DISASTERS OF HUMAN HEALTH – COMMUNICABLE DISEASE

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Health Impacts of Disasters

• What’s an emergency?
  – Suspension of normal procedures with measures taken to avoid a disaster

• What’s a disaster?
  – Disruption of normal conditions, exceeding the capacity of the affected community

• Disasters and emergencies are not “natural” but a result of how communities are structured and resources are allocated
Stronger, more frequent disasters...

<table>
<thead>
<tr>
<th>Rank</th>
<th>mm</th>
<th>in</th>
<th>Storm (Year)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1538.7</td>
<td>60.58</td>
<td>Harvey (2017)</td>
<td>Texas</td>
</tr>
<tr>
<td>2</td>
<td>1321</td>
<td>52.02</td>
<td>Lane (2018)</td>
<td>Hawaii</td>
</tr>
<tr>
<td>4</td>
<td>1096</td>
<td>43.15</td>
<td>Imelda (2019)</td>
<td>Texas</td>
</tr>
<tr>
<td>8</td>
<td>912.6</td>
<td>35.93</td>
<td>Florence (2018)</td>
<td>N. Carolina</td>
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</tbody>
</table>
A growing public health problem

• Beyond compound disasters, the frequency and severity of disasters is increasing
  – Aging population; fastest growing in the U.S. are the “old old” >85
  – Urbanization: 50% of global populations in 3% of land (coastal, seismically active)
  – Climate change
The U.S. has experienced 15 weather and climate disasters each incurring losses that exceeded $1 billion in 2022.

Record eighth-consecutive year where the U.S. experienced 10 or more billion-dollar disasters.

Focus on $ alone can district from equity focus.
Inequitable impacts

- “...spatial correspondence between flood extent and non-Hispanic Black and Hispanic proportions, as well as socioeconomic deprivation.”

Inequitable impacts

- Poorer neighborhoods have more disaster impacts and less resources to recover
  - Hurricane Ida flooded low income communities in Wilmington in September 2021

- Must consider environmental justice as part of preparedness

# Inequitable impacts

## Risk for COVID-19 Infection, Hospitalization, and Death By Race/Ethnicity

*Updated Feb. 1, 2022*  
*Print*

<table>
<thead>
<tr>
<th>Rate ratios compared to White, Non-Hispanic persons</th>
<th>American Indian or Alaska Native, Non-Hispanic persons</th>
<th>Asian, Non-Hispanic persons</th>
<th>Black or African American, Non-Hispanic persons</th>
<th>Hispanic or Latino persons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cases</strong>(^1)</td>
<td>1.5x</td>
<td>0.7x</td>
<td>1.0x</td>
<td>1.5x</td>
</tr>
<tr>
<td><strong>Hospitalization</strong>(^2)</td>
<td>3.2x</td>
<td>0.8x</td>
<td>2.5x</td>
<td>2.4x</td>
</tr>
<tr>
<td><strong>Death</strong>(^3)</td>
<td>2.2x</td>
<td>0.8x</td>
<td>1.7x</td>
<td>1.9x</td>
</tr>
</tbody>
</table>

Race and ethnicity are risk markers for other underlying conditions that affect health, including socioeconomic status, access to health care, and exposure to the virus related to occupation, e.g., frontline, essential, and critical infrastructure workers.

Inequitable impacts

Discussion

In this study of nearly 700,000 COVID-19 patients who sought medical care, the proportion who were treated with an outpatient antiviral substantially over time, primarily driven by increased Paxlovid use; however, treatment gaps exist among racial and ethnic minority patients. Paxlovid treatment was 35.8% lower among Black patients relative to White patients and 29.9% lower among Hispanic patients. This corroborates previous reports of inequitable outpatient COVID-19 treatment (1,2) and documents the persistence of racial and ethnic disparities in pharmacy dispensing of oral antiviral medications between zip codes with high and low social vulnerability before and after the current study ended (3). Additional analyses can determine whether this recent ecological trend will result in reduced disparities.
Post-Disaster Surveillance

- Counts and rates of morbidity and mortality
- Shelter surveillance
- Provides data to evaluate public health impact of effectiveness of protective actions
- Data for analytic studies

<table>
<thead>
<tr>
<th>State</th>
<th>Total</th>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA</td>
<td>33</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>NJ</td>
<td>30</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>NY</td>
<td>18</td>
<td>18</td>
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<td>PA</td>
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</tr>
<tr>
<td>MS</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>AL</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>MD</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>CT</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>VA</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Hurricane Ida Mortality in the U.S., Aug-September, 2021
Disaster-Related Mortality

• Major challenges in defining disaster-related deaths
  • Defining disaster-related deaths (direct and indirect)
  • Reporting disaster-related deaths
  • Capturing death information in a timely manner
Disaster-Related Morbidity

- Outbreak investigations
- Emerging or reemerging diseases (trapping and testing mosquitos for Zika)
- Suicide attempts and other mental health outcomes
- Animal and spider bites
- Domestic violence and other assault
Disaster-Related Morbidity

• Disease common in the disaster affected areas
• Living conditions of affected populations
• Availability of safe water and sanitation
• Underlying health status (nutrition, immunization coverage)
• Access to healthcare

• Waterborne outbreaks
• Diseases associated with crowding
  – Acute Respiratory Infections
• Vectorborne diseases
  – Malaria, dengue, West Nile, Zika
• Fungal disease
  – Exposure to soils, molds, dust
Hurricane Katrina

• Significant spikes in ED census, peaking 3 days after landfall
• Active surveillance: 24,950 case reports from 29 facilities
  – 16% infectious disease
  – 26% injuries (e.g., MVA, trauma, falls)
  – 33% exacerbation of chronic illness (e.g., asthma, COPD) and medication refills

https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5526a3.htm#fig3
Carbon Monoxide Surveillance: AL & TX

- Study of CO poisoning after Hurricanes Katrina and Rita
- 78 nonfatal cases, 10 deaths in hurricane-affected counties
- Nearly all associated with generator placed close to home

Emerging and Reemerging Infectious Diseases
Public Health Impacts of Crises

- WHO began a “catch up” polio vaccination campaign in Ukraine in Feb 2022
  - Response to 2015 outbreak to increase vaccine coverage (reached 83% by 2019)
  - COVID-19 reversed gains (53% of <1 by October 2021)
Indirect or Unmeasured Health Impacts

• Increases in domestic violence, child hunger, mental health, isolation
  – 51% increase in ER visits for suicide attempts by teenage girls
  – 8.1% increase in Domestic Violence

• Complications associated with delay (postoperative complications of appendicitis 15.3% vs. 6.7%)

Indirect or Unmeasured Health Impacts

- Reductions in access to screening and other preventive care (e.g., childhood lead screening) – reduced hours/restricted services
  - Delays in cancer diagnoses due to COVID-19 were estimated to increase the number of deaths among patients diagnosed with breast, colorectal, esophageal, or lung cancer by 4.8%-16.6% (UK National Health Service)
Indirect or Unmeasured Health Impacts

• Lead: Neurotoxin that causes permanent damage to brain
  • Early life exposure to lead leads to cognitive and behavioral impairments; lifelong problems with school performance, need for special education
• All U.S. jurisdictions had decline of at least 40%; Delaware among 6 states and Washington, DC with >75% reduction in childhood lead screening

Decline in Vaccine Coverage during COVID-19

UP-TO-DATE* VACCINATIONS HAVE DECLINED TO <50% AMONG MOST CHILDREN ≤2 YEARS

*Age-based vaccine series assessment for recommended vaccines. Compares May 2020 coverage with the average of 2016-2019 May coverage estimates.
Public Health Emergency: Polio New York

- 1 case of paralytic polio in an unvaccinated in Rockland County
- Polio detected in wastewater across Rockland, Orange, Sullivan, and Nassau Counties & New York City
- Nassau County case genetically linked to the case of paralytic polio previously identified in Rockland County
Vaccine Preventable Diseases and Disaster

- Between 2000 and 2015, outbreaks associated with disasters and humanitarian crises:
  - Polio, Measles, Rubella, Mumps, Varicella
  - Meningitis
  - Yellow Fever
  - Hepatitis A, B, and E
  - Rotavirus, Cholera
  - Tetanus
  - Pneumococcus
Compound Hazards during COVID-19

https://www.nature.com/articles/s41558-020-0804-2/figures/1
Hurricanes during COVID

- Mass evacuations and risk of infection
  - Capacity of responders and response organizations
  - Reduced capacity of transportation and shelters
  - Disrupted testing capacity – would there be a spike in COVID-19 afterwards?

Remaining Challenges

• Demonstrating return on investment
  – Investment vs. temporary funding for surge capacity that ends with emergency
• Strengthening the evidence base
  – Research on what worked; Funding for practice-based research and
• How to address growing inequities post-pandemic
  – Green gentrification; Intersectional risk from emergencies and sequelae
Questions?

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