Education Seminars on the Health Risks of Extreme Heat in Under-Resourced Colorado Communities

Nathaniel Bunnell, BA, Cameron Basquez-Pfeifer, BS, William Canty, MS, Logan Harper, MD

Developed and Delivered via Collaboration With:

HEALTHY AIR & WATER COLORADO

Abstract

Extreme heat is the deadliest weather-related hazard in the United States. Heat-related mortality is largely preventable, underscoring the need for effective community-based education. We implemented a pilot series of community heat-health seminars led by medical trainees and delivered in partnership with local organizations to improve access for underserved populations. Educational content was adapted from established federal and public health resources. A total of 25 participants attended the seminars (mean age 47.9 ± 14.3 years); most identified as female (76%) and preferred Spanish (72%). Educational attainment and income levels were low overall, reflecting a high-risk population. Attendance increased across the three summer sessions, and community-led follow-up programming emerged from this pilot study. Pre- and post-seminar surveys demonstrated no significant change in participants' confidence in preventing heat-related illness (p = 0.86), but non-significant trends toward improved confidence in recognizing heat illness (p = 0.10) and identifying relevant resources (p = 0.083).
This pilot suggests that medical trainee–led seminars are a feasible and community-accepted model for heat-health education. While limited by small sample size, this approach may enhance climate resilience in vulnerable communities while simultaneously meeting medical education objectives in community engagement and immersion.

Introduction: The Relevance of Heat Illness and Climate Education

In 2023, at least 2,325 people died due to extreme heat across the U.S., though this is likely a severe underestimate due to poor clinical recognition.[1–3] Despite the rising threats posed by longer and more severe heat waves driven by climate change, public risk perception often does not reflect this reality.[4] In resource-rich settings, including most American communities, heat-related deaths are mostly preventable with proper education.

Seminars targeted toward high-risk communities have the potential to augment existing heat-education efforts on a larger scale. Previous heat action plans with a focus on community-level interventions have been shown to reduce mortality during heat waves.[5] One study found that community education seminars led by local health workers resulted in better understanding of best practices for heat safety and reduced rates of unplanned hospitalizations during heat waves.[6]

Due to the need for better dissemination of information about the adverse health outcomes associated with extreme heat, we implemented a series of pilot seminars led by medical trainees to teach at-risk community members about heat-related illness prevention. These seminars were anchored in a community setting through partnership with local organizations like Healthy Air and Water Colorado (HAWC) in an effort to improve access. Educational material was adapted from existing resources, including the CDC Heat and Health Patient Toolkits and Heat Risk Dashboard,[7,8] Harvard/Americares Toolkit for Climate Resilient Health Clinics,[9] and the extreme heat page of Ready.gov (the FEMA website that provides guidance for personal preparedness for natural disasters).[10]

Bridging from former research and heat seminar implementation, this program represents a novel and innovative approach to community heat education in which medical trainees lead the educational seminars, thereby promoting climate resilience for vulnerable communities while also satisfying educational objectives around community engagement.

Methods

Survey Generation

Pre-Surveys inquired into demographic data of participants including age, primary language, gender, race/ethnicity, annual household income, and level of education attained. Participants were preliminarily surveyed on their knowledge of peers who had succumbed to heat-related illness, whether air quality or frequency of heat waves would worsen in the future, and their self-determination of capacity to find heat-health resources with a series of questions structured with "yes, no, don't know" options. Participants were surveyed on their knowledge of the symptoms of heat exhaustion and heat stroke with check all that apply questions. They were then asked to rank their confidence on a Likert 1-5 scale in recognizing the symptoms of heat-related illness and preventing the development of heat-related illness through prophylactic measures. Post-Surveys were matched via ID and measured changes in confidence and heat-illness symptom knowledge over time.

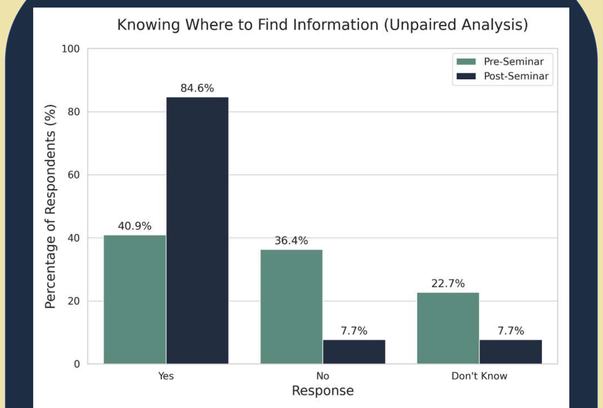
Statistical Analysis

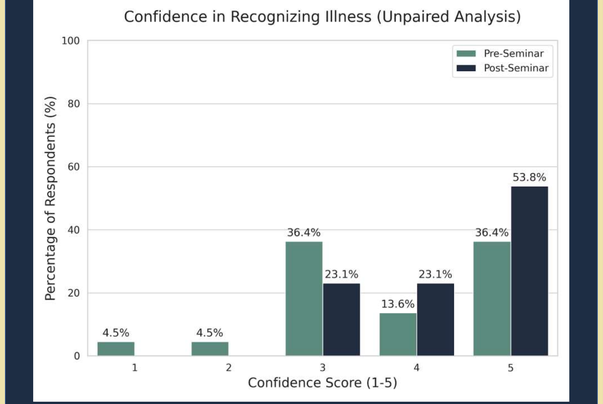
Stata was used to examine both paired and unpaired data survey sets. Mann-Whitney Tests were used to analyze the unpaired initial and final response surveys with ordinal, Likert-style variables. Fischer exact tests were used to analyze questions with "yes/no/don't know" options. McNemar's test was used to analyze pre and post responses to CATA questions. A combination of McNemar and Wilcoxon Signed-Rank tests were used to analyze paired-ID responses between initial and final surveys.

Results

Characteristics	n	%	μ	SD
Gender				
Female	19	76		
Male	6	24		
Preferred Language				
No Response	5	20		
Spanish	18	72		
English	2	8		
Education Level				
No Response	4	16		
< High School	6	24		
Some High School	3	12		
High School Grad	8	32		
Some College	2	8		
College Degree	2	8		
Income				
No Response	5	20		
< $30,000	9	36		
$30 – 60,000	10	40		
$60 - 90,000	1	4		
> $90,000	0	0		
Age			47.95	14.3

Table 1: Demographic Characteristics of Climate Seminar Participants. *N* = 25. Participants were on average 47.95 years old (*SD* = 14.3), and participant age did not differ significantly by the conditions listed above. All participants identified as Hispanic/Latino. Notably, there was a statistically significant difference in gender and education level (p = 0.001, 2 sided Fischer's exact test), but this is likely also explained by the small sample size in this pilot study.





Figures 1 and 2: Pre and Post Seminar Confidence Ratings Demonstrate Non-Significant Trends Towards Higher Awareness. While no significant findings were elucidated during this pilot study, the fraction of participants not knowing where to find critical resources dropped to 14% (p = 0.083), while confidence in illness recognition trended toward higher Likert values (p = 0.10).

Discussion

Though our sample size was limited, this pilot study indicates that our heat education seminars were effective in bridging critical information gaps and enhancing attendee confidence. **The most significant finding was the substantial increase in participants knowing where to find information about heat risk and safety. In the unpaired analysis, knowledge rose from 41% pre-seminar to 74% post-seminar (p=0.083), while the paired analysis showed an improvement from 50% to 83%.** This outcome is particularly important because access to reliable information is a foundational component of climate-health literacy. **Confidence in recognizing heat illness also showed a positive trend, with the median score in the paired group increasing from 4.0 to 5.0 (p=0.10).** This suggests the curriculum successfully clarified the specific symptoms of heat exhaustion versus heat stroke, empowering attendees to identify danger signs earlier. Conversely, confidence in preventing heat illness remained stable and high. This stability may reflect a "ceiling effect" where attendees entered with high baseline confidence, or potentially a "re-calibration" effect where they realized prevention requires more specific actions than previously thought but still chose to score highly after our seminar intervention.

These findings align with broader literature suggesting that community-based education is a potent tool for harm reduction. Studies have shown that targeted educational outreach, particularly for vulnerable populations like older adults, can significantly improve prophylaxis and self-reported heat stress management.[11] **However, other studies note that high awareness does not always translate to behavioral change if individuals do not perceive themselves as part of an at-risk group.[12]** By focusing on actionable resources, this seminar effectively moved attendees beyond passive awareness toward active preparedness, a critical step in building community resilience against worsening heat waves.

Notable limitations of this study include language barriers and the limited sample size of surveyed participants, particularly those with paired ID responses. Language barriers were combatted with multilingual resource administration via the use of translating services, but the researchers were primarily English speaking and there may have been miscommunications in content delivery or survey administration that were improperly addressed. The sample size was limited by stringent funding and shortened turn around, but increasing attendance at subsequent sessions suggests future research opportunities in climate intervention and community partnership.

References

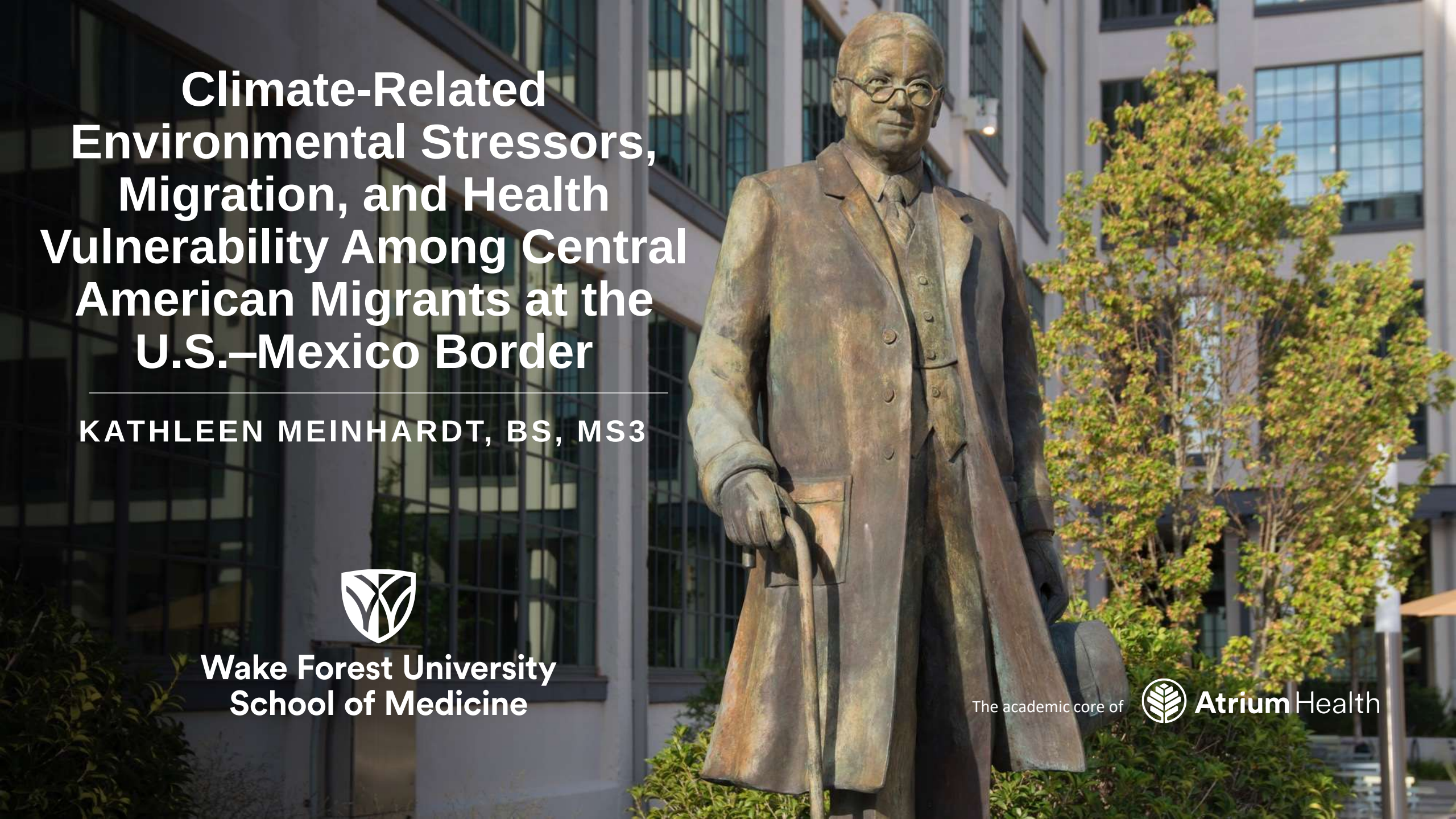
To view my references, please scan the QR code to the right. Thank You!

Climate-Related Environmental Stressors, Migration, and Health Vulnerability Among Central American Migrants at the U.S.–Mexico Border

KATHLEEN MEINHARDT, BS, MS3

Wake Forest University
School of Medicine

The academic core of Atrium Health



Background

Climate Change and Displacement in Central America

- Central America has experienced:
  - Drought, heat shocks, rain variability
  - Food insecurity
  - Natural disasters (e.g., hurricanes)
- Impacts are unevenly distributed, disproportionately affecting marginalized populations
- The region is projected to experience significant future temperature increases

Climate Stressors and Migration

- Extreme heat linked to agricultural disruption, labor instability, and U.S.-bound migration

U.S.-Mexico Border as a Site of Environmental Risk

- Increasing border morality (2018-2022)
- Environmental heat exposure is leading cause of death
- Desert terrain + border enforcement policies may increase physiologic stress and limit access to care

Gap: How climate stress translates into migration and health risk remains under-synthesized.

Objective

To synthesize evidence on how climate-related stressors drive migration and shape downstream health risks, including morbidity and mortality, among Central American migrants at the U.S.–Mexico border.

Methods

Study design: narrative literature review

Search strategy:

- Custom climate-migration-health search string
- Database: PubMed
- Reference list cross-checking

Screening process:

- Primary abstract screening
- Secondary full-text review

Methods

Inclusion criteria

- Population: Human populations affected by environmental disasters leading to migration from Central America toward the US or US-Mexico Border
- Exposure: Climate change, extreme weather, natural disasters, environmental degradation are a primary or contributing driver of migration
- Outcome: Physical or mental health outcomes, healthcare access, or vulnerability
- Setting: Central America or the U.S.-Mexico border, 2012-2024

Results

Author (year)	Study Type	Study Design	Population	Sample Size	Climate Exposure	Primary Outcomes
World Food Programme (2015)	Mixed-methods secondary analysis	Literature review + country-level secondary data	Households and communities in the “Northern Triangle” of Central America (El Salvador, Guatemala, Honduras)	-	Drought and prolonged dry spells	Migration (internal and to U.S.) Food insecurity and livelihood disruption
World Food Programme (2017)	Mixed-Methods observational	Cross-sectional surveys + interviews + admin data	Households and communities in the Central American “Dry Corridor” (El Salvador, Guatemala, Honduras)	54 key-informant interviews 660 community members in 44 focus groups 123 household surveys	Drought and prolonged dry spells Climate variability linked to El Niño conditions	Migration (internal and to U.S.) Food insecurity and livelihood disruption Household coping strategies
Bermeo & Leblang (2021)	Quantitative observational (secondary data)	Longitudinal ecological panel (regression)	Honduran households/ families migrating from Honduras to the United States (Observed via U.S. family-unit apprehensions)	-	Rainfall deviation and precipitation variability (drought) *Modifier*: homicide rate	Number of Honduran family-unit apprehensions at the U.S. border
Doering-White *et al.* (2024)	Qualitative	Cross-sectional interviews	Central American migrants in transit at a nongovernmental migrant shelter in Mexico	40 interviews	Self-reported climate disruptions (e.g., drought, heat, hurricanes, rainfall variability), both direct and indirect	Migration to U.S.

Key Vulnerabilities Among Affected Populations

Key findings across studies

- Migration observed primarily from the Northern Triangle (El Salvador, Guatemala, Honduras) and rural Mexico
- Most affected groups included small-scale farmers, laborers, and rural households
- Migration frequently described as an adaptive coping strategy to environmental stress

Climate stressors as migration triggers

Heat

Drought

Rainfall variability

Agricultural disruption

Food insecurity

Structural factors amplifying risk

Poverty

Economic instability

Agricultural dependence

Violence / homicide rates

World Food Programme, 2015; World Food Programme, 2017; Bermeo and Leblang, 2021; Doering-White et al., 2024

Limitations

Migration shaped by complex political and enforcement contexts that may confound climate effects

Limited number of recent eligible studies

Heterogeneous study designs and migration measures

Structural drivers (e.g., violence) not fully captured in search strategy

Potential underrepresentation of Spanish-language literature

Future Directions

Prospective, individual-level longitudinal studies

Quantify proportion of climate-exposed individuals who migrate vs. remain

Stratify by socioeconomic vulnerability (education, income, land ownership)

Incorporate mediators (food insecurity, violence, labor instability)

Examine health outcomes during and after transit

Study populations unable to migrate

Conclusions

Climate-related stressors — particularly **drought, heat, and rainfall variability** — are consistently linked to migration from Central America

Environmental shocks drive migration largely through **food insecurity, livelihood disruption, and economic instability**

Migration occurs within a context of **structural vulnerability**, including poverty and violence

Framing climate-related migration as a **public health and health equity issue** is essential for future research and policy

Acknowledgements and References

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Interprofessional Climate and Health Education: Addressing Knowledge Gaps in Healthcare Sustainability Through Collaborative Learning

Nandita M. Kasireddy BA[1], Prisha Jain BS Candidate[2], Kali Smolen PhD[1], Katie E. Lichter MD, MPH[1,3]

[1]Geisel School of Medicine at Dartmouth, [2]University of California, Los Angeles (UCLA), [3]Dartmouth Cancer Center, Geisel School of Medicine

BACKGROUND

Climate change poses unprecedented threats to human health, yet healthcare professionals receive minimal education on the linkages between climate and health, or training on how to reduce the environmental impact of healthcare. Furthermore, interprofessional education opportunities in climate and health are scarce, limiting collaborative approaches to this complex challenge. We developed and evaluated a six-week interprofessional enrichment course to address these critical knowledge gaps and prepare future healthcare professionals to integrate sustainability into clinical practice.

OBJECTIVE

To assess the impact of a 6-week course on participants' knowledge, engagement, and attitudes regarding the intersection of climate and health.

METHODS

We designed a hybrid enrichment elective at Dartmouth's Geisel School of Medicine (Oct-Nov 2025) with six weekly 75-minute sessions (**Table 1**). Participants included students in medical school, graduate school, and faculty/staff (N=20) (**Figure 1**). Changes in participants' climate-health competencies and attitudes were evaluated with pre- and post-program surveys consisting of 12 items rated on a 5-point Likert scale (1 = strong disagreement, 5 = strong agreement), capturing knowledge and confidence in applying climate and health concepts in their future careers (Example question is shown in **Figure 2**).

Table 1: Course sessions and facilitators

Session Title	Facilitator(s)
Climate Change & Health: Framing the Crisis and Dartmouth's Role	McLellan, Crockett
Disaster Preparedness in a Changing Climate: Local Health Systems	Crockett
Evaluating Climate Change Through the Cancer Lens	Lichter
Measuring and Reducing Healthcare's Environmental Footprint	Pohl, Smolen, Lichter
Environmental Determinants of Health & Cancer Risk in the Upper Valley	Romano, Stommel
Air Pollution and Respiratory Disease in a Warming World	Paulin, Mayfield

Figure 1. Demographics

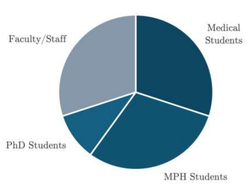


Figure 2. Survey Question

RESULTS

Figure 3. Pre-Course Ratings

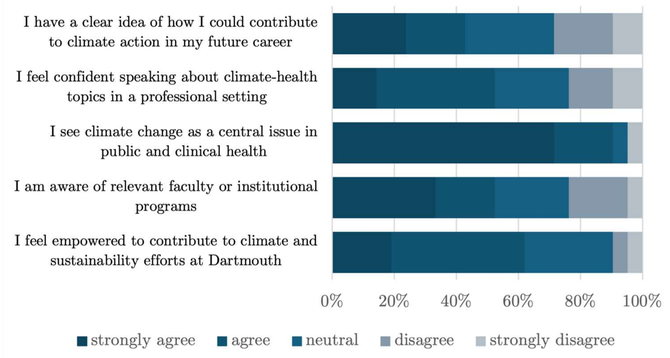
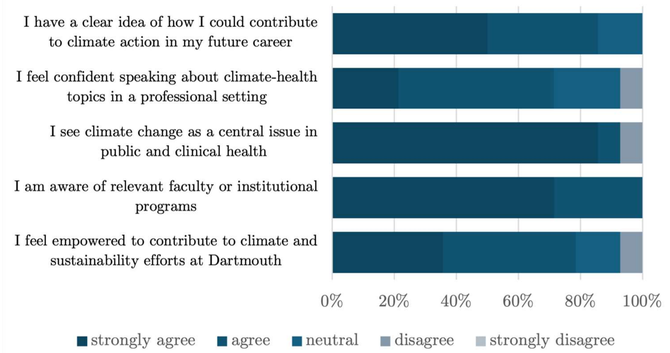


Figure 4. Post-Course Ratings



Of 36 participants, 20 and 14 completed the pre- and post-course surveys, respectively. Prior to the course, only **16.4%** of participants reported strong knowledge of climate and health topics. This increased to **41.8%** following the course. Interest in climate and health engagement increased from **34%** pre-course to **52.9%** post-course. Effect sizes shown in **Table 2.**

Table 2: Pre-post improvements in climate-health competencies

Competency	Pre	Post	p	d
Emission reduction	2.60	3.50	0.008	1.42**
LCA framework	3.60	4.42	0.016	1.19*
Co-benefits	3.60	4.33	0.016	1.14*
Healthcare contributes	2.85	3.92	0.016	1.00*
Climate affects health	3.40	4.17	0.016	0.94*

DISCUSSION

This 6-week hybrid interprofessional elective successfully addressed critical knowledge gaps in healthcare sustainability while achieving exceptional learner satisfaction. These results are comparable to or exceed those reported in climate-health education studies with longer durations, suggesting the interprofessional model enhances learning efficiency. Unanimous interest in continued opportunities suggests that bringing together diverse healthcare learners enhances climate-health education and engagement.

Table 3: Qualitative Themes and Representative Quotations

Theme	Representative Quotation
Career Impact	*"Inspired interest in reaching out to physicians engaged in research."* *"Encouraged consideration of health as a major consequence of climate change."*
Clinical Relevance	*"Provided practical approaches and research applicable to the clinical setting."* *"Improved understanding of life cycle assessment in the healthcare system."*
Interprofessional Learning	*"Well organized and interactive; enhanced understanding of the relationship between health and climate."*
Future Directions	Increased discussion time Student-led presentations Greater emphasis on global perspectives

92.3% of participants (N=13) reported plans to engage in future climate-health efforts.

Project Limitations

Findings are limited by a small sample size (final *N* = 14). Increasing incentive to complete post-course survey would bolster strength of analyses. Additionally, self-selection bias of participants may over-represent positive reviews.

Future Directions

Develop a curriculum model to formally integrate sustainability education into medical student and residency programs.

Involve professionals across disciplines (i.e. public health, engineering, research) to implement sustainability initiatives into hospital practice.

CONCLUSIONS

This pilot course effectively enhanced participants' climate-related health knowledge and confidence in engaging in health and climate initiatives. Moreover, the interprofessional nature of the course made space for cross-departmental communication, inspiring future clinical and research collaborations.

Occupational Exposure to Microplastics in Hospitals: A Scoping Review of Health Risks and Knowledge Gaps

Presenting Author: Isabel Chris, BS (RUSH)

Co-Authors: Charita Kunta, BS (RUSH); Gwyneth Sullivan, MD (RUSH); Schuyler Hilton, MLIS (RUSH); Lorena E. Juarez, MLIS (RUSH); Jennifer C. Westrick, MSLIS, AHIP (RUSH); Brian C. Gulack MD, Ami N. Shah, MD (RUSH)

Introduction

As technology has evolved to produce effective products for healthcare providers, microplastics have become a ubiquitous part of daily operational tasks in hospitals. There is a need for recognition of plastics and particulate matter of microplastics as an emerging occupational hazard for healthcare providers. Recent evidence has indicated that microplastics are released from plasticizers, sutures, face masks, and single-use plastics.

Objective: To map and synthesize primary literature evaluating occupational exposure and health effects in surgical and perioperative settings.

Hypothesis: Occupational exposure to microplastics and associated chemical additives in clinical environments leads to a measurable burden of plastic associated biomarkers in healthcare personnel, correlating with specific clinical roles and plastic medical devices.

Methods

Following the PRISMA-ScR guidelines, PubMed/MEDLINE, Scopus, and Google Scholar were searched on 10/7/2025, using keywords and MeSH terms related to perioperative plastic-related occupational exposures. After screening 2,223 titles and abstracts and conducting 286 full-text reviews, 29 studies were included that characterized exposure routes (e.g., inhalation, dermal, ingestion) or health outcomes for healthcare workers in procedural environments.

Results

Inhalation: OR air contains 1,924 +/- 3,105 microplastics/m3/day during working hours, primarily from masks and device manipulation (Field, et al).

Dermal: Repeated handling of plasticized PVC (blood bags, infusion sets) leads to measurable chemical absorption.

Ingestion: Potential hand-to-mouth transfer during clinical workflows.

Dominant Polymers: Polyethylene terephthalate (PET), Polypropylene (PP), Nylon, and Polyvinyl chloride (PVC).

Table 1. Microplastic and Chemical Additive Exposure, Health Effect Categories, and Device Types in Healthcare Settings

Device/Setting Type	Microplastic Concentration/Release	Dominant Polymer Types	Chemical Additives/Plasticizers Detected	Health Effect Category	Reference
Operating Room Air	1924 ± 3105 (working hours); 0 (non-working hours)	PET, PP, Nylon, PE (rank order)	—	Respiratory exposure	Field, et al.
Hospital Indoor Air	29.75 ± 8.28 (mean); 41.23–232.23 (daily exposure)	PET, PP (predominant)	—	Health risk mentioned (unspecified)	Hazrati, et al.
Disposable/Surgical/N95/FFP2/FFP3 Masks (includes cotton, fashion, activated carbon)	Surgical: 18 ± 6 items/mask; N95: 5 ± 4 items/respirator; ~90% 2.5 µm; FFP2/3: 3–4× more MPs than medical masks	PP, PE, PA, PS, polycarbonate, PET, nylon, PVC, ethylene-propylene copolymer	AO168 (median 2968 ng/g), Bisphenol B, 1,4-bis(2-ethylhexyl) sulfosuccinate, 16 phosphate esters, 11 phthalates, 4 plasticizers, 7 major phthalates, 12 OPEs, 79 VOCs, PAHs	Endocrine/reproductive disruption, neurotoxicity, suspected carcinogenicity, respiratory effects, long-term health risks (mechanism unclear)	Guo, et al., Bogush, et al., Callejas-Martos et al., Esmeralda et al., Cao et al., Fernández-Arribas et al., Jin et al., Li, et al., Weng, et al.
Plasticized Medical Devices (infusion sets, blood bags, etc.)	Not quantified for MPs	Plasticized PVC (contains DEHP, DINCH, DEHTP, TEHTM)	DEHP, DINCH, DEHTP, TEHTM (plasticizers)	Endocrine/reproductive disruption, multi-organ toxicity	Eckert, et al.
Smoke Evacuation Systems	Not quantified for MPs	—	Carcinogenic, mutagenic, reprotoxic VOCs (from surgical smoke)	Carcinogenicity, mutagenicity, reproductive toxicity, respiratory effects	Gioutsos, et al.
Bone Cement (MMA)	Not quantified for MPs	PMMA, MMA	MMA vapor (monomer)	Respiratory, dermal, neurologic, cardiovascular toxicity; burns, asthma hypersensitivity, neurotoxicity	Merajikhah, et al.

Conclusions

Microplastics are a growing, underrecognized occupational hazard for healthcare workers across all settings.

The bottom line: There is an urgent need for standardized occupational surveillance and protective strategies in healthcare settings.

Plant-Based Diet Education in Health Professional Schools: Global Trends and Pedagogic Approaches

Insights from the Planetary Health Report Card (2021-2025)

Presenter: Jessica Mo
Co-Authors: Emma Willcocks, James Lee, Alexander Bauer, Shireen Kassam

Climate Health Equity Day

The Co-Benefits Case for Plant-Based Diets

Individual Health Benefits

↓ Cardiovascular disease risk [1]

↓ Cancer risk, especially colorectal [2,3]

Improved diabetes control [4]

Healthy weight maintenance [5]

Treatment of chronic conditions [6]

Global Health Benefits

↓ Antibiotic resistance

↓ Pandemic Risk

Food justice [7]

Environmental Benefits

Lower greenhouse gas emissions

Reduced land use

Reduced freshwater consumption [7]

Endorsed by WHO, American College of Lifestyle Medicine, American College of Cardiology…
Yet per Lancet Countdown 2025: Only 64% of medical students receive climate-health education

Plant-Based Diet Education: An Unmet Need

Evidence of Inadequacy

Patel & Kassam (2022): Rapid review of nutrition education interventions for medical students - most were optional rather than mandatory, heterogenous in content, and not guided by standardized national frameworks.

Metoudi et al. (2025): UK/Ireland dietitians reported limited knowledge and inadequate training in whole food plant-based diets.

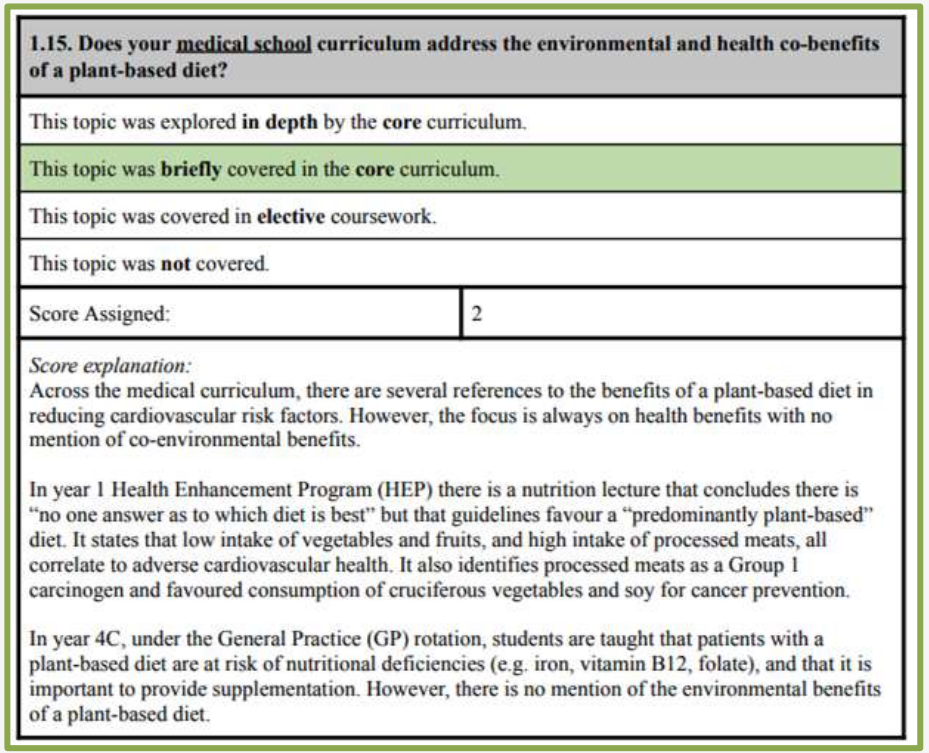
EAT-Lancet 2025: A Call to Action

72 organisations worldwide co-developed the EAT-Lancet 2025 Healthcare Professionals Action Brief with plant-based diets as a central priority.

1. Integrate plant-based nutrition into health professional education as part of routine training
2. Educate patients on plant-rich, whole-food dietary patterns emphasizing both health and environmental benefits
3. Equip healthcare professionals to lead the shift toward the Planetary Health Diet across clinical, public health and policy settings

Planetary Health Report Card

- Student-led curriculum assessment
- Annual cycles since 2020
- Standardized metrics
- Scored ordinally at 0, 1, 2, or 3 points with corresponding free-text response for justification of the allocated score
- Quality-checked by leadership
- Publicly available at phreportcard.org



1.15. Does your medical school curriculum address the environmental and health co-benefits of a plant-based diet?	
This topic was explored **in depth** by the **core** curriculum.	
This topic was **briefly** covered in the **core** curriculum.	
This topic was covered in **elective** coursework.	
This topic was **not** covered.	
Score Assigned:	2

Score explanation:
Across the medical curriculum, there are several references to the benefits of a plant-based diet in reducing cardiovascular risk factors. However, the focus is always on health benefits with no mention of co-environmental benefits.

In year 1 Health Enhancement Program (HEP) there is a nutrition lecture that concludes there is "no one answer as to which diet is best" but that guidelines favour a "predominantly plant-based" diet. It states that low intake of vegetables and fruits, and high intake of processed meats, all correlate to adverse cardiovascular health. It also identifies processed meats as a Group 1 carcinogen and favoured consumption of cruciferous vegetables and soy for cancer prevention.

In year 4C, under the General Practice (GP) rotation, students are taught that patients with a plant-based diet are at risk of nutritional deficiencies (e.g. iron, vitamin B12, folate), and that it is important to provide supplementation. However, there is no mention of the environmental benefits of a plant-based diet.

Study Design

Our Study Scope:

- 2021-2025 (5 cycles)
- 556 report cards
- 23 countries
- 6 health professions (Medicine, Nursing, Pharmacy, OT, Healthcare Mgmt, Nutrition and Dietetics*)

Research Questions:

1. What is the current state of PB diet education inclusion?
2. How does it vary internationally and across disciplines?
3. How has it changed over time (2021-2025)?
4. How is it being taught (pedagogical approaches)?

Mixed Methods Approach

"Does your _____ school curriculum address the environmental and health co-benefits of a plant-based diet?

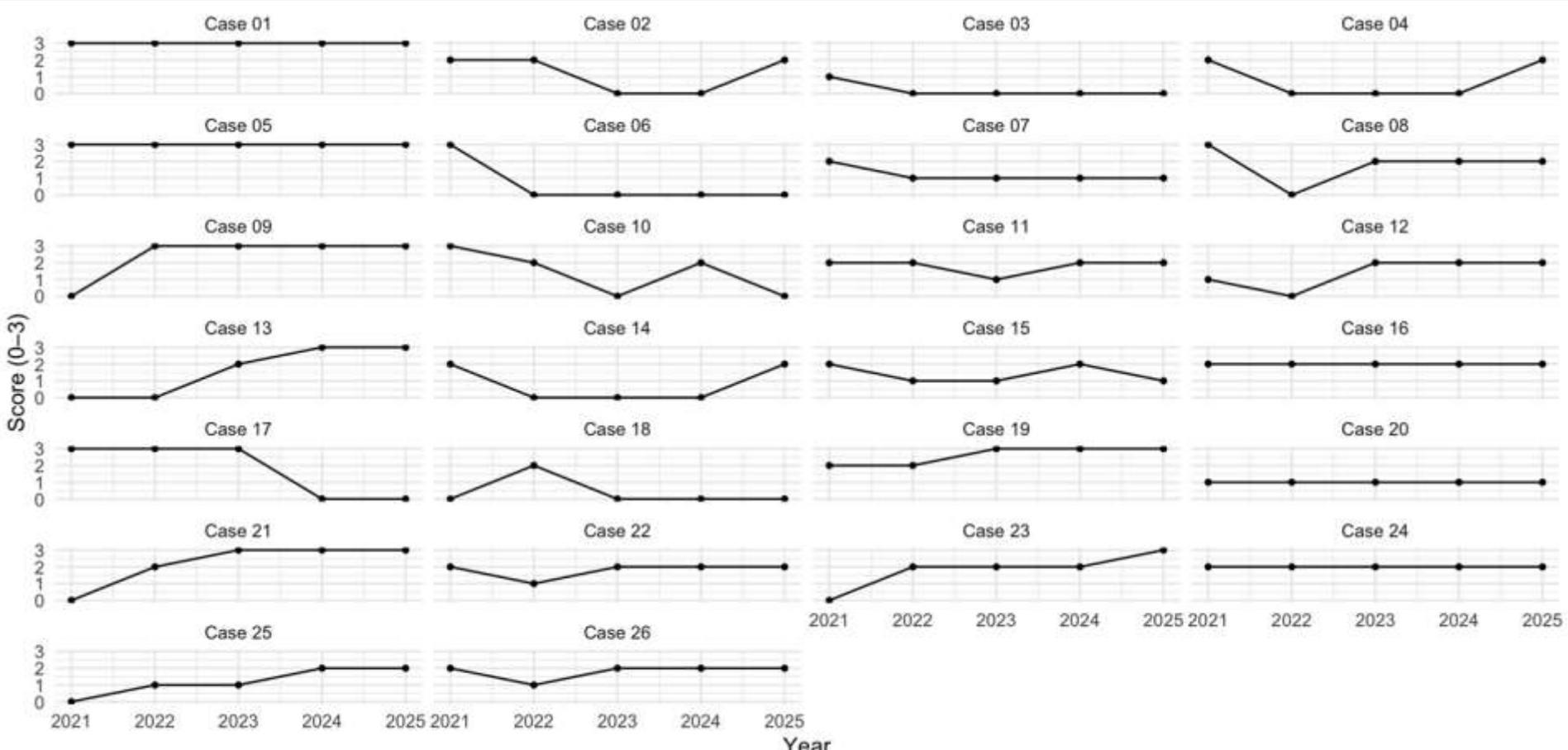
Quantitative Analysis (n=556)

- Analyzed all report cards 2021-2025 (n = 556)
- Tracked ordinal score progression over time
  - 3 = In-depth core curriculum
  - 2 = Brief core inclusion
  - 1 = Elective only
  - 0 = No inclusion
- Analyzed by discipline and geography
- 26 schools participated in all 5 cycles

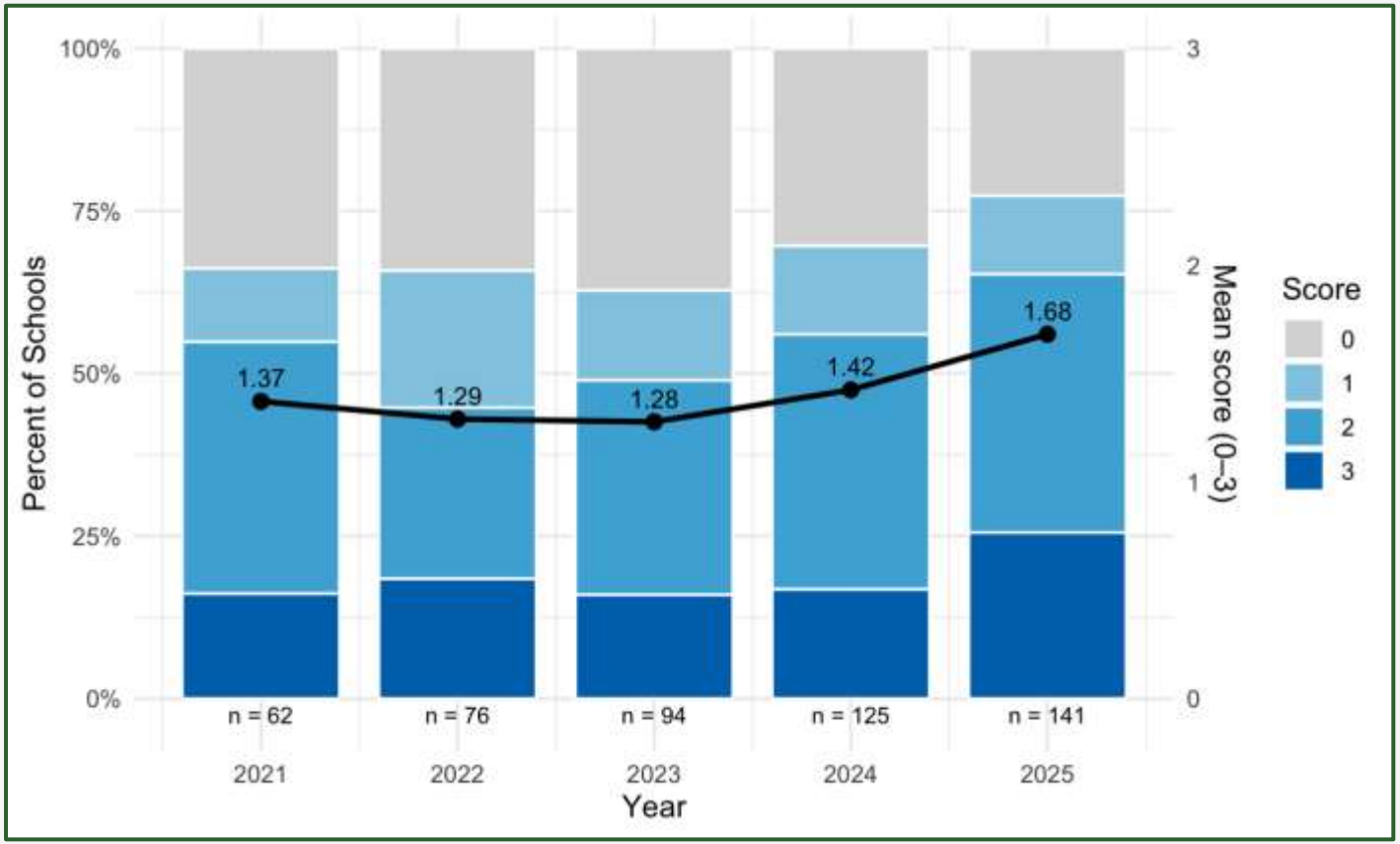
Qualitative Analysis (n=165)

- Analyzed 2025 report cards (n = 165)
  - Medicine (n=137)
  - Pharmacy (n=11)
  - Nursing (n=10)
  - OT (n=2)
  - Healthcare Mgmt (n=5)
- 8 Turkish, 1 German language translated
- Using free-response score justification, performed deductive content analysis (2 reviewers, Cohen's Kappa = 88%)
- Interpreted through Harden's Integration Ladder

Growth Trajectory (2021-2025) (Complete Cases)



Growth Trajectory (2021-2025) (All Medical Schools)



Growth Trajectory (2021-2025)

+174%

PHRC Participation

(62 → 170 schools)

+15.3%

Mean Plant-Based Metric Score Increase

(1.37 → 1.68)

60%

Schools with meaningful core curriculum inclusion of PB in 2025

Tipping Point Reached:
In 2025, more schools scored 2-3 (60%) than 0-1 (40%)

Geographic & Disciplinary Distribution

Geographic Concentration (Medical Schools):

Year	Australia	Canada	Ireland	Switzerland	Turkey	UK	US	Other	Total
2021	-	1	5	-	-	31	25	-	62
2022	-	4	5	-	-	26	33	8	76
2023	-	6	-	6	5	21	45	11	94
2024	6	5	5	8	7	23	52	19	125
2025	6	9	6	7	9	24	63	17	141

Discipline Comparison (2025, n=165):

Medicine	Pharmacy	Nursing	OT	Healthcare Management
137	27	10	2	5

How is PB Diet Education Being Taught?

Integrated clinical curricula
42%

N = 70

In class lectures for environmental health (17%, n=27), lifestyle med (6%, n=10), and gastro/cardio (8%, n=13)

Nutritional curricula
37%

N = 61

PB diet taught in context of weight control, food security, and sustainable nutrition

Elective Courses
24%

N = 40

Roughly 1/3 of medical, nursing, and pharmacy programs offered an elective that included PB diet learning

Isolated teaching events
7%

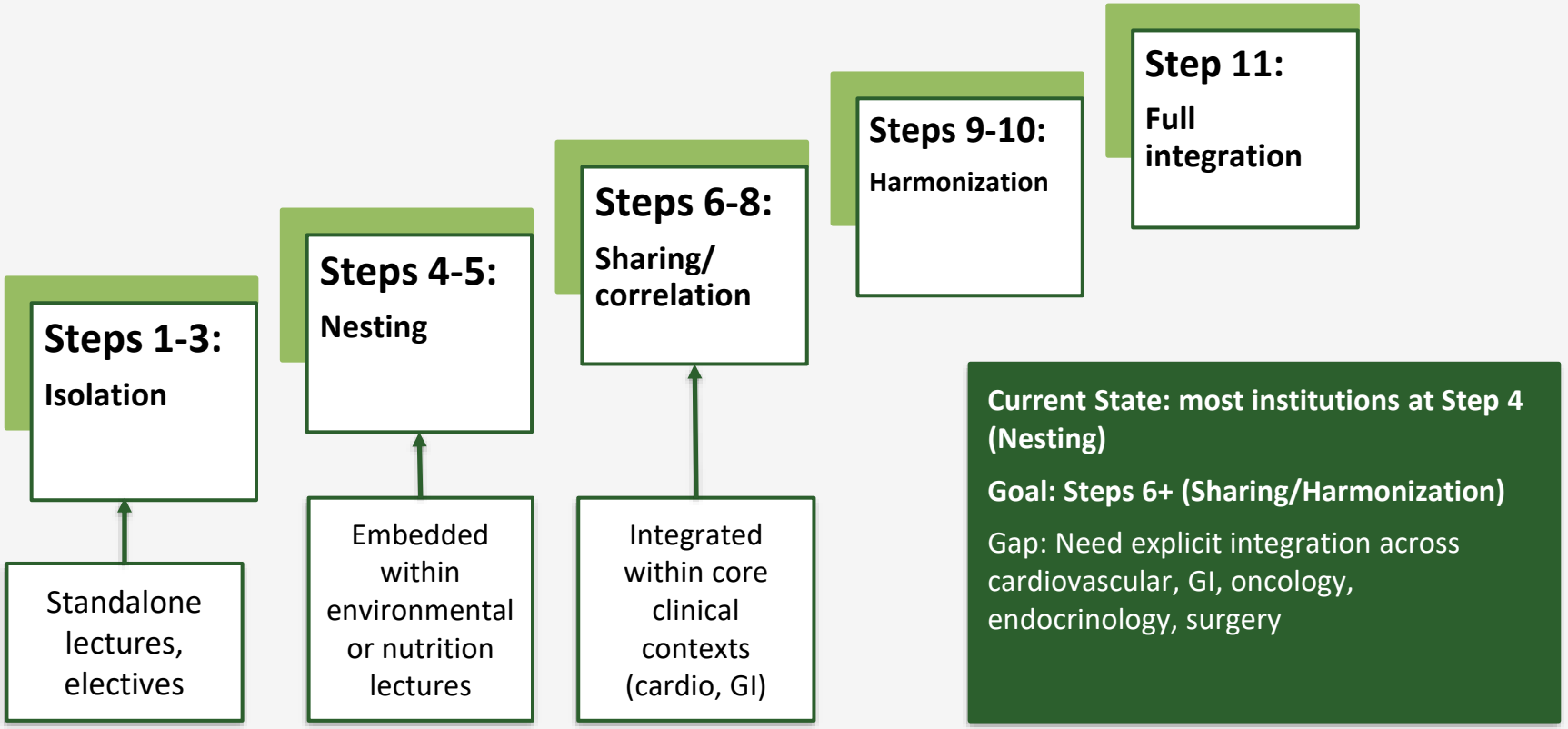
N = 11

Standalone lectures or case-based discussions only within medical schools

Only 19% of overall courses (n=32) and 14% of medical courses (n=19) did not include plant-based diet education in any form

89% (119/133) of courses with PB diet content addressed BOTH health AND environmental co-benefits

Harden's Integration Ladder for Curriculum



Innovative Pedagogies Emerging

Traditional Methods (Most Common):

- Lectures
- Case-based discussions
- Module integration

Novel/Experiential Approaches:

- Culinary medicine (n=3)
- Personal experimentation (n=1)
- Student-led initiatives (n=2)

The Critical Gap:

- Most innovative approaches limited to elective experiences, so only reach already-interested students
- Need integration into core curriculum to reach all students

Concerning Finding: Small minority (n=2) taught PB diets only as risks

- Example: taught that B12 deficiency is risk of PB diet without discussing benefits
- Perpetuates pathologization rather than recognizing therapeutic value

Key Findings Summary

1. Rapid Normalization

Medical schools with zero inclusion: 35% → 14% • Meaningful core inclusion (scores 2-3): 45% → 60% • No longer acceptable to omit this topic

2. Integration Remains Siloed

54% taught within ESH or nutrition 'boxes' • Only 23 examples of clinical integration • Current: Step 4 (Nesting) • Needed: Step 6+ (Sharing)

3. Geographic & Disciplinary Gaps

Geographic: US+UK = 71% of reports • Disciplinary: OT & Healthcare Mgmt = 0% • Missing disciplines critical for systems change

4. Co-Benefits Recognition Strong

89% of courses address both benefits • But 19% of schools have zero inclusion • Next frontier: Universal with explicit co-benefits

Limitations & Implications

Limitations:

- Student-reported data: may miss content, limited institutional access
- Cannot assess: teaching quality, learning outcomes, assessment integration
- Self-selection bias possible

Implications for Practice:

- Curriculum developers: move beyond isolated ESH, integrate across specialties, embed experiential learning
- Policymakers: address geographic inequities, include in accreditation
- Educators: make co-benefits explicit, bridge knowledge-to-practice

Despite limitations, implications are clear:

Move from siloed ESH sessions to integrated clinical teaching

Address equity gaps, make co-benefits explicit, include practical skills

Conclusions & Call to Action

What We've Shown:

✓ First international study mapping PB diet education

✓ Progressive growth 2021-2025, reaching tipping point

✓ Most institutions at 'nesting' stage (Step 4)

✓ Innovative practices emerging but limited to electives

What's Needed:

Short-term: Expand PHRC participation, share best practices, develop faculty resources

Medium-term: Achieve 'sharing' integration, move experiential learning to core, include in accreditation

Long-term: Full harmonization across specialties, universal recognition as core competency

"Plant-based diet education represents a tractable pathway for preparing health professionals to address the interconnected crises of climate change and chronic disease."

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

Cecile Schreidah[1], Kashif Ansari[2], Andrew Creamer[3], Dr. Kyle Martin[4], Dr. Lida Zheng[1,5]

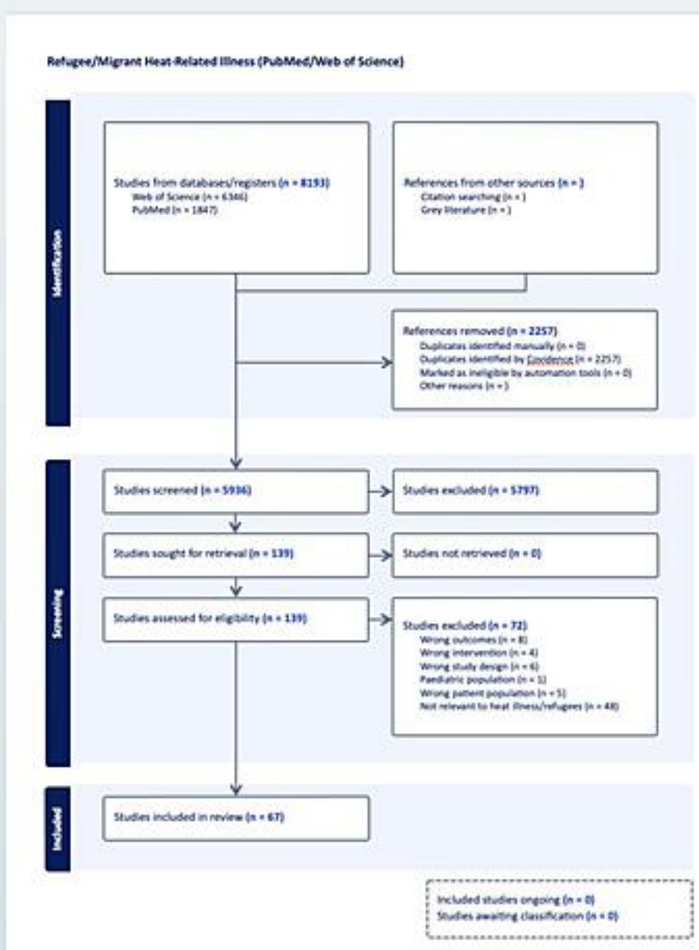
[1]Northwestern University Feinberg School of Medicine, [2]Vanderbilt University School of Medicine, [3]Brown University, [4]Warren Alpert Medical School of Brown University, [5]Northwestern Memorial Healthcare

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.

Planetary Health Education at Keele University School of Medicine, 2025-2026

Aghna Wasim[1], Marijoh Rodriguez Humber[1], Cordelia Hassan Wadi[1], Olivia Benny[1], Safa Khan[1], Zelke Tutagiel[1], Tom Smith[1], Ananya Shearman[1]

1. School of Medicine, Keele University, UK

OBJECTIVE

Evaluate the standard of planetary health (PH) education at Keele University School of Medicine in the 2025-2026 academic year

METHODS

- Data collection from institutional websites and faculty
- PH report card (PHRC) completion, including domain and cumulative scores

Domains of evaluation

- curriculum
- community outreach and advocacy
- interdisciplinary research
- support for student-led initiatives
- campus sustainability

RESULTS

Overall grade – A+ (96.3%)

Section-specific Grades

- Community outreach and advocacy – A+ (100%)
- Support for student-led initiatives – A+ (100%)
- Campus sustainability – A+ (97%)
- Interdisciplinary research – A+ (94%)
- PH curriculum – A+ (93%)

Curriculum
Focuses on pollution and extreme weather effects on health, disease spread and disparities
Recommendations: Training on discussing PH with patients, impact of surgery on environment, and the role of ingenious knowledge in solutions

Support for student-led initiatives
Dedicated PH and sustainability website run by the medical school and funding for student projects across campus
Recommendations: Student-led PH group with faculty support

Community outreach and advocacy
Meaningful partnerships with multiple community organizations, several community-facing events, patient education materials, e-learning modules for hospital staff
Recommendations:
Community events run by medical school events

Campus sustainability
Dedicated sustainability staff, approved carbon neutrality plan, sustainable building practices, environmentally-friendly transport options
Recommendations: Enforce Green Event Guidelines for student-led events

Interdisciplinary research
Strong focus on sustainability research, with medical school staff studying PH topics, and Institute of Sustainable Futures supporting interdisciplinary PH research
Recommendations:
Engage affected communities to give input or make decisions about research agenda

CONCLUSION

- Keele scored highly across all domains, showing a strong commitment to PH and sustainability in medical education
- Future initiatives - student-led PH groups, co-production of research agenda, and modules on indigenous knowledge and sustainability in surgery

The Missing Curriculum: A Website Review of Planetary Health and Healthcare Sustainability in Ob/Gyn Residency Programs

Nadine Najah AB[1]

[1] *The Warren Alpert Medical School of Brown University*

INTRODUCTION

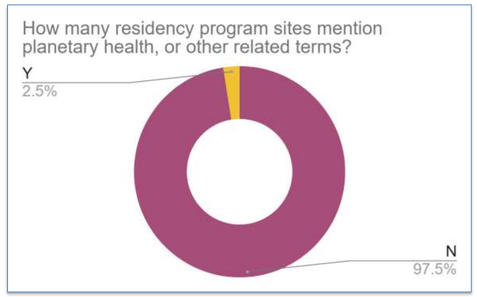
- *Objective:* To highlight the extent to which academic Ob/Gyn residency programs and their respective Ob/Gyn department include planetary health and healthcare sustainability education and/or research through a website review.
- Medical trainees are already confronted with effects of climate change, pollution, and environmental degradation. [1]
- Studies recommend creating ACGME core competencies for planetary health.[1,2]

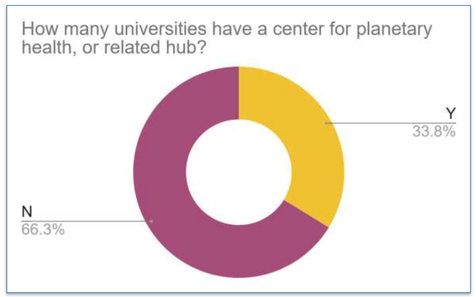
METHODS

- Web-based review of all university-based ACGME-accredited Ob/Gyn residency programs and their respective department (N = 123).
- Between Oct–Dec, 2025, we systematically searched each program's residency and department site for any mention of planetary health and recorded the type of exposure.
- We also included whether the university has a center for planetary health.

RESULTS

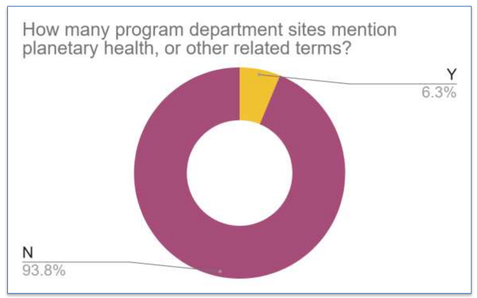
For instance, Brown mentioned a lecture on "green household products", while OSU stressed the importance of "sustainability".





For example, MGH has the "Center for the Environment and Health", and the University of Nebraska has the "Water, Climate, and Health Program".

All mentions were related to faculty research, such as the study on "phthalate exposure in immigrant women" at BIDMC.



EVALUATION

The findings of this study are in dissonance with the calls of ACOG, who encourages addressing climate change in the Ob/Gyn clinical space as it pertains to patient health and healthcare sustainability. [3]

CONCLUSIONS

Minimal Ob/Gyn residency programs and respective departments highlight planetary health and healthcare sustainability material, despite climate health risks posed to Ob/Gyn patient populations and necessity of environmental stewardship.

FUTURE DIRECTIONS

- Explore frameworks for introducing climate change and health content for residents.
- Gauge interest of Ob/Gyn residency programs in adding planetary health education to their competencies.

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