



IMPACTS OF CLIMATE CHANGE AND DISASTER: THE INCREASING NEED FOR A COLLABORATIVE AND TIMELY INTERNATIONAL WORKFORCE

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- No relevant commercial relationships to disclose.
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INTRODUCTION

Climate change affects health. It is important to recognize the impact of climate change and the ever increasing numbers of disasters. There are social determinants that affect health as they relate to climate change. Clinicians must be educated and aware of its impact and know the collaborative efforts being conducted especially in a global environment.

PURPOSE

The purpose of this presentation is two fold: (1) to educate clinicians on the impacts of climate change and disaster; and (2) bring awareness and educate in the increasing need of a collaborative and timely international workforce efforts.

LEARNING OBJECTIVES

At the conclusion of this session, participants should be able to:

- Discuss the effects of climate change on health
- Recognize the impact of climate change and the increasing numbers of disaster
- Discuss how social determinants of health relate to climate change
- Educate attendees and collaborate between U.S. military and international PAs in the discussions of experiences working globally

WHAT IS CLIMATE CHANGE?

- A systematic change in the long-term state of the atmosphere over multiple decades or longer.”
- At its most basic, climate change is caused by a change in the earth’s energy balance-how much of the energy from the sun that enters the earth (and its atmosphere) is released back into space.
- The earth is gaining energy as we reduce the amount of solar energy that is reflected out to space



A simplified animation of the greenhouse effect. Credit: NASA/JPL-Caltech



**CLIMATE
CHANGE!**

**GLOBAL
WARMING!**

CLIMATE CHANGE AND DISASTER

- Temperatures are rising world-wide due to greenhouse gases trapping more heat in the atmosphere.
- Increasing Droughts
- Warmer water and hurricanes & tropical storms
- Glaciers are melting at a faster rate/Sea levels are rising
- Sea ice in the Arctic Ocean around the North Pole is melting faster with the warmer temperatures.
- Permafrost melting, releasing methane, a powerful greenhouse gas, into the atmosphere.

EXAMPLES FROM 2019-2020

- Argentina and Uruguay: Floods
- Queensland, Australia: Floods
- Europe: Storm Eberhard
- Mozambique Southern Africa: Cyclone Idai
- Midwest and South US: Floods
- Iran: Floods
- India and Bangladesh: Cyclone Fani
- China: Floods
- North India: Floods
- China: Typhoon Lekima
- Japan: Typhoon Faxai and Typhoon Hagibis
- Bahamas/North America: Hurricane Dorian
- Spain: Floods
- Texas US: Tropical Storm Imelda
- Bangladesh: Cyclone
- California, US: Fires

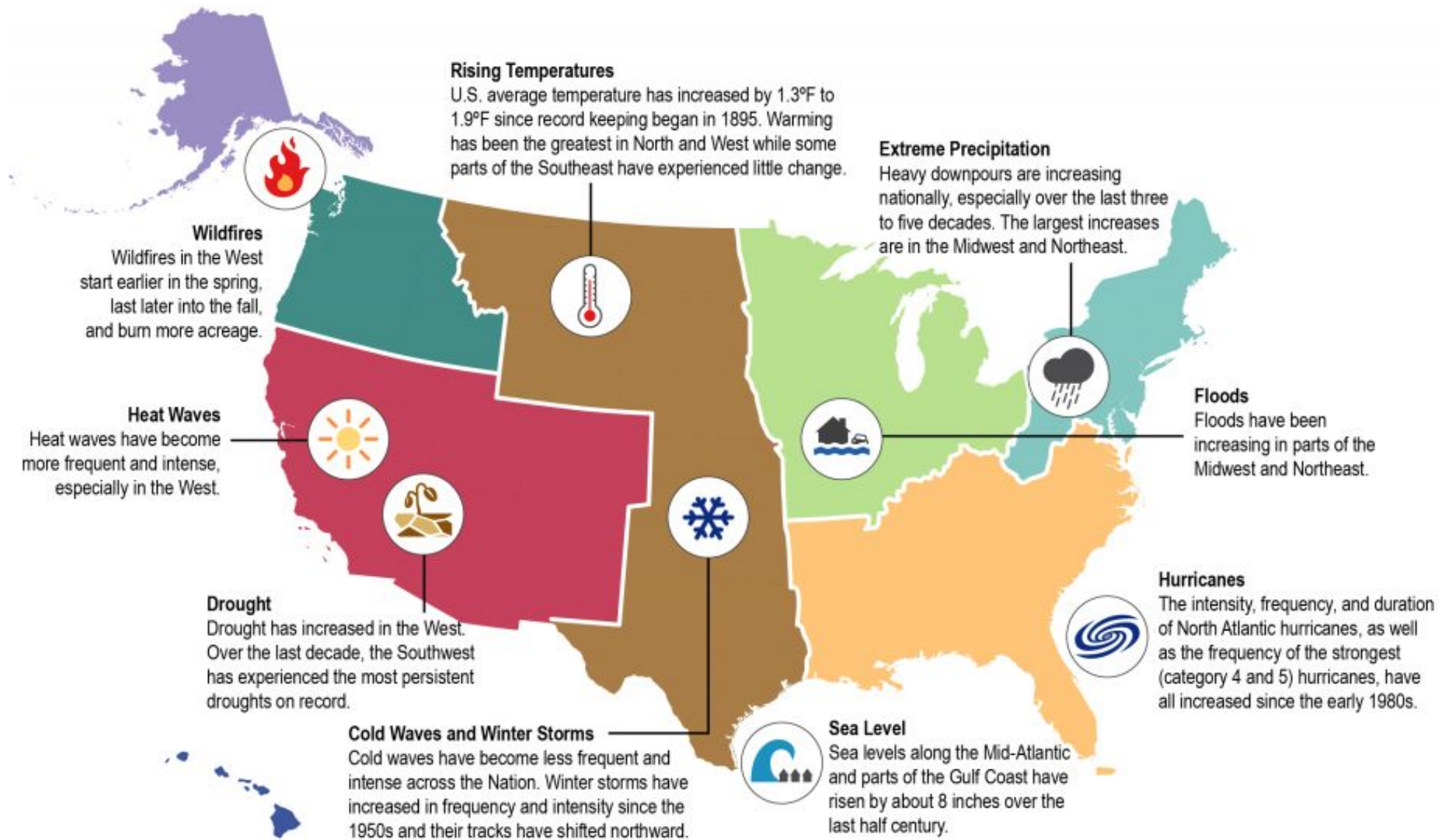
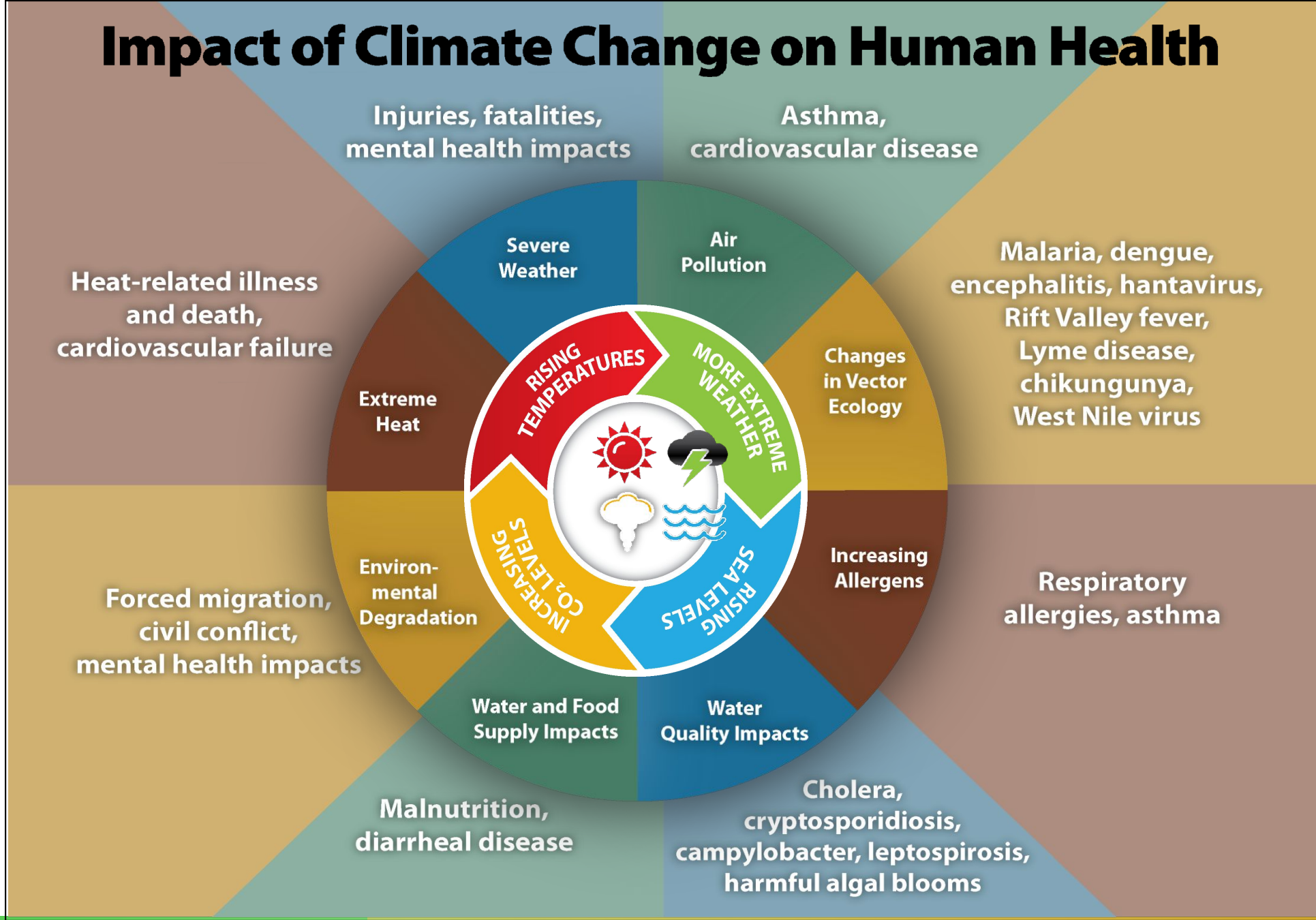


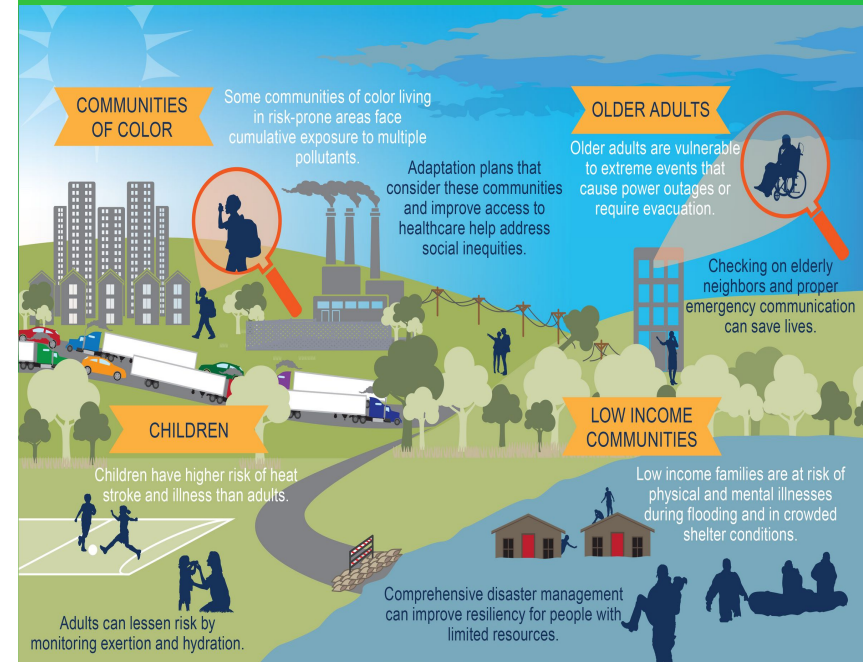
Photo credit: US Global Change Research Project Climate and Health Assessment

Impact of Climate Change on Human Health



VULNERABLE POPULATIONS

- Vulnerability is multifactorial
- Geographical locations affect deterioration of health especially caused by climate change
- Factors:
 - Children: susceptible to malaria, diarrhea and poor nutrition
 - Elderly: limited ability for response to physiological stressors
 - Lower income: At risk of loss of health, increased mortality




SOCIAL DETERMINANTS OF HEALTH (SDOH) DEFINED

- “conditions in the places where people live, learn, work, and play that affect a wide range of health and quality of life-risks and outcomes”





The screenshot shows the CDC website page for Social Determinants of Health. At the top, the CDC logo and tagline 'Centers for Disease Control and Prevention' are visible. Below the navigation bar, the main heading reads 'Social Determinants of Health: Know What Affects Health'. A large banner image features a diverse group of people in an urban setting. The text on the banner reads 'CDC Research on SDOH' and 'Conditions in the places where people live, learn, work, and play affect a wide range of health risks and outcomes. These conditions are known as social determinants of health (SDOH)'. A 'View SDOH Research' button is present. Below the banner, a paragraph defines SDOH: 'Social determinants of health (SDOH) are conditions in the places where people live, learn, work, and play that affect a wide range of health and quality-of-life risks and outcomes. Learn more about social determinants of health.' A second paragraph states: 'This website connects you to CDC resources for SDOH data, research, tools for action, programs, and policy. They may be used by people in public health, community organizations, research organizations, and health care systems to assess SDOH and improve community well-being. Information and tools available on this website were generated or funded by CDC within the last 10 years.' The page is organized into three columns: 'Learn more about SDOH' with links for 'About Social Determinants of Health (SDOH)', 'CDC Research on SDOH', and 'CDC Programs Addressing SDOH'; 'Take Action with SDOH Tools' with links for 'Policy Resources to Support SDOH' and 'Tools for Putting SDOH into Action'; and a 'Spotlight' section featuring a 3D model of a virus and text about health disparities in racial and ethnic minority groups.

SOCIAL DETERMINANTS OF HEALTH

- Economic stability
- Neighborhood and Physical Environment
- Education
- Food
- Community and Social Context
- Health Care System

 World Health Organization

Division of UHC/Healthier Populations

Departments				
	<i>Climate change, health and environment</i>	<i>Social determinants of health</i>	<i>Health Promotion</i>	<i>Nutrition and food safety</i>
Areas	<ul style="list-style-type: none"> • Air pollution and urban health • Climate change • Water, Sanitation and hygiene • Chemicals, radiation, occupational health 	<ul style="list-style-type: none"> • Social welfare and well-being • Violence • Road safety and injury prevention • Children, youth and vulnerable groups 	<ul style="list-style-type: none"> • Governance frameworks, healthy settings, health literacy • Physical activity • Tobacco control • Healthy Ageing 	<ul style="list-style-type: none"> • Healthy diets • Effective nutrition actions in the food and health systems • Food safety risk assessment

HEALTHY PEOPLE 2030

- Healthcare Access and Quality
- Education Access and Quality
- Social and Community Context
- Economic Stability
- Neighborhood and Built Environment

Healthy People 2030 uses a place-based framework that outlines five key areas of SDOH:



Healthcare Access and Quality

The connection between people's access to and understanding of health services and their own health. This domain includes key issues such as access to healthcare, access to primary care, health insurance coverage, and health literacy.



Education Access and Quality

The connection of education to health and wellbeing. This domain includes key issues such as graduating from high school, enrollment in higher education, educational attainment in general, language and literacy, and early childhood education and development.



Social and Community Context

The connection between characteristics of the contexts within which people live, learn, work, and play, and their health and wellbeing. This includes topics like cohesion within a community, civic participation, discrimination, conditions in the workplace, and incarceration.



Economic Stability

The connection between the financial resources people have - income, cost of living, and socioeconomic status - and their health. This area includes key issues such as poverty, employment, food security, and housing stability.



Neighborhood and Built Environment

The connection between where a person lives - housing, neighborhood, and environment - and their health and wellbeing. This includes topics like quality of housing, access to transportation, availability of healthy foods, air and water quality, and neighborhood crime and violence.

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY



2 ZERO HUNGER



3 GOOD HEALTH AND WELL-BEING



4 QUALITY EDUCATION



5 GENDER EQUALITY




6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE




10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



14 LIFE BELOW WATER



15 LIFE ON LAND



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



ONE HEALTH

- Brings together representatives from human, animal, and environmental health sectors, as well as other relevant partners, to prioritize zoonotic diseases of greatest concern for multisectoral, One Health collaboration in a country, region, or other area

PREPARATION VIGNETTES

- Avalanche
- Cyclone
- Landslide
- Tornado
- Tsunami

PREPARATION: Avalanche



- *Anticipated Injuries:* asphyxiation, Airway, cardiac compromise, control of hypothermia, Blunt trauma, craniofacial trauma, chest and abdominal trauma, and closed head injuries
- *Exacerbating Factors:* Sudden onset, terrain contributes to vulnerability to storms, melting snow leads to flooding
- *Provider Preparation:* Safety and rescue equipment, treatment of hypothermia
- *Infrastructure Problems:* difficulty with egress and ingress, lack of reliable communications, distances to local hospitals



PREPARATION: Cyclone



- *Cyclone-related injuries:* Top three are lacerations, blunt trauma and puncture wounds
- *Exacerbating factors:* Lack of clean water, leading to diarrhea, dehydration and death; water borne and vector diseases
- *Provider Preparation:* Pack resupply bag, treatment bag, anticipate related injuries and pack accordingly; teach locals first aid
- *Infrastructure Preparation:* Build structures to endure high winds and flooding; improve water drainage systems; cyclone shelters, improve building heights to decrease vulnerability to high winds; construction of brick pathways to evacuation centers, Ingress and Egress, lack of robust Health Care System

PREPARATION: Landslide

- *Landslide related injuries:* blunt trauma, asphyxiation
- *Health problems:* Exacerbating factors
- *Provider Preparation:* Heightened situational awareness, identify and train volunteer rescuers; establish rapid rescue operations; prepare for postdisaster assessments and interventions; Develop education campaigns to educate the population
- *Infrastructure Preparation:* Monitoring systems, determine vulnerabilities of landslides based on movement, distance and timing



PREPARATION: Tornado



- *Tornado related injuries:* Entrapment, injuries from flying debris, contaminate soft tissue injuries, fractures and head injuries
- *Exacerbating factors:* No notice, community members failing to heed warnings, lack of family emergency kits
- *Provider Preparation:* Develop Hazardous Vulnerability Assessment with local authorities and leaders; establish procedures for handling hazardous materials; carry an NOAA (National Oceanic and Atmospheric Administration) hand-crank weather radio; sign up for community warning systems; pay attention to weather reports; identify and rehearse going to safe shelters; slowly build essential supplies
- *Infrastructure Preparation:* Storm shelters, safe rooms and basements in new buildings

PREPARATION: Tsunami



- *Tsunami related injuries:* Drowning, traumatic injuries, heat and cold injuries, sunburn, insect bites, animal bites, blisters
- *Exacerbating Factors:* loss of electricity, nuclear plant leaked radiation, lack of drinking and medical water, lack of shelter, expired personnel and where to place them
- *Provider Preparation:* Triage marking kit, high volume of patients, handling of remains, prepare for immediate (injuries), secondary effects (decaying bodies) and long lasting effects (infectious and water- and insect-transmitted diseases; diverting medical supplies to needed areas; assisting in community mental and social health
- *Infrastructure Preparation:* Reconstruction funding, establishment of a cabinet level reconstruction agency; Construction of coastal infrastructure or seawall

TEN ESSENTIALS OF A SURVIVAL KIT

1. Map
2. Compass
3. Knife
4. Water and food
5. Rain gear and proper clothing for warmth
6. Headlamp or flashlight
7. First-aid supplies
8. Matches or spark source
9. Tinder
10. Sunglasses and sunscreen



PERSONAL PROTECTION POCKET ITEMS

- Needle for sewing or splinter removal
- Dental floss for flossing teeth, sewing, or gear repair
- Duct tape for clothing or gear repair, use as medical tape, signaling and notes
- Knife or multi-tool to cut, use as a screwdriver, digging, skinning
- Parachute cord to lash shelters and tools, gear repair, use of the inner strands for sewing
- Vaseline/cotton for use as tinder, lip balm, and to moisten dry skin
- Metal match to start a fire or signal at night
- Candle to save matches and as a light source
- Water purification tablets and water container
- Signalling: mirrors whistle and markers

PERSONAL MEDICAL KIT

- antibiotic ointment
- antihistamine
- aspirin
- band-aid
- bee sting kit
- moleskin
- roller gauze
- routine medications
- scissors
- snake bite kit
- soap
- tincture of benzoin
- triangular bandage (kravat)
- suture material



PREPARATION: Overall Tips

Basic Disaster Supplies Kit

To assemble your kit store items in airtight plastic bags and put your entire disaster supplies kit in one or two easy-to-carry containers such as plastic bins or a duffel bag.

A basic emergency supply kit could include the following recommended items:

- [Water](#) (one gallon per person per day for at least three days, for drinking and sanitation)
- [Food](#) (at least a three-day supply of non-perishable food)
- Battery-powered or hand crank radio and a NOAA Weather Radio with tone alert
- Flashlight
- First aid kit
- Extra batteries
- Whistle (to signal for help)
- Dust mask (to help filter contaminated air)
- Plastic sheeting and duct tape (to [shelter in place](#))
- Moist towelettes, garbage bags and plastic ties (for personal sanitation)
- Wrench or pliers (to [turn off utilities](#))
- Manual can opener (for food)
- Local maps
- Cell phone with chargers and a backup battery

<https://www.ready.gov/kit>

Additional Emergency Supplies

Consider adding the following items to your emergency supply kit based on your individual needs:

- [Masks](#) (for everyone ages 2 and above), soap, hand sanitizer, disinfecting wipes to disinfect surfaces
- [Prescription medications](#)
- Non-prescription medications such as pain relievers, anti-diarrhea medication, antacids or laxatives
- Prescription eyeglasses and contact lens solution
- Infant formula, bottles, diapers, wipes and diaper rash cream
- Pet food and extra water for your pet
- Cash or traveler's checks
- Important family documents such as copies of insurance policies, identification and bank account records saved electronically or in a waterproof, portable container
- Sleeping bag or warm blanket for each person
- Complete change of clothing appropriate for your climate and sturdy shoes
- Fire extinguisher
- Matches in a waterproof container
- Feminine supplies and personal hygiene items
- Mess kits, paper cups, plates, paper towels and plastic utensils
- Paper and pencil
- Books, games, puzzles or other activities for children



Since Spring of 2020, the CDC has recommended people include additional items in their kits to help prevent the spread of coronavirus or other viruses and the flu.

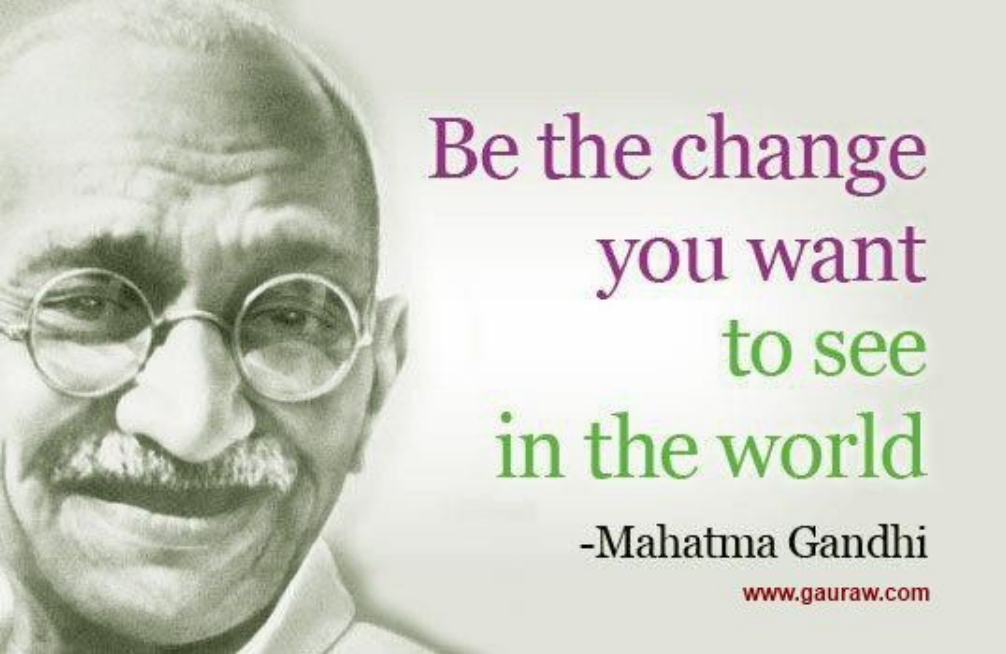
Beyond Medicine

Interprofessionalism





- You are volunteering as an individual with expertise in your field of practice
- You may need to check your expectations at the door
- Come ready to work as a member of a team
- Approach with an open mind, ready to collaborate



Start by getting involved;
Participation = Preparation

1. FEMA emergency management courses

<https://training.fema.gov/emi.aspx>

2. MRC (Medical Reserve Corps)

3. SERV (State Emergency Registry of Volunteers) organizations

1. Education

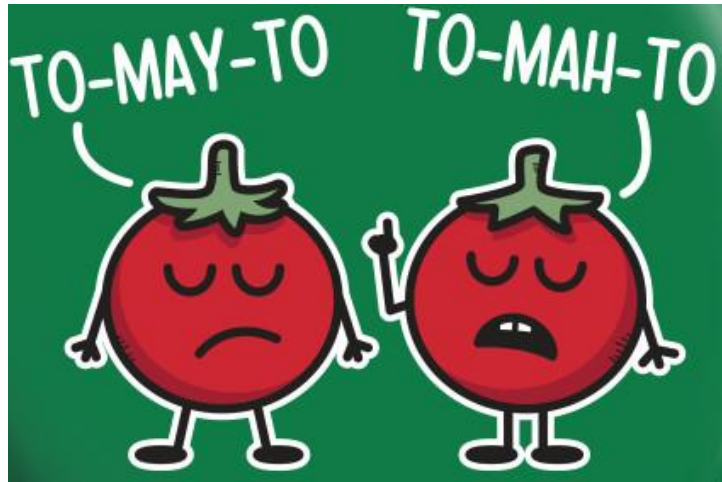
2. Training

3. Action

WHAT'S THE DIFFERENCE?

Medical Readiness Units

- Identify
- Train
- Organize



<http://mrc.hhs.gov/FindMRC>

State Emergency Registry Volunteer

- Individual state level registry

SERV-OR, SERV-NV, SERV-PA, SERV-MA, SERV-WA
NY - <https://apps.health.ny.gov/pub/servny/>
TX - <https://www.texasdisastervolunteerregistry.org>
CA - <https://healthcarevolunteers.ca.gov>
FL - <https://www.volunteerflorida.org/emergency-management/>

WHAT ELSE CAN WE DO?

- Listen and learn
- Educate
- Speak out
- Practice what we preach
- Become involved
- Act as stewards



HOW TO GET INVOLVED

- FEMA (Federal Emergency Management Agency)
- Disaster Medical Assistance Team
 - <https://www.phe.gov/Preparedness/support/medicalassistance/Pages/default.aspx>
- PAs for Global Health
- Public Health Departments
 - Medical Relief Corps
- Wilderness Medicine - <https://www.nols.edu/en/>
- Peace Corps
- DoD / Federal (can allow for international work but typically limited to providing care to americans outside of mission trips)
- International Rescue Committee
- International Medical Corps
- Reliefweb.int



FEMA



Peace
Corps

The screenshot shows the website for the Disaster Relief Organizations Database. At the top left is the PAGH logo. The page title is "Disaster Relief Organizations Database". A navigation menu includes "Home", "Members Only", "About Us", "Conferences", "Blog", "Contact", and "Profile". A breadcrumb trail reads "Home / Disaster Relief Organizations Database". A yellow button labeled "Disaster Relief Government Links/Resources" is visible. The main content area features a link for "Medic Assist International" with the URL <https://medicassistinternational.org>. Below this is a description: "Enables local partners to develop sustainable healthcare in vulnerable and marginalized communities. Funding self-sustaining projects and sending short term volunteers to facilitate growth. These include mobile clinics in Pakistan, Sri Lanka, South Sudan, and life care in Uganda and India, public health in Nepal, and hospital services in Nigeria and South Sudan". Contact information is listed: "When hope confronts despair", "Contact: MAI, PO Box 1626 Oxford, Oxfordshire, OX4 9NF, England, 07482925431", and "Email: steve@medicassistinternational.org".

AVAILABLE CIVILIAN TRAINING

- Formalized training opportunity through John Hopkins center for Humanitarian Health
 - HELP course - Health Emergencies in Large Populations
 - Creates an understanding of public health needs of populations in disasters and conflict situations
 - Aimed to equip participants with basic skills and competencies to enable them to respond in public health needs in emergency situations
- National level
 - FEMA National Preparedness online Course Catalog - <https://training.fema.gov/>
 - DMAT - <https://www.phe.gov/Preparedness/responders/ndms/ndms-teams/Pages/dmat.aspx>
- State/County level
 - Medical Reserve Corps [MRC \(hhs.gov\)](https://www.mrc.gov/)
 - State Emergency Registry of Volunteers

AVAILABLE MILITARY TRAINING AND RESOURCES

Training

- Global Medicine <https://www.med.navy.mil/sites/nmpdc/courses/Pages/Global%20Medicine.aspx>
- Military Tropical Medicine <https://www.med.navy.mil/sites/nmpdc/courses/Pages/Military%20Tropical%20Medicine.aspx>
- Army Emergency Management Training Program
- Defense Medical Readiness Training Institute (DMRTI) Course (multiple) (<https://health.mil/Training-Center/Defense-Medical-Readiness-Training-Institute>)
 - Emergency Preparedness Response Course
 - Public Health Emergency Management (PHEM) Course - Initial and Sustainment
 - Public Health and Medical Services in Defense Support of Civil Authorities (PH MED DSCA) Course
 - Hospital Incident Command System (HICS) Course
 - Incident Command System (ICS) Course
 - Federal Coordinating Center-Patient Reception Area Basic Opps Course (FCC/PRC)
 - Joint Humanitarian Operations Course (JHOC)
 - Joint Medical Operations Course (JMOC) - Basic and Advanced
 - Joint Medical Planning Tool (JMPT) Course

Resources

- Army Emergency Management Career
- Emergency Management workforce: <https://safety.army.mil/CP-12/Who-We-Are/Emergency-Management>
- AR 525-27 Army Emergency Management Program [ARN4163 AR525-27 FINAL.pdf \(army.mil\)](#)
- DA PAM 525-27 Army Emergency Management Program https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN30057-PAM_525-27-000-WEB-1.pdf
- Career Development and Training Guide for the Emergency Management Community of Practice and Contingency Operations Workforce [USACE EM Career Program EP 690-1-824 31Jul2015.pdf \(army.mil\)](#) or [EP 690-1-824 - Civilian Personnel \(army.mil\)](#)
- Army Public Health Center [Home - Army Public Health Center](#)

TAKE HOME POINTS

- Recognize our relationship with nature and animals
- Educate yourself on climate change
- Educate your patients on the effects of climate change
- Recognize how climate change may affect your patients and their social determinants of health
- Volunteer
- Get involved

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- US Global Change Research Project Climate and Health Assessment
- Florida Clinicians: <https://states.ms2ch.org/fl/fcca/>
- Planetary Health Alliance: <https://www.planetaryhealthalliance.org/planetary-health>
- US Geological Survey:
https://www.usgs.gov/faqs/how-can-climate-change-affect-natural-disasters-1?qt-news_science_products=0#qt-news_science_products
- National Weather Foundation:
<https://www.nwf.org/-/media/Documents/PDFs/Environmental-Threats/Climate-Change-Natural-Disasters-fact-sheet.ashx>
- CDC: www.cdc.gov/onehealth/global-activities/prioritization.html

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