Emerging from the SARS-CoV-2 pandemic

a presentation prepared for the
Honolulu City Council Committee on
Economic Assistance and Revitalization

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Submitted at the 05/27/20 meeting for discussion item on
community needs related to the COVID-19 pandemic and the use of
Federal and State funding
Hawaii daily confirmed COVID-19 cases through May 25, 2020 and calibrated “Infectives” from simple SIR model: mitigation success?

Hawaii Department of Health Epidemic Curve official data (not exactly the same as what is obtained from “the scrapers”): with attribution

Second waves?

Source: 91-DIVOC (yes, that’s COVID-19 spelled backwards) (http://91-divoc.com/pages/covid-visualization/).
Aggregate Weekly Excess Deaths per million for 43 US Cities by Region from September 8, 1918 through February 22, 1919

Source: Howard Markel, MD, PhD; Harvey B. Lipman, PhD; J. Alexander Navarro, PhD; Alexandra Sloan, AB; Joseph R. Michalsen, BS; Alexandra Minna Stern, PhD; Martin S. Cetron, MD (August 8, 2007), "Nonpharmaceutical Interventions Implemented by US Cities During the 1918-1919 Influenza Pandemic," Journal of the American Medical Association, vol. 298, No. 6, pp. 597-706 (https://jamanetwork.com/journals/jama/fullarticle/208354).
Weekly excess deaths per 100,000 persons, fall 1918 – winter 1919, deaths/100,000 after 24 pandemic weeks, social distancing measures

**Philadelphia**
- Weekly deaths per 100,000 from 1918 pandemic above the expected rate
- Duration of social distancing measures
- Philadelphia waited eight days after their death rate began to take off before banning gatherings and closing schools. They endured the highest peak death rate of all cities studied.

**San Francisco**
- 673 Deaths per 100,000
- After relaxing social distancing measures, San Francisco faced a long second wave of deaths.

**New York**
- 452 Deaths per 100,000
- New York City began quarantine measures very early—11 days before the death rate spiked. The city had the lowest death rate on the Eastern Seaboard.

**St. Louis**
- 358 Deaths per 100,000
- St. Louis had strong social distancing measures and a low total death rate. The city successfully delayed its peak in deaths, but faced a sharp increase when restrictions were temporarily relaxed.

**Sources:**
Weekly excess deaths/100,000, 1918–1919, and social distancing policies; starting late and stopping early are way deadlier strategies.

▲ Cities that ordered social distancing measures later and for shorter periods tended to have spikes in deaths and higher overall death rates.

▼ Cities that ordered social distancing measures sooner and for longer periods usually slowed infections and lowered overall death rates.

1. Jurisdictions more severely affected by the pandemic saw sharp and persistent decline in economic activity—consumption cutbacks reduce economic activity and pandemic severity
   a) Declines in economic activity are persistent in medium-term
   b) More affected areas remain depressed relative to less exposed areas, subsequently
   c) Empirical results remain intact controlling statistically for other factors

2. Early and extensive non-pharmaceutical interventions (NPI) such as school, theater, church, and partial business closings have no adverse effect on local economic outcomes: pandemics depress the economy; NPIs mitigate mortality and adverse economic effects

3. Earlier and more aggressive NPIs yield stronger and faster the post-pandemic recovery*
   a) Higher mortality was associated with lower employment growth
   b) Cities with stricter NPIs were associated with lower mortality and higher growth, and performed better during and after the pandemic

“[In 1918-1919] cities that got closest to the theoretical maximum possible reduction in mortality were those that implemented both early and effective interventions throughout the first peak and then were able to reintroduce these when transmission again increased [emphasis added].”

Preceding paragraph:

“In the cities that saw double-peaked autumn [1918] epidemics, control measures may have been, if anything, too effective, stopping transmission so effectively that substantial numbers of susceptible individuals remained in the population when controls were lifted. This remaining susceptible pool allowed transmission to restart, leading to another epidemic peak and (in some cases) to the resumption of interventions. Conversely, cities in which transmission had been continuing for longer before interventions were introduced saw much smaller or no second epidemic peaks, because insufficient susceptible people remained to restart transmission. The theory of imperfect interventions tells us there is an optimal middle ground, i.e., interventions tuned to give a single peak of minimal size.”


<table>
<thead>
<tr>
<th></th>
<th>Taiwan</th>
<th>S Korea</th>
<th>Hawaii*</th>
<th>Germany</th>
<th>Canada</th>
<th>U.S.</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19 cases</td>
<td>441</td>
<td>11,225</td>
<td>643</td>
<td>181,288</td>
<td>86,636</td>
<td>1,662,414</td>
<td>34,440</td>
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<tr>
<td>Deaths</td>
<td>7</td>
<td>269</td>
<td>17</td>
<td>8,498</td>
<td>6,639</td>
<td>98,261</td>
<td>4,124</td>
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<tr>
<td>Population (million)</td>
<td>23.78</td>
<td>51.64</td>
<td>1.42</td>
<td>83.02</td>
<td>37.59</td>
<td>328.20</td>
<td>10.23</td>
</tr>
<tr>
<td>Cases/thousand</td>
<td>0.019</td>
<td>0.217</td>
<td>0.454</td>
<td>2.184</td>
<td>2.305</td>
<td>5.065</td>
<td>3.367</td>
</tr>
<tr>
<td>Deaths/thousand</td>
<td>0.00029</td>
<td>0.00521</td>
<td>0.01201</td>
<td>0.10236</td>
<td>0.17662</td>
<td>0.29939</td>
<td>0.40313</td>
</tr>
<tr>
<td>$x_{Taiwan}$ cases/000</td>
<td>1</td>
<td>12</td>
<td>24</td>
<td>118</td>
<td>124</td>
<td>273</td>
<td>182</td>
</tr>
<tr>
<td>$x_{Taiwan}$ deaths/000</td>
<td>1</td>
<td>18</td>
<td>41</td>
<td>348</td>
<td>600</td>
<td>1,017</td>
<td>1,369</td>
</tr>
</tbody>
</table>

*Oahu COVID-19 cases: 414 (slightly lower than 0.419 cases/thousand, with just under 1 million population, approximately 22 times Taiwan's prevalence)

Taiwan and Sweden are relatively culturally homogenous, but Taiwan adopted strict screening, testing, contact tracing and tracking protocols while Sweden’s approach was more “laissez-faire.” High Swedish social cohesion resulted in a lower contracted case rate than in the U.S. (lower prevalence) but Sweden has higher mortality—the U.S. is more culturally heterogeneous; both countries have more than 1,000 times Taiwan’s death rate.

Source: Google
1. Did tourism stop because of the 14-day quarantine or because people didn’t want to fly? It makes a difference—and such quarantine attributions as “success” may not fully be warranted.

2. Proposed resolution misrepresents (“whereas”) “that it is visitors to Hawaii [sic] who present the greatest risk of…COVID-19 to Hawaii…unlike returning residents…[because they (visitors)] experience the greatest temptation to violate the requirements of the quarantine.”

   More than 80 percent of cases originally introduced came from returning residents, and transmission to their community (c. 55:45 travel:community overall)—not including asymptomatic and presymptomatic cases (up to half again as many cases or more)

3. Resolution refers to “an ongoing tension between public health priorities and jumpstarting the economy,” a false dichotomy. Non-pharmaceutical interventions (NPIs) such as social distancing are what mitigate the epidemic spread and jumpstart the economy: NPIs are the solution to the public health problem and the reason for economic recovery, not a substitute.

4. Some blend of—upon arrival—screening, testing, contact tracing, and smartphone tracking are a necessary and sufficient condition for restoration of tourism exports and economic activity.
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