December 2020

COVID-19 Data Evaluation: Dashboards and KPIs

Partners In Health

Context for these materials

The ideas presented in this deck reflect the latest public health thinking and scientific evidence as of December 2020. However, the COVID-19 landscape is changing dramatically daily, and so must our recommendations over time.

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Overview

1 **Context surrounding KPI and dashboard development**

2 **Guiding questions for dashboard development**

3 **Key Performance Indicators**

4 **Types of dashboards**

5 **Measuring speed across cascade: Case example linking components for a faster response**

Context surrounding KPI and dashboard development: Performance management and results

Key question domains of Contact Tracing (CT) operations

Equity:
Are we responding to all unique needs with a social justice lens, and prioritizing the most vulnerable groups?

Retention:
Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?

Scale:
Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

Speed:
Is the response happening quickly enough to drive the rate of infection below 1: < 3 days for the full cascade?

Core assumptions for KPI and Dashboard development:

- Management of CT teams and processes requires a responsive measurement system

- CT teams need timely, accessible data in order to drive continuous learning and quality improvement

How we think about building dashboards

Three Guiding Questions:

1. What audiences will use the dashboard, and what reporting needs do different audiences require (including data privacy issues)?
   - Potential audiences for this program include: Governor's office, fidelity partner/IDPH, LHD/CT supervisor

2. What objectives does the program aim to achieve and what **Key Performance Indicators** (KPIs) measure those objectives?
   - In Newark, we have a 4-part framework for our program objectives, and our dashboard is built to align to that framework.

3. Where is the data sourced from?
   - Who is inputting the data? Can it be integrated to update the dashboard automatically? Are there permissions issues?

Dashboard structure and content: tracking progress and productivity within each step of the response cascade

Key components of cascade:

CT start-up and hiring → Testing → Case Investigation → Contact Tracing → Care Coordination

Domains of inquiry:

Equity:
Are we responding to all unique needs with a social justice lens, and prioritizing the most vulnerable groups?

Retention:
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KPIs measure outputs that the program wants to monitor and influence

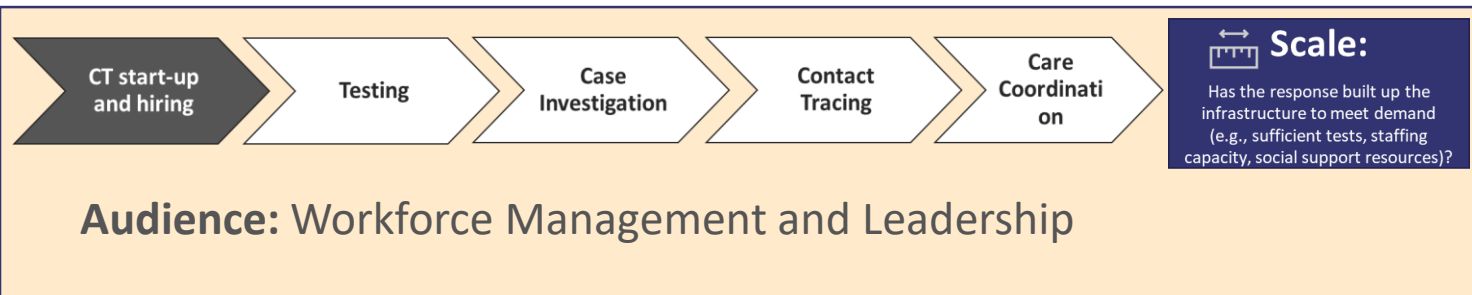| Testing	Case Investigation	Contact Tracing	Care Coordination
❑ Total # of tests performed, disaggregated by testing site and by high-risk groups	❑ Case investigation completion rate	❑ Contact tracing completion rate	❑ # and % of positive cases able to self-isolate safely
❑ Test positivity rate	❑ Breakdown of investigations by case status: no number, no answer, declined to participate, pending or completed	❑ Breakdown of contacts identified by status: completed, pending, declined to participate, no/wrong number, etc.	❑ # and % of cases linked to social support services, disaggregated by service domain
❑ % of positive tests performed with correct patient contact information (name and phone number) linked	❑ # contacts identified per case	❑ # and % contacts reporting symptoms	❑ # and % of contacts able to quarantine safely
❑ Testing turnaround time (TAT), by laboratory	❑ Case final outcomes: recoveries/deaths	❑ # and % contacts who test positive and become cases	❑ # and % of contacts linked to social support services, disaggregated by domain
	❑ # and % positive cases admitted to hospital	❑ Average/median call time for completed tracing calls	
	❑ Average/median call time for completed disease investigations	❑ Daily # tracers on duty	
	❑ Daily # investigators on duty	❑ Daily time spent on tracing	
	❑ Daily time spent on investigations	❑ Average/median time from contact entered in tracing system to first tracing call attempted	
	❑ Average/median time from positive case entered in disease surveillance system to first investigation call attempted		

KPIs provide guidance and benchmarks, and serve as the foundation of the visualization that goes into the dashboard

- KPI list should have indicators from each part of the Contact Tracing Cascade – Test, Trace, Care coordination

- Development of KPI's should include clear explanation of data type or format, how / when data is compiled, and from what source the data will be extracted

KPI Category/Metric	Type	Compiled	Data source
Contact Tracing			
Tracing – Personnel & Time			
Disease investigators on duty	#	Daily	City
Hours of disease investigations completed	#	Daily	City
Contact tracers on duty	#	Daily	External vendor
Hours of tracing calls completed	#	Daily	External vendor
Tracing - Productivity			
Total investigations completed	#	Cumulative	City
Daily tracing completion rate	%	Daily	External vendor
Tracing - Timeliness			
Cases contacted by investigator within 2 hrs of positive test	#	Daily	External vendor
Contacts traced within 24 hrs. of identification	%	Daily	External vendor
Tracing – Follow-up			
Cases called daily	#	Daily	External vendor
Cases still open requiring follow-up	#	Daily	External vendor
Isolation and social Supports (Equity)			
Cases unable to safely isolate	#	Daily	External vendor
Cases unable to safely isolate	%	Daily	External vendor
Referrals made to social programs, by domain	#	Daily	External vendor

Note: Illustrative example table only

Production dashboards: give a quick view to leadership as to how many CTs are coming online

CT start-up and hiring → Testing → Case Investigation → Contact Tracing → Care Coordination

📏 **Scale:** Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

Audience: Workforce Management and Leadership

Hiring Group	Training Dates	Production Date	Target Addition to Workforce	Cumulative Target	Actual Addition to Production	Cumulative Actual in Production	% in Production	Status	Notes
1	June 9-11	June 12	5	5	4	4	80%	Complete	
2	June 12-15	June 16	10	15	5	9	60%	Complete	
3	June 16-18	June 19	20	35	18	27	77%	Complete	
4	June 19-21	June 22	40	75	45	72	85%	Complete	
5	June 22-24	June 25	80	155	90	162	98%	Complete	
6	June 25-27	June 28	30	185				In-progress	
7	June 28-30	July 1	12	197					

Mock-up dashboard, all figures are illustrative

Hiring and training pipeline dashboards: highlight attrition and bottlenecks in onboarding and training

CT start-up and hiring → Testing → Case Investigation → Contact Tracing → Care Coordination

Audience: Workforce Management

Scale: Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

Hiring Pipeline

Applicants	8,235
Offers Sent	200
Offers Accepted	172
In Production	130 32

■ CBOs

Workforce Breakdown (Headcount)

Hired

	Contact Tracer	Case Investigator	Supervisor	Care Resource Coordinator	Translator
■ LDH	45	15	3	6	5
■ CBOs	35	11	3	4	3

	June 10	June 11	June 12	June 13	June 15	June 16	June 17	June 18	June 19	June 20	June 20	June 22	June 23	June 24	June 25
Target Addition															
Actual Addition															
Delayed in Training															
Departures															
Headcount in Production															
FTE Production															

Program management dashboards: timeliness and speed

Audience: Program Management and State Leadership

Speed: Is the response happening quickly enough to drive the rate of infection below 1: < 3 days for the full cascade?

The Timing Dashboard shows how long the entire cascade takes, with the goal of <3 days to achieve R_0 below 1.

ILLUSTRATIVE – FAKE DATA
TIMING

TIMING OVERVIEW

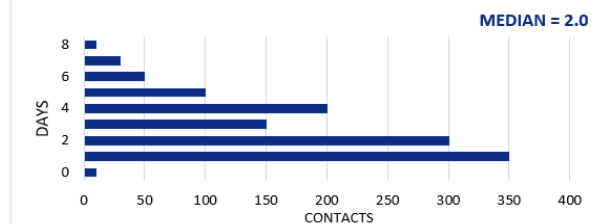| **2.0**	**15.0**	**7.0**	**4.0**
MEDIAN DAYS FROM LAB TEST DATE TO MAVEN	MEDIAN HOURS FROM MAVEN TO CRM	MEDIAN HOURS FROM CRM TO CASE OUTREACH COMPLETE	MEDIAN DAYS FROM CASE OUTREACH COMPLETE TO FIRST CONTACT REACHED

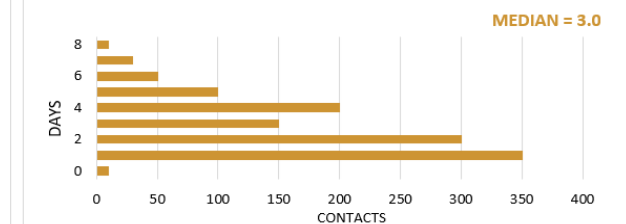**MEDIAN HOURS FROM CRM TO CASE OUTREACH COMPLETE**
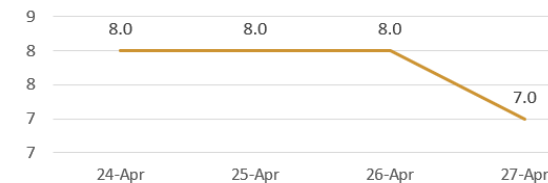
CONTACT OUTREACH PERFORMANCE
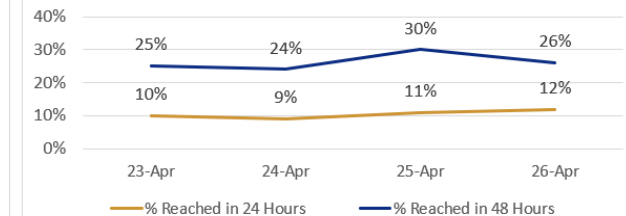
DAYS FROM CASE SYMPTOM ONSET TO FIRST CONTACT REACHED

MEDIAN = 2.0

DAYS FROM CASE LAB TEST TO FIRST CONTACT REACHED

MEDIAN = 3.0

Call center operations dashboard: show management quickly if targets are being hit and utilization rates

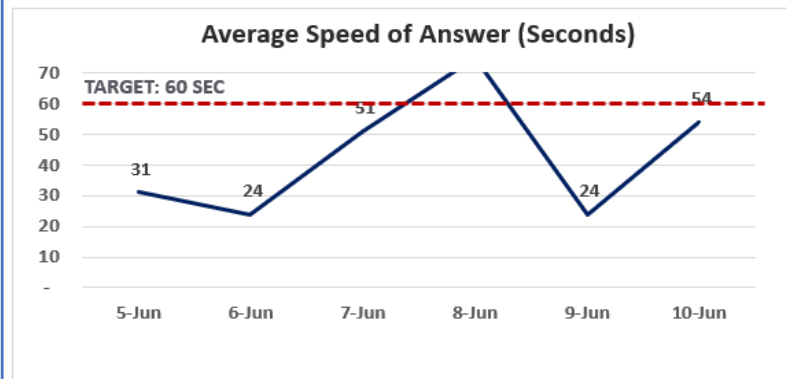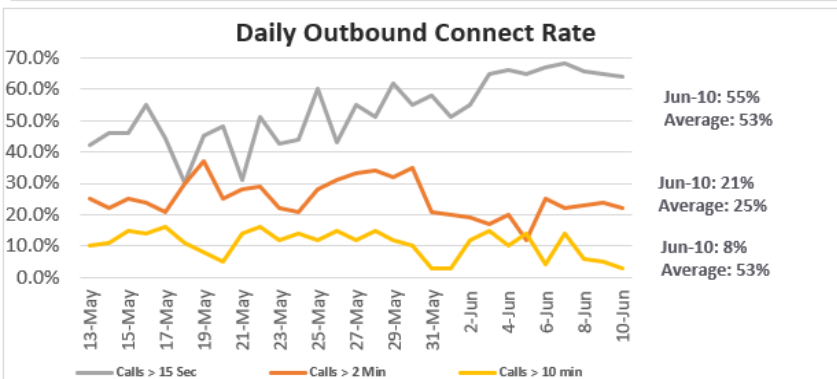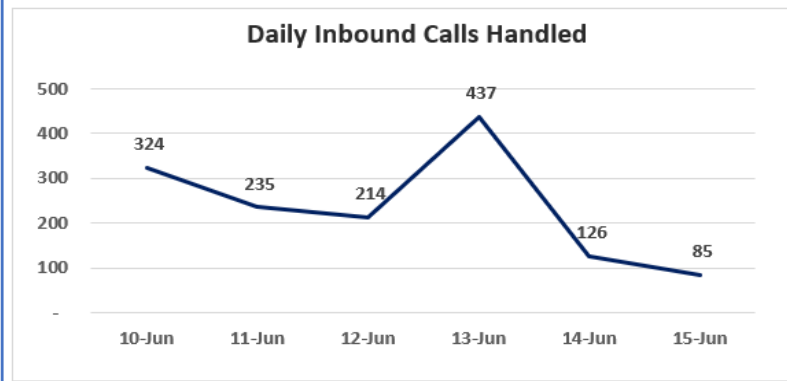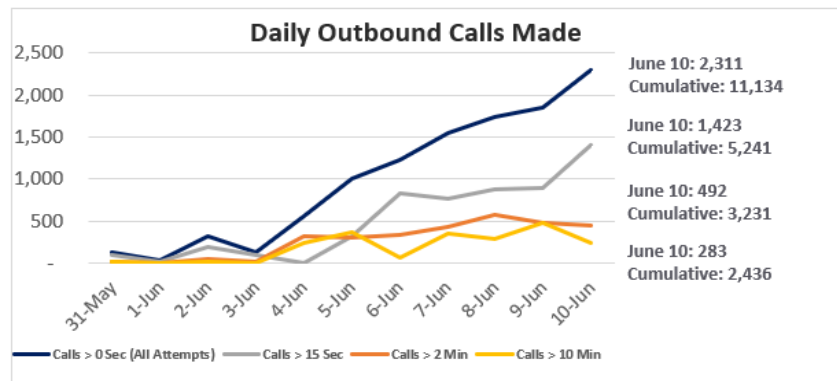CT start-up and hiring → Testing → **Case Investigation** → Contact Tracing → Care Coordination

⏱ Speed: Is the response happening quickly enough to drive the rate of infection below 1: < 3 days for the full cascade?

Audience: Quality and Program Management

Daily Outbound Calls Made

June 10: 2,311 Cumulative: 11,134

June 10: 1,423 Cumulative: 5,241

June 10: 492 Cumulative: 3,231

June 10: 283 Cumulative: 2,436

Calls > 0 Sec (All Attempts) — Calls > 15 Sec — Calls > 2 Min — Calls > 10 Min

Daily Inbound Calls Handled

324, 235, 214, 437, 126, 85

10-Jun, 11-Jun, 12-Jun, 13-Jun, 14-Jun, 15-Jun

Daily Outbound Connect Rate

Jun-10: 55% Average: 53%

Jun-10: 21% Average: 25%

Jun-10: 8% Average: 53%

Calls > 15 Sec — Calls > 2 Min — Calls > 10 min

Average Speed of Answer (Seconds)

TARGET: 60 SEC

31, 24, 51, 24, 54

5-Jun, 6-Jun, 7-Jun, 8-Jun, 9-Jun, 10-Jun

Program management dashboards: case investigation

CT start-up and hiring → Testing → **Case Investigation** → Contact Tracing → Care Coordination

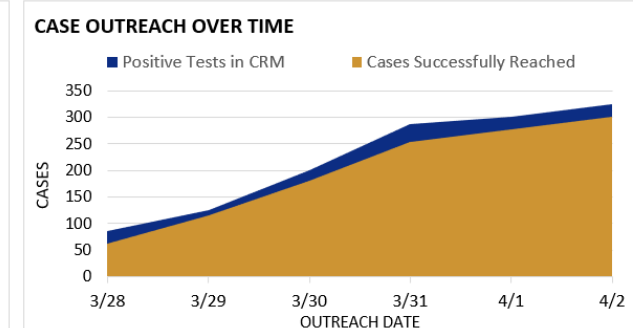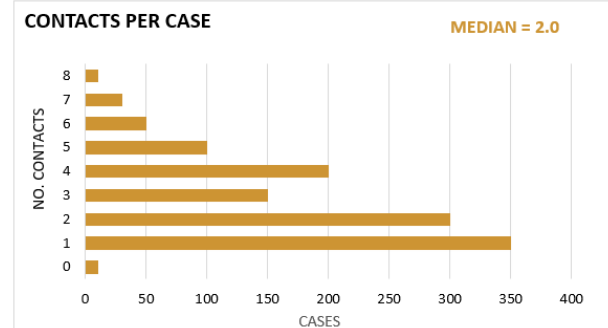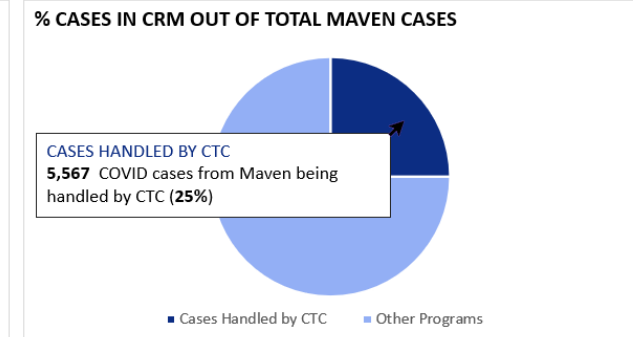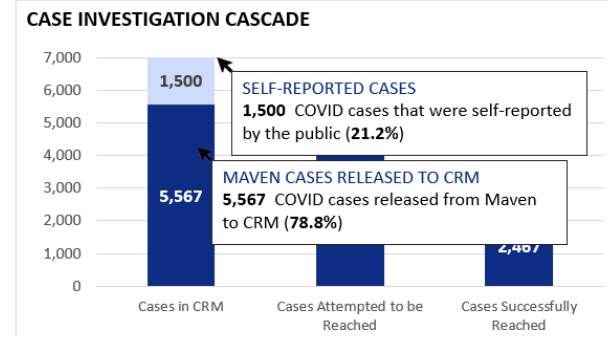**Audience:** Program Management and State Leadership

Retention:
Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?

Scale:
Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

Provides a high-level overview into the scale of case investigation, as well as retention

ILLUSTRATIVE – FAKE DATA
CASE INVESTIGATION

CASE INVESTIGATION CASCADE

1,500
5,567
2,467

SELF-REPORTED CASES
1,500 COVID cases that were self-reported by the public (**21.2%**)

MAVEN CASES RELEASED TO CRM
5,567 COVID cases released from Maven to CRM (**78.8%**)

Cases in CRM | Cases Attempted to be Reached | Cases Successfully Reached

% CASES IN CRM OUT OF TOTAL MAVEN CASES

CASES HANDLED BY CTC
5,567 COVID cases from Maven being handled by CTC (**25%**)

■ Cases Handled by CTC ■ Other Programs

CONTACTS PER CASE   **MEDIAN = 2.0**

NO. CONTACTS / CASES

CASE OUTREACH OVER TIME

■ Positive Tests in CRM ■ Cases Successfully Reached

CASES / OUTREACH DATE
3/28, 3/29, 3/30, 3/31, 4/1, 4/2

Program management dashboards: contact tracing

CT start-up and hiring → Testing → Case Investigation → **Contact Tracing** → Care Coordination
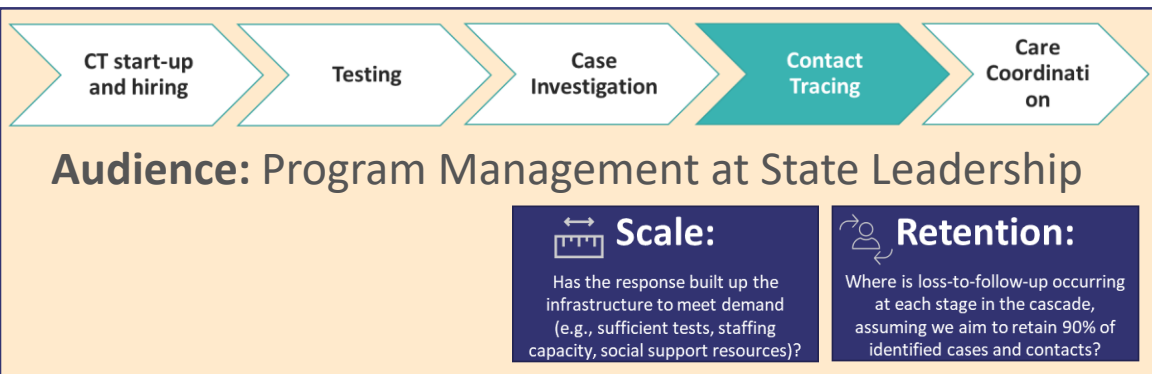
Audience: Program Management at State Leadership

Scale: Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?

Retention: Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?

Shows the scale and retention of contacts, as well as the rate of successful referral to testing.

ILLUSTRATIVE – FAKE DATA
CONTACT TRACING

CONTACT TRACING CASCADE

4,955

TOTAL NUMBER OF CONTACTS
4,955 identified contacts in CRM (**100%**)

340

Total Number of Contacts · Contacts Attempted to Be Reached · Contacts Successfully Reached · Contacts Successfully Completing Quarantine

TOTAL CONTACTS BY ZIP CODE

NUMBER OF CONTACTS
1493
100

ATTEMPTED
3,284
TOTAL

REACHED
2,302
TOTAL

REFERRED TO TEST
802
TOTAL

REFERRED TO TEST
Contacts reporting symptoms that were referred to testing

Program management dashboards: care resource coordination

CT start-up and hiring → Testing → Case Investigation → Contact Tracing → **Care Coordination**

Audience: Program Management and State Leadership

Retention: Where is loss-to-follow-up occurring at each stage in the cascade, assuming we aim to retain 90% of identified cases and contacts?

Equity: Are we responding to all unique needs with a social justice lens, and prioritizing the most vulnerable groups?

Maps vulnerability and equity among contacts, particularly demonstrating those who need to support to quarantine

VULNERABILITY AND EQUITY

CONTACTS OVERVIEW

| 24%	30%	43%	32%
INABILITY TO SAFELY SELF-ISOLATE	INABILITY TO SAFELY SELF-QUARANTINE	LACKING HEALTHCARE PROVIDER	REFERRED TO RESOURCE COORDINATOR

INABILITY TO ISOLATE/QUARANTINE BREAKDOWN

	FEMALE	MALE	TOTAL
White	15%	25%	18%
Other	20%	30%	40%
Black African American	30%	20%	25%
American Indian	15%	30%	25%
Native Hawaiian Pacific Islander	10%	20%	15%
TOTAL	25%	40%	30%

REQUESTING SUPPORT BY TYPE

Food
Chronic Medical Condition
Lack of Mobility/Support for ADLs
Household Items
Social Network Connection
Housing
Other

0% 5% 10% 15% 20% 25% 30% 35% 40% 45%
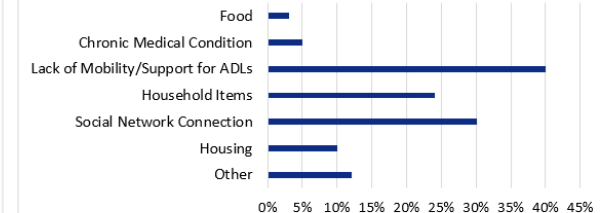
REFERRED TO RESOURCE COORDINATOR BY RACE

Native Hawaiian Pacific Islander
American Indian
Black African American
Asian
Other
White

0% 5% 10% 15% 20% 25% 30% 35% 40% 45%
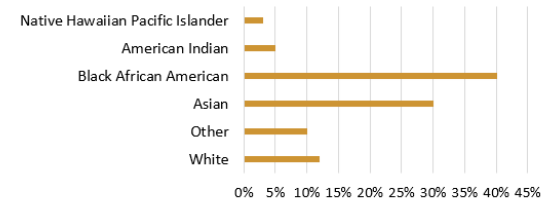
REQUESTING SUPPORT BY ZIP CODE

Value
1493
100

Powered by Bing
© GeoNames, HERE
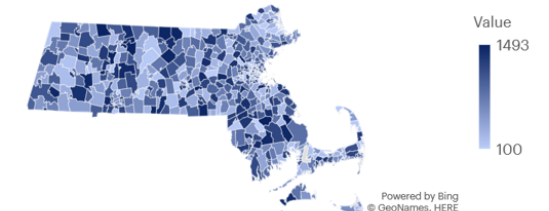
Program management dashboards: demographics

Audience: Epidemiologists and Program Management

| CT start-up and hiring | Testing | Case Investigation | Contact Tracing | Care Coordination |

Scale:
Has the response built up the infrastructure to meet demand (e.g., sufficient tests, staffing capacity, social support resources)?
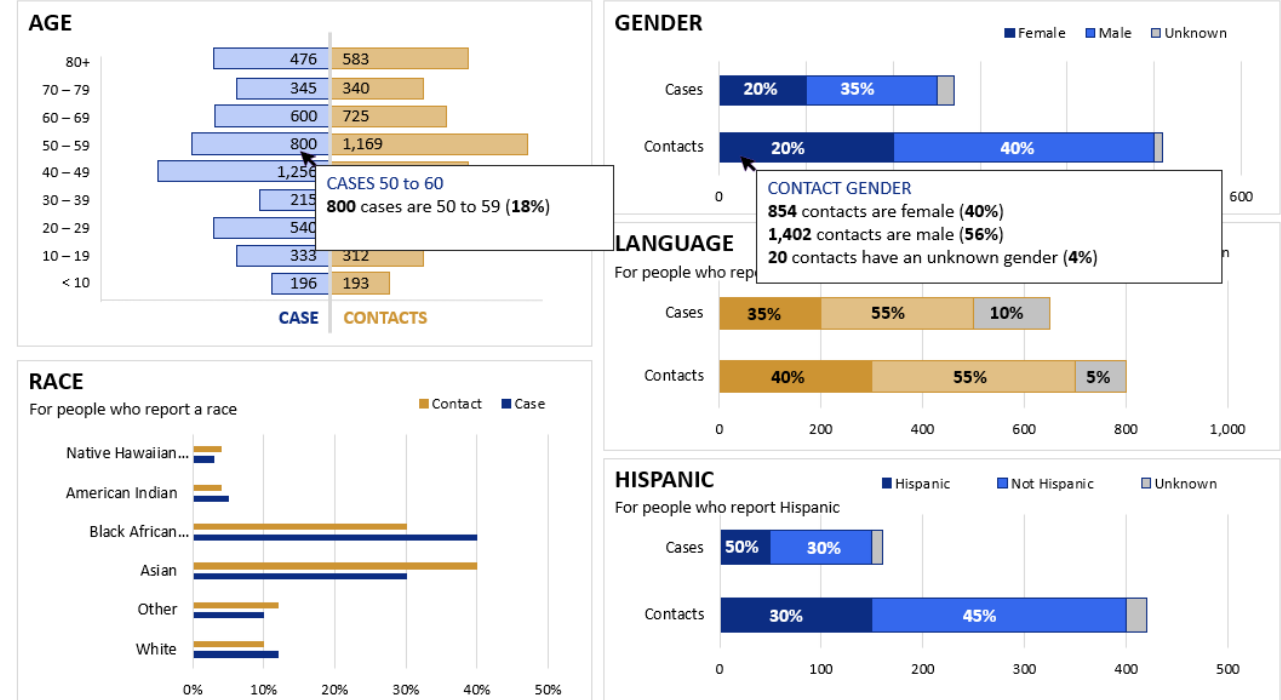
Equity:
Are we responding to all unique needs with a social justice lens, and prioritizing the most vulnerable groups?

Provides an epidemiological profile of Covid-19, as well as heavily impacted communities

ILLUSTRATIVE – FAKE DATA

DEMOGRAPHICS

AGE

	CASE	CONTACTS
80+	476	583
70 – 79	345	340
60 – 69	600	725
50 – 59	800	1,169
40 – 49	1,256	
30 – 39	215	
20 – 29	540	
10 – 19	333	312
< 10	196	193

CASES 50 to 60
800 cases are 50 to 59 (**18%**)

GENDER
■ Female ■ Male □ Unknown

| Cases | 20% | 35% |
| Contacts | 20% | 40% |

CONTACT GENDER
854 contacts are female (**40%**)
1,402 contacts are male (**56%**)
20 contacts have an unknown gender (**4%**)

LANGUAGE
For people who rep...

| Cases | 35% | 55% | 10% |
| Contacts | 40% | 55% | 5% |

0   200   400   600   800   1,000

RACE
For people who report a race
■ Contact ■ Case

- Native Hawaiian...
- American Indian
- Black African...
- Asian
- Other
- White

0%   10%   20%   30%   40%   50%

HISPANIC
For people who report Hispanic
■ Hispanic ■ Not Hispanic □ Unknown

| Cases | 50% | 30% |
| Contacts | 30% | 45% |

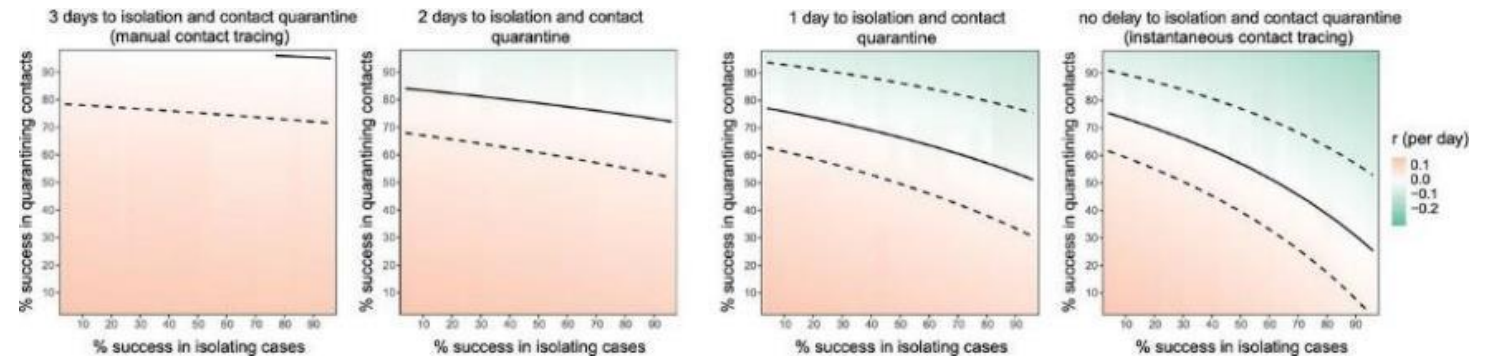0   100   200   300   400   500

Measuring speed: how can we link all cross-pillar activities together for a faster response architecture?

Overall Target:

Modelling indicates that response cascade must span ≤ 3 days to drive the rate of reproduction (Rt) below 1 and control the epidemic

| 3 days to isolation and contact quarantine (manual contact tracing) | 2 days to isolation and contact quarantine | 1 day to isolation and contact quarantine | no delay to isolation and contact quarantine (instantaneous contact tracing) |

Source: Luca Ferretti et al. Science 2020;368:eabb6936

Linkage step	KPI
Testing to Case Investigation	❑ Average/median time from test result available to test result upload into case investigation platform ❑ Average/median time from test result available to first investigation call attempted
Case Investigation to Contact Tracing	❑ Average/median time from case investigation completion to contact(s) assigned to contact tracers
Contact Tracing to Care Coordination	❑ Average/median time from case investigation to information shared with care resource coordinator ❑ Average/median time from contact traced to information shared with care resource coordinator

US Public Health Accompaniment Unit

For more information please contact LearningCollab@pih.org

Partners In Health