

# Healthy Solutions for the Climate Crisis

Combatting climate change is the biggest public health opportunity of this century

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## Faculty Disclosure Information

I have had no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial service(s) discussed in this lecture. I have no relevant financial relationships to disclose.

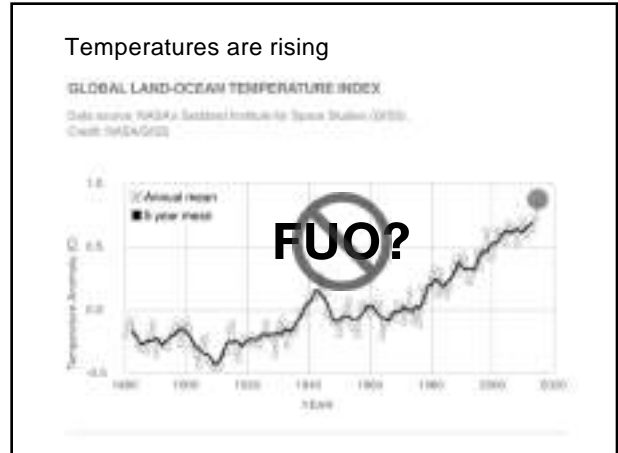
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## Learning Objectives

At the conclusion of the session, participants should:

1. recognize that climate change harms child health and how mitigating climate change improves it.
2. appreciate how climate change makes our job's harder to do as it causes more frequent and widespread power outages, medical supply shortages, and impairs access to care.
3. be motivated to act in the vital role that pediatricians have in communicating the health effects of climate change.

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Greenhouse gases are causing most of the warming\*

**Svante Arrhenius**

\* we've known this since at least 1896

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You are seeing a 16yo F who presents with nightmares that wake her from sleep. She is having difficulty going to school because going there tends to provoke flashbacks to the nightmares. Her nightmares involve her house getting burned down.

What is your differential diagnosis?

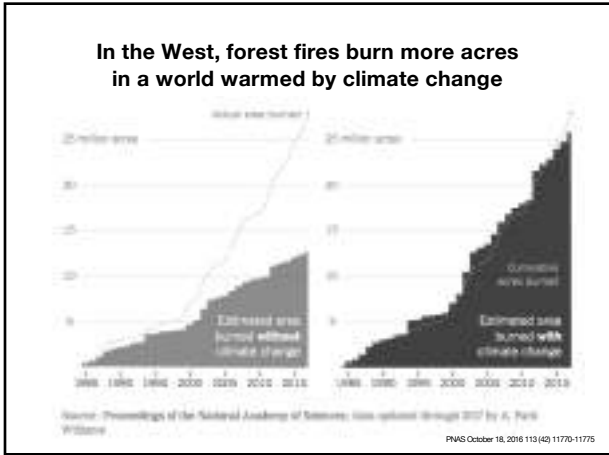
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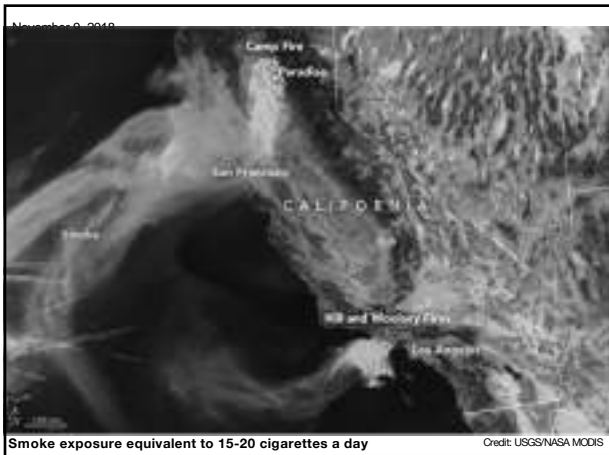
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**Smoke is bad for your health**

CC=O  
acrolein

C=O  
formaldehyde

c1ccccc1  
benzene/PAHs  
Leukemia/lymphoma  
Anxiety/depression  
ADHD

PM<sub>2.5</sub>

NOx  
oxides of nitrogen  
Asthma (causal)  
Respiratory infections

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### Health effects of PM exposure

| Definitive                         | Probable   | Possible                                   |
|------------------------------------|------------|--|
| Premature mortality                | Type 2 DM  | Autism                                     |
| Cardiovascular events (stroke, MI) | Alzheimers | Preterm birth                              |
| Hypertension                       | LBW        | Hypertension in offspring of exposed women |
| Respiratory and ear infections     |            |  |
| Asthma                             |            |  |
| Lung cancer                        |            |  |

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### CAN WILDFIRE SMOKE MAKE YOU SICK? PLUMES FROM WORST WILDFIRE IN CALIFORNIA HISTO

BY ARISTOS GEORGIU ON 11/12/18 AT 12:49 PM



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Jul 10, 2019

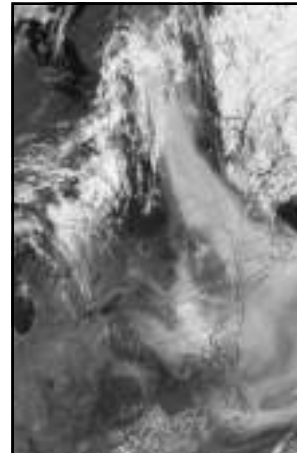
### Smoke from western Canadian wildfires reaches New England

Updated: 10:25 AM EDT, Jul 10, 2019



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### Days added to annual wildfire season with unmitigated climate change 2071-2100 vs 1981-2010

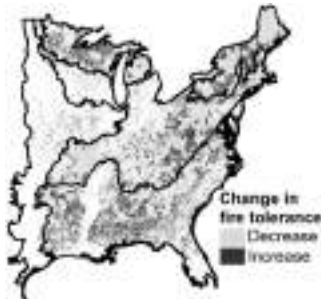


Legend for days added to annual wildfire season:  
 0 to 10 days longer  
 10 to 20 days longer  
 20 to 30 days longer  
 30 to 40 days longer  
 40 to 50 days longer  
 50 to 75 days longer  
 75 to 100 days longer  
 More than 100 days longer

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### Change in county-level fire tolerances from the early 1980s to 2015 10 most prevalent tree genera

- Maple
- Ash
- Hickory
- Birch
- Tupelo
- Pine
- Poplar/Aspen
- Oak
- Cherry/Fruit
- Elm



Forest ecology and management 433 (2019): 176-183.

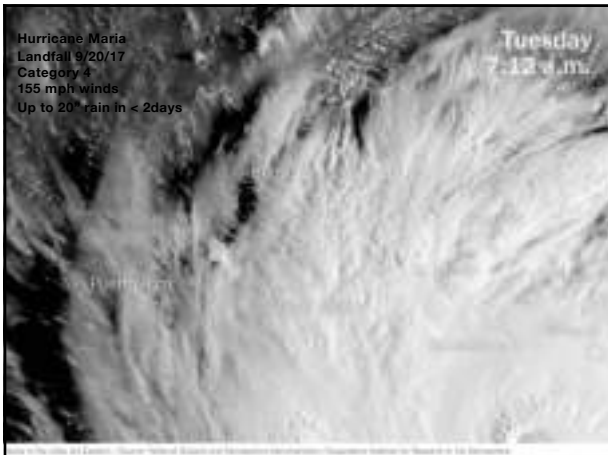
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It's February 2018 and you are working an urgent care shift in an emergency department.

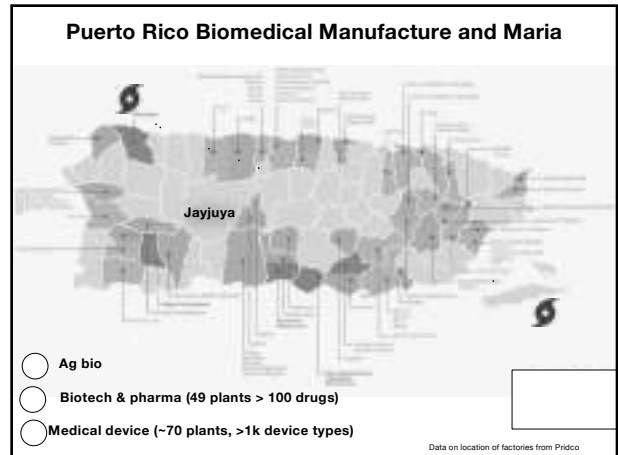
A mother brings her 4 month old infant to triage stating that he's had a week of vomiting and diarrhea. He appears severely dehydrated. His fontanelle is sunken, his mucous membranes are tacky and he appears listless. T 36.4 HR 190 BP 60/40 RR 40.

What is your next step in management?

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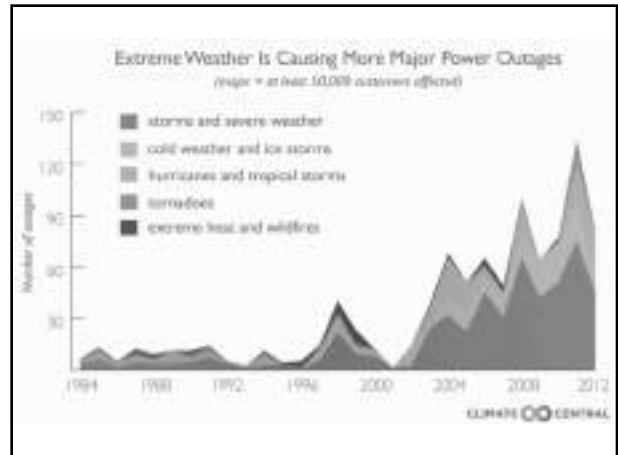
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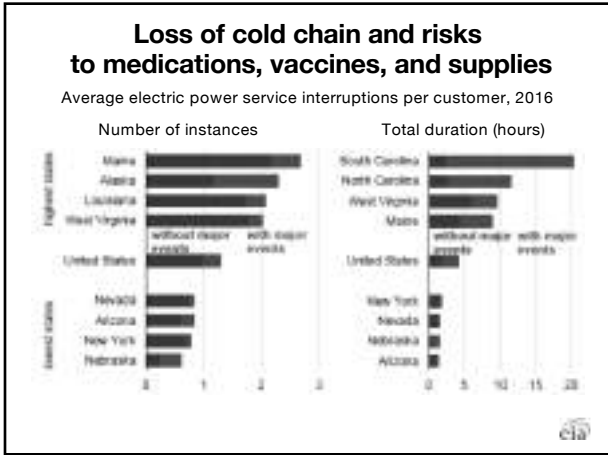
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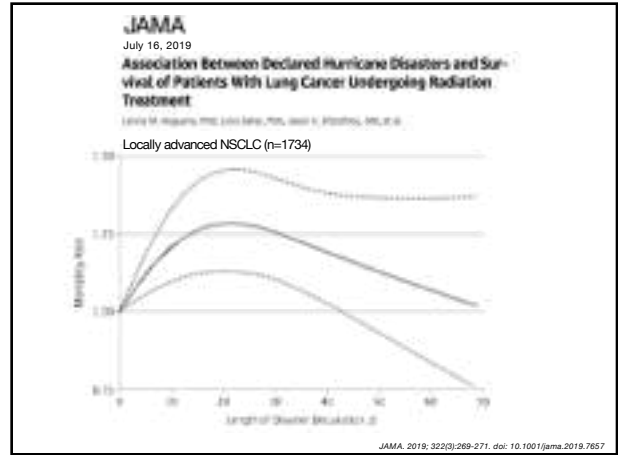
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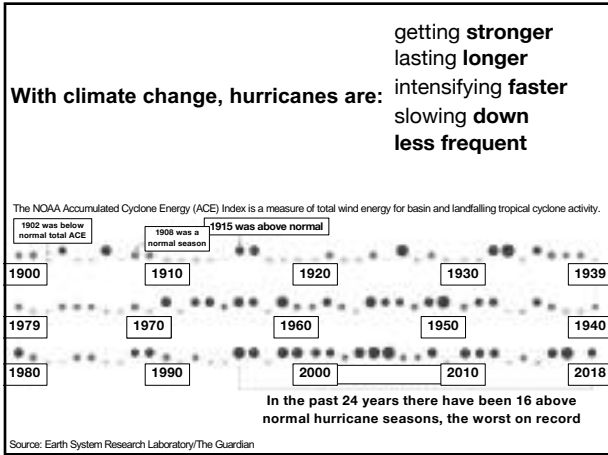
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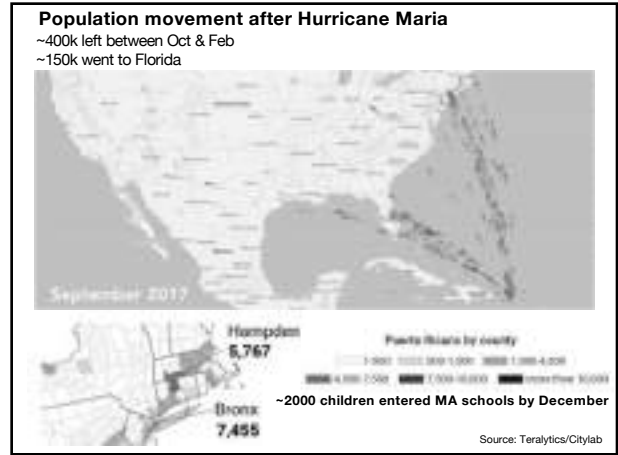
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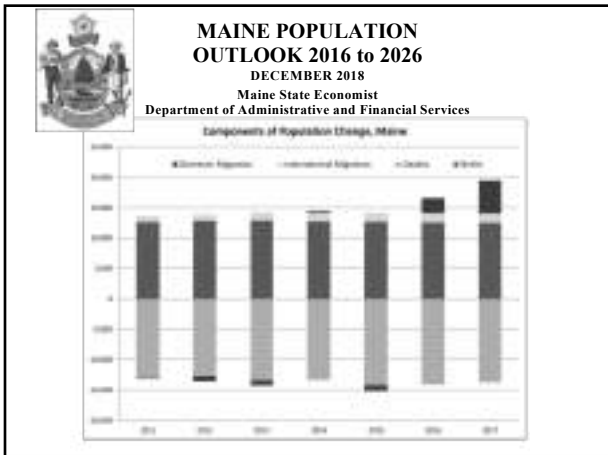
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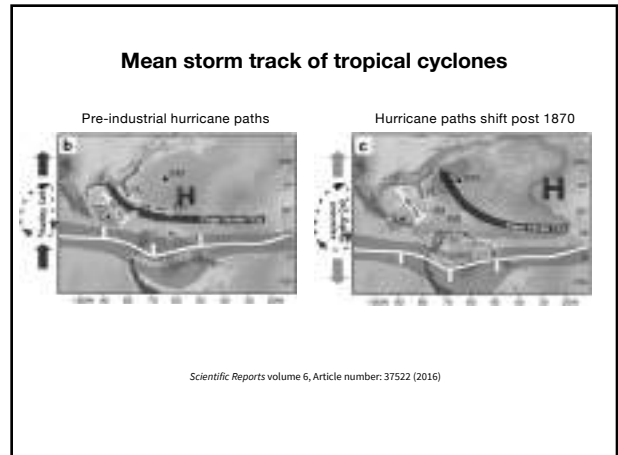
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You are seeing an 8 year old boy with autism and longstanding history of aggression for which he takes several medications including quetiapine and cogenin. Last week, his psychiatrist increased his quetiapine dose as his behaviors escalated.

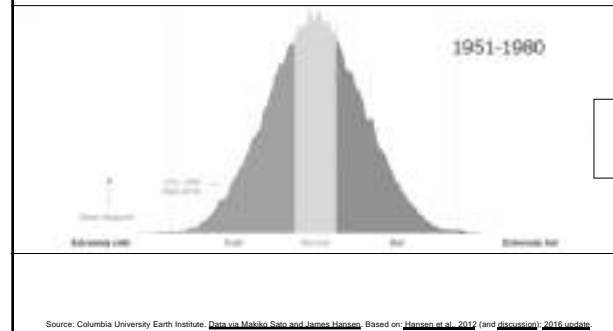
His mother has brought him to see you for an urgent care visit because he's been acting confused after he came home from playing outside for a few hours. He has complained of headache and nausea.

T 40.1 HR 130 BP 102/60 RR 22. He appears flush. His skin is diffusely red and dry. When asked what he was doing outside he said he had a great time dancing with wildcats.

What is your diagnosis?

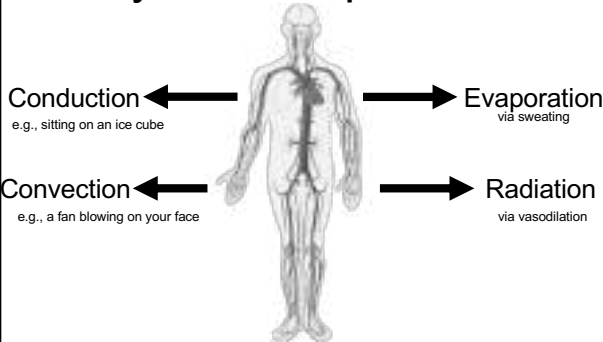
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Shifting summer temperatures across the northern hemisphere 1951-2016



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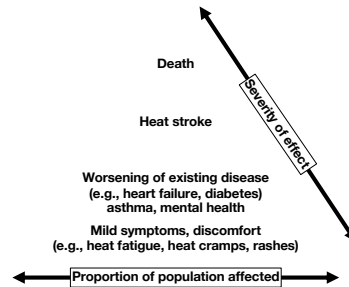
### Ways to dissipate heat



When ambient temperature exceeds body temperature, sweating works best

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### Health effects associated with extreme heat



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### Health effects associated with extreme heat

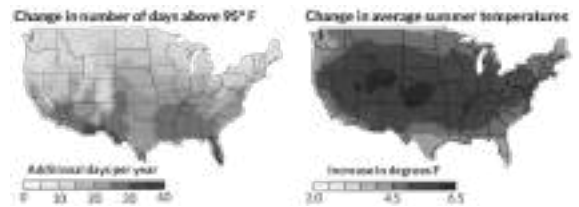
**Mental health**  
Suicide rate 1 to 37% times higher per 1°C warming  
Public Health. DOI: 10.1016/j.puhe.2018.06.008

**Medications**  
15% decreased dose  
60°C (car trunk) vs 4°C

**Job performance?**  
Increased "unsafe" behaviors in workers  
~30% more @ 23°C vs 35°C  
Journal of Safety Research, Vol. 14, pp. 105-114, 1983

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### Changes in extreme and average heat by mid century with business as usual greenhouse gas emissions

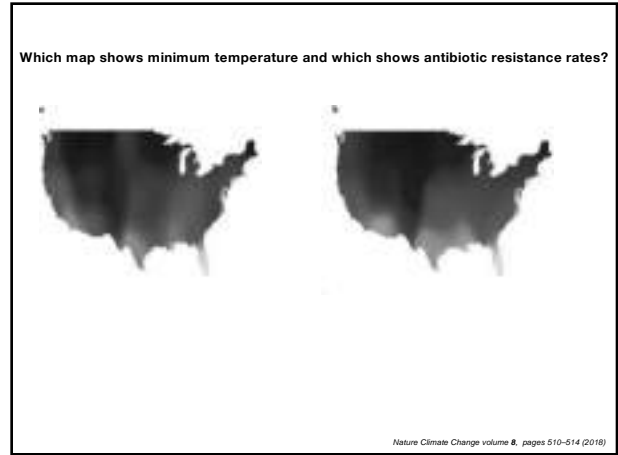


US Global Change Research Program [usgcrp.gov](http://usgcrp.gov)

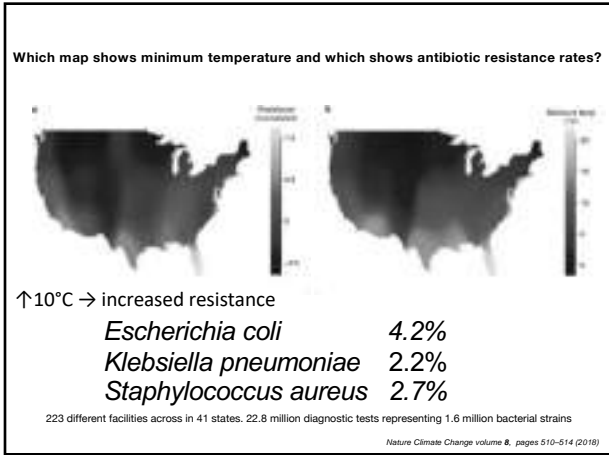
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What causes antibiotic resistance?

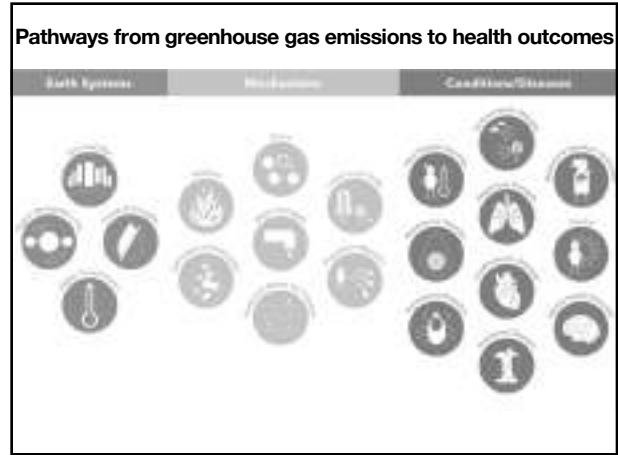
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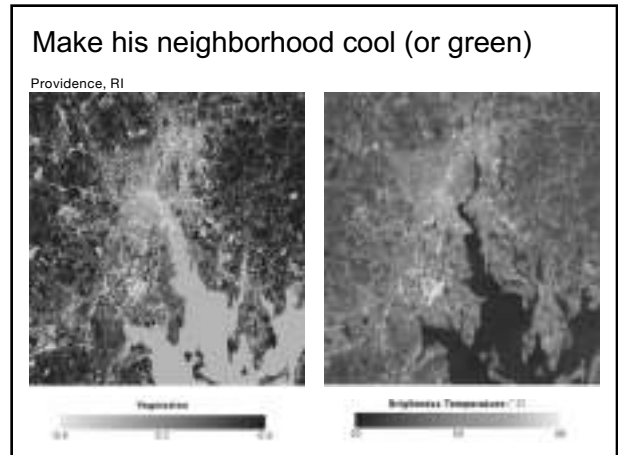
You are seeing a 12 year old M with a history of ADHD and depression, BMI of 32 with insulin resistance, and moderate persistent asthma. He presents for a well-child check-up. He takes methylphenidate, sertraline, montelukast, and fulticasone/salmeterol.

He reports that he has been short of breath several times a week and has been having difficulty walking more than a flight of stairs. He also says he avoids going outside.

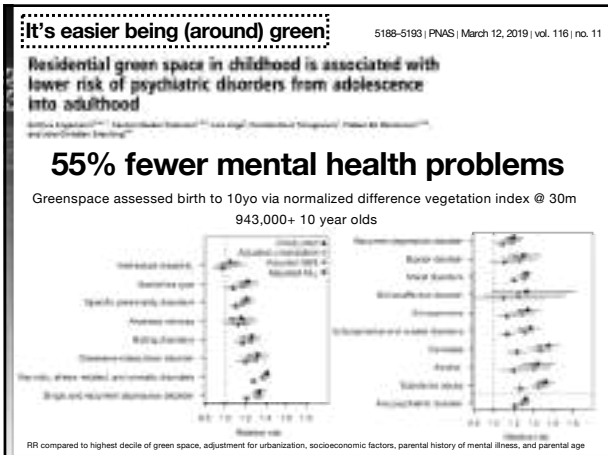
He reports getting teased at school because of his weight and he is feeling increasingly down and has had passive suicidal thoughts.

What can we do to improve the health of this child?

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**We can build green** Lucile Packard Children's Hospital Stanford

**40%**  
Energy used in buildings

**Between 2000-2016 green certified buildings:** saved \$6.7 billion in energy costs and 30MT CO2

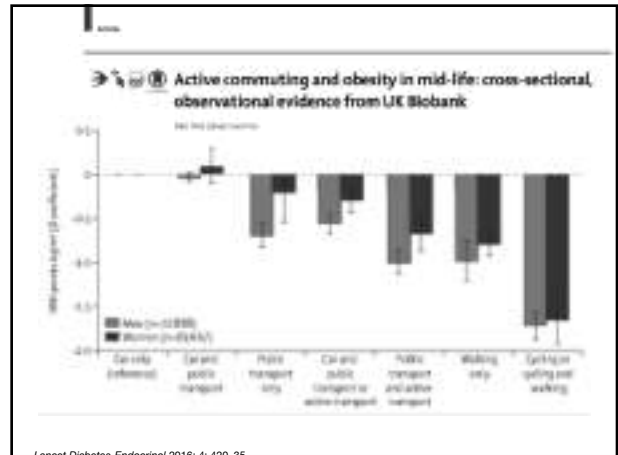
and prevented hundreds of deaths, ~11,000 asthma attacks, and ~16,000 lost days of school

*Journal of Exposure Science & Environmental Epidemiology, 28:307-318 (2018)*

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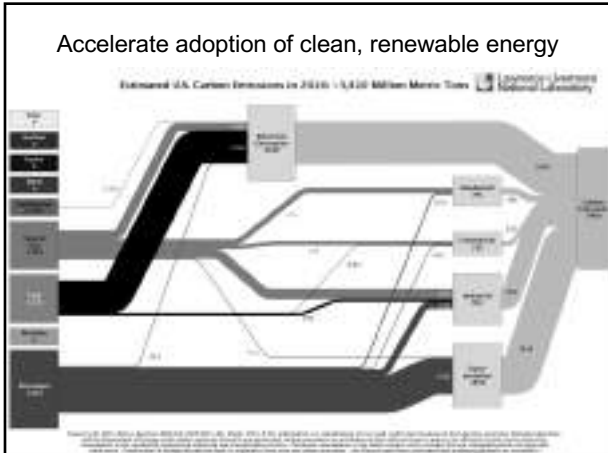




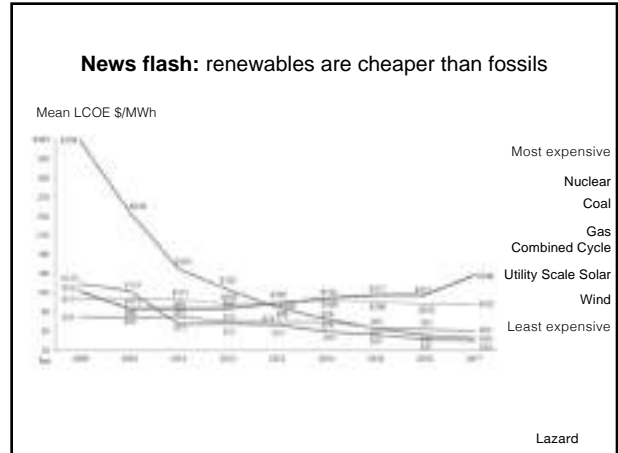
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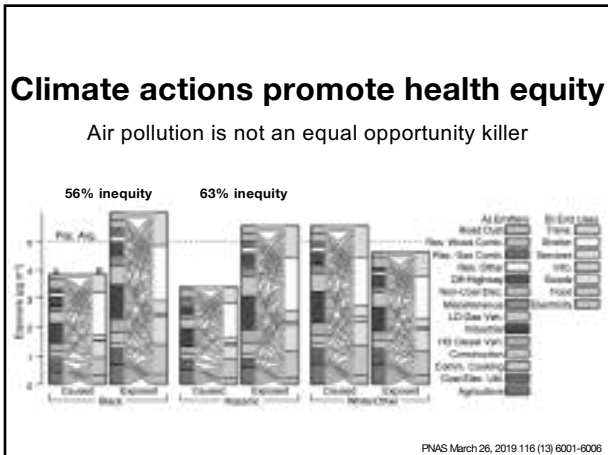


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**Burning less fossil fuels means:**

- A. Less children with asthma & fewer asthma exacerbations (ozone/PM)
- B. Fewer cases of AOM & fewer respiratory infections (PM)
- C. Less HTN, including in offspring of exposed women.
- D. Fewer premature births and LBW (PM)
- E. Less neurodevelopment disorders, including ADHD (PAHs)
- F. All of the above

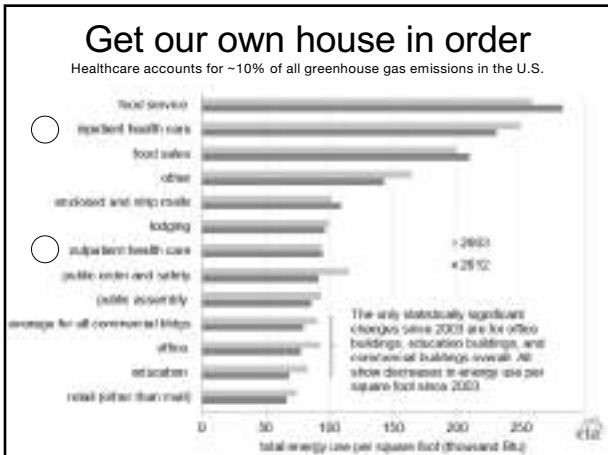
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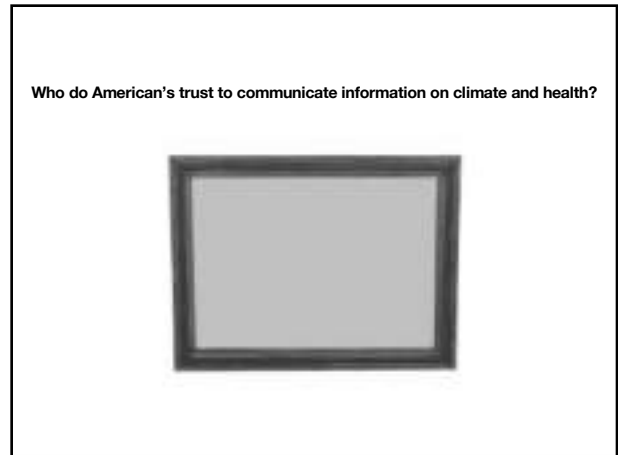
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