A Pandemic Model: Looking at Policies and Historic COVID Data to Promote a Resilient Future

Cole Bligh, Elisavet Gallou, James Robinson, Yuqing Zhou
Introduction

Objective: Assess the response of the United States to the COVID-19 pandemic at the Federal and State level to identify evidence based policy decisions that could, if implemented, reverse the current course of the virus.

How should we prepare for the next pandemic?

Definitions:

Fatality rate: measures of the SEVERITY of the condition.

Prevalence rate: determines a person's likelihood of having a disease.
National Infographic
More National Analytics
Northeast Overview

- Population: 63,707,996
- COVID-19 Cases: 923,517
- COVID-19 Deaths: 64,643
- Total Tests: 8,681,361
Midwest Overview

- Population: 68,329,004
- COVID-19 Cases: 620,759
- COVID-19 Deaths: 25,282
- Total Tests: 9,254,574
South Overview

- Population: 117,855,255
- COVID-19 Cases: 1,538,923
- COVID-19 Deaths: 26,786
- Total Tests: 15,769,927
South

Uninsured and Poverty Population by State

Prevalence Rate by State

Tests with respect to State Population

Fatality Rate by State
West Overview

- Population: 78,347,268
- COVID-19 Cases: 785,924
- COVID-19 Deaths: 15,443
- Total Tests: 11,132,250
West

Uninsured and Poverty by State

- Hawaii
- Washington
- California
- Oregon
- Colorado
- Montana
- Utah
- New Mexico
- Wyoming
- Arizona
- Nevada
- Idaho
- Alaska

Prevalence Rate by State

- Arizona
- Nevada
- Utah
- California
- Idaho
- New Mexico
- Colorado
- Washington
- Wyoming
- Oregon
- Alaska
- Montana
- Hawaii

Tests with Respect to State Population

- Wyoming: 7.64%
- Hawaii: 7.64%
- Colorado: 7.94%
- Oregon: 8.36%
- Idaho: 8.62%
- Washington: 11.05%
- Arizona: 11.18%
- Nevada: 13.13%
- Montana: 13.43%
- Utah: 15.02%
- California: 16.87%
- New Mexico: 22.96%
- Alaska: 25.33%

Fatality Rate by State

- Colorado
- New Mexico
- Washington
- California
- Nevada
- Oregon
- Hawaii
- Arizona
- Montana
- Wyoming
- Utah
- Alaska
- Idaho

- Fatality Rates: 3.36% (Colorado), 4.00% (New Mexico), 3.02% (Washington), 1.90% (California), 1.82% (Nevada), 1.75% (Oregon), 1.69% (Hawaii), 1.61% (Arizona), 1.49% (Montana), 1.09% (Wyoming), 0.73% (Utah), 0.73% (Alaska), 0.65% (Idaho)
Lowest Prevalence Rate

Hawaii

Prevalence Rate: 0.10%
Population: 1,415,872
Contact Tracing: 80 tracers; tracing 73% infections
Testing: 7.64%
Positive Test Rate: 1.31%

Shortage Areas:
- Health Professional Shortage Areas: 81
- Medically Underserved Areas/Pop.: 13

Status: Reopening (5/7)
Highest Prevalence Rate

Louisiana

Prevalence rate: 2.14%

Population: 4,648,794

Contact tracing: 400 tracers; tracing 4% infections

Testing: 24.80%

Positive test rate: 8.62%

Shortage areas:

Health Professional Shortage Areas: 434

Medically Underserved Areas/Pop.: 73

Status: Reversing (Reopened 5/15)
National Future Projection

**Current projection**: Mandates are re-imposed for 6 weeks whenever daily deaths reach 8 per million (0.8 per 100k).

**Mandates easing**: Continued easing of social distancing mandates, and mandates are not re-imposed.

**Universal Masks**: 95% mask usage in public in every location, reaching levels seen in Singapore. Mandates are re-imposed for 6 weeks if daily deaths reach 8 per million (0.8 per 100k).
### United States Government / NSC Playbook

#### Phase 1: Primarily Pre-Incident

<table>
<thead>
<tr>
<th>Event Date</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Operations long time ago</td>
<td>✓</td>
<td>Departments and agencies are monitoring per usual systems</td>
</tr>
<tr>
<td>Elevated Threat</td>
<td>Case reports/clusters of novel pathogen: 31-Dec-20</td>
<td></td>
</tr>
<tr>
<td>17-Jan-20</td>
<td>✓</td>
<td>Consider border screenings to prevent the spread into the US</td>
</tr>
<tr>
<td>29-Jan-20</td>
<td>✓</td>
<td>Determine joint reporting structure and frequency of situation reports</td>
</tr>
<tr>
<td>7-Jan-20</td>
<td>✓</td>
<td>Health Advisory</td>
</tr>
<tr>
<td>23-Jan-20</td>
<td>✓</td>
<td>Travel Advisory</td>
</tr>
<tr>
<td>25-Feb-20</td>
<td>✓</td>
<td>Determine need for higher level engagement on research and development of countermeasures</td>
</tr>
<tr>
<td>1-Mar-20</td>
<td>✓</td>
<td>Determine the risk communication strategy</td>
</tr>
<tr>
<td>Credible Threat</td>
<td>Confirmation of multiple human cases of a PPP anywhere: 4-Jan-20</td>
<td></td>
</tr>
<tr>
<td>29-Apr-20</td>
<td>✓</td>
<td>Evaluate Contact Tracing</td>
</tr>
<tr>
<td>6-Feb-20</td>
<td>✓</td>
<td>Diagnostic testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Office of Foreign Affairs Disaster Declaration</td>
</tr>
<tr>
<td>3-Jan-20</td>
<td>✓</td>
<td>Consider funding options</td>
</tr>
<tr>
<td>17-Mar-20</td>
<td>✓</td>
<td>PREP Act Declaration</td>
</tr>
</tbody>
</table>
# United States Government / NSC Playbook

## Phase 2: Begins Upon Notification When/After an Incident occurs

### Initial Response: Activation, Situational, Assessment, and Movement

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-Mar-20</td>
<td>Donation of supplies from SNS</td>
</tr>
<tr>
<td>13-Mar-20</td>
<td>Disaster Declaration</td>
</tr>
<tr>
<td>22-Mar-20</td>
<td>Military deployment in support of civilian DART response</td>
</tr>
<tr>
<td>17-Mar-20</td>
<td>PREP Act Declaration</td>
</tr>
</tbody>
</table>

**Declaration of a Public Health Emergency: 31-Jan-20**

### Employment of Resources and Stabilization

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Apr-20</td>
<td>Deploy PHS Commissioned Corps</td>
</tr>
<tr>
<td>23-Mar-20</td>
<td>Implement screening and monitoring in travel</td>
</tr>
<tr>
<td>29-Mar-20</td>
<td>Are SNS resources necessary</td>
</tr>
<tr>
<td>14-Apr-30</td>
<td>Use of the Defense Production Act</td>
</tr>
<tr>
<td>21-Mar-20</td>
<td>Use of Emergency Use Authorization</td>
</tr>
</tbody>
</table>

**SLTT request for assistance: 29-Feb-20**

### Intermediate Operations

<table>
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<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-Feb-20</td>
<td>Assistance to SLTT in response</td>
</tr>
<tr>
<td>2-Apr-20</td>
<td>Deploy PHS Commissioned Corps</td>
</tr>
</tbody>
</table>

**SLTT request for assistance: 29-Feb-20**
FEMA Response

**PREVENTION:**
Identifying Risks and Hazards to either substantially reduce or eliminate the impact of an incident usually through structural measures.

**PREPAREDNESS:**
Enhance the capacity to respond to an incident by taking steps to ensure personnel and entities are able to respond.

**RESPONSE:**
Immediate actions to save lives, protect property & the environment, and meet basic human needs.

**RECOVERY:**
Intended to Restore essential service and repair damages caused.

DEC 31, 2019
First COVID-19 Case Reported to the WHO in Wuhan, China

JAN 20, 2020
First COVID-19 Case Reported in the US
DHS Reform

- Congressional: 8
- Data & Research: 22
- Preparedness: 30
- Communication: 17
- Operation & Management: 28
Evidence Based Policy Decisions

3 Ts (Test, Track, Treat)

DIM (Distance, Isolate, Mask)

P.O.L.I.C.Y.(Prepare & Organize, Lead & Inform, Coordinate & Yaager Results)
Evidence Based Policy Decisions
Test, Track, Treat
“DIM” the Virus

Distance

Isolate

Mask
POLICY

Prepare & Organize

Lead & Inform

Coordinate & Yaager Results
James’s application

https://jnrobinsoniii.shinyapps.io/Timeline_Dashboard/
Future

All fellows will continue to work on this project through the rest of the summer and will look deeper into:

- How COVID-19 has disproportionately affected minorities and different demographics
- How specific governmental policies affected each state’s trajectories
- The role of age and race distribution of a state in their cases
Our main data sources

U.S. Bureau of Labor Statistics

CDC

data.HRSA.gov

United States Census Bureau

The COVID Tracking Project

Covid ActNow

GAO U.S. Government Accountability Office

Congressional Research Service

IHME
Acknowledgment

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