UNIVERSITY OF MIAMI
OFFICE of CIVIC & COMMUNITY ENGAGEMENT

SCAN360

HEAT and HEALTH

Urban Heat Islands & Melanoma Incidence: The Urban Heat Island Effect refers to the temperature difference between urban areas and their surrounding rural or natural environments. This temperature disparity contributes to increased risk factors for melanoma, including higher ultraviolet (UV) radiation exposure.

The Protective Role of Greenness in Mitigating the Urban Heat Island Effect

RESEARCHER SPOTLIGHT!

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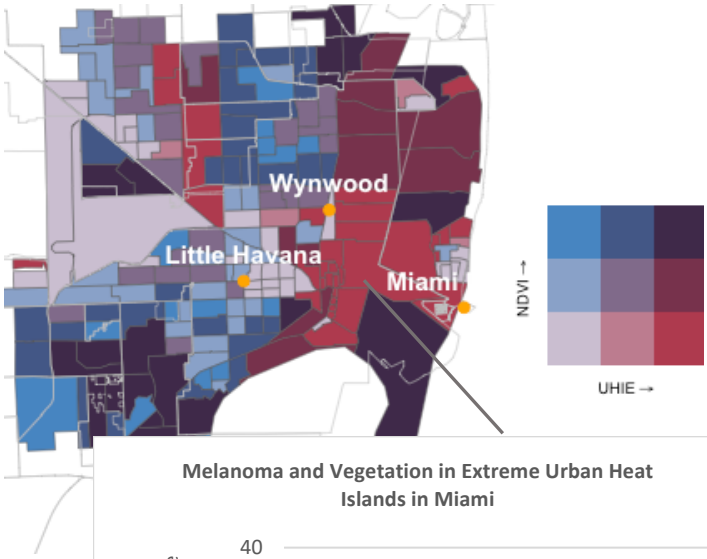
Rebecca Kaiser is a key contributor to this factsheet. Rebecca is a first-year MD/MPH student at the Miller School of Medicine. For her capstone project, she is studying melanoma incidence and how social determinants of health and climate change contribute to disparities in skin cancer prevention and treatment.

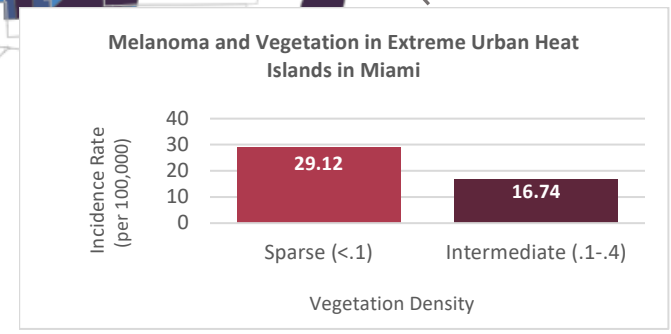
The Urban Heat Island Effect (UHIE) is a phenomenon in which urban areas experience elevated temperatures due to high concentrations of heat-absorbing surfaces, such as concrete and asphalt. This heightens the risk of melanoma by indirectly increasing sun and UV radiation exposure within these areas. As climate change is expected to exacerbate these conditions, further research is critical in identifying mitigation strategies.

One promising approach is the increase of vegetation in urban heat islands, which provides natural cooling and UV protection. Research has shown that more disadvantaged communities typically have lower vegetation density, also highlighting the need to prioritize this in urban planning efforts.

To further explore this topic, our study investigated the relationship between UHIE, vegetation density, and melanoma incidence in the city of Miami. Our results show the impact of UHIE on overall melanoma incidence is significantly reduced as vegetation density increases, suggesting a protective effect.*

The map below illustrates the distribution of UHIE and vegetation, with bright red highlighting tracts that would likely benefit most from increased vegetation, as they exhibit the highest UHIE and lowest NDVI.** The accompanying graph further compares average tract-level incidence in these high-UHIE areas by NDVI category.





While greening initiatives are underway in Miami and other cities, staying informed about how to protect yourself from sun and heat exposure remains essential. Please see the attached resource page to learn more about these topics and discover ways to stay safe and advocate for healthier communities.

** Modeled using FCDS age-adjusted incidence rates (2019), controlling for tract-level demographic composition, socioeconomic status, and environmental measures*
*** NDVI (Normalized Difference Vegetation Index: A scale from -1 to 1 that quantifies vegetation density using satellite imagery (2014-2018; usgs.gov)*

References:
- *Whiteman DC, Neale RE, Green AC. Climate change and skin cancer: A new and increasing public health challenge. Lancet Oncol. 2023;24(8):e353-e361.*
- *Jones L, Smith K, Brown R. The impact of climate change on dermatological health: A review. Public Health.2024;226:12-18.*
- *Yamaguchi Y, Beer L, Kraemer KH. UV exposure and DNA damage in human skin: Implications for cancer risk. Int J Dermatol. 2024;63(2):234-245.*
- *Osei DA, Kwakye EO, Mensah MA. Skin conditions and UV radiation exposure: Implications for dermatological health. Int J Womens Dermatol. 2020;6(3):178-184.*
- *Lee CH, Wong CK, Chiu ML. Pediatric skin cancer risk factors and prevention strategies. Pediatr Dermatol.2024;41(1):56-67.*
- *Nguyen AA, Taylor DM, Chen AC. Climate change, ozone depletion, and the rising incidence of skin cancer. Med J Aust. 2023;219(5):234-240.*
- *Glazer AM, Rigel DS. Trends in skin cancer incidence and prevention strategies. JAMA Dermatol. 2020;156(11):1202-1208.*
- *Schadendorf D, Fisher DE, Garbe C. Melanoma epidemiology and trends: Insights from global data. J Skin Cancer.2016;2016:4635740.*

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Learn More About Skin Cancer, Heat Exposure, and Community Resources:

- Heat Exposure in Miami-Dade County
  - Explore how rising temperatures impact health and communities: Miami-Dade Heat Exposure StoryMap
- Skin Cancer Care & Appointments
  - Learn about skin cancer services at Sylvester Comprehensive Cancer Center: Skin Cancer Information & Appointments
- Sun Safety Tips
  - Protect your skin with these evidence-based sun protection practices: Skin Protective Practices
- Melanoma Warning Signs
  - Know what to look for with this guide to melanoma symptoms and images: Melanoma Warning Signs
- Greening Our Communities
  - Learn about efforts to expand urban tree coverage in Miami-Dade County: Urban Forestry Draft Plan

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