

ScienceBeat

CLIMATE CHANGE

MODULE 5 HEALTH EFFECTS



Open Ended Question

List some health and living conditions that YOU think could become dangerous if our climate changes.

Type of Diseases

Vector-borne disease

Infectious disease transmitted by organisms



Examples:

Malaria – transmitted by mosquito
Lyme disease – transmitted by ticks

Diseases of Concern

There are **THREE** types.

Type of Diseases

Food/Water-borne diseases

Transmitted by contact/consumption of contaminated water or food.



Cholera – consumption of contaminated water
Salmonellosis: consumption of contaminated water or uncooked meat/egg

Type of Diseases

Allergic diseases

From air pollution, pollen and mold or heredity)



Example:
Asthma
Hay Fever

Open Ended Question

There are six major populations most vulnerable (at danger) from climate change health risks. How many can you identify?

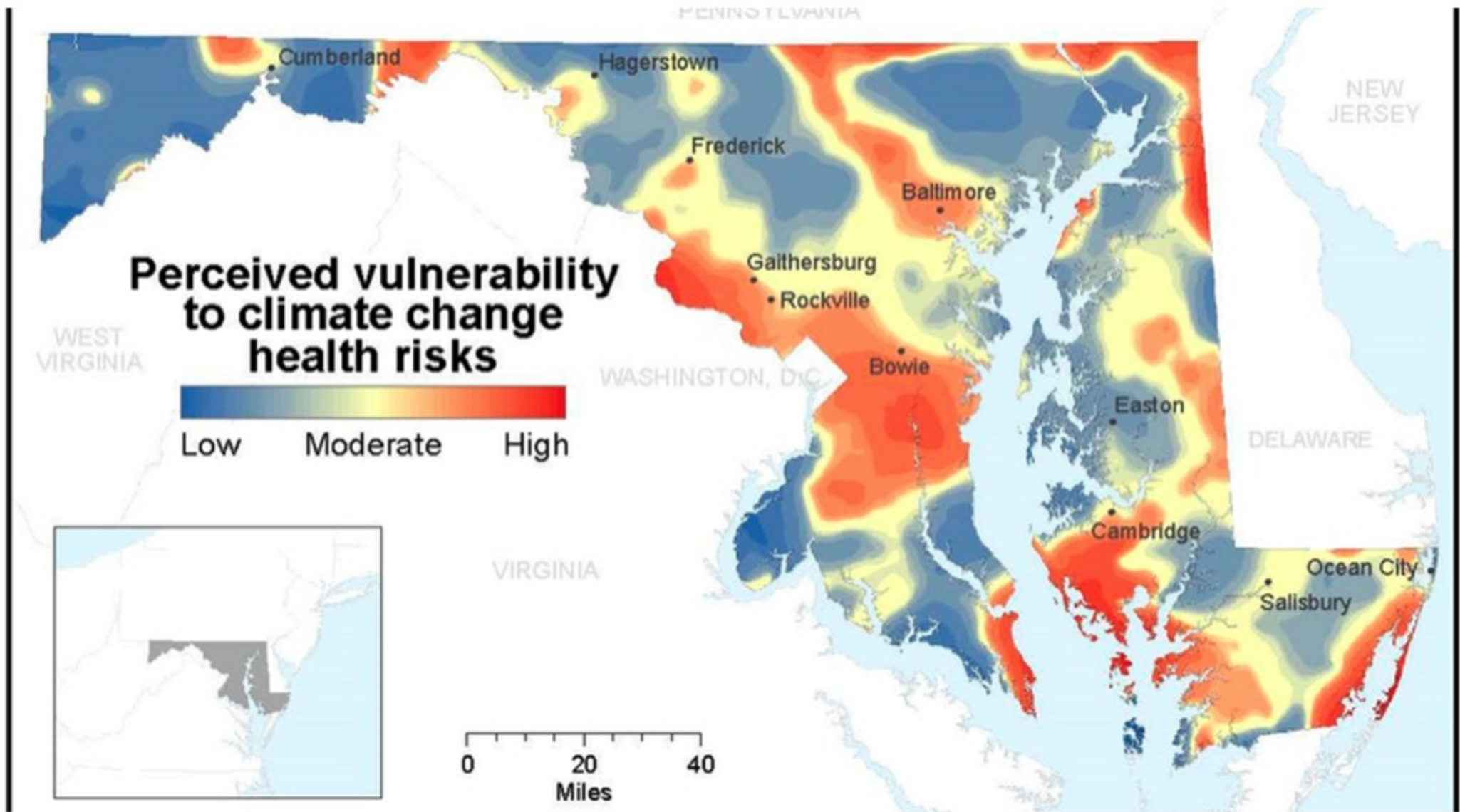
VULNERABLE POPULATIONS

1. Children
2. Pregnant women
3. The elderly
4. Malnourished or lacking access to water
5. People with pre-existing conditions
6. Those with lack of access to health care (i.e. Inner city and rural populations)



Draw It

Circle the largest area of vulnerability of health risks. Place an "X" for your current location.



REMEMBER ?

Weather:

State of atmosphere at a given place and time
(i.e. current temperature)

Climate:

Long term pattern of weather averages, extremes

Climate Change:

Altered patterns of Climate

Deviation from the long term averages.



Scientists across the globe agree

Extreme heat, precipitation, hurricane, draught events will become more frequent, intense, and longer lasting.

One way to look at the climate-health link is to ask how extreme events impact occurrence and spread of human diseases.



More Extreme Weather Events From Climate Change Are Affecting Health

Extreme precipitation →
Drowning and health risks
from water-borne illness



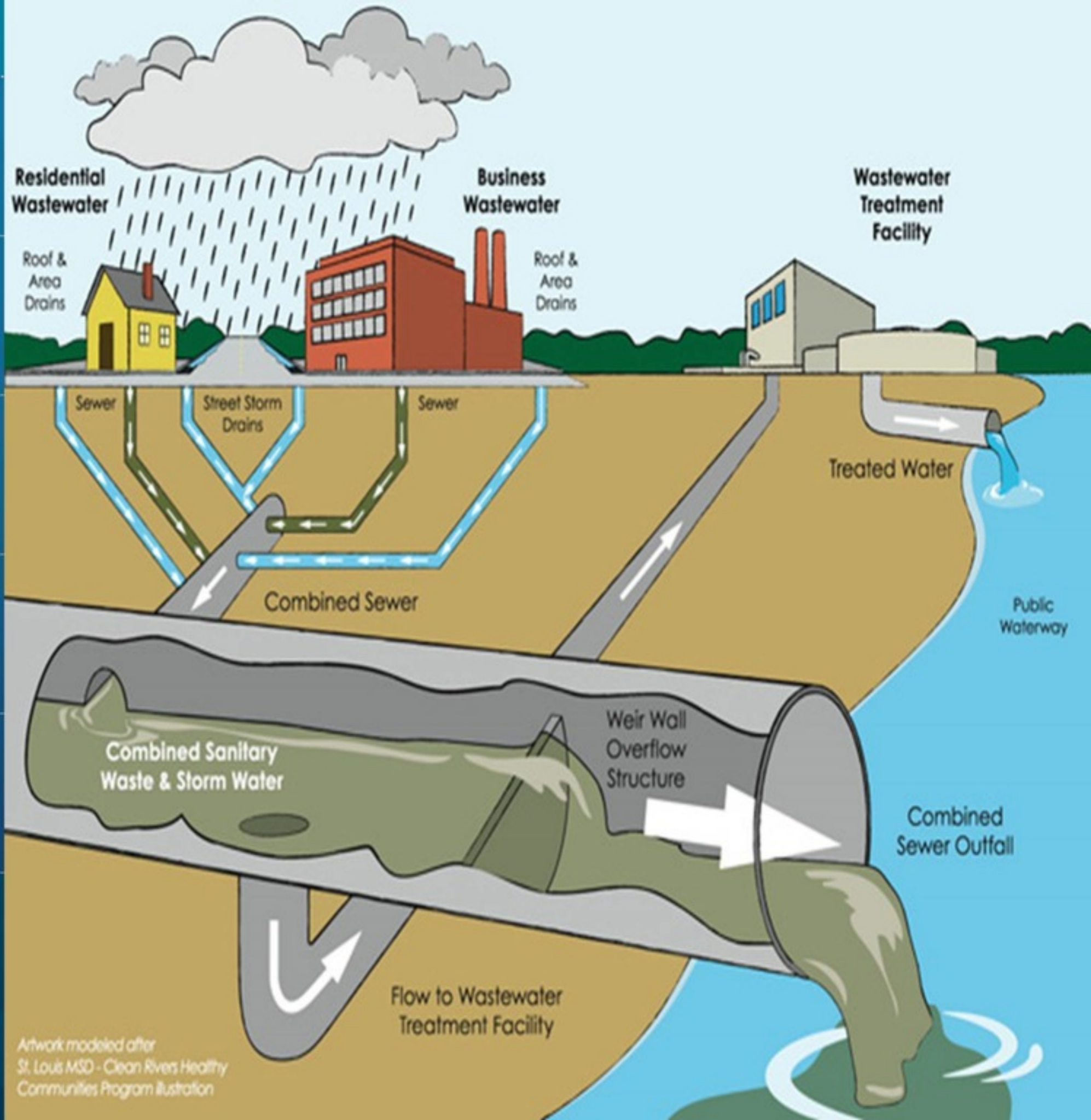
Contaminated flood water
hosts bacteria and viruses
that cause illness long after
the event.



Bacteria and Viruses in Contaminated Flood Waters Enter The Food Supply



Sewer Systems Overwhelmed by Flood Water Contaminate Water and Food Supply.



Artwork modeled after St. Louis MSD - Clean Rivers Healthy Communities Program Illustration



In The Extreme flood In Chennai, India (December 2015)

Water from nearby lake caused the “polluted and stinking Adyar river” to overflow



Why does it matter if rivers nearby overflow?

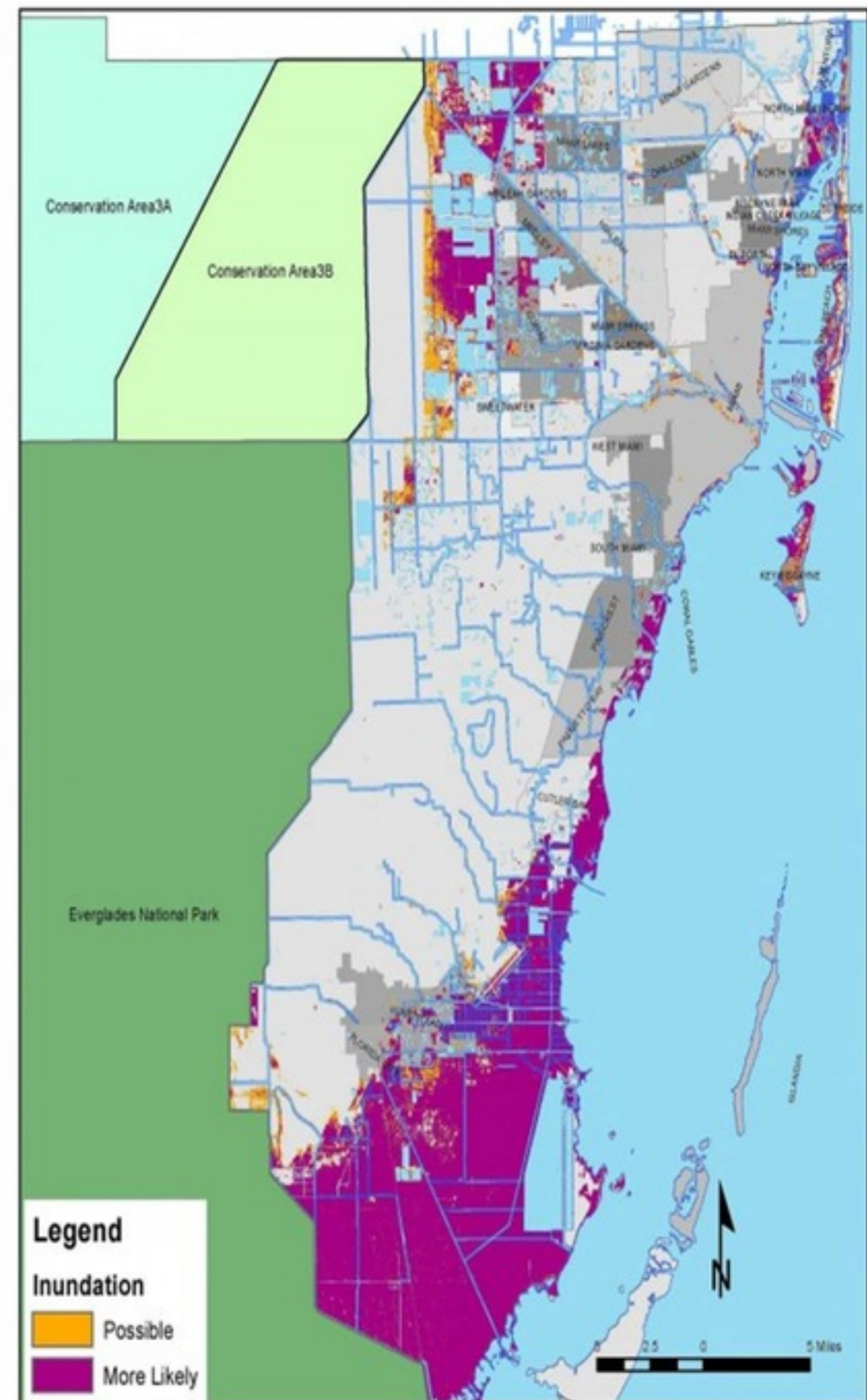
(Citizens were already dealing with flooding.)



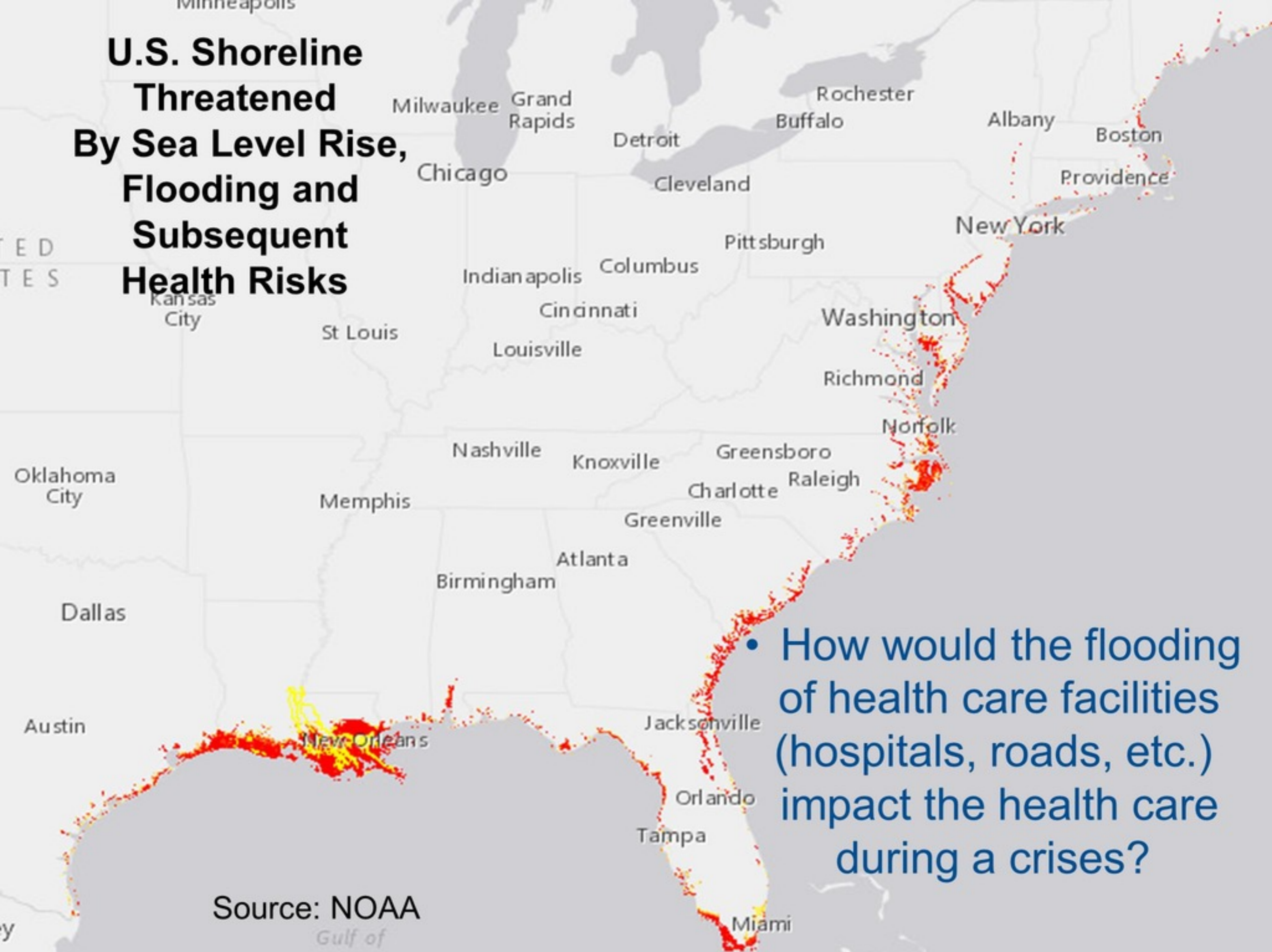
In Miami-Dade County
Florida,
a one foot rise in sea level
would flood:

- 75% of hospitals
- 65% of schools
- 71% of emergency shelters .

3-foot Sea Level Rise In Miami-Dade County



U.S. Shoreline Threatened By Sea Level Rise, Flooding and Subsequent Health Risks



Source: NOAA

- How would the flooding of health care facilities (hospitals, roads, etc.) impact the health care during a crises?

Populations in southeast India were plagued by malaria, cholera, hepatitis and skin infections...

for
months
afterward



After Hurricane Katrina in New Orleans, people lived FOR MONTHS In The Super Dome

- No drinking water
- Damaged sewer systems
- Increases in mosquitos
- Spread of leaking chemicals
- Anxiety, depression and other mental health conditions



Mental health conditions continued for months.

- Low-income and African American populations were most affected.
- Isolation from the social community
- Loss of homes, property and savings.
- Destruction of health care facilities and schools
 - Loss of medical records





Health effects from **EXTREME TEMPERATURE** Global and Local Examples



HEAT INDEX:

How hot you feel with humidity.

HEAT WAVE:

When the heat index is expected to be 105° or higher for at least two days and night time temperatures stay above 75°



NWS Heat Index

Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution

Extreme Caution

Danger

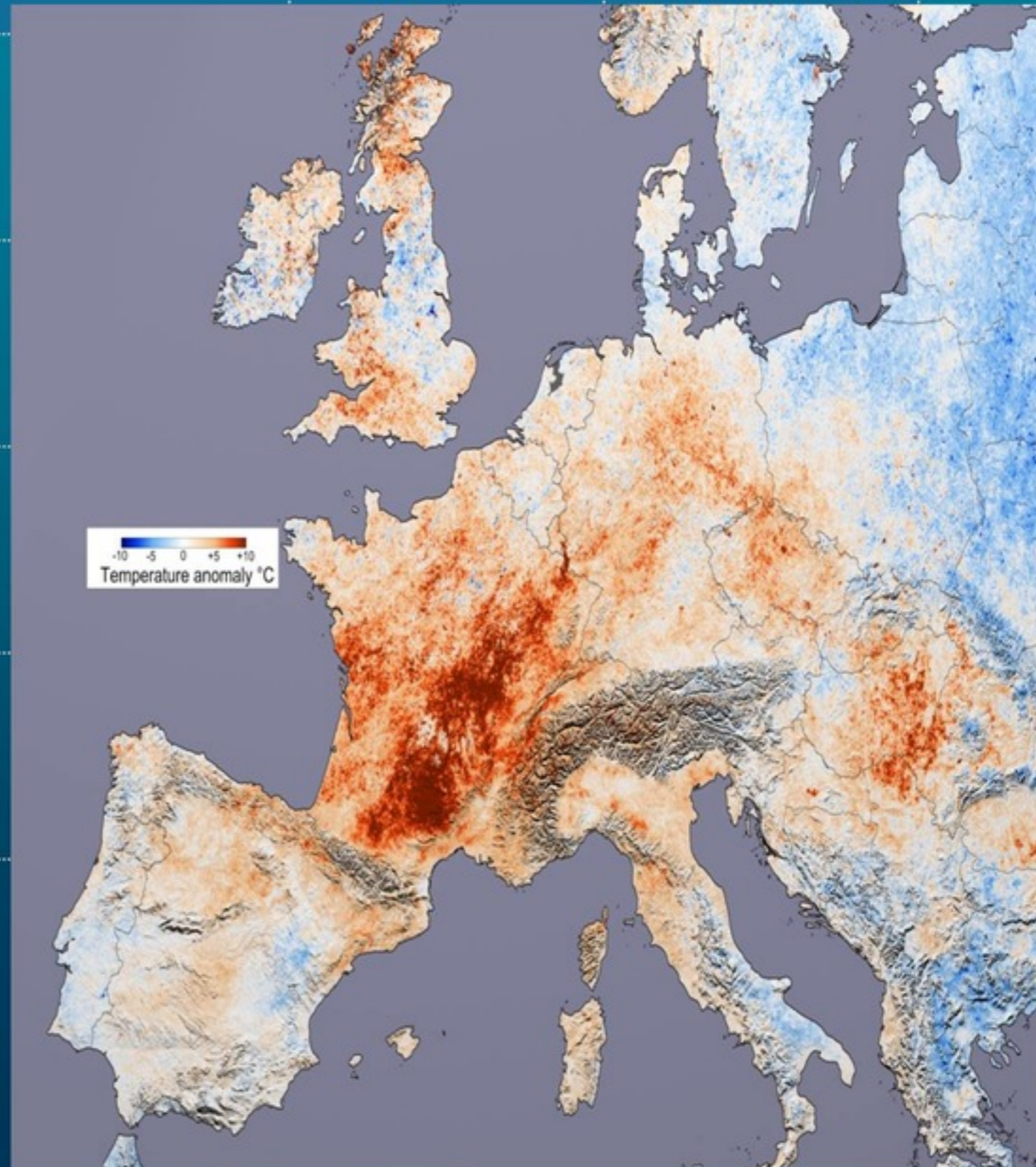
Extreme Danger

European Heat Wave

Exceptionally hot
in August 2003.

More than
52,000 deaths.

Hottest weather
in 500 years.



Heat Exhaustion vs. Heat Stroke

Can lead to heart attack
and death

Between 2000 and 2012,
Maryland recorded more
than 32,000
hospitalizations during the
summer months alone

HEAT EXHAUSTION

1. MOIST & CLAMMY SKIN
2. PUPILS DILATED
3. NORMAL OR SUBNORMAL TEMPERATURE

HEAT STROKE

1. DRY HOT SKIN
2. PUPILS CONSTRICTED
3. VERY HIGH BODY TEMPERATURE



www.pakmed.net

BMRf1416

Extreme heat and sports.



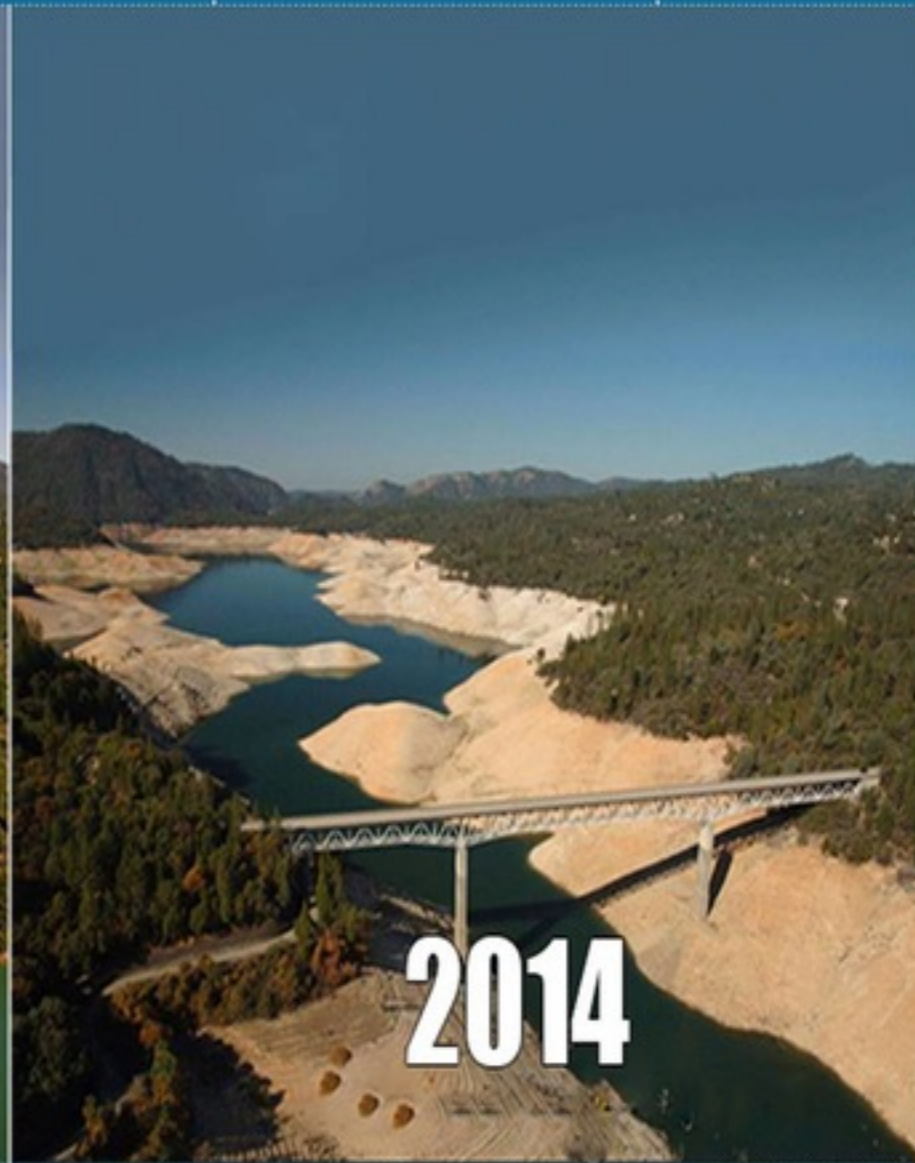
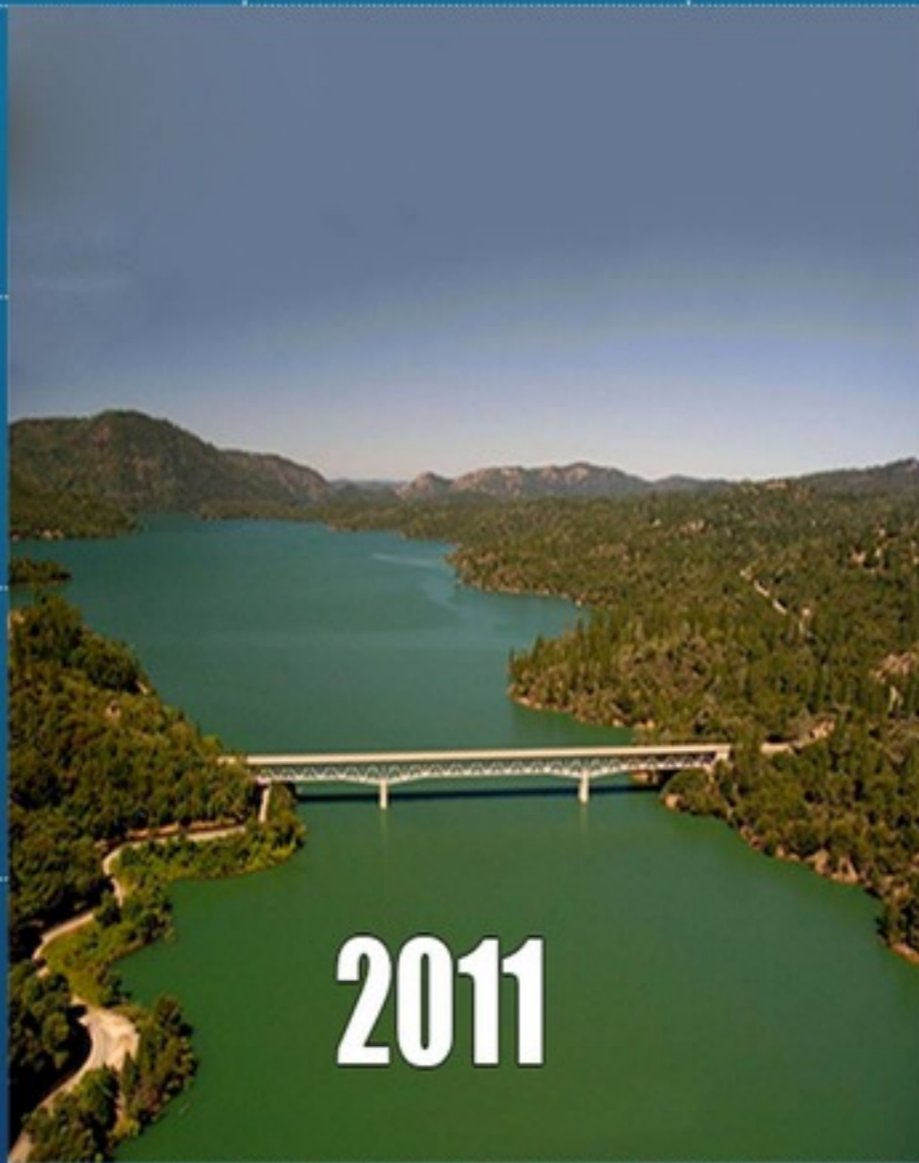
Some schools cancel all outdoor activities
in extreme heat & humidity.

Have you or anyone you know had changes to their
sporting event or practice because of heat?

**We already have
evidence of
drought**



Lake Orville, California



The following web site

will give us an idea of this week's drought conditions in the U.S.
What does it tell us?

Home > Maps And Data > Change Maps

U.S. Drought Monitor Change Maps

April 26, 2016

National

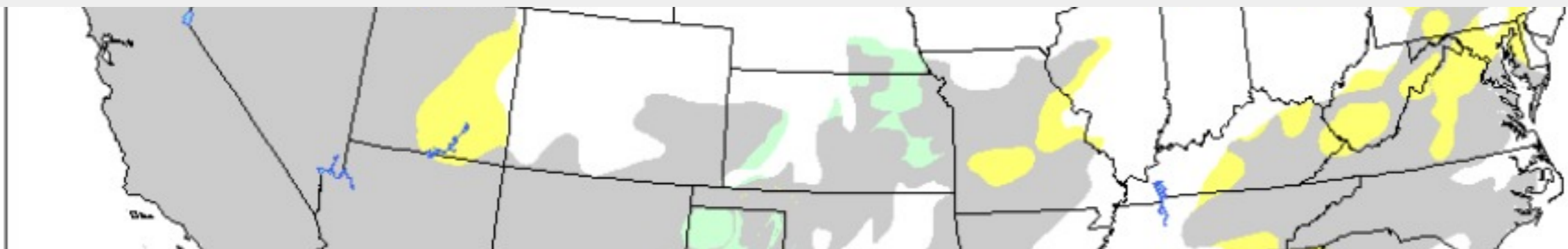
CONUS

1 Week

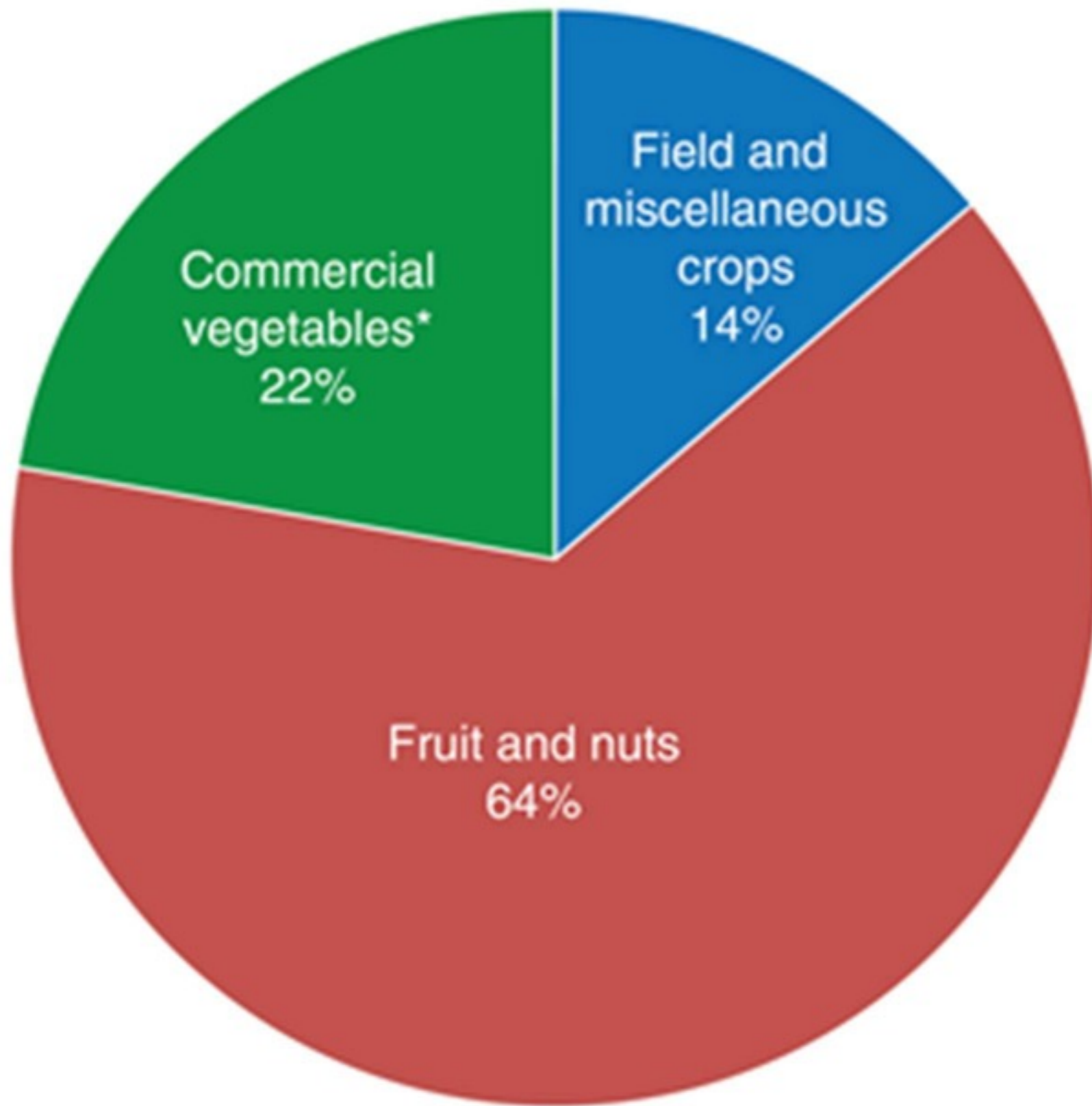
Download: PDF



<http://droughtmonitor.unl.edu/MapsAndData/ChangeMaps.aspx>



Crop shares of the value of California's crop output, 2012-14 average



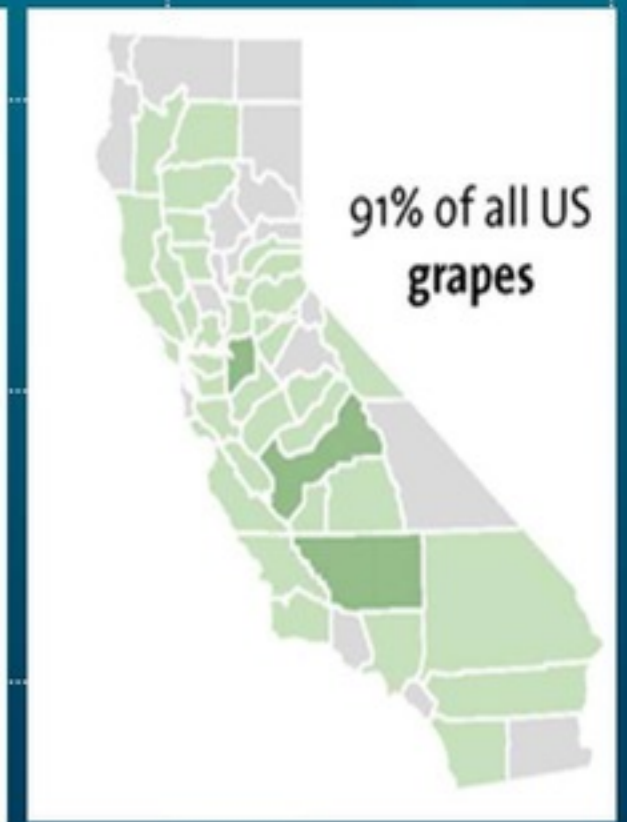
*Includes melons.

Source: USDA, National Agricultural Statistics Service, *Crop Values 2015 Summary*.

Where Does Your Food Come From?

California's drought affects the whole country's fruits, veggies, and nuts.

Percentage of Total US Production by County



The following video

is a news report about the drought's effects.



https://www.youtube.com/embed/IjM0oKf_jog

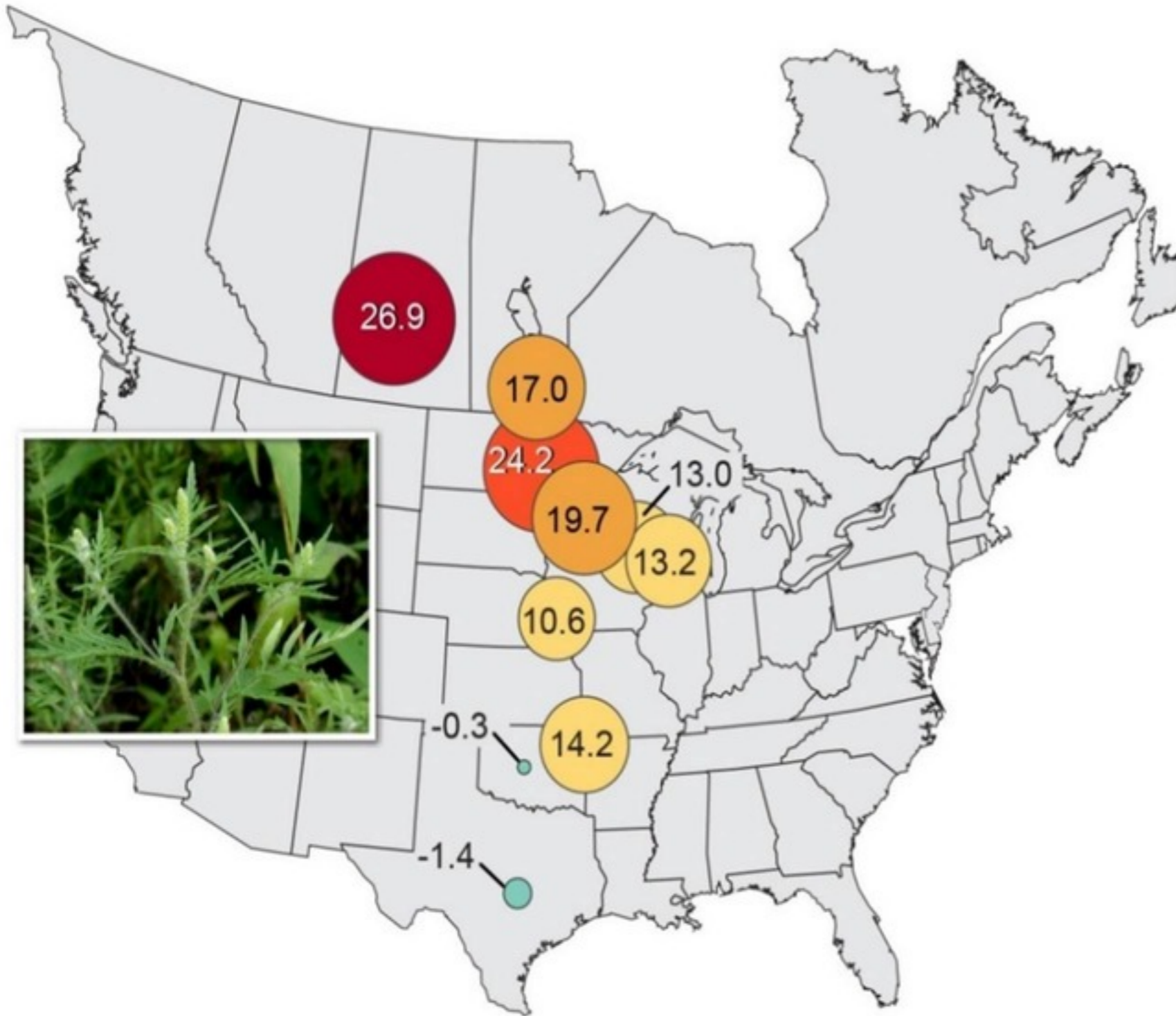
Indirect Impact of Climate Change on Human Health

Allergic Diseases:
Asthma, Hay Fever

Foodborne Diseases:
Salmonellosis



Ragweed Pollen Season Lengthens



Change in Ragweed Season Length (Days)



Ragweed pollen season is getting longer.

Ragweed is dangerous because it can cause an asthma attack.

If you suffer from allergic disease such as asthma or other respiratory conditions, this has consequences

Credit: Dr. Ziska, USDA (Ziska et al. 2011)

Open Ended Question

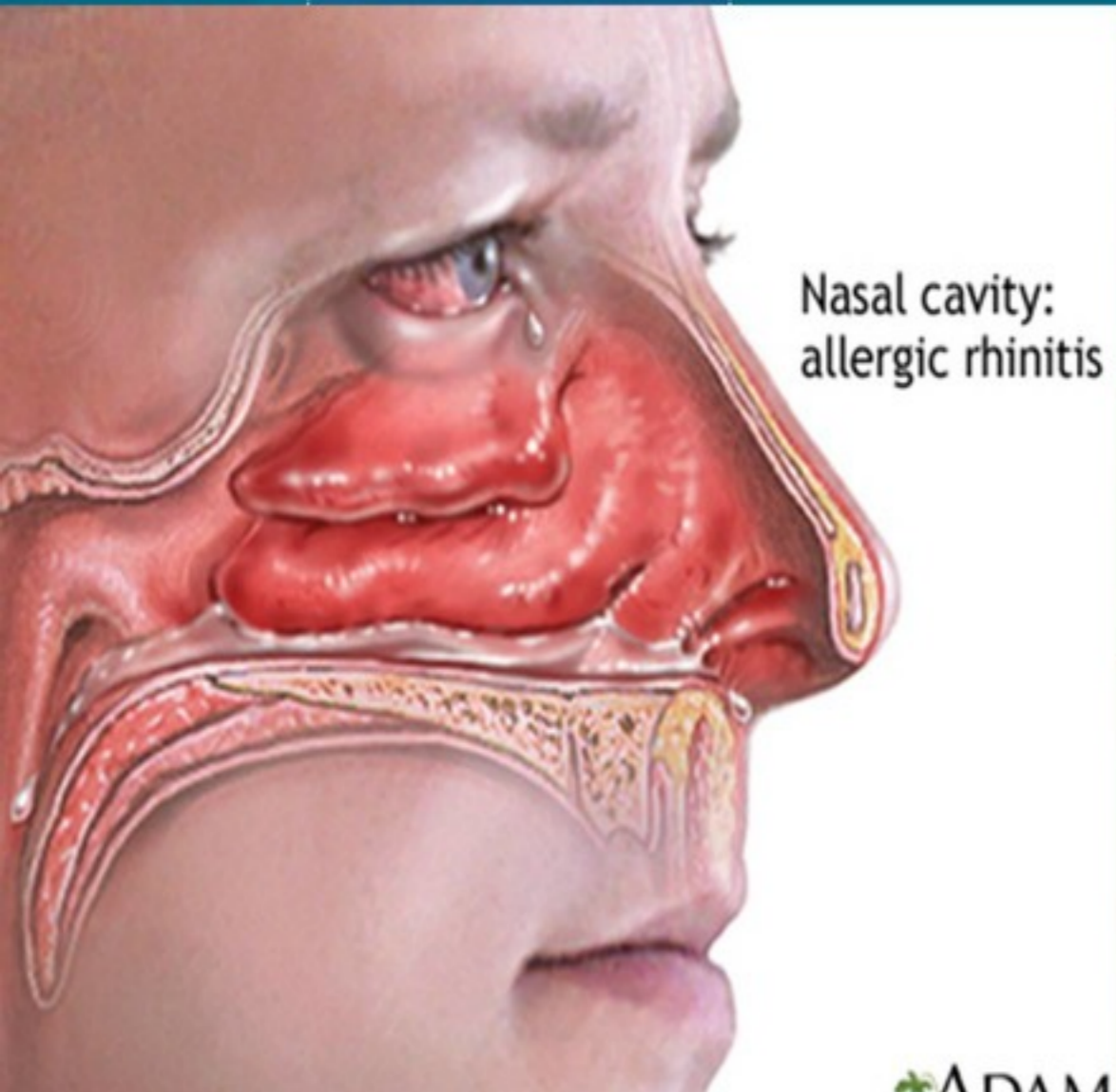
What happens to those with allergies when the spring season is longer?

Scientists can answer these questions:

- The timing of spring arrival can be measured from satellite.
- People's allergy symptoms can be measured using survey, such as National Health Interview Survey (NHIS).
- These two can be linked together based on location information.



Roughly 8% of US
adults suffer from
Hay Fever



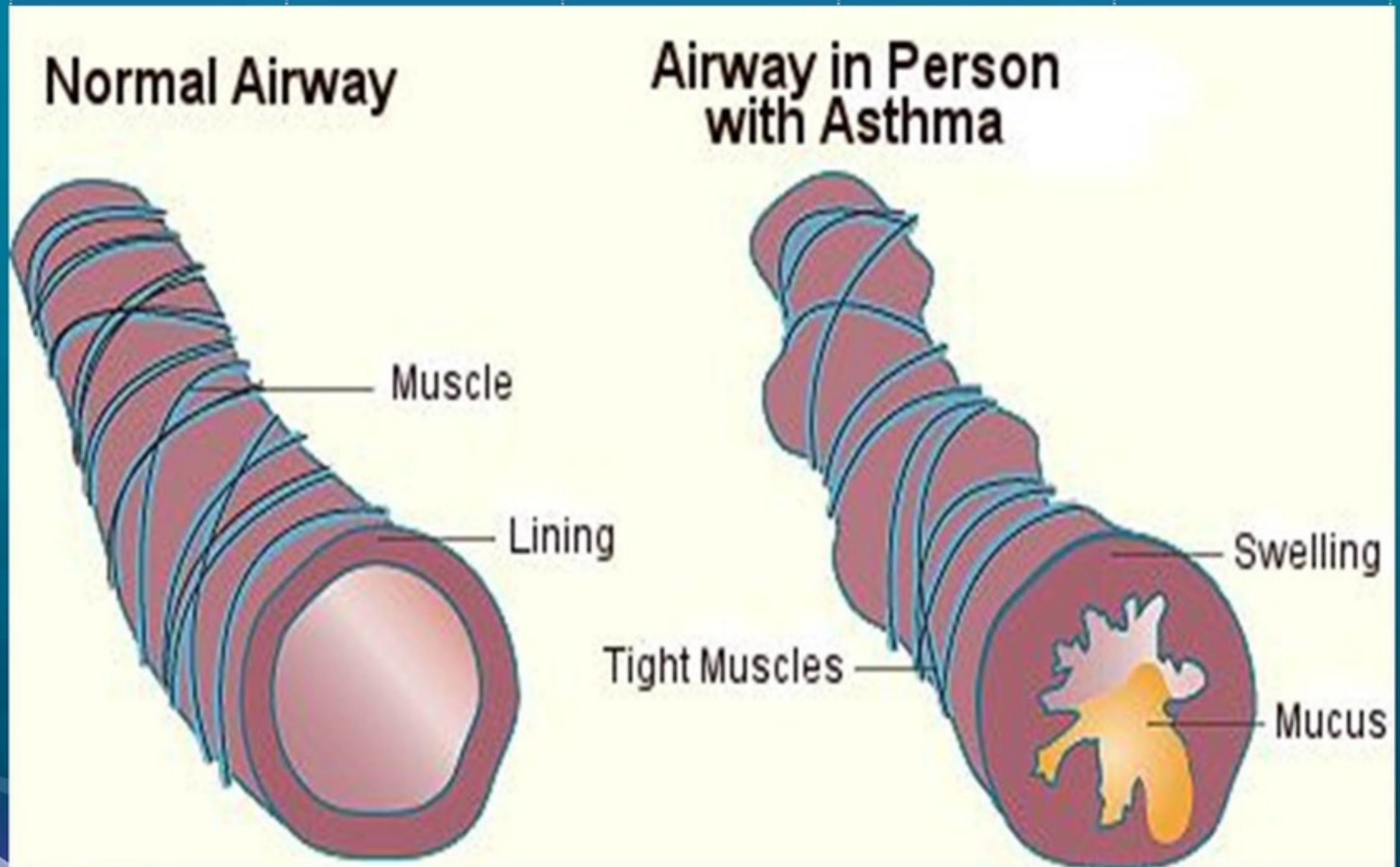
Nasal cavity:
allergic rhinitis

If spring starts earlier,
and summer ends
later – think of the
health outcomes for
those with allergic
rhinitis.

Scientists at the University of Maryland have observed:

When spring arrived early (> 3 weeks),
hay fever risk increased by almost 13%.
Surprisingly, when spring arrived late,
the risk of hay fever also increased!

Asthma and Extreme Heat in MD



Asthma – a chronic disease of the lung – causes narrowing of the airways, leading to shortness of breath.

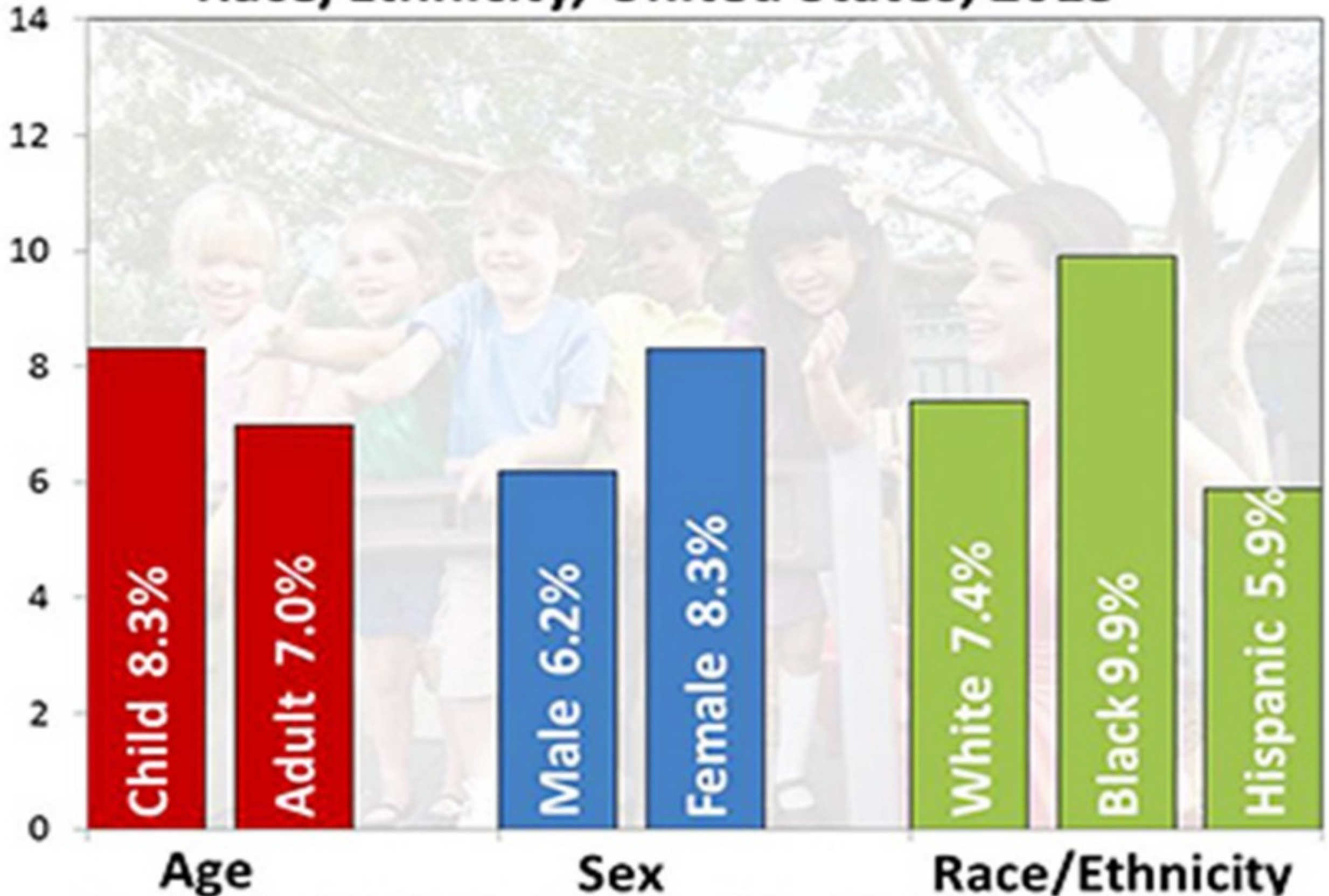
Poll

Asthma is more common in men than women.

TRUE

FALSE

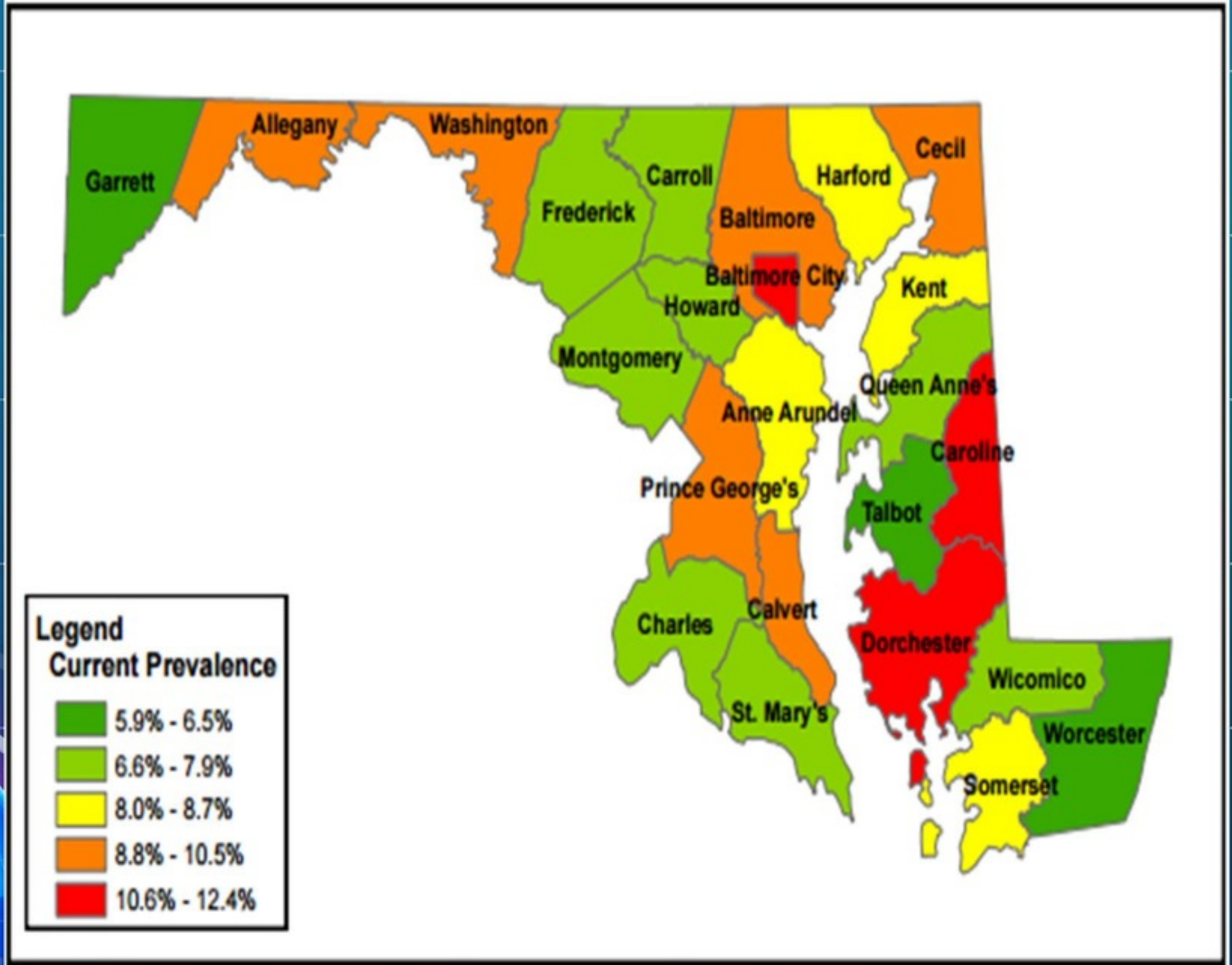
Current Asthma Prevalence Percents by Age, Sex, and Race/Ethnicity, United States, 2013



Source: National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control and Prevention

More than a half a million people in Maryland have asthma.

Figure 16-2: Maryland Adult Asthma Current Prevalence by Jurisdiction, 2008-2010



Indirect Impact: Foodborne Illness

Foodborne illness, caused by bacteria called *Salmonella*. People become sick when they eat contaminated food (not properly cooked meat, poultry, eggs, or milk).



“Climate change
– bringing more stomach bugs
to a coast near you”

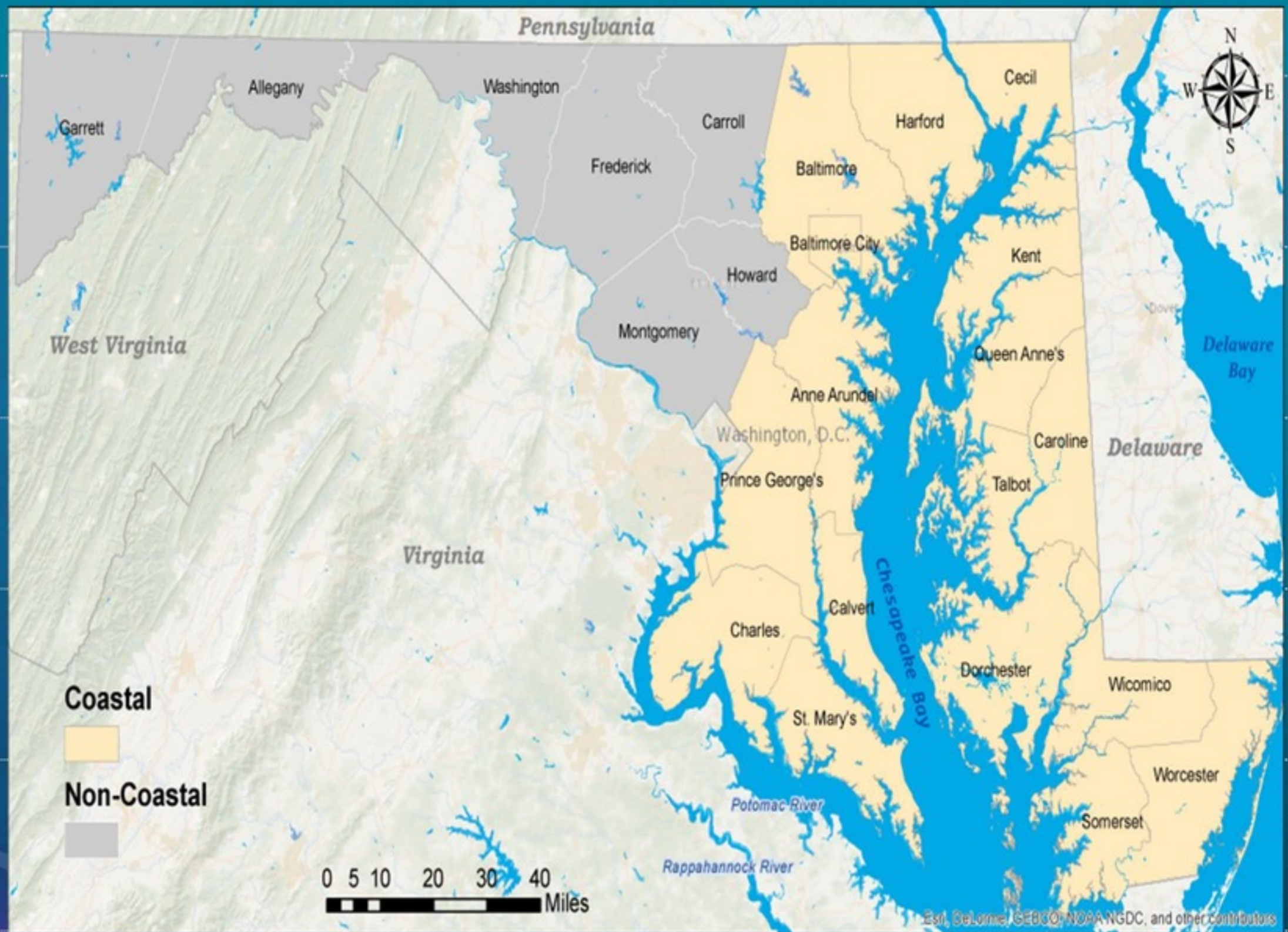
<http://www.baltimoresun.com/health/bs-hs-climate-salmonella-20150814-story.html>

Extreme Precipitation and *Salmonella* Infection



Warmer temperature
promotes bacterial growth.
Precipitation can lead of the
spread of the bacteria in
surface water.





In the coastal Maryland counties (orange),
 a 1 day increase in precipitation
 increased *Salmonella* 7%.
 In the non-coastal (grey), the risk was only 3%.

Extreme precipitation and *Salmonella* infection in Maryland

**Why do you think the risk was
more than doubled in the
coastal areas?**



Quiz

How much do you know about climate change and health?

What is the relationship between severe heat events and heart attacks?

- There's not a relationship.
- More severe heat means more heart attacks.
- More severe heat means fewer heart attacks.
- Fewer severe heat events mean more heart attacks.

A critical aspect to protecting public health from climate change is:

- developing new medicines.
- preparing for extreme weather events.
- nothing
- going to the gym at least five times a week.

One negative health outcome that becomes more likely from increasing air pollution is:

- an earlier death
- depression
- asthma
- the common cold