The Environment and Health

How the world around us affects wellbeing and health outcomes

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Disclosures

- No conflicts of interest to report
- No off-label use of medications or devices will be discussed

Determinants of Health

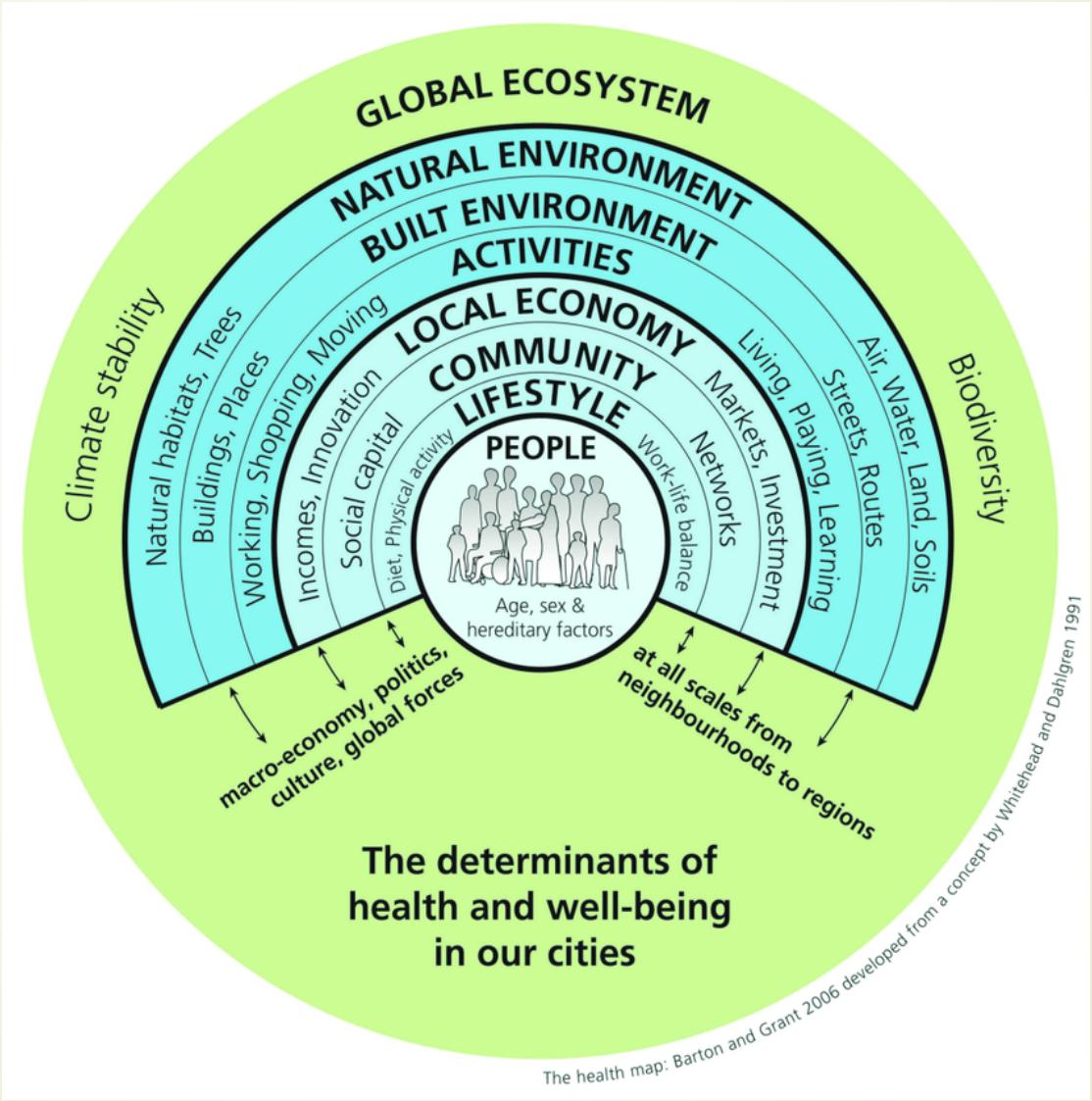
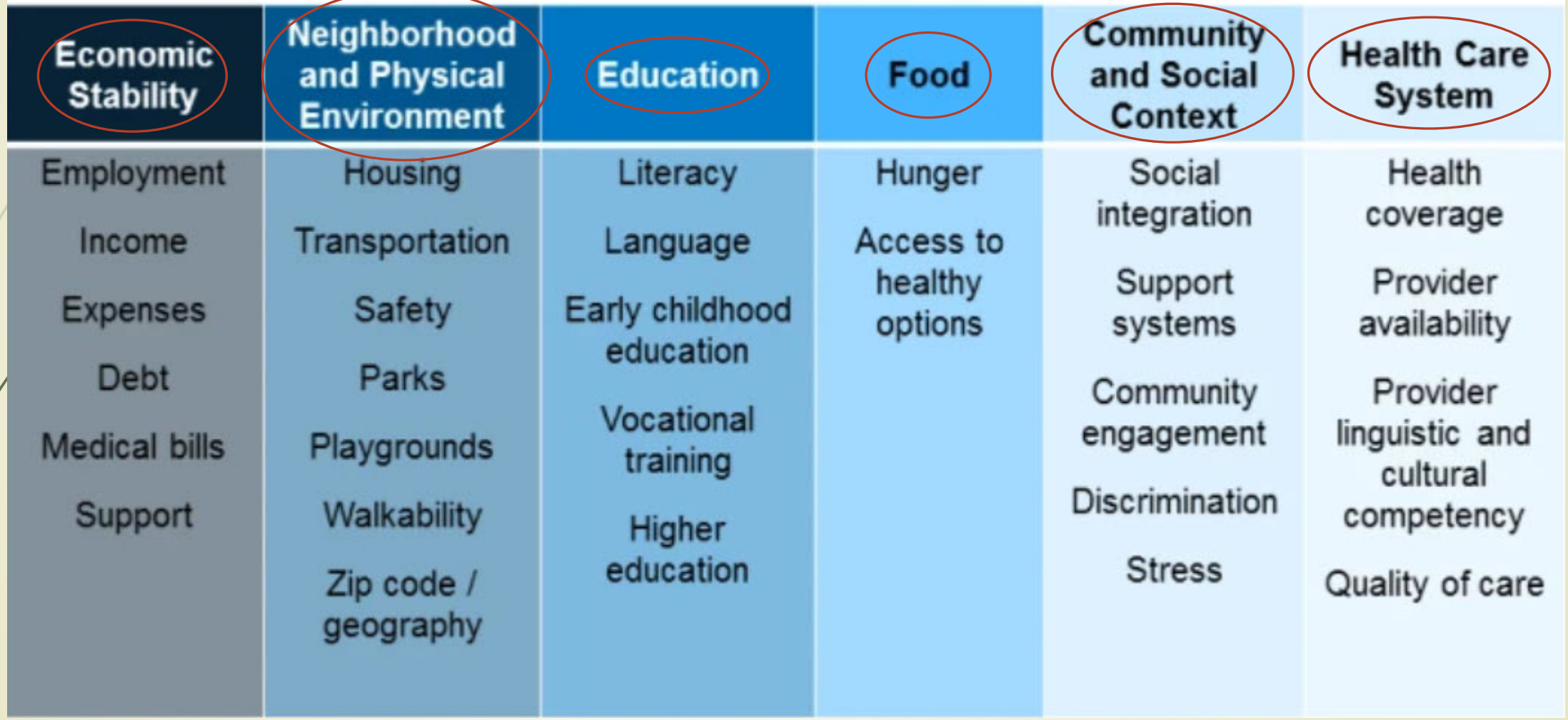


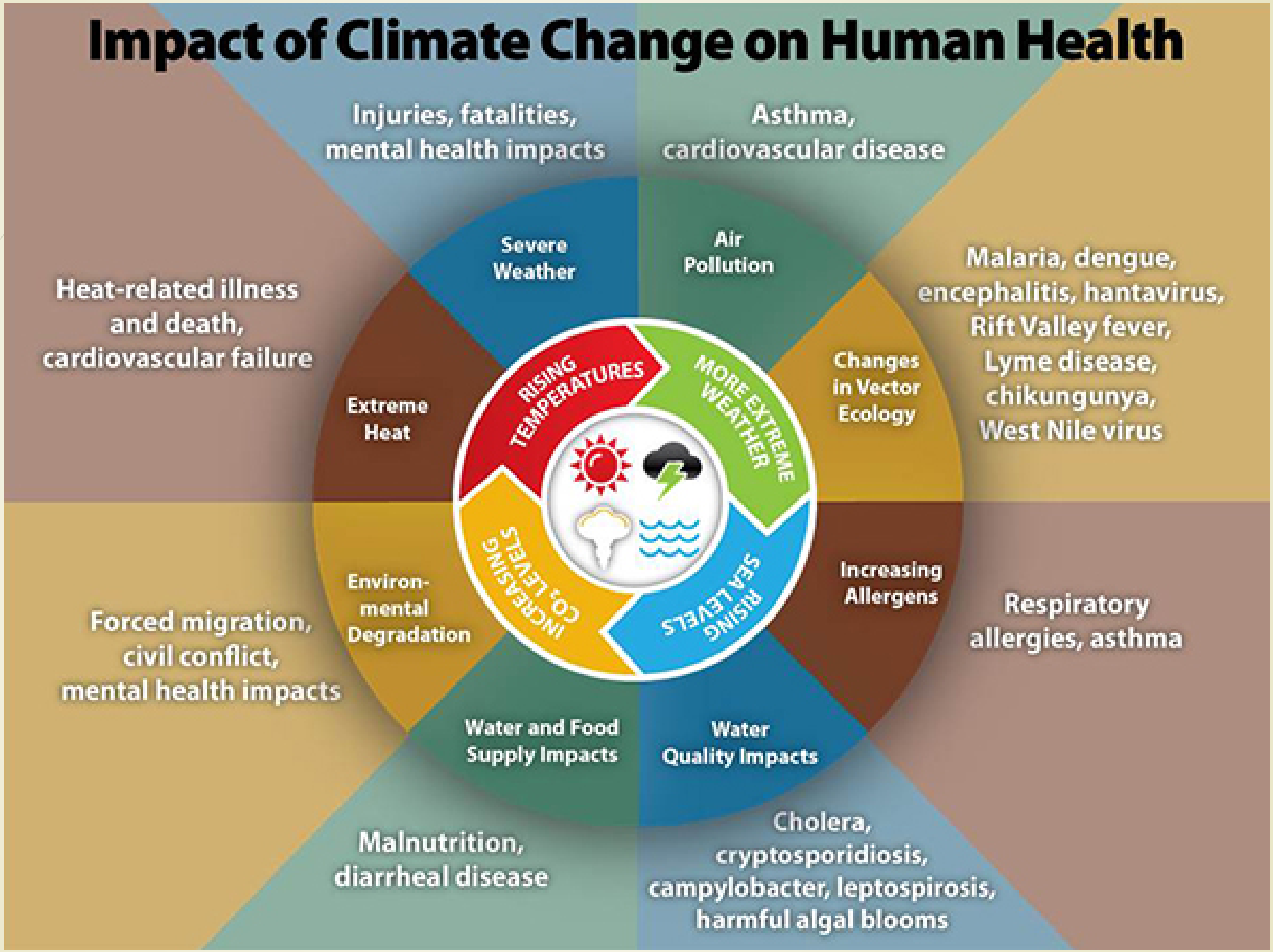
Figure 1

Social Determinants of Health



Economic Stability	Neighborhood and Physical Environment	Education	Food	Community and Social Context	Health Care System
Employment	Housing	Literacy	Hunger	Social integration	Health coverage
Income	Transportation	Language	Access to healthy options	Support systems	Provider availability
Expenses	Safety	Early childhood education		Community engagement	Provider linguistic and cultural competency
Debt	Parks	Vocational training		Discrimination	Quality of care
Medical bills	Playgrounds	Higher education		Stress	
Support	Walkability				
	Zip code / geography				

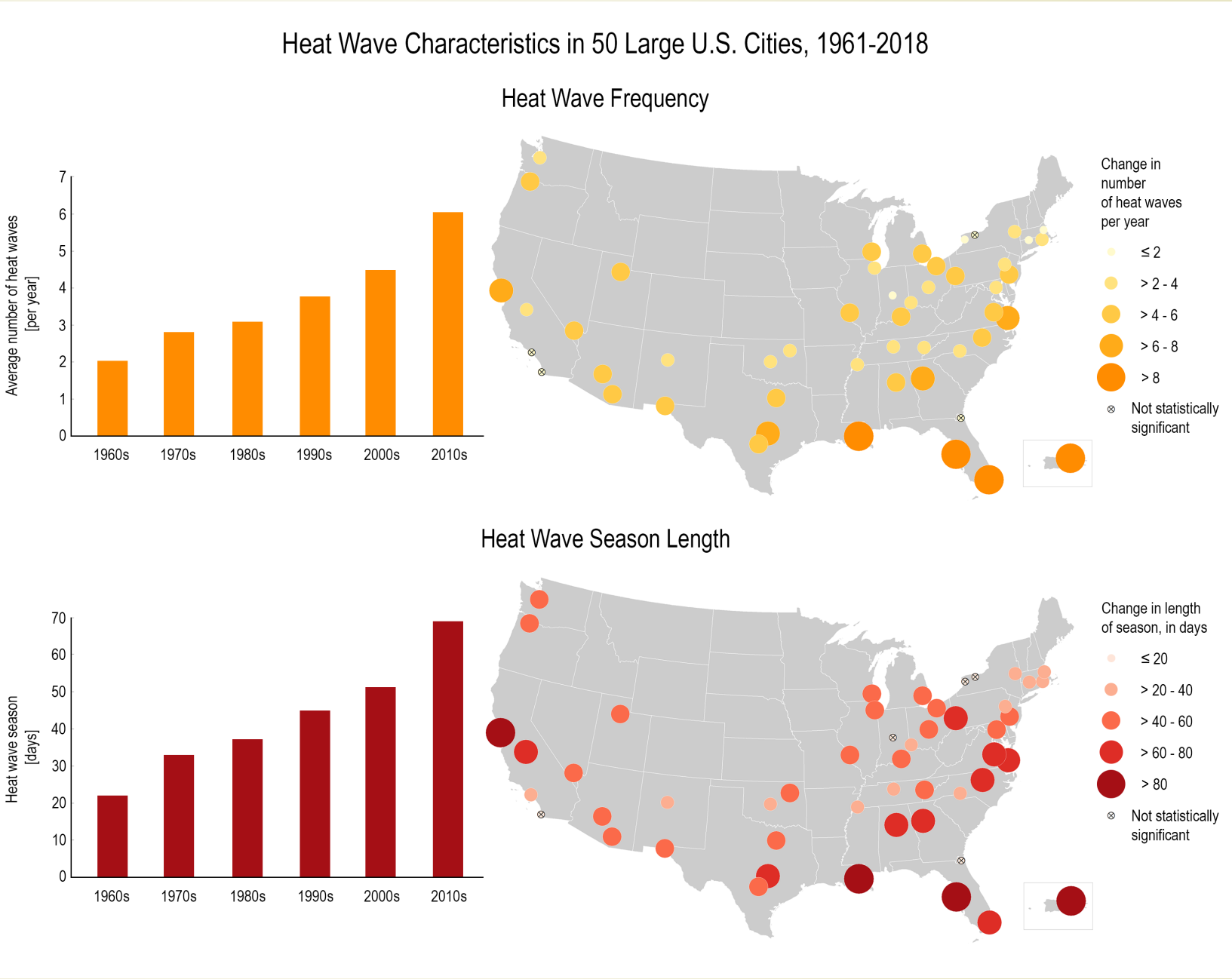
(Surescripts.com 2021)



(U.S. Center for Disease Control and Prevention, 2021)

Extreme Temperatures

- Hotter than usual days and nights are more common
- Urban health island effect
- Increased risk of heat-related illness and death
- Secondary effects on food quality and supply, personal expenses, access to healthcare services, and stress



(USGCRP, global change.gov)

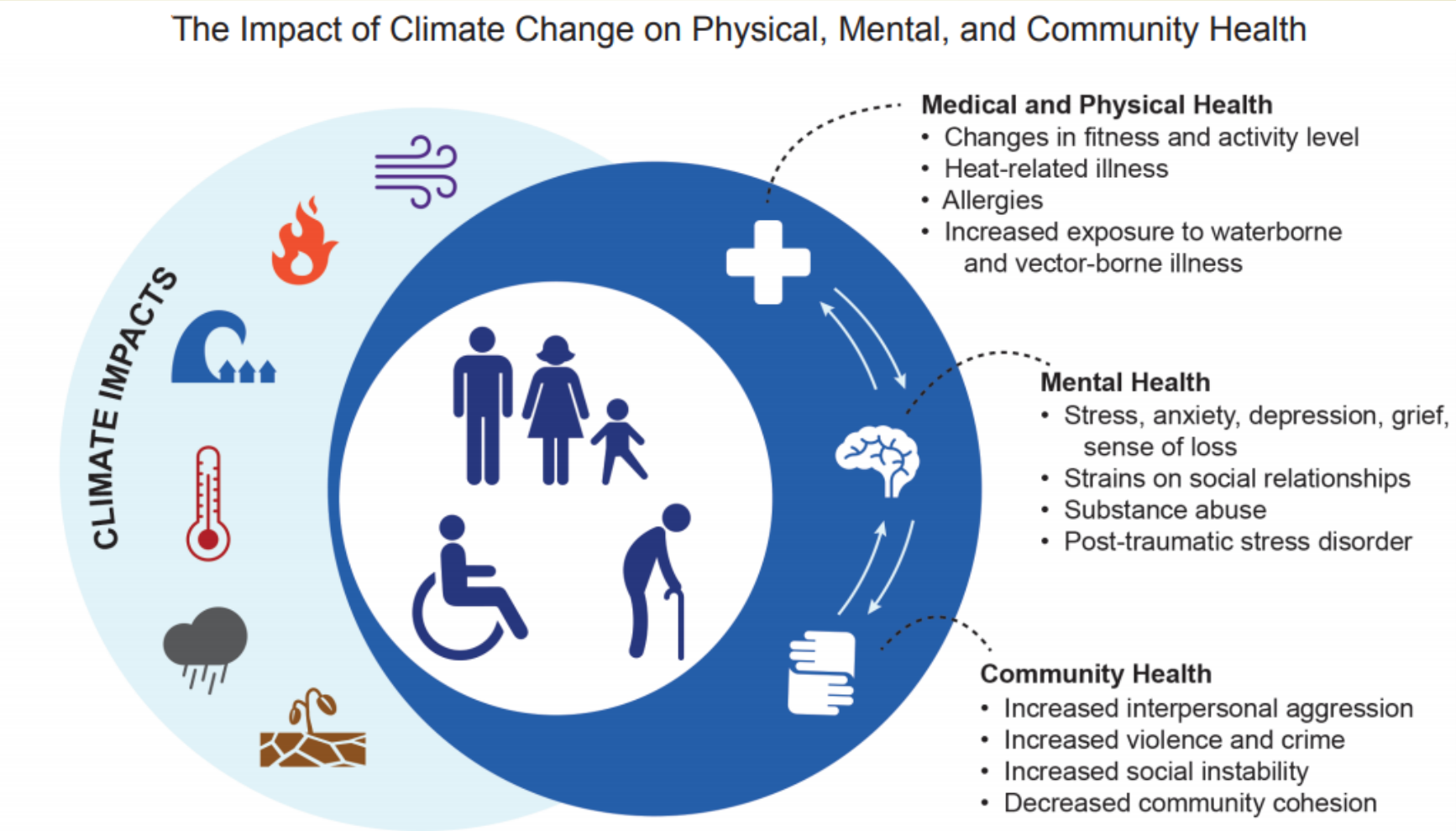
Air Quality and Allergens

- Poor air quality most affects people with asthma, heart disease, and COPD
- Increased ground-level ozone and particulate matter air pollutions
- Estimated 1000-4300 additional premature deaths annually by 2050
- Health related costs estimated at $6.5 billion (in 2008 US dollars)
- Longer and more productive(higher concentration) pollen seasons
- More frequent asthma attacks and increases in hospital admissions for respiratory illness
- Indoor air quality problems related to extreme rainfall and rising temperatures

Mental Health Effects

- Range from minimal stress or distress symptoms to clinical disorders, such as anxiety, depression, post-traumatic stress, and suicidality.
  - Effect on everyday life, perceptions, and experiences
- Cumulative effects of climate change on health + mental health = complete understanding of the effect on human health
- Exposure to climate-related or weather-related disasters
- The perceived threat of climate change and changes to one's local environment
- Specific groups at higher risk
  - Extreme heat and people with pre-existing mental illness

So that's the bad news…



At the center of the diagram are human figures representing adults, children, older adults, and people with disabilities. The left circle depicts climate impacts including air quality, wildfire, sea level rise and storm surge, heat, storms, and drought. The right circle shows the three interconnected health domains that will be affected by climate impacts: Medical and Physical Health, Mental Health, and Community Health (see Ch. 8: Mental Health). (Figure source: adapted from Clayton et al. 2014)[7]

…Now for some good news!

It's possible to make changes and see real improvements now

- In Utah during the pandemic, Air quality indexes were better than ever with lower-than-average CO2 and particulate matter
  - ~40-50% reduction in traffic comparable to 40-50% of vehicles being electric
- Lung function can rapidly recover in children after relocation
  - Moving from a highly polluted urban environment to a less polluted urban environment
- There are clinical interventions we can implement to help our patients adapt to and recover from the effects of environmental pollutants and climate change

What can we do?

Health effect	Mechanism	Clinical interventions
Cardiopulmonary effects (e.g., asthma and COPD exacerbations, MI, stroke)	Worsening air pollution, higher ozone concentrations, extended pollen season	Self-monitoring devices, N95 protective masks, staying indoors in response to EPA air quality alerts, avoiding high-traffic areas AIR Mnemonic for Patients with Pulmonary Disease- **A**sk; **I**nform; **R**eact
Heat injury (e.g., muscle cramps, sweating, nausea, vomiting, ataxia, altered mental status, seizures, death)	Warmer temperatures, urban heat islands, more frequent and severe heat waves	Counsel patients about prevention, including moving to public cooling centers during heat waves, recognizing early symptoms, and taking appropriate actions Outdoor workers should avoid peak heat, take breaks, and hydrate adequately
Allergies (e.g., allergic rhinitis, asthma)	Extended hay fever season and more severe allergic responses; higher ozone levels combine with the urban heat island effect to cause higher pollen counts, especially from ragweed	Pharmacologic treatment; counsel patients to monitor pollen counts and adjust medications using parameters provided by clinician

What can we do, continued

Health effect	Mechanism	Clinical interventions
Infectious disease (e.g., West Nile virus, Zika virus, Lyme disease, dengue virus, malaria)	Warmer temperatures/longer summers = more effective reproduction of insect vectors; Warmer, shorter winters allow insect vectors to expand range poleward (Lyme disease, dengue virus) and into higher altitudes (malaria); unexposed populations have less behavioral and/or physiologic resistance; Warmer surface water temperatures are directly correlated with increasing Vibrio counts, and warmer ambient temperatures are associated with higher incidence of diarrheal illness; groundwater and drinking water contaminated with sewage increases risk of enteric disease	Early detection and appropriate treatment; notify public health authorities; counsel patients about signs and symptoms to watch for and ways to reduce exposure
Mental health effects (e.g., anxiety, depression, posttraumatic stress disorder)	Exposure to natural disasters, loss of resources, loss of social support systems, worry	Screening during office visits (especially after disasters) and appropriate referral