K., Singh, A., & Bhowmik, A. (2025). Crosscutting inequalities and urban heat adaptation. *Global Environmental Change, 92*, 103003. https://doi.org/10.1016/j.gloenvcha.2025.103003

Ursano, R. J., Morganstein, J. C., & Cooper, R. (2017). *Resource document on mental health and climate change*. American Psychiatric Association. https://www.psychiatry.org/getattachment/b7fb9e58-86f7-4b54-bd32-59fb50f32d9c/Resource-Document-2017-Mental-Health-Climate-Change.pdf

World Health Organization. (2021a). *Mental health atlas 2020*. https://www.who.int/publications/i/item/9789240036703

World Health Organization. (2021b). *Checklists to assess vulnerabilities in health care facilities in the context of climate change*. https://www.who.int/publications/i/item/checklists-vulnerabilities-health-care-facilities-climate-change

Xu, Z., Georgiadis, T., Cremonini, L., Marini, S., & Toselli, S. (2025). The perceptions and attitudes of residents towards urban green spaces in Emilia-Romagna (Italy)—A case study. *Land, 14*(1), 13. https://doi.org/10.3390/land14010013.

Research in Social Sciences
ISSN: 2641-5305
Vol. 8, No. 4, pp. 66-72
2025
DOI: *10.53935/2641-5305.v8i4.468*

Corresponding Author: Teodoro Georgiadis

Funding: *This study was conducted in the frame of the project Climate-Resilient Development Pathways in Metropolitan Regions of Europe (CARMINE) funded by the European Union under the Horizon Europe Programme (Grant Number: 101137851).*

Copyright:
© 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).