

The Path to Zero

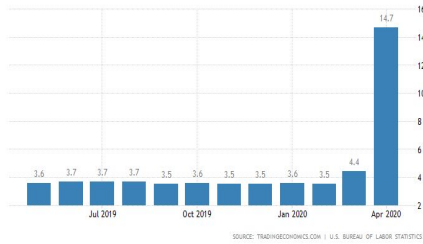
Plan B

Based on recommendations from “Pandemic Resilience: Getting It Done,” by the Edmond J. Safra Center for Ethics at Harvard University. <https://ethics.harvard.edu/pandemic-resilience-supplement>

June 28 2020

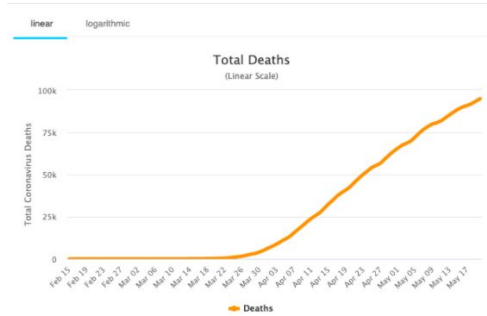
CRISIS: *covid-19* killing Americans, freedom, and our economy

13.3% unemployment (May)

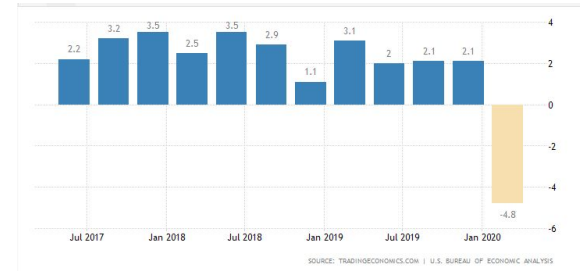


14.7 % through April

125,000+ dead



-40% Q2 GDP growth rate (Atlanta Fed)

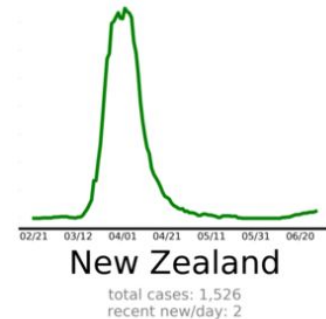
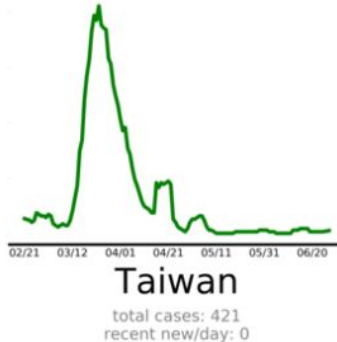
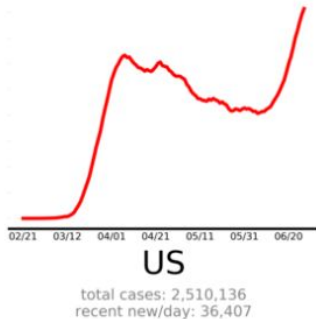


-4.8% Q1 GDP growth rate

- As long as the virus continues to kill Americans, it will also kill our economy.
- To stop fear, disease spikes, and lockdowns, we have to suppress the virus.

SOLUTION: *suppression (not mitigation) for economic recovery*

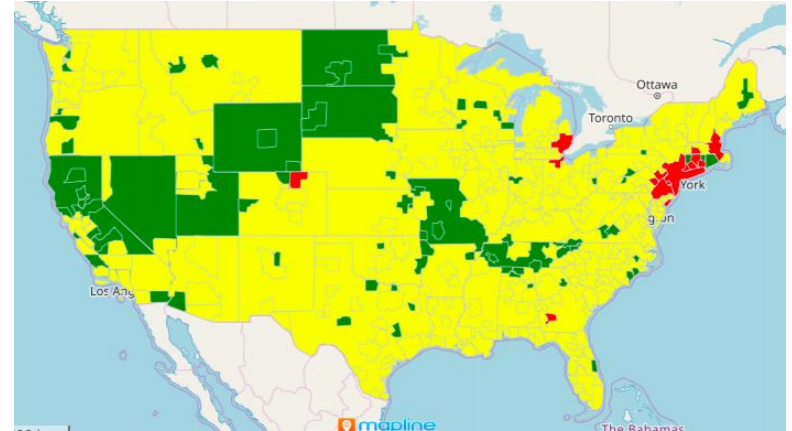
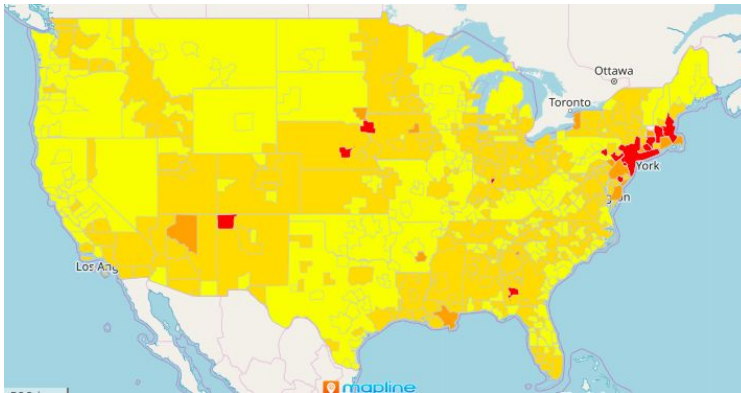
Suppress the Virus through TTSI (**Testing, Tracing and Supported Isolation**) until the United States is a “Green Zone”, like Taiwan, New Zealand & South Korea



- fully opened economy
- sporting events, schools, church & large gatherings

GOAL: *green zones without community spread*

Each state divides its jurisdictions into **green, yellow, orange, and red zones** based on case incidence



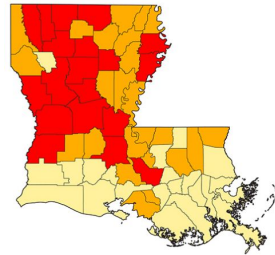
- **Green zones** (<1 new daily cases per 100,000 people) require **maintenance level** testing & tracing to keep the disease suppressed. This surveillance will identify and suppress outbreaks *before* community spread.
- **Yellow, orange, & red zones** (medium & high incidence) require **surge level** of testing & tracing to *stop* community spread and drive the disease back close to zero prevalence.

STEP 1: *identify zones by calculating disease case incidence*

Step 1: For each jurisdiction within a state, calculate:

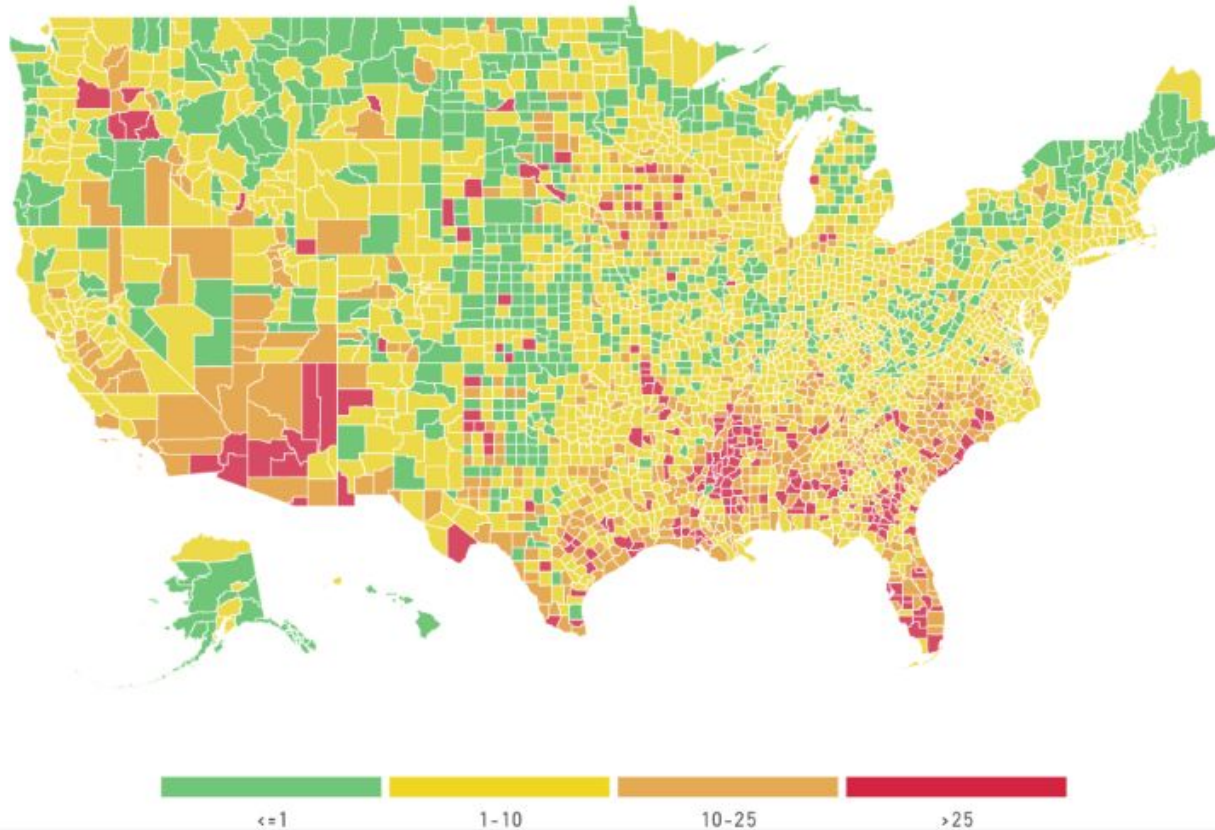
- a. **Case incidence based on daily new cases:**
(7-day rolling average of new cases)/population (*normalized to per 100,000*)
- b. **Case incidence based on deaths:**
(7 rolling average of deaths x 100)/population (*normalized to per 100,000*)

Step 2: If (b) > (a), then (b) should be used to determine prevalence in the jurisdiction.



ZONES	INCIDENCE
Red	>25 new daily cases per 100,000 people
Orange	10 to 25 new daily cases per 100,000 people
Yellow	1 to 10 new daily cases per 100,000 people
Green	<1 new daily cases per 100,000 people

STEP 1: *current U.S. situation as of June 27, 2020*





Step 2: *establish safety precautions to accelerate suppression*

SAFETY PRECAUTIONS	Green	Yellow	Orange	Red
Masks	X	X	X	X
6-ft social distancing		X	X	X
Ban on Mass Gatherings		X	X	X
Stay-at-home orders				X

N.B. At yellow and orange covid levels, strategic choices must be made about which package of non-pharmaceutical interventions to use for control. At orange levels, stay-at-home orders are advised, unless viral testing and contact tracing capacity are implementable at levels meeting surge indicator standards.

STEP 3: *set testing & tracing surge targets to drive suppression*

	ZONES	TESTS	TRACERS	SUPPRESSION GOALS
 Priority	Red	1200-2500 tests/daily death*	5 tracers/new case	getting to orange
	Orange		or	getting to yellow
	Yellow		300 tracers/daily death*	getting to green
	Green	Minimum 10 daily test/100,000 people	30 tracers/100,000 people (or 1/4000 in sparsely populated areas)	Surveillance and suppression before community spread



Suppression

*depending on levels of usage of and compliance with other NPIs

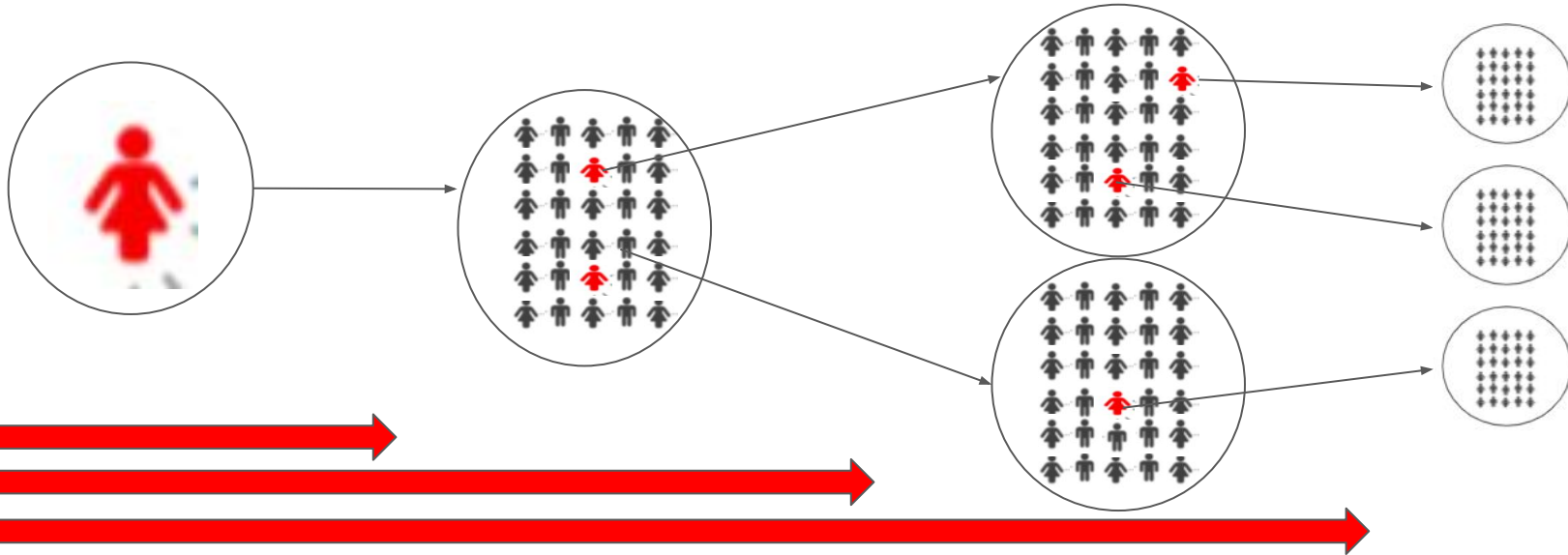
Priority: if testing/tracing resources are scarce, lowest-incidence zones surge first because they require fewer resources to get to green. Higher-incidence zones mitigate in the interim.

Step 4: *establish diagnostic & surveillance testing priorities based on zones*

	Green	Yellow	Orange	Red
Diagnostic (symptomatics & suspected exposures)	X	X	X	X
Contact Tracing Based (contacts &, if positive, their contacts)	X	X	X	X
Data-driven targeted testing of hotspots: staff and residents of hotspots (e.g., nursing homes, hospitals, prisons, meat-packing plants, zip codes).		X	X	X
Critical Context Routine Testing within vulnerable populations & national security contexts (e.g., nursing homes, hospitals, prisons, meat-packing plants, warships, etc.). Frequency ranges from multiple times per week to weekly.	Weekly pooled	Weekly pooled	Individual	Individual
Congregate Setting Testing within schools, churches, sports leagues, and other congregate contexts <i>if and only if contact tracing, hotspot, & CCRT are hitting all KPIs</i> . Frequency ranges from multiple times per week to weekly.	Optional	Optional Weekly pooled	Optional Individual	

Surveillance

TRACING: *Every covid-positive individual should generate 12-25 more tests (depending on levels of usage of and compliance with other NPIs)*



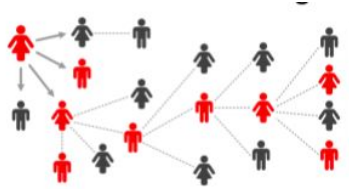
A positive test activates a contact tracing team that identifies those who may have been exposed

Those exposed contacts have a test appointment scheduled for them (and quarantined in the interim).

A positive test result of any contact triggers a further round of contact tracing and testing.

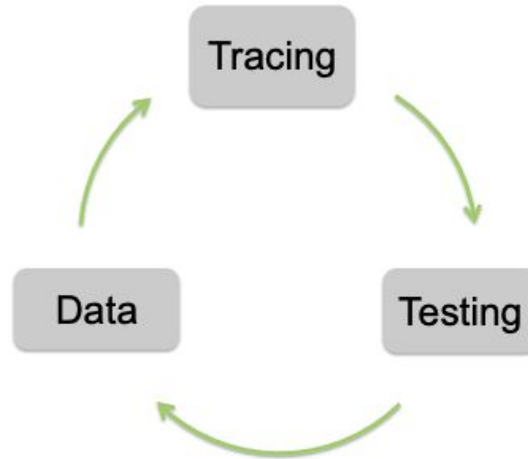
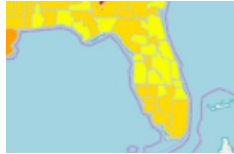
Tracing down a chain of transmission until no new positives are found.

TACTICS: *states “get to green” by virtuous cycle of TTSI*



Boots on the Ground: Tracing contacts of positives and their contacts down a chain of transmission until no new positives are found. (Local county health depts, municipal workers & recruited community organizations--e.g., churches, NYC knows)

Suppression Strategy: Data on positives enables state health depts to target testing for suppression



Testing Arsenal: Tests by point-of-care clinics, at-home tests, mobile testing sites (walk-up and drive-thru sites)

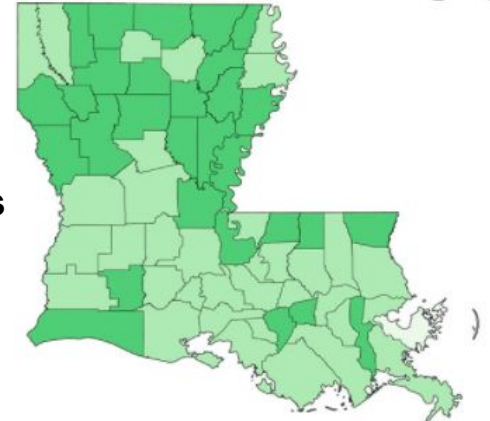
TTSI: *Key Metrics & Outcomes*

KEY OUTCOME

Successful surge suppression efforts work fast to restore jurisdictions to near-zero prevalence within **1-2 months**. In other words, surge testing and tracing resources are a **temporary** need; only **maintenance** levels for green zones become permanent until a vaccine.

KEY METRICS

- **3% of daily tests are positive**
- **80% = $\frac{\text{positives from contact tracing}}{\text{total positives} - \text{positives not from critical contexts}}$**
- **Every covid+ individual generates 12-25 more tests**
- *See appendix for more indicators*



LOGISTICS: *suppression strategy requires regional logistics*

Suppressing the virus requires:

- **regional testing labs** so test results produced w/in 24 hours
- **regional testing capacity surge** from 10^5 to 10^6



ANALOGY: *Springfield Armory during Revolutionary War*



Washington ordered the creation of the armory in 1777, which supplied patriot colonists with weapons to defeat the British.

General Honoré: *“leaving states to buy their own tests during a pandemic is like leaving battalions to buy their own weaponry during a war.”*

LOGISTICS: *interstate compacts build regional test armories*

Congress authorizes interstate procurement compacts (IPCs) with a single mandate to spend \$25B on procuring tests for a suppression surge in their region.



Advantages over state procurement:

- **Suppression-level test volumes:** cash-strapped states will have competing demands for spending and will therefore have incentives to purchase only mitigation test volumes, which is more costly in the long-run (more testing, more lockdowns).
- **Rapid expansion of testing capacity:** opportunity to win offtake contracts will create a market incentive for rapid expansion of testing capacity for existing test labs and manufacturers
- **Rapid expansion of testing arsenal:** offtake contracts and loans will spur more innovation in CRISPR point-of-use tests or next generation sequencing mega-labs that can process a million tests/day, which can produce rapid test results for *any* novel disease in a future pandemic.
- **Lower transaction costs, economies of scale, regional oversight & expertise**

LOGISTICS: *compacts expand arsenal for high-throughput testing*

Arsenal	Testing Modality	Companies/ Labs	Current Daily Capacity	Potential Daily Capacity by Oct w/Surge	Test Type	Accuracy
Rockets	Centralized Regional Labs	LabCorp, Quest, Thermo Fisher, Roche, Hologic, Cepheid, BioReference, ARUP, Regional CLIA Univ.Labs	~400k	10 ⁶	RT-qPCR (swab/saliva)	High
		Hologic	~143k	10 ⁶	iNAAT (swab)	Medium
Mortars	Point-of-care	Roche	~50k-70k	10 ⁵	RT-qPCR (swab/saliva)	High
		Abbott, Atila Bio	~50k-70k	10 ⁵	iNAAT (swab)	High
		Quidel	10 ⁴	10 ⁵	ELISA (swab)	Medium
Infantry guns	Point-of-use	Mammoth, Sherlock, Broad	0	0	CRISPR (still in R&D)	Medium
Nuclear	Cent. Labs	Illumina, Hudson, Ginkgo	0	10 ⁷	NGS (swab/saliva)	High

ROLES: *federal government, compacts & states*

Federal Govt



**Funding & Public
Communication about
Nat'l Suppression Target**

Interstate Compacts



**Logistics: buys \$25B in
tests for regional compacts**

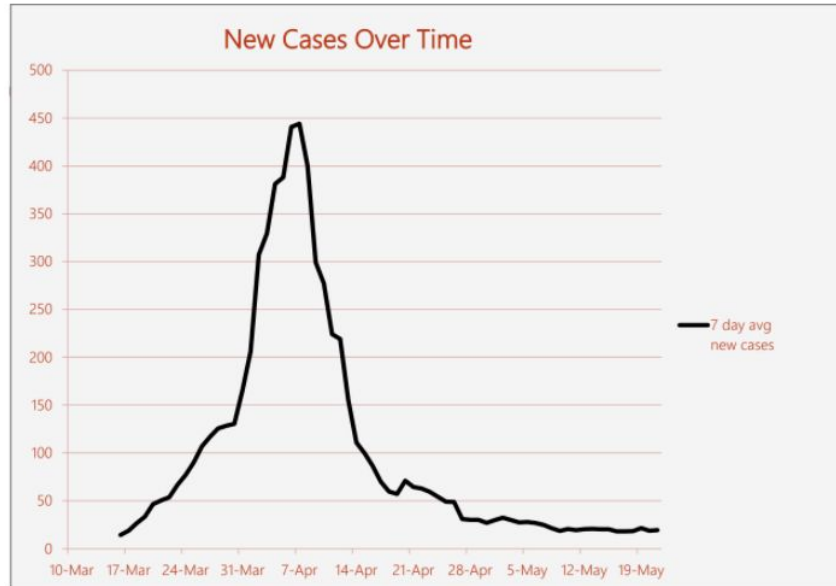
States



**Battalions: Testing, Tracing,
& Supported Isolation
(TTSI)**

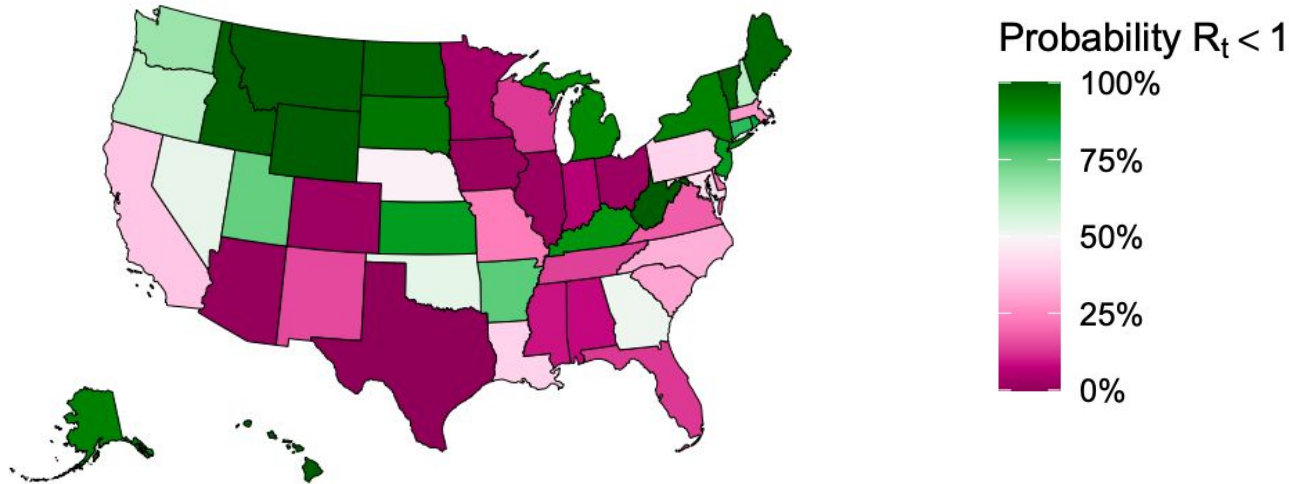
Key: *New Orleans is a model for the nation*

New Orleans: COVID Day 75



Key: *States predicted in late May to have outbreaks in June & July*

Estimates of the probability that R_t is less than one for each state in the next 8 weeks



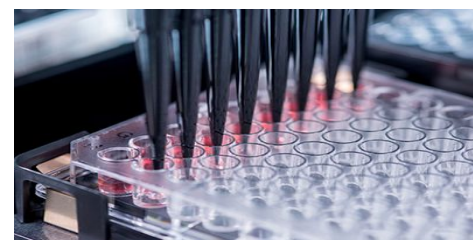
Source: "Report 23: State-level tracking of COVID-19 in the United States" May 24 2020, Imperial College COVID-19 Response Team
<https://www.imperial.ac.uk/media/imperial-college/medicine/mrc-gida/2020-05-21-COVID19-Report-23.pdf>

Key: *TTSI will restore and protect the United States from pandemics*

Once “green,” states can pay for maintenance testing and tracing costs to stay “green”



Investment in regional testing capacity will create a resilient and mobile pandemic testing infrastructure to suppress future outbreaks of covid-19 or other diseases



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APPENDIX

State Block Grants: *\$49B funding for TTSI administration*

- Block grants to states based off population and/or infection rates
 - public health offices (\$5.5 bn)
 - contact tracing personnel (\$9 bn)
 - voluntary self-isolation facilities (\$4.5 bn)
 - income support for voluntary self-isolation (\$30 bn)
- Accountability & Incentives
 - Grants could be contingent upon submission of suppression plan with suppression targets and metrics
 - Grants could be phased in tranches based on states' success in reducing disease prevalence and successful movement towards becoming a green zone (less than 1/100,000 daily new cases)

State Block Grants: *Sample Indicators*

TESTING METRICS

- % of test results received within 24 hours of collection
- median/distribution of turnaround time in testing
- % of those seeking tests who are tested w/in 24 hours
- % of false positives and % of false negatives
- % of recommended number of tests administered

TRACING METRICS

- % of identified positives who are interviewed within 24 hours test results
- % of identified contacts who are tested and isolated within 24 hours of the index test result
- % of identified contacts who are tested and isolated within 48 hours of the index test result
- % of new positives found by a tracer out of all new positives
- % of recommended number of active tracers

Compacts: *Formation & Administration*

- Congress adopts legislation authorizing the creation of compacts between states with the purpose and power to procure covid-19 tests on behalf of member states
 - Compacts have power to make equity contracts, loan contracts, purchase contracts, and guaranteed uptake contracts (no grants)
- Compact takes effect upon three states' passing legislation to join the compact
- Any state, territory, or tribal nation would be permitted to join within region
- Congress funds the compacts \$25 bn
- The compact's authorities should expire on December 31, 2021, unless extended by Congress. Any funding left over on that date should be remitted back to US Treasury
- Compact have tranching based off compacts ability to increase current capacity to target capacity (2nd tranche after X% target capacity achieved; 3rd tranche after Y% target capacity achieved; 4th tranche after Z% target capacity)

Compacts: *Appointments of Members*

- Congress will provide initial slate of members who meet certain statutory criteria
- Governors within a compact shall appoint members from Congress' slate; Governors can remove at will (with majority vote) and appoint (with majority vote) in accordance within the statutory criteria
- Compact includes a minimum: 1 current or former head of school public health (phD), 1 virologist (PhD), 1 epidemiologist (PhD), 1 procurement/contracts lawyer (JD), 1 Medical Doctor with public health background (MD), 1 biotechnology entrepreneur, 1 member with medical device manufacturing experience (preferably engineers, MS), 1 member with substantial hospital or health center procurement backgrounds, 1 member with substantial government procurement experience, 1 other discretionary member
- Members select Compact Chair

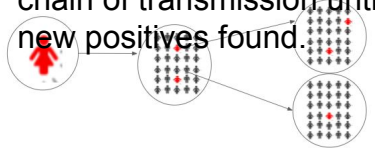
Compacts: *Anti-Corruption Provisions*

- Members required to sell any individual stocks and invest only in total market or broad market index funds.
- Members prohibited from purchasing stock in any company doing business with the PTB for an additional year after their time of service.
- Contracting firms prohibited from raising CEO pay, offering bonuses to executives, paying out dividends, or buying back stock during the contracting years and for two years thereafter.
- Inspector general would monitor transparency, anti-corruption, and ethics provisions, and conduct oversight of the operations and activities and would refer possible corruption, hoarding, profiteering, fraud, or other unlawful activities to the relevant state attorney(s) general.

KPIs Contact tracing	MAINTENANCE	SUPPRESSION	MITIGATION
Zones	GREEN	YELLOW, ORANGE, RED	YELLOW, ORANGE, RED
# tracers	30 tracers/100,000 people (or 1/4000 in sparsely populated areas)	Whichever is higher, 30 tracers/100,000 people or 5 tracers/case	30 tracers/100,000 people
% positives from tracing vs. testing symptomatics	>80%	>80%	>50%
% index cases who give contacts	>75%	>75%	>75%
% identified contacts Traced	>90%	>90%	>80%
trace time	24 hours	24 hours	24 hours
time from contact from tracer to test of contact	24 hours	24 hours	24 hours

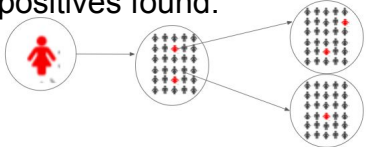
KPIs Contact tracing	MAINTENANCE	SUPPRESSION	MITIGATION
% identified contacts Traced	>90%	>90%	>80%
% contacts with Symptoms at Time of Trace	close to zero	close to zero	close to zero
% traced contacts in quarantine, isolation, or active monitoring	90%	90%	90%
% traced contacts receiving supports	varies with context; locales should set targets	varies with context; locales should set targets	varies with context; locales should set targets
% traced contacts assigned to quarantine, isolation, or active monitoring who are fully compliant with program	90%	90%	90%
% of traced contacts tested	90%	90%	0%

RED ZONE: *TTSI surge & stay-at-home orders (flattening the curve)*

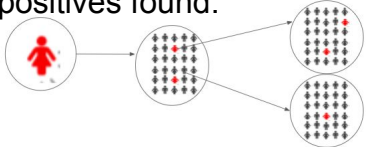
TESTS	TESTING PRIORITIES	TRACING*
1200-2500 tests/daily death*	data-driven targeted testing of hotspots: staff and residents of hotspots (e.g., nursing homes, hospitals, prisons, schools, churches, meat-packing plants).	<p>Whichever is higher, 30 tracers/100,000 people or 5 tracers/case.</p> <p>Trace and test the contacts of all covid+ individuals down chain of transmission until no new positives found.</p> 
	symptomatics & suspected exposures to covid-19, including from contact tracing chains	
(CCRT) Critical Context Routine Testing	multiple-times per week individual testing within vulnerable populations or national security contexts (e.g., nursing homes, hospitals, prisons, meat-packing plants, warships, etc.).	

**Tracing is a suppression strategy. Red Zones pursuing mitigation will quarantine contacts in lieu of testing and tracing.*

ORANGE ZONE: *TTSI surge in an open economy (breaking the chain)*

TESTS	TESTING PRIORITIES	TRACING
<p>1200-2500 tests/daily death</p>	<p>data-driven targeted testing of hotspots: staff and residents of hotspots (e.g., nursing homes, hospitals, prisons, schools, churches, meat-packing plants).</p> <p>symptomatics & suspected exposures to covid-19, including from contact tracing chains</p>	<p>Whichever is higher, 30 tracers/100,000 people or 5 tracers/case.</p>
<p>(CCRT)</p> <p>Critical Context Routine Testing</p>	<p>individual testing within vulnerable populations & national security contexts (e.g., nursing homes, hospitals, prisons, meat-packing plants, warships, etc.). Frequency ranges from multiple times per week to weekly.</p>	<p>Trace the contacts of all covid+ individuals down chain of transmission until no new positives found.</p> 
<p>(Optional)</p> <p>Congregate Setting Testing</p>	<p>individual testing within schools, churches, sports leagues, and other congregated contexts <i>if and only if daily testing & CCRT are hitting all KPIs</i>. Frequency ranges from multiple times per week to weekly.</p>	

YELLOW ZONE: *TTSI surge in an open economy (breaking the chain)*

TESTS	TESTING PRIORITIES	TRACING
<p>1200- 2500 tests/daily death</p>	<p>data-driven targeted testing of hotspots: staff and residents of hotspots (e.g., nursing homes, hospitals, prisons, schools, churches, meat-packing plants).</p> <p>symptomatics & suspected exposures to covid-19, including from contact tracing chains</p>	<p>Whichever is higher, 30 tracers/100,000 people or 5 tracers/case.</p>
<p>(CCRT) Critical Context Routine Testing</p>	<p>pooled testing within vulnerable populations & national security contexts (e.g., nursing homes, hospitals, prisons, meat-packing plants, warships, etc.). Frequency ranges from multiple times per week to weekly.</p>	<p>Trace the contacts of all covid+ individuals down chain of transmission until no new positives found.</p> 
<p>(Optional) Congregate Setting Testing</p>	<p>pooled testing within schools, churches, sports leagues, and other congregated contexts <i>if and only if daily testing & CCRT are hitting all KPIs</i>. Frequency ranges from multiple times per week to weekly.</p>	

GREEN ZONES: *preventing community spread to stay green*

TESTS	TESTING PRIORITIES	TRACING
<p>Min. 10 daily tests/100,000 people</p>	<p>symptomatics & suspected exposures to covid-19. including from contact tracing chains</p>	<p>Whichever is higher, 30 tracers/100,000 people or 5 tracers/case.</p>
<p>(CCRT) Critical Context Routine Testing</p>	<p>weekly pooled testing within vulnerable populations or national security contexts (e.g., nursing homes, hospitals, prisons, meat-packing plants, warships, etc.).</p>	<p>Trace the contacts of all covid+ individuals down chain of transmission until no new positives found.</p>
<p>(Optional) Congregate Setting Testing</p>	<p>weekly pooled testing within schools, churches, sports leagues, and other congregate contexts <i>if and only if daily testing & CCRT are hitting all KPIs.</i></p>	