### Ola ka 'āina, ola ke kanaka, ola ka lāhui

The health of the land, is the health of the people, is the health of the nation

HAFP 2025 Annual Meeting, Honolulu Hawai'i February 7, 2025 Martina L. Kamaka, MD, FAAFP Mahealani Lum, DO



Per ACCME Guidelines, we do not have anything to disclose

M. Kamaka 2023 Photos: courtesy W. Takenaka and JABSOM



#### **Objectives:**

1) Describe how greenhouse gas emissions are driving climate change

1) Discuss how climate change impacts health

1) Illustrate how physicians can help patients and communities address climate change related health impacts

# Mauli Ola – A Tradition of Health



Kānaka 'Ōiwi (Native Hawaiian) ancestors developed an elaborate and highly sophisticated public health system

- Resource management system ensured:
  - Equitable access to natural resources
  - Availability of these resources in perpetuity
  - Primary importance of connection to land...."The land is chief"
- Minimized if not eliminated starvation, disease, and illness on islands with finite resources



#### Climate Science 101

- Global temperature baseline is "Preindustrial averages"
- Green house gases heat planet
  - Act like a blanket
  - CO2 (80%) burning of fossil fuels
  - CH4 Methane (10%)– agriculture, landfills (potency >CO2)
  - N20-agriculture (fertilizers), fossil fuels (6%)
  - Fluorinated gases (3%)-very long lasting

source: https://www.c2es.org

#### **The Greenhouse Effect Explained**



#### SOURCE

National Park Service

# Why Does it Matter?

- Climate change affects the natural, built, and social systems we rely on individually and through their connections to one another
- These interconnected systems increasingly vulnerable to cascading impacts
- Increasing Temperature...
  - Increases cause multiple, soon irreversible environmental effects
  - 2015 International Paris climate agreement 196 adoptees
  - Hold global average temperature rise to <2°C by 2030</li>
  - Realization that <1.5°C is new required threshold
  - We have reached 1.5°C several times this year!
- US Department of Health & Human Services declares climate change: "greatest public health challenge of the 21st century."



Source: <u>https://unfccc.int/process-and-meetings/the-paris-</u>

<u>agreement</u>, Source: Fletcher, C et al, Earth at Risk: in press Figure Source: Hanson, JE et al, Global warming in the pipeline. *Oxf Open Climate Change*.3kgad008.

#### **Impact of Climate Change on Human Health**

Injuries, fatalities, mental health impacts Asthma, cardiovascular disease



Source: CDC

#### **Climate Change and Impact to Health**



contamination

### Climate Change in Hawai'i



*Climate Change in Hawai'i* | U.S. Department of the Interior (doi.gov)





# Case study Pt 2: The Aug 9, 2023 Lahaina, Maui Wildfire

- Maui most severe/prolonged drought in state (January 2024)
- Climate change brings flash (rapidly increasing) droughts
  - Extreme dryness "sucks" moisture from plants/ground
- Maui-
  - May 23, 2023 = No drought
  - August 10, 2023 =
    - 83% of Maui abnormally dry/ moderate/severe drought





### Case Study: Lahaina Fire-contributing factors



- Lahaina traditionally was green and lush with ample water, home to fishponds and taro fields (grown in water) and Ulu groves.
- Mid 1800s, Sugar plantations diverted water, drying up streams and changing the vegetation
- Sugar industry ends 1999,
  - diverted water sent to hotels, resorts and luxury developments
- Undeveloped land (fallow) overrun by invasive grasses (very flammable)
- Drought
- High winds (sustained 65-80mph with gusts up to 90 mph)-Northern high pressure systemdownslope windstorm (like the Santa Anas)

**Figure 1.** Irrigation pipes for Pioneer Co. Mill in Lāhainā circa 1905 diverting water from Native Hawaiian agriculture. (Lahaina Restoration Foundation, 2023).<sup>2</sup>

### The aftermath

- Over 100 lives lost
- 2,200+ structures damaged/destroyed
- 2,170 acres burned
- 12,000 residents displaced
  - Still receiving housing assistanceextended
  - First 169 FEMA temporary housing units in November 2024
- Total damage: \$10 billion



#### Long Term Impacts and MauiWES SDOH

- Most comprehensive and ethnically diverse study
  - eval short and long term health impacts
- Initial 679 wildfire-affected participants
  - wide range of ages and ethnicities,

#### Results

- Unemployment (20%), recent update 33% looking for work
- Lack of permanent housing (90%)
  - First FEMA housing for 169 families Nov 2024
- Decreased household income (74%),
- Food insecurity (42%).



Photo: Civil Beat Nov 2024

#### Long Term Impacts and MauiWES Heath Specific

- With exposure to ash, debris and smoke
  - 50% with worsened health one year later
  - Respiratory problems, skin/eye irritations, headaches, fatigue, dizziness
- 74% hypertension
- 60% poor respiratory health with abnormal spirometries
  - 40% with various degrees of lung obstruction.
- Depression: 52% with depressive sxs,
  - 4.4% considered suicide( rest of Maui 1%)\_
- Difficulty Accessing care (40%)- many lacked insurance
- Ash: elevated arsenic\*, lead, antimony, cobalt, copper
  - Over 20% had elevations in their urine as well as
  - Elevated nickel, chromium and selenium also seen.
  - \* Elevated arsenic-had more eye/skin irritations, worse lung function

#### **Questionnaires**

- Demographics
- Housing Stability
- Food Security
- Employment
- Exposure
- Resiliency
- Social Support
- Health Behaviors
- Perceived Trust
- Etc...

#### **Biospecimens**

- Stress Response
- Inflammation
- Environmental Toxicants

#### Health Exam

- Lung Health
- Cardiovascular Health
- Metabolic Health
- Mental Health
- Cancer Risk (EMR)

# Case Study: Patient Case

- 70-year-old Hawaiian woman with chronic HFrEF, atrial fibrillation, CAD s/p CABG, insulin-dependent Type 2 diabetes mellitus, chronic kidney disease, COPD, bilat knee OA, recurrent falls, obesity, depression
- **CC:** Follow-up hospitalization for acute decompensated HF
- "Can you write me a doctor's letter for A/C for my housing?"



# Host risk factors for heat illness:

- Age: infants, elderly
- Medical co-morbidities
  - Heart disease
  - Respiratory disease
  - Chronic kidney disease
  - Diabetes
  - Psychiatric conditions
  - Pregnancy

- Medications
  - Psychiatric
    - medications (SSRIs)
  - Antihypertensives (ACE inhibitors, thiazides, other diuretics)
- Mobility
- Lives alone



# Back to the Case - Social & Environmental History

- Quit smoking cigarettes 10yrs ago. No EtOH. Remote Hx meth, quit 20yrs ago
- Widowed, estranged from children
- Lives alone in Section 8 housing near the freeway in Honolulu, ground floor, no air conditioning

- Occupation: retired security guard
- Hobbies: used to enjoy swimming and gardening, now rarely leaves home
- Nutrition: loves Hawaiian food, meal delivery service, food stamps
- Transportation: does not drive, Handivan, uses walker



# Environmental risk factors for heat illness:

- Heat index (combines Location temperature and relative humidity)
  - Housing
  - Access to cooling stations





### Heat Index - www.osha.gov/heat/heat-app

#### U.S. DEPARTMENT OF LABOR

#### **Occupational Safety and Health Administration**

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Heat Illness Prevention Campaign > Heat Safety Tool

#### **Heat Safety Tool**

By U.S. Department of Labor (DOL), Occupational Safety and Health Administration (OSHA) and the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH)



10:44 \* Heat Index Calculated B5°F Caution A 10:44 AM Feels Like B6°F Precautions Conditions are hazardous.

When you're working in the heat, safety comes first. With the OSHA-NIOSH Heat Safety Tool, you have vital safety information available whenever and wherever you need it - right on your mobile phone.

The App allows workers and supervisors to calculate the **heat index** for their worksite, and, based on the heat index, displays a **risk level** to outdoor workers. Then, with a simple "click," you can get reminders about the **protective measures** that should be taken at that risk level to protect workers from heat-related illness-reminders about drinking enough fluids, scheduling rest breaks, planning for and knowing what to do in an emergency, adjusting work operations, gradually building up the workload for new workers, training on heat illness signs and symptoms, and monitoring each other for signs and symptoms of heat-related illness.



First Aid



#### **Hydration & Rest** Choose the reminder times: **Start Time End Time** 12:00 am 12:00 am 1:00 am 1:00 am 2:00 am 2:00 am Choose the interval: 15 min 30 min 60 min Choose the Day(s) of the Week: Select a day of the week for the hydration reminder Clear Set Done

### Back to the Case - Assessment & Plan

- High risk for heat illness
- Counseling on prevention, staying cool, being prepared
- Manage medical comorbidities
- Address social, environmental, cultural determinants of health
- Climate change mitigation



### Other Useful Tools in Patient Care

- NOAA Sea Level Rise Viewer
  <u>www.coast.noaa.gov</u>
- NOAA Coastal Flood Exposure Mapper <u>www.coast.noaa.gov</u>
- NOAA Climate Resilience Toolkit
  <u>www.climate.gov</u>
- EPA Air Quality
  <u>www.airnow.gov</u>
- EPA Carbon Footprint Calculator
  <u>www.epa.gov/ghgemissions</u>



# Billing & coding

Z77.110	Contact with and (suspected) exposure to air pollution	J45 asthma, J44 COPD
Z77.111	Contact with and (suspected) exposure to water pollution	S91 open wound of lower extremity, L03 cellulitis and acute lymphangitis
Z77.112	Contact with and (suspected) exposure to soil pollution	L24 irritant contact dermatitis, L03 cellulitis and acute lymphangitis
Z77.118	Contact with and (suspected) exposure to other environmental pollution	R06 abnormalities of breathing, J96 respiratory failure not elsewhere classified

Jessica L. Ryan, Diagnoses and charges of patients with ICD-10-CM environmental pollution exposure codes in Florida, The Journal of Climate Change and Health, Volume 5, 2022,100083, ISSN 2667-2782, https://doi.org/10.1016/j.joclim.2021.100083.

#### What can we do as physicians?

#### Mitigation

Prevent emissions by reducing health care's own climate footprint.

#### Resilience

Prepare for the impacts of extreme weather and the shifting burden of disease.

#### Leadership

Educate staff and the public about climate and health and promote policies to protect public health from climate change.



healthcareclimateaction.org/challenge/

- Health NOT an immediate priority in disasters
- Health secondary to housing, job, and food
- Delays in addressing health has consequences
- Allow data to inform interventions and best practices
- Assessment of chronic exposures to environmental hazards needed
- First responders are often overlooked
- Mental Health Professionals needed- severe shortage
- Train the next generation:
  - Exposure Medicine, Disaster Research, Specialized Care, Environment and Health, Integrated Community and Health Research Opportunities

#### Lessons Learned from MauiWES: Preparing patients/communities for Climate Related Crises



# Lessons Learned from MauiWES: How to prepare communities for Climate Related Crises

- Enable long-term and sustainable solutions ahead of disasters
- Community resources more trusted than federal agencies
- Data sharing and integration, monitoring and support strategies needed for communities and decision makers.
- Building resiliency
  - Must address health disparities
  - Indigenous knowledge systems in resiliency planning
- Tailored interventions for vulnerable groups:
  - low-income households
  - food-insecure families
  - Immigrants
  - pre-existing conditions
  - people with disabilities



### Why physicians? - Trust factor

#### Veracity Index 2022 – all professions

"Now I will read you a list of different types of people. For each would you tell me if you generally trust them to tell the truth, or not?"



Base 1,005 and 1,004 British adults aged 16+, interviewed by talephone 19 - 26 October and 25 October - 1 November

@ DAIN | Verkoly Index 2022 | November 2022 | Version 1 | Public



#### Why Our Voice Matters

Americans, especially conservative Americans, trust their primary care doctors as a source of information about global warming							
Rank by		Liberal	Moderate/Conservative Democrats	Liberal/Moderate Republicans	Republicans		
trust	All Registered Voters	Democracs	and the second se	NASA	Family & friends		
	NASA	Climate scientists	Climate scientists	Family & friends	Your primary care doctor		
1	Family & friends	Environmental organizations	EPA	Your primary care doctor	NASA		
2	Climate scientists	EPA	Environmental organizations	Climate scientists	The Fox News Channel		
3	Your primary care doctor	NASA	NASA	EPA	Leaders in your religious faith		
1	EPA	Teachers	Television weather reporters	Television weather reporters	Television weather reporters		
2	Television weather reporters	President Biden	American Medical Association.	11.5 military leaders	Climate scientists		
0	Environmental organizations	National Public Radio (NPR)	President Biden	Teachers	U.S. military leaders		
1	Teachers	Television weather reporters	Your primary care doctor	American Medical Association	American Medical Association		
	American Medical Association	Family & friends	National network news	American internet al organizations	Teachers		
10	Your local newspaper	National network news	National Public Radio (NPR)	Environmental organization	Oil, gas, and coal companies		
11	National Public Radio (NPR)	American Medical Association	Your local newspaper	Tour local Telesus	EPA		
12	Local TV news	Your local newspaper	Family & friends	Local IV news	Your local newspaper		
13	National network news	CNN	Local TV news	National Public Radio (Writy	Environmental organizations		
14	President Biden	Your primary care doctor	Teachers	National network news	Your Congressperson		
15	U.S. military leaders	MSNBC	CNN	The Fox News Channes	Local TV news		
16	CNN	Local TV news	MSNBC	Leaders in your religious faith	National Public Radio (NPR)		
17	MSNBC	Your Congressperson	U.S. military leaders	Your Congressperson	National network news		
18	Your Congressperson	U.S. military leaders	Your Congressperson	CNN	CNN		
19	Leaders in your religious faith	Leaders in your religious faith	Leaders in your religious faith	MSNBC	MSNBC		
20	The Fox News Channel	The Fox News Channel	Oil, gas, and coal companies	Oil, gas, and coal companies	Dravidant Biden		
21	Oil, eas, and coal companies	Oil, gas, and coal companies	The Fox News Channel	President Biden	President bluen		

How much do you trust or distrust the following as a source of information about global warming?

April 2022



Climate Change Communication

GEORGE MASON UNIVERSITY CENTER for CLIMATE CHANGE COMMUNICATION Patient Care

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AAFP / About Us / Policies / All Policies / Climate Change and Environmental Health (Position Paper)

# Climate Change and Environmental Health (Position Paper)

Intro

Anthrop human and res global to product change estimat care del Globally In the U Family physicians play a critical role in preventing and mitigating the health impacts of anthropogenic climate change on their patients and communities.

The AAFP calls for action in the following 5 areas:

Physician Level
 Practice Level
 Community/Leadership Level
 Educational Level
 Advocacy Level

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net.<sup>9</sup>

role in preventing and mitigating the health impacts of anthropogenic climate change

### **Physician Level**

- Become informed about the impact of climate change on human health and take tangible steps to address these impacts while promoting health equity.
- Address and manage each patient's specific environmental health risks to help them achieve their health goals.

### **Educational Level**

 Lead change in undergraduate, graduate and continuing medical education to prepare current and future physicians to prevent, mitigate and adapt to health and occupational impacts related to climate change.

### **Practice Level**

- Understand the healthcare sector's environmental footprint and how this contributes to adverse community and public health outcomes.
- Understand how climate change will impact the healthcare sector's ability to provide safe, effective, high-quality care.
- Partner with sustainability experts to set greenhouse gas emissions reduction goals, and create practices for providing climate-smart, climate-ready and climate-resilient health care.

### Healthcare's contribution to climate change



Purchased goods & services: 41%

#### Direct GHG emissions

Greenhouse gas (GHG) emissions from sources that are owned or controlled by the reporting entity. Health care examples include stationary combustion, waste anesthesia gases, refrigerants, and mobile fleet vehicles.

Scope 1 includes all direct GHG emissions.

#### Indirect GHG emissions

GHG emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity.

Scope 2 includes indirect GHG emissions from consumption of purchased or acquired electricity, steam, heat and cooling.

Scope 3 includes all other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc.

https://practicegreenhealth.org/tools-and-resources/scope-3-ghg-emissions-accounting-tool

## Community/Leadership Level

- Promote partnerships with private and public community organizations and health departments to advance the integration of primary care, environmental health and public health.
- Proactively engage with other health care and social service organizations to link resources that mitigate the impacts of climate change on health.



HAFP at Loko I'a Pā'aiau 2022 & UHFMRP 2021-2024

### **Advocacy Level**

• Leverage the voices of family physicians as stewards of public health to advocate for local, national and international policies that improve the environmental health determinants affecting communities, patients and health care workers.

#### www.capitol.hawaii.gov



#### How to Prepare Patients for Climate Related Crises

- Prepare our Patients/Families/Communities
  - Assess risks (fire, food, water, heat, flooding, etc.)
  - Ask for behavior change
- Be role models-Be the "Change"
- Physicians have powerful voices
- Advocate for policy changes!!!

Malama 'āina, Mālama i ka wai, Mālama honua

#### We do this for the 7th generation!





#### Ola Ka 'Āina, Ola Ke Kanaka, Ola Ka Lāhui Mahalo! M. Kamaka <u>tinakamaka@gmail.com</u> M. Lum <u>mahe.lum@gmail.com</u>