



# Dermatologic Manifestations of Heat Exposure in Migrant and Displaced Populations: A Scoping Review

Cecile Schreidah<sup>1</sup>, Kashif Ansari<sup>2</sup>, Andrew Creamer<sup>3</sup>, Dr. Kyle Martin<sup>4</sup>, Dr. Lida Zheng<sup>1,5</sup>

<sup>1</sup>Northwestern University Feinberg School of Medicine, <sup>2</sup>Vanderbilt University School of Medicine, <sup>3</sup>Brown University, <sup>4</sup>Warren Alpert Medical School of Brown University, <sup>5</sup>Northwestern Memorial Healthcare

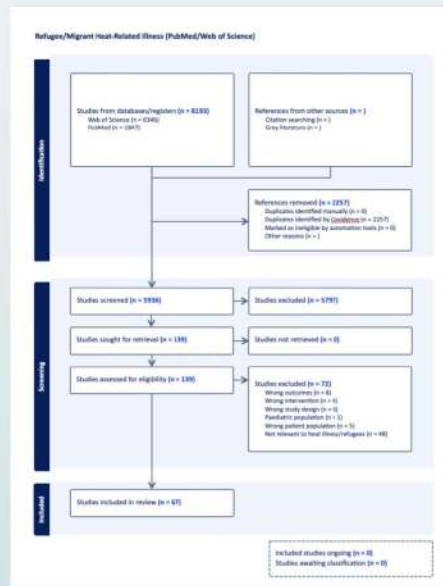
**M Northwestern Medicine**  
Feinberg School of Medicine

## Introduction

- Climate-driven heat exposure poses significant health risks worldwide. Migrant and displaced populations are particularly vulnerable due to occupational exposure, unstable housing, and systemic barriers to healthcare.
- While heat-related illness has been widely studied, the dermatologic consequences of heat exposure in these populations remain unclear.
- This study aims to characterize dermatologic risk factors and manifestations associated with heat exposure among migrant and displaced populations.

## Methodology

- We conducted a scoping review following PRISMA-ScR guidelines. A comprehensive literature search of PubMed and Web of Science was performed using MeSH terms related to heat exposure, migration status, and health outcomes.
- A total of 8,193 studies were imported into Covidence. After removing 2,257 duplicates, 5,936 studies underwent title and abstract screening, with 5,797 excluded. The remaining 139 full-text articles were reviewed independently by two reviewers (CS, KA), with 67 meeting inclusion criteria.
- Data extraction followed a standardized binary framework across four domains (21 subcategories):
  - Heat exposure types
  - Heat injury types
  - Key findings
  - Dermatologic observations



## Results

- Six dermatologic subcategories were identified:
  - Heat rash
  - Sunburn risk
  - Sunscreen underutilization
  - Clothing-related heat trapping/irritation
  - UV exposure concerns
  - PPE-associated irritation
- Clothing-related skin risk was most frequently reported (52.24%), followed by:
  - Heat rash (31.34%)
  - Sunburn risk (20.90%)
  - PPE-associated irritation (17.91%)
  - Sunscreen underutilization and UV exposure concerns were least examined (11.94%).
- Although 31.34% of studies discussed sunburn risk, fewer than half assessed sunscreen underutilization or UV exposure behaviors. Among studies addressing UV exposure concerns, 87.5% contextualized findings within cultural beliefs, underscoring the importance of culturally competent prevention strategies.

## Conclusion

- Heat exposure and related illness are widely documented in migrant and displaced populations; however, dermatologic manifestations remain underexplored.
- Future research must integrate dermatologic risk assessment into heat-related health studies and develop culturally responsive prevention strategies.



# From Policy to Physiology: Multinational Gold Mining and Women's Health in El Salvador



Anna Mulhern

## Abstract

This cross-sectional, community based research and education project addressed El Salvadoran women's perceptions of the anticipated pathophysiological impacts of proposed multinational mining projects on their individual health, family health and health of their community. It also assessed advocacy approaches that integrate biomedical risk communication with women's rights-based organizing within El Salvador's political context.

## Background

Proposed multinational gold mining in El Salvador, situated within a political history shaped by U.S. government-backed military violence and economic intervention, undermines decades of community-led environmental and public health protections. President Bukele's 2024 reversal of the 2017 national mining ban places communities at heightened risk of exposure to these mining related toxins:

- cyanide
- arsenic
- mercury
- lead
- cadmium

Exposure to these continents have downstream reproductive, endocrine, renal, and neurodevelopmental effects. Women face disproportionate harm due to gendered exposure pathways and structural marginalization. In response, anti-mining organizations are centering women in both the content and structure of their advocacy. The goal of this project was to assess the biggest health and safety concerns of local women with regards to the proposed mining.

## Methods

I lived in rural El Salvador for two months and worked with the country's leading anti-mining advocacy organization, ADES. This collaborative, community based project used cross-sectional methodology that combined assessment of participants' current understanding of mining-related health impacts with education. Methods for understanding the impacts of mining that women considered to be most concerning for their health and community's health included the following:

- 3 focus groups of community members with around 10 women per group - 30 women total.
- 4 semi-structured interviews with professional women's health and women's right advocates

Data was analyzed in a narrative format, with major themes expressed by multiple focus group participants confirmed through discussion in the semi-structured interviews and sub-categorized.

## Community-Based Research

Understanding the historical and current contexts of violence against community collaborators was foundational to study planning and workshop design. Community-based research projects require centering the needs and risk factors of local leaders and those most at risk. The images below share some of this context.



Images starting in the upper left and going clockwise:

- River "Rio" Lempa, the river that supplies water to most of the country of El Salvador and is liable to be contaminated by industrial scale gold mining
- Monument to the massacre at Rio Lempa in 1981 that killed many members of the community of Santa Marta, now a key community advocating for environmental health justice
- Mural in Santa Marta that reads "Juntas somos las fuertes," a message of women's activism that "we are stronger together"
- Poster of the 5 members of the Santa Marta community who are environmental activists and currently under house arrest by the Salvadoran government
- Mural to a member of the Santa Marta community who was assassinated while advocating for the 2017 mining ban
- Message reading "Ni la tierra ni las mujeres son territorio de conquista" translating to "Neither the land or women are territory for conquest."



## Findings

Major themes expressed El Salvadoran women near proposed mining areas in each of the three focus groups, and confirmed through semi-structured conversations with women advocacy leaders can be encompassed by two major categories and respective sub-categories. Percentages represent the proportion of participants who mentioned each respective harm as a concern.

### 1. Health harms

- Neurodevelopment of children (100%)
- Anxiety and depression (100%)
- Kidney health impacts (82%)
- Hypertension related to stress (78%)

### 2. Livelihood and cultural harms

- Land dispossession and forced migration (100%)
- Water scarcity harming agricultural practices (100%)

## Conclusion and Limitations

This cross-sectional, community-based research and education project was limited by threats of carceral retribution, violence and restrictive laws. Due to historical and recent surveillance and threats by mining corporations and the El Salvadoran government, specifics about participant locations, identities and more detailed data collection was not possible. However, difficulty conducting environmental health research due to violence and repression should be approached not as a deterrent, but rather an indication to focus on community collaboration and safety in the research process. The safety of a community should never be compromised for a specific methodology.

This study provides a snapshot of environmental injustices currently happening in El Salvador. The related health concerns expressed by women in impacted communities and serves as an example of environmental health advocacy that centers women's voices.

# My Gap Years with the NYC Urban Forest

Olivia J. Keenan BA; olivia.keenan@icahn.mssm.edu  
Icahn School of Medicine at Mt. Sinai

## 1. Introduction

In August of 2023, I began my gap years as a Research Assistant at Weill Cornell Medicine in NYC. One of my roles was to engage with community members and urban foresters across NYC to understand the health benefits of the urban forest, particularly as it relates to mitigating extreme heat and improving environmental justice. What began as a job assignment turned into a deep passion and appreciation for urban trees, and led me on a journey across all five boroughs. Join me as I retrace my steps across subway stops, ocean bays, and railroads, through stories, lessons, and poems, all about urban trees.



Scan to learn more about NYC-specific policies on the urban forest

## 3. The People Who Care for the Urban Forest

Next, we will go uptown on the A or the 1 to visit the Super Stewards of Inwood Hill Park in Manhattan.

As discussed in the "Urban Forest and Our Health" section, an unhealthy urban forest, or an urban forest that is not cared for, will not provide optimal health benefits. But taking care of an entire urban forest is hard work! It requires a city full of dedicated stewards, both paid and volunteer.

As I networked with urban foresters in the city, I stumbled upon the NYC Parks Super Stewards program, a pathway for regular New Yorkers to receive advanced training to take care of street trees, trails, wetlands, and other natural areas. I attended trainings for both the street tree "Care Captains" and the "Trail Maintainers" at Inwood Hill Park. It is here where I learned how to best take care of a city tree in streets and parks.

Next, we will visit the Greenbelt Native Plant Center, now named the NYC Parks Plant Ecology Center and Nursery, which requires taking the Staten Island Ferry and then asking a friend for a ride...

The Native Plant Center is the hub for NYC Parks seed conservation and native tree cultivation. I visited to see the young tree saplings and help organize native plants to be distributed to Care Captains for tree bed beautification. Taking care of tree beds is an essential part of overall tree health. A trash-free, aerated, well-watered, beautiful tree bed often houses a much happier, healthier tree.

## 4. The Great Trees of New York

Finally, we will end our journey in the Bronx and Brooklyn, where some of the greatest (and unexpected) arboretums and forests in the city are located. First, the Bronx, which holds Wave Hill, Woodlawn Cemetery, and the New York Botanical Garden, accessible (mostly) by the 4 train and Metro North train.

Stewardship of the urban forest is a lot easier when you develop a personal relationship with the trees around you. One way to do this is to keep a journal and write about what you observe in the trees. But in NYC, another way to cultivate this relationship is by visiting the Great Trees of New York, a list of over 100 trees with historical, cultural, and cultural significance.

I first visited the Woodlawn Cemetery for a New York Re-Leaf workshop on tree care, extreme weather, and urban public health. Woodlawn Cemetery has 8 Great Trees. Wave Hill is a garden and cultural center that I visited for a Great Tree event, equipped with Great Tree volunteers and a Great Tree coloring book. Wave Hill has 3 Great Trees. Finally, I visited the New York Botanical Garden (NYBG) for a Tree ID walk. NYBG has 3 Great Trees.

Further south off the 2,3,Q,N, or D trains are some of my favorite Great Trees of Brooklyn.

Greenwood Cemetery is another cemetery that also serves as an arboretum in NYC. I visited for a Spring Bloom Tree ID tour, perfect for the cherry blossom season and visiting their famous Camperdown Elm Great Tree. And finally, the trees of Brooklyn Botanic Garden (BBG), a garden I have visited my whole life because my family lives nearby. When I first moved to NYC in 2023, BBG's Power of Trees exhibit sparked my desire to discover the urban forest's stories, facts, and sites around the city. BBG's 5 Great Trees and Native Flora Garden are some of my favorite trees to learn from in the city.

## 2. The Urban Forest and Our Health

First, we will stop in Jackson Heights, Queens, off of the R, F, or 7 train.

Trees are well-understood in the literature to be essential for our health. Some of trees' health benefits include providing cooling and shade, improving mental health outcomes, filtering the air, and lowering stress levels. A healthy urban forest that is well taken care of produces the best public health benefits. Over time, I found that stewarding (taking care) of trees is also healthy for us.

On this stop, I found wonderful examples of how community-centered spaces with trees demonstrate the best reciprocal benefits of caring for each other and the trees around us, and the trees in turn caring for us.

The Moore-Jackson Community Garden is a space for community members of all ages to gather for puppet shows and art exhibits, eat garden-grown produce, organize resources for fundraising opportunities, learn about beekeeping and plant care, and rest on a hot day under the old mulberry, or the newly planted cherry trees.

A few blocks east, the 34th Avenue Greenway is a 1.3 mile Open Street that, since COVID, has been a pedestrian-only thoroughfare thanks to the organizing of the 34th Avenue Open Streets Coalition. The avenue now has ample greenspace, and plans for new trees and gardens to be planted. This Greenway is another example of how the urban forest can be creatively expanded to benefit community health and wellness, especially during a public health emergency like COVID-19. Now, more people have access to shade, cleaner air, space for physical activity, and opportunities for stewardship education.



Scan to see more resources on trees and public health



Scan to learn more about how to take care of a street tree



Scan to learn more about the Great Trees and journaling about trees and nature



Scan to learn more about the Great Trees and journaling about trees and nature



Scan to see examples of stories and poems about trees



Route: Staten Island Ferry  
**Greenbelt Native Plant Center, Staten Island**  
Well beyond the Staten Island Ferry stop sits the Greenbelt Native Plant Center, now named the NYC Parks Plant Ecology Center and Nursery. This nursery is the city's main hub for native plant distribution and seed storage. I visited once to tour the tree saplings, see the seeds, and help distribute native plants for street tree beds.



Route: NYC Subway or Metro North  
**Woodlawn Cemetery, NY Botanical Garden, and Wave Hill, Bronx**  
Woodlawn Cemetery is another cemetery in New York that serves as a spectacular arboretum, with 8 Great Trees. Wave Hill is a private garden with 3 Great Trees, and rotating exhibits that honor trees (including Forest Bathing events!) The New York Botanical Garden is also home to 3 Great Trees and the Thain Family Forest, and weekly tree tours for the curious traveller.

Route: NYC Subway  
**Inwood, Manhattan**  
Inwood Hill Park has incredibly devoted volunteer stewards to take care of mature old growth forests, including an Eastern Hemlock that some locals say is the true "oldest tree of NYC". Inwood Hill Park is where I trained to be a "Tree Care Captain" and "Trail Maintainer", and where I learned about how to spot non-native plant species that can be harmful to trees.

Route: NYC Subway  
**Jackson Heights, Queens**  
Moore-Jackson Community Garden is a green space for community to gather, make art, rest, and learn about stewardship and gardening. A few blocks away, the 34th Avenue Greenway boasts 1.3 miles of an "Open Street", with plenty of new trees and gardens caring for and being cared for by the community.

**Great Trees NYC List**

Route: NYC Subway  
**Brooklyn Botanic Garden and Greenwood Cemetery, Brooklyn**  
The Brooklyn Botanic Garden is a beautiful arboretum, boasting species from all over the world and 5 Great Trees, but also a very special Native Flora Garden narrated by Chene Bullock, an enrolled Shinnecock Indian Nation tribal member. BBG's 2023 exhibit "The Power of Trees" sparked my love for trees. Across Prospect Park, the Greenwood Cemetery is a lesser known arboretum, with 1 official Great Tree but dozens of other notable trees, and self-guided or guided tours offered to visit them and hear their stories.

## 5. Conclusion

I hope these chronicles can inspire others to, at the very least, notice the trees around them. While there is plenty of data to back me up when I say how important trees are for our own health, I hope it has also become clear that it is much more than that. I believe that caring for and noticing trees is a solution to mending the broken relationship many of us have with nature. It is one thing to recycle and turn off lights, but it is another to lay hands on the bark of a Great Tree, or to see the dirt in your fingernails after planting a new tree on a street that needs it, or to journal about the trees as they change through the seasons. It is essential for our individual health, and for the health of our community. I hope you can find a way to notice a tree in your life after today! It is one of the best things that ever happened to me.