Project ASPeCT

(Anonymized, systematic, population e-(geo-fenced) Contagion Tracking)

Geo-fenced Contagion Tracking System

+

Comprehensive Decision Support Dashboard Approach

TGH Tampa General Hospital

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Phase 1 Plan for Re-opening is Underway

- What do we know for sure -> Movement around the region will grow.
- Some types of movement increase the risk of spreading the virus.
- How do we **measure** the relative rate and risk of increase in movement? [Spread]
- How do we **predict** the effect of the increased movement? [Outcome]
- When will it exceed medical hospital **capacity** to treat COVID patients? [Capability]

Data Requested, Received and Presented to the EPG

- Move from disparate to comprehensive
- Move from descriptive to predictive or prescriptive
- Move from informative to actionable

Discuss an Aggregated Dashboard [Governor's Task Force]

- Capacity Dashboard [Capability]
- Testing Dashboard [Outcome]
- Movement Dashboard [Spread]

Let's answer the questions:

- How does each re-opening announcement/phase effect movement?
- How does the type of movement affect risk of spread?
- How can we identify the 5% and intervene?
- How will the movement behavior consume hospital capacity?
- How do we adjust the models through feedback from testing and tracing?

Overview

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Chief Medical Informatics Officer

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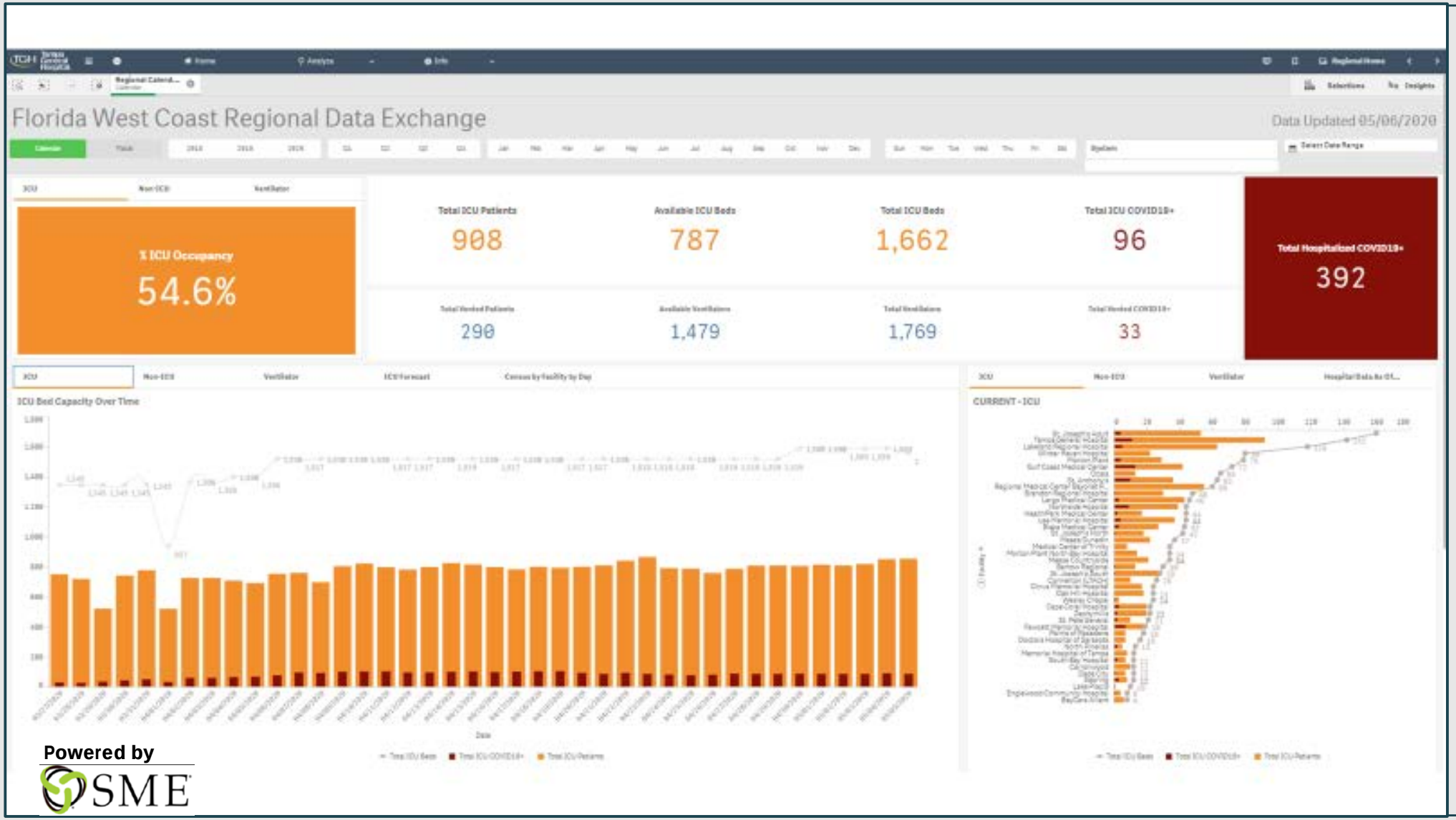
With acknowledgement to our medical professional and data science research colleagues who designed, developed and deliver (every day) the information in this presentation.

Caveats

- **All data presented:**
  - Contains no personally identifiable information
  - Contains no HIPPA protected information
  - Complies with comprehensive data protection laws in 80+ countries including GDPR (EU) and CCPA (California Consumer Privacy Act)
  - Device data is Opt-In and Cleaned Daily for Opt-Out

- **Analysis performed:**
  - Uses Massive Data to replicate the whole population
  - Avoids samples filled with self-selection bias or skewed to those with access
  - Stochastic in nature with probabilities at levels of confidence (not deterministic)
  - Attempts to understand underlying behaviors in this region, and,
  - Provides results specific to this region
    - Our demographics
    - Our density
    - Our movement behavior
    - Our social behaviors

Capacity Dashboard – ICU Beds & Ventilators



Powered by SME

- Data Sharing Collaboration between:
  - TGH
  - Advent Health
  - BayCare Health System
  - HCA Healthcare
  - Lakeland Regional Health
  - Lee Health
  - Manatee Memorial Hospital
- 51 Hospitals
- 13 Counties
- 5 million lives

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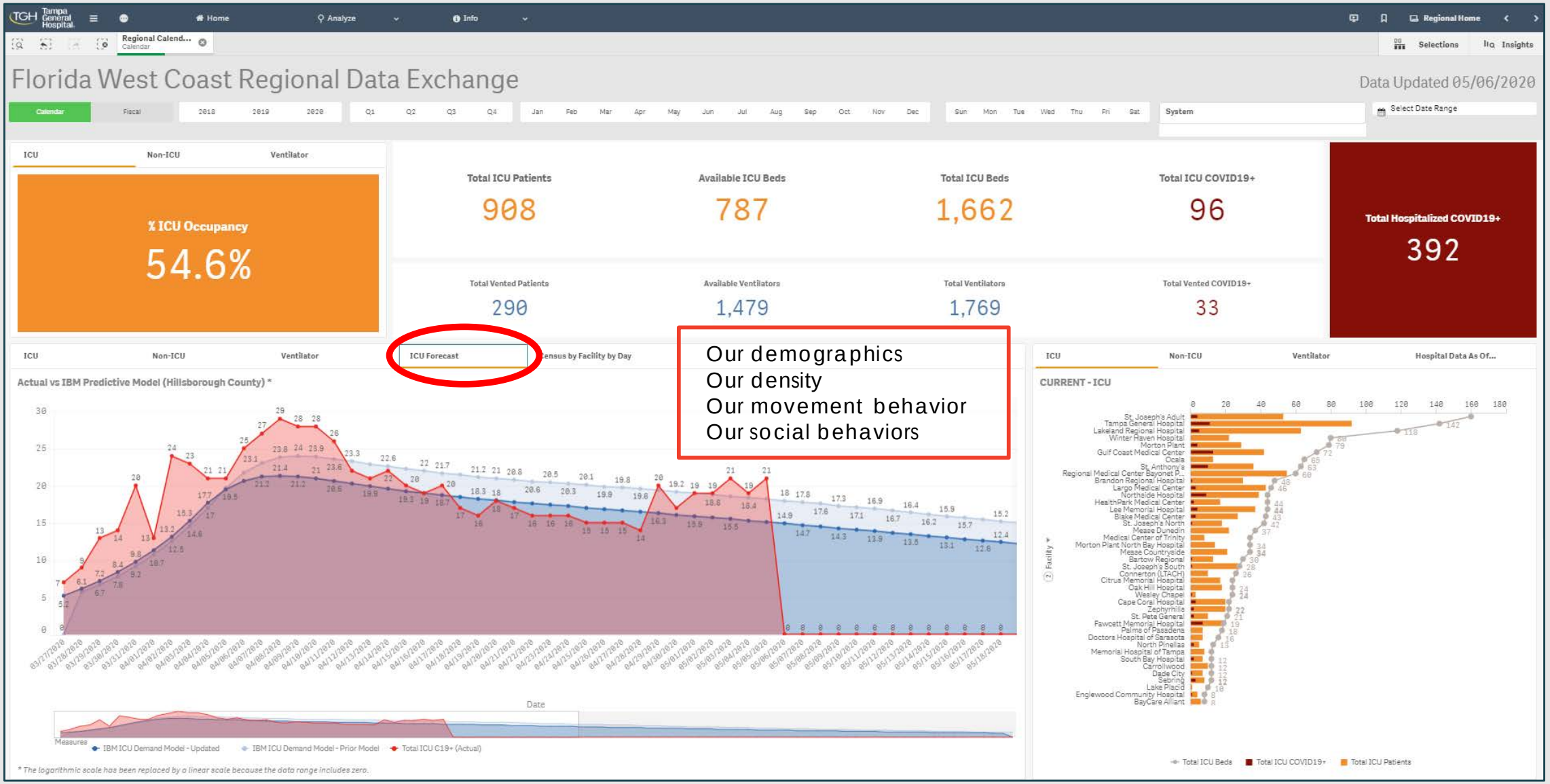
Capacity Dashboard – Generic Models have low Predictive Power in the Region



Our demographics
Our density
Our movement behavior
Our social behaviors

Capacity Dashboard

Coronavirus: characteristics of 36,492 Florida resident cases

Data verified as of May 5, 2020 at 10 AM

Data in this report are provisional and subject to change.

Age group	Cases		Hospitalizations		Deaths	
0-4 years	203	1%	13	0%	0	0%
5-14 years	431	1%	10	0%	0	0%
15-24 years	2,764	8%	86	1%	0	0%
25-34 years	5,389	15%	302	5%	12	1%
35-44 years	5,493	15%	534	8%	27	2%
45-54 years	6,543	18%	821	13%	59	4%
55-64 years	6,218	17%	1,092	17%	153	10%
65-74 years	4,566	13%	1,378	22%	335	23%
75-84 years	2,975	8%	1,261	20%	441	30%
85+ years	1,902	5%	833	13%	444	30%
Unknown	8	0%	0	0%	0	0%
Total	**36,492**		**6,330**		**1,471**	

Gender	Cases	
Male	18,195	50%
Female	18,271	50%
Unknown	26	0%
Total	**36,492**	

<u>>65 years old</u>
26% of Cases
55% of Admissions
83% of Deaths

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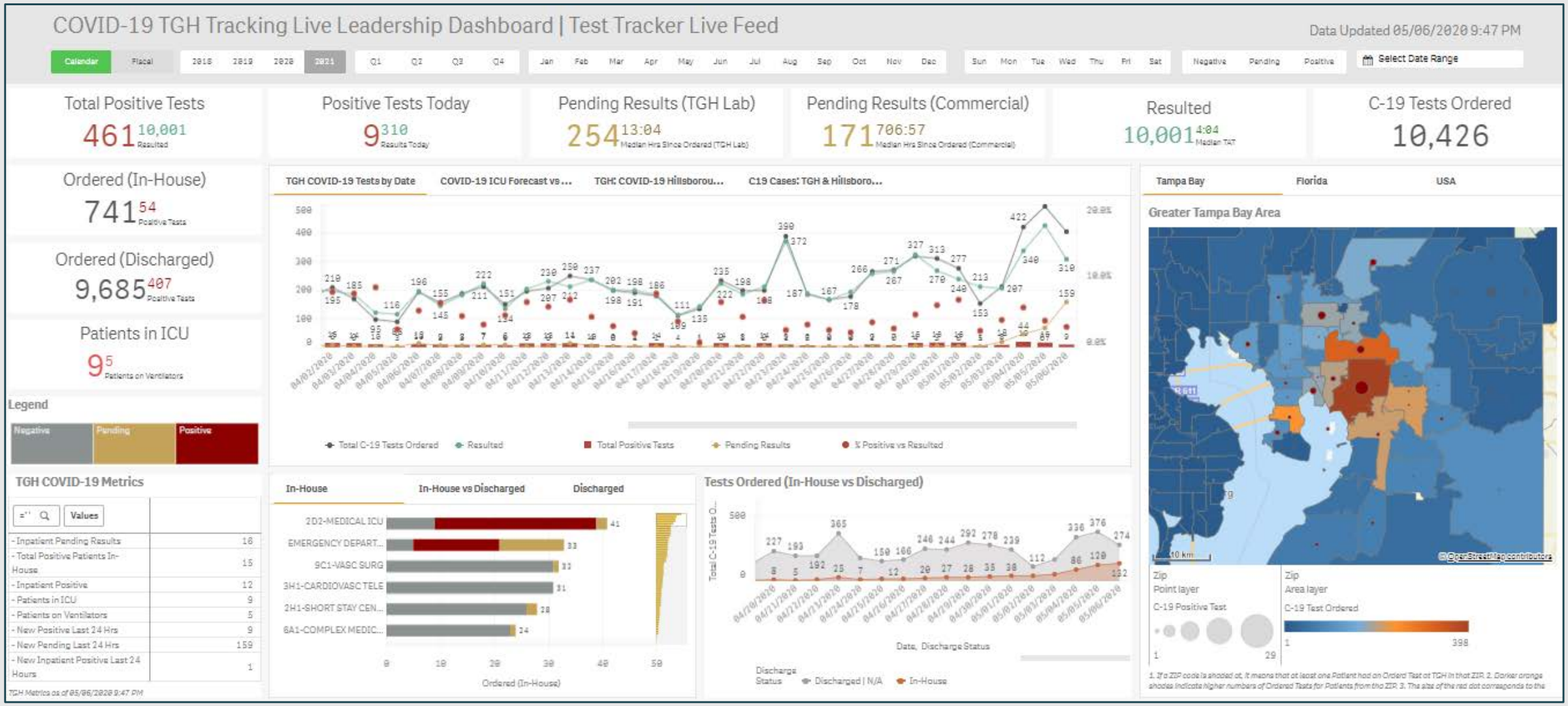
Testing Dashboard



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Movement Dashboard

Powered by mobilewalla

Data Partner – Mobilewalla
Geolocation daily of some 3 million devices across 13 counties and 5 million people…

Movement Behaviors Affect Risk

- Three types of movement:
  - How Far Traveled (ROGSI)
  - Number of Unique Locations Visited (NULV)
  - Number of Dense Locations Visited (NUDL)
- Combined Risk Score
  - Individual Device Vector
  - Geo-fenced Area Score
    - Social Isolation Score
      - Median NULV,
      - Top 25 NULV Devices,
      - Median NUDL

Movement Risk and Virus Spread

- The Social Isolation Score has been "trained" using actual new cases for thousands of devices across hundreds of zip codes.
- The Social Isolation Score is statistically correlated with number of new cases
  - As the score for an area increase due to increased movement behaviors, the number of new cases climbs
  - Since every area behaves differently the risk score is different by area
  - The risk score is heavily affected by the 5-10% of devices that move the most thru the most dense locations.

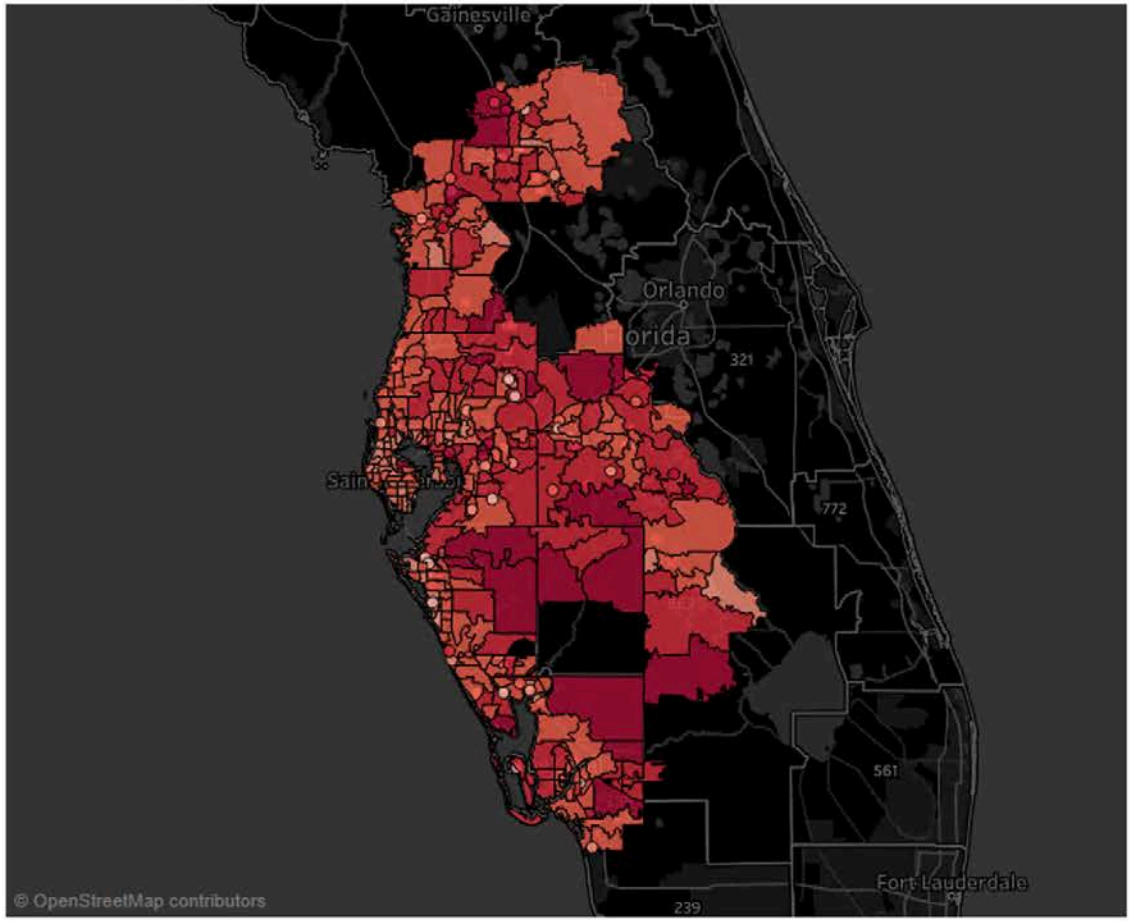
Movement Dashboard – Heat Map (PRE)

Powered by mobilewalla

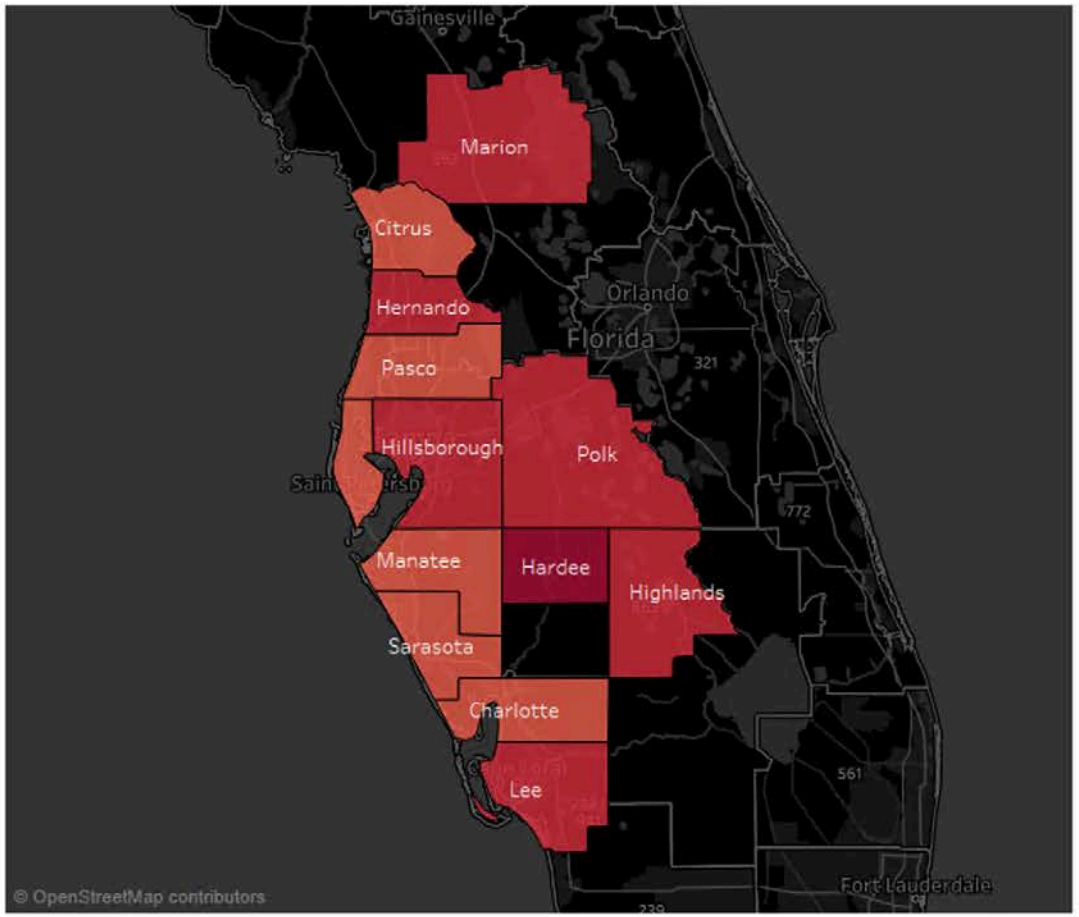
Day of Date
March 18, 2020

Mobilewalla Social Isolation Risk Heat Map

Zip - March 18, 2020



County - March 18, 2020



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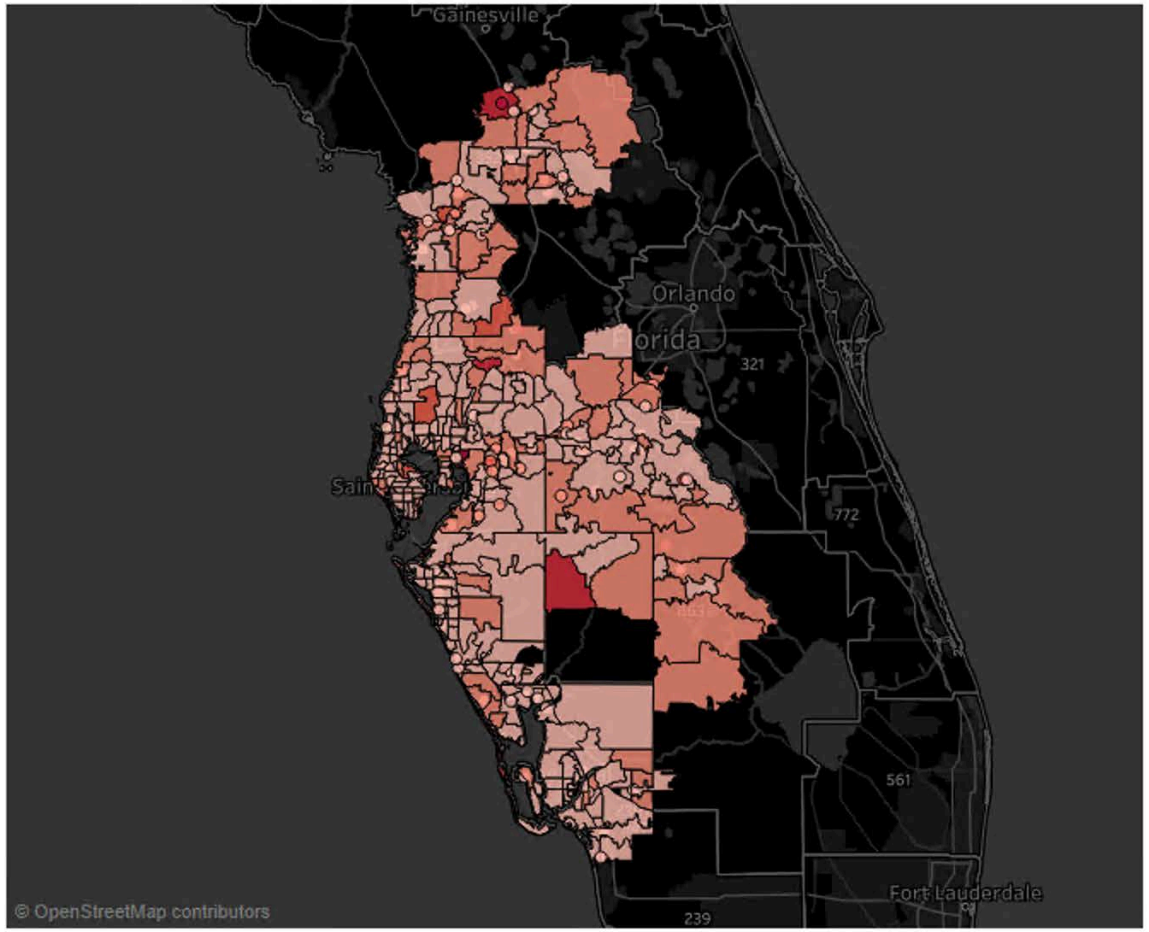
Movement Dashboard – Heat Map (POST)

Powered by mobilewalla

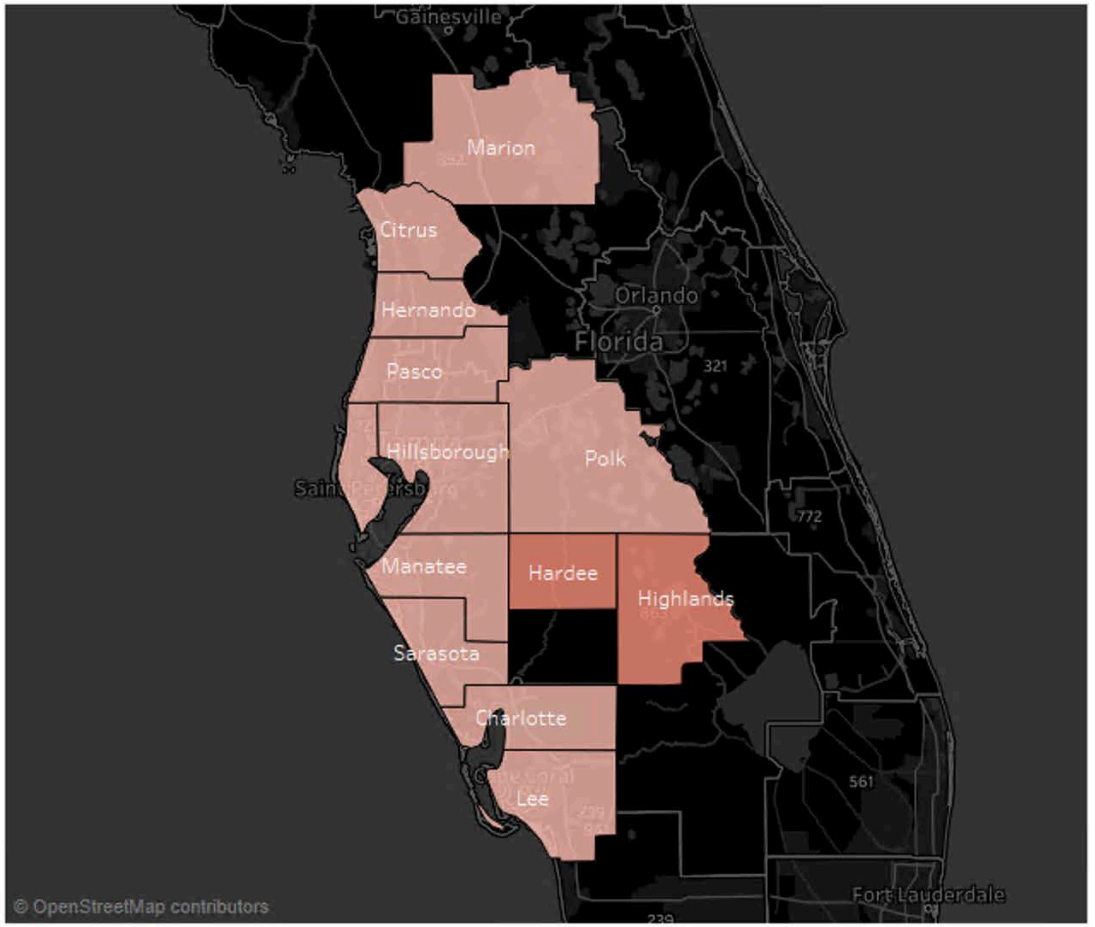
Day of Date
April 5, 2020

Mobilewalla Social Isolation Risk Heat Map

Zip - April 5, 2020



County - April 5, 2020



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Movement Dashboard – Heat Map (DURING)

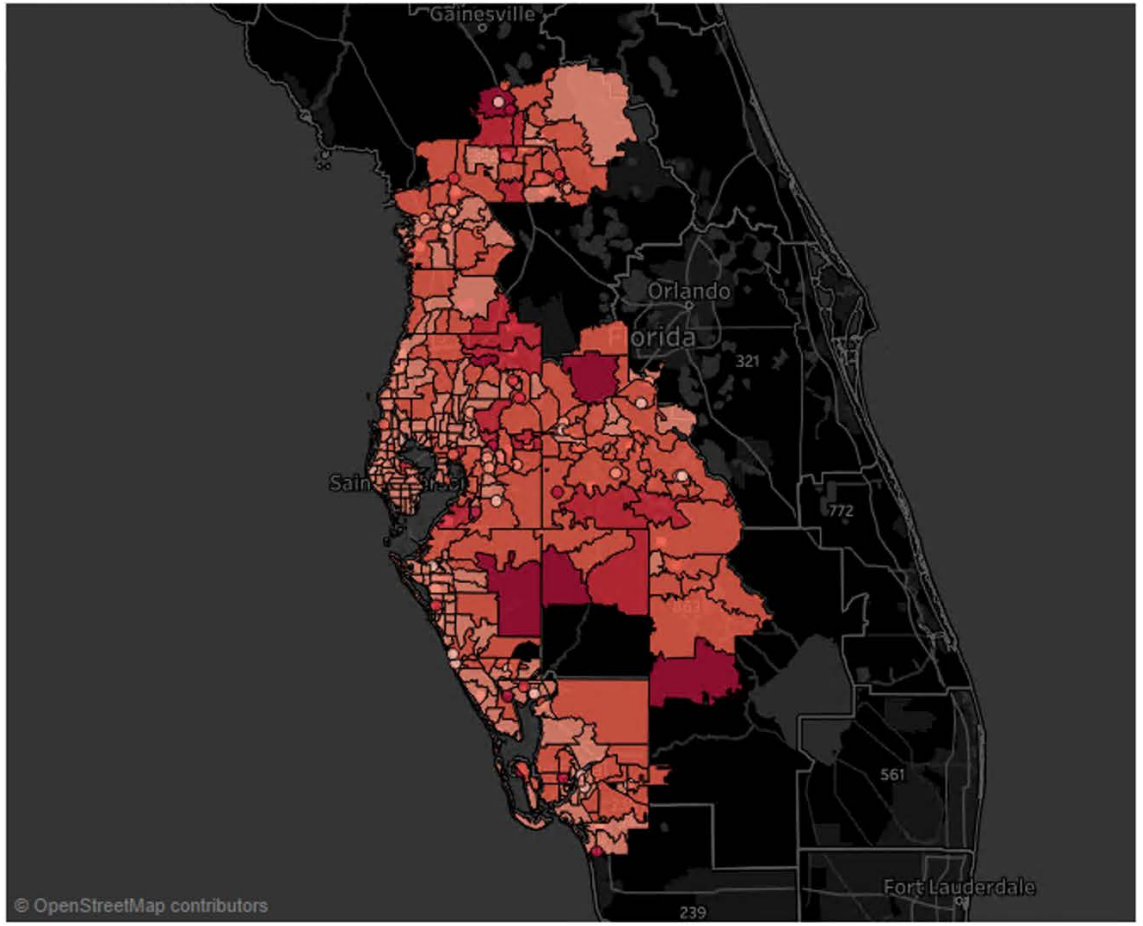
Powered by mobilewalla

Day of Date

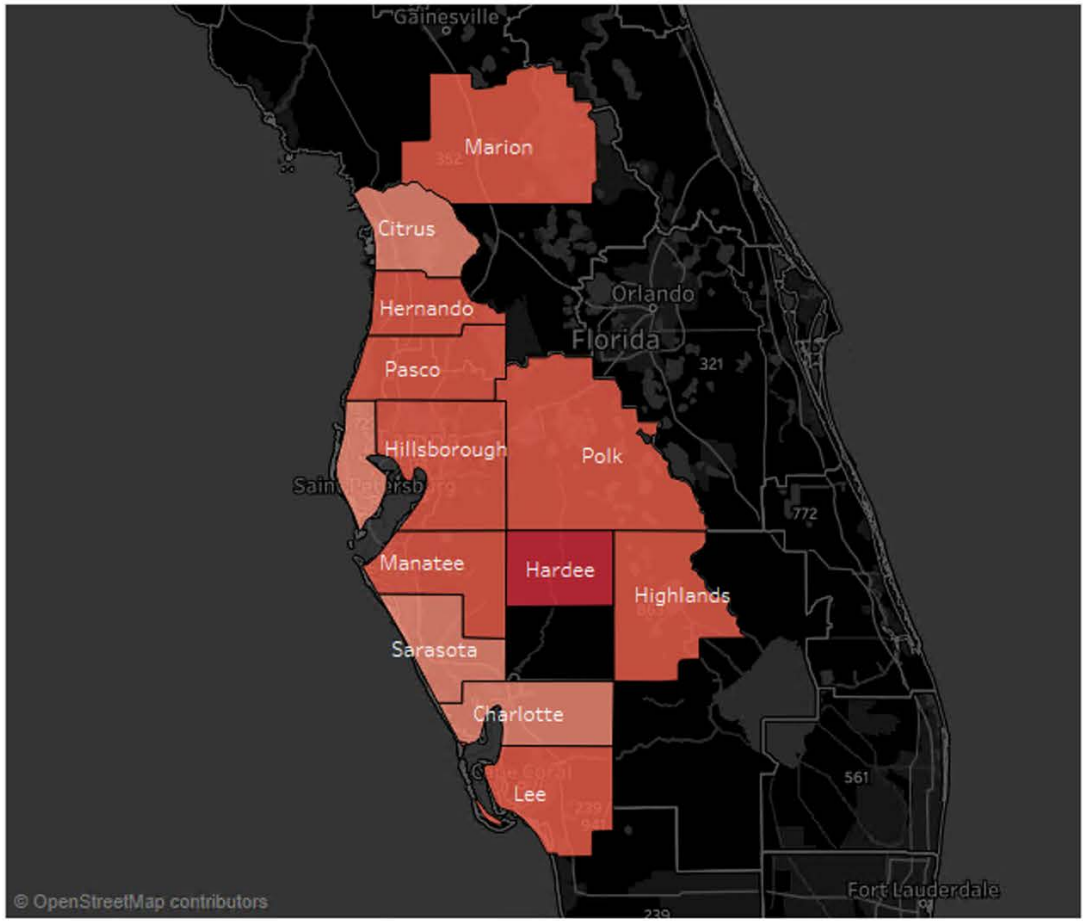
April 22, 2020

Mobilewalla Social Isolation Risk Heat Map

Zip - April 22, 2020



County - April 22, 2020



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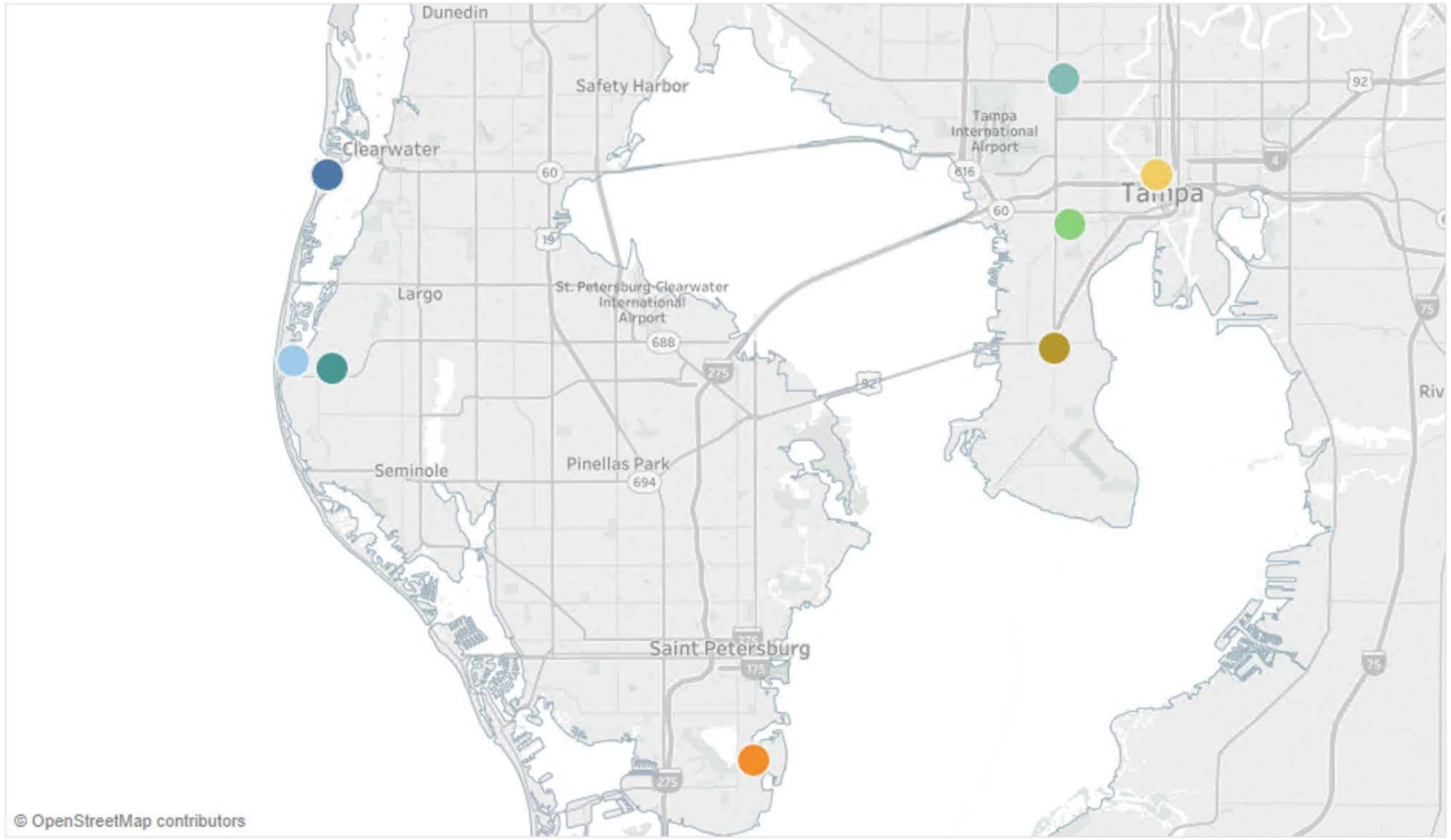
Movement Dashboard – Risky Cluster ID

Powered by mobilewalla



POI
- Beach
- Boathouse
- Church
- Furniture Shop & Restaurants
- Lighthouse Bay Apartment Co..
- Park & Recreation Area
- Walmart

<u>Geo-Fenced:</u>
>150 Devices in a 500x500 square-foot area in 8 hours

<u>Two Types of Clusters:</u>
- Movement Risk
- Acuity/Demographic Risk

mobilewalla

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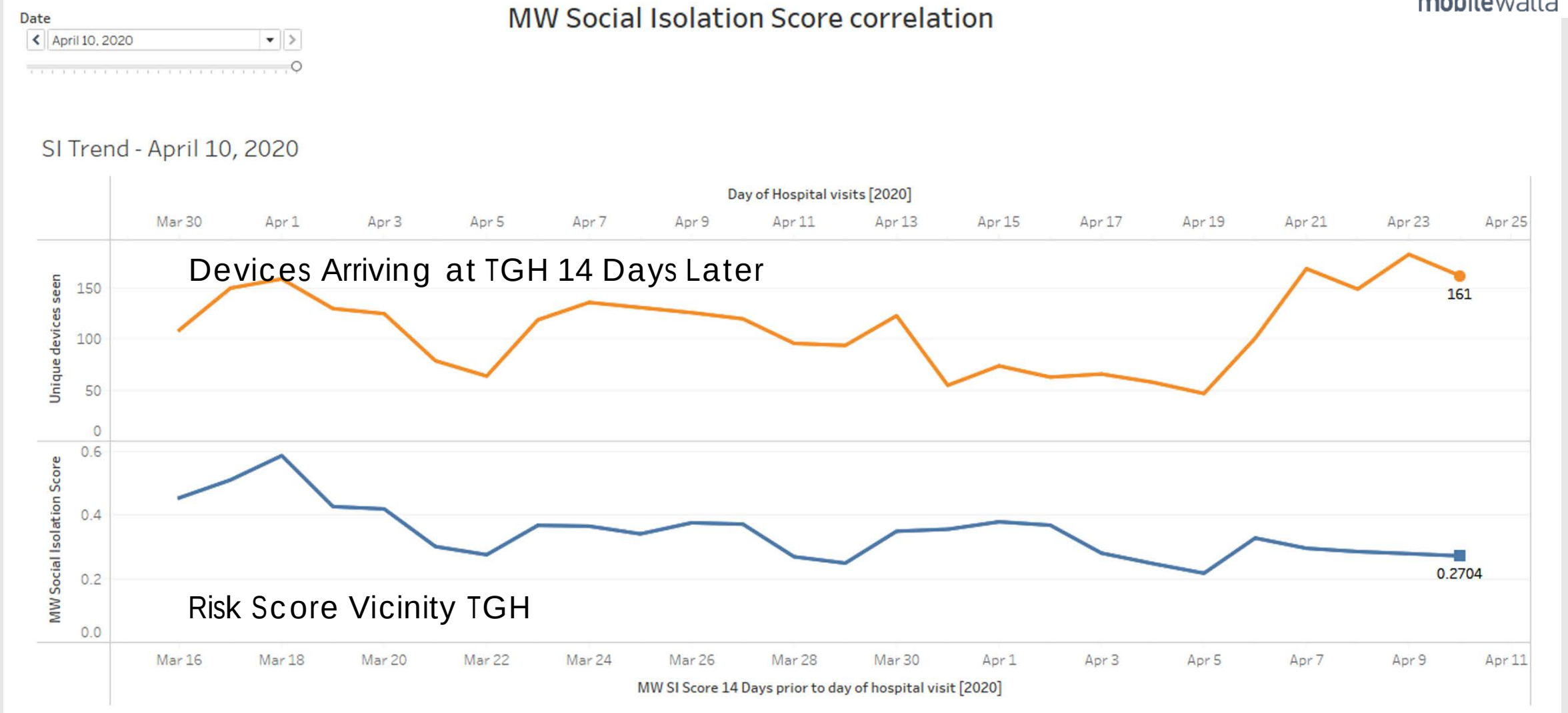
Movement Dashboard – Capacity Correlation

Powered by mobilewalla



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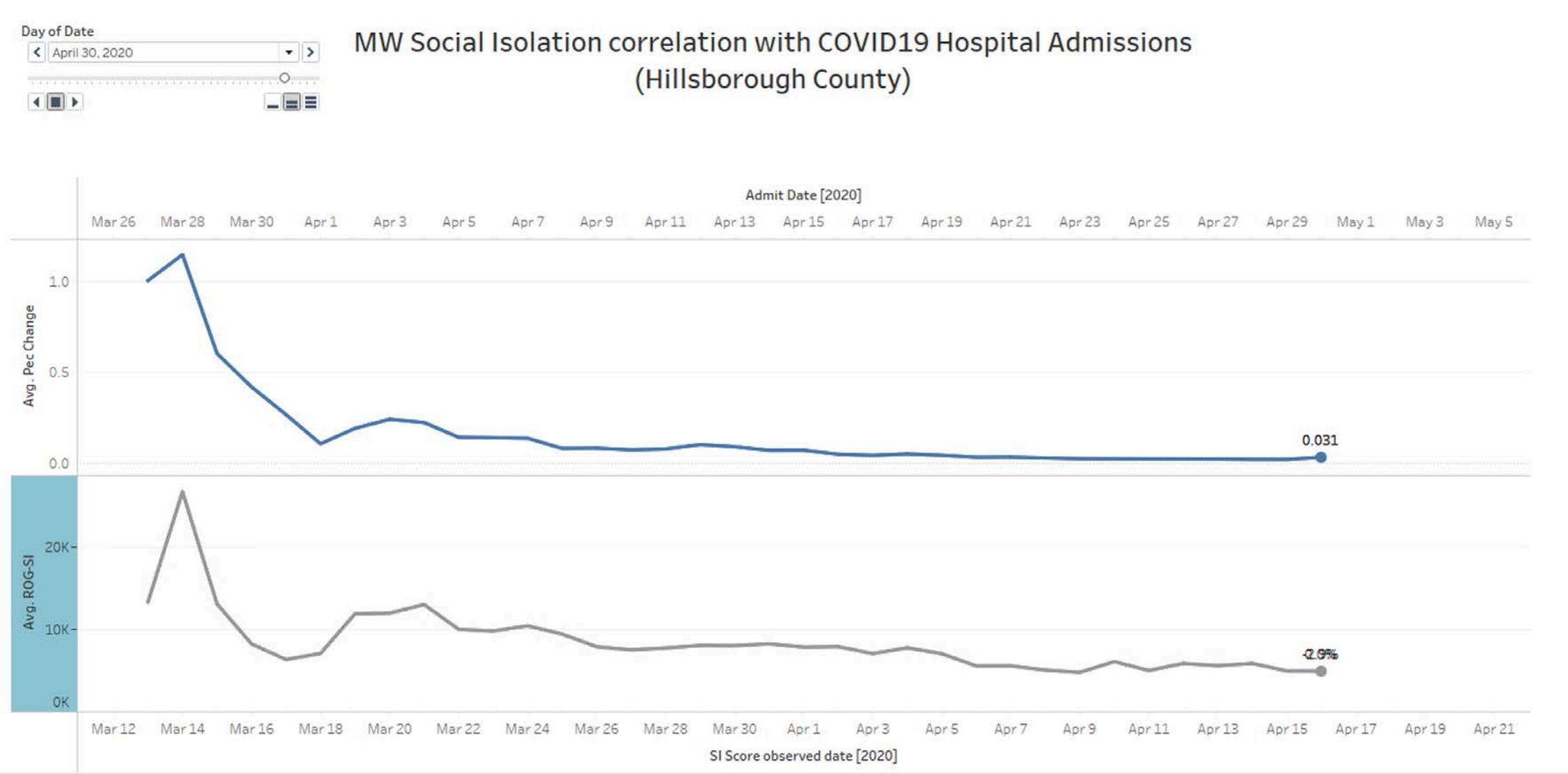
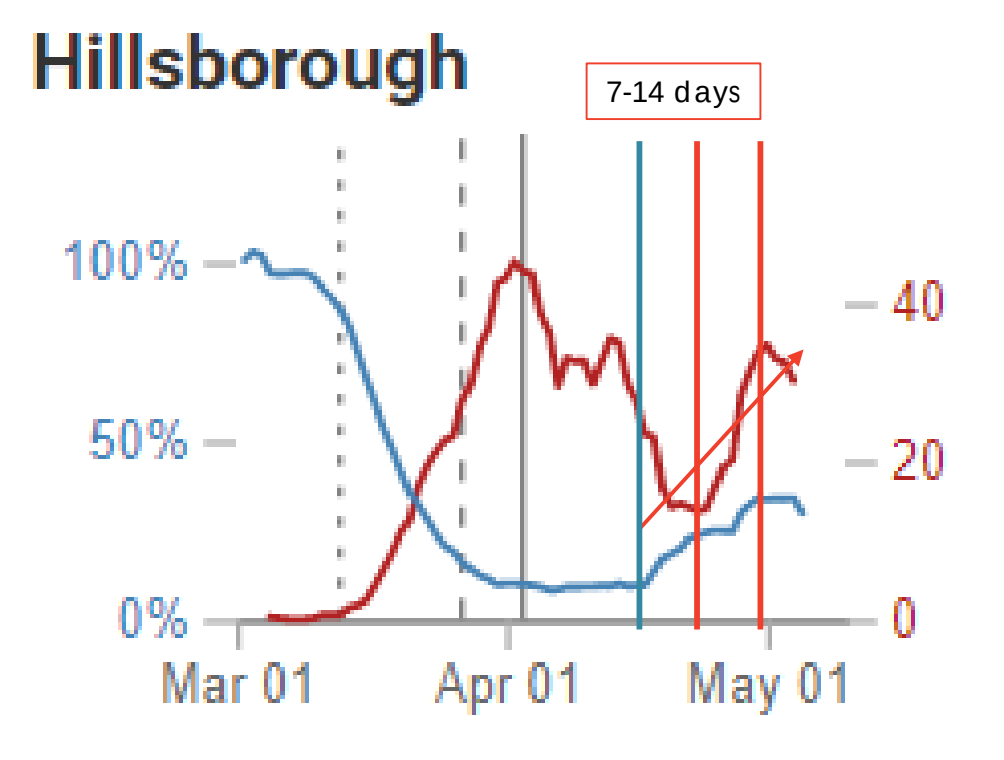
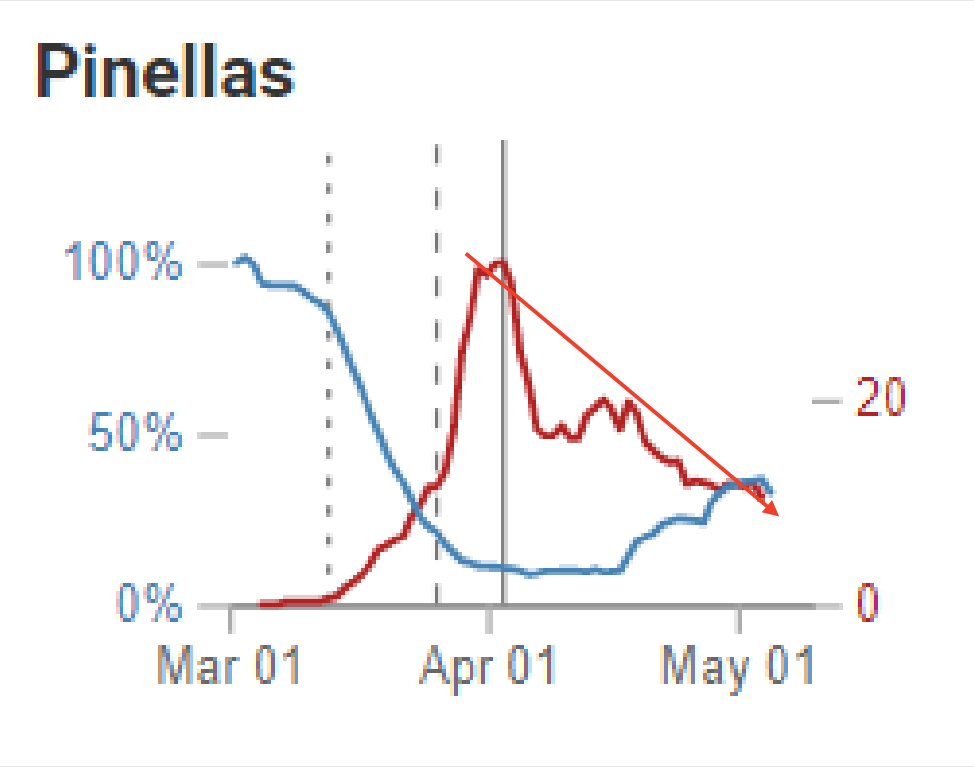
County: Risk of Spread (Movement Score) vs. Hospital Admissions (% Change)



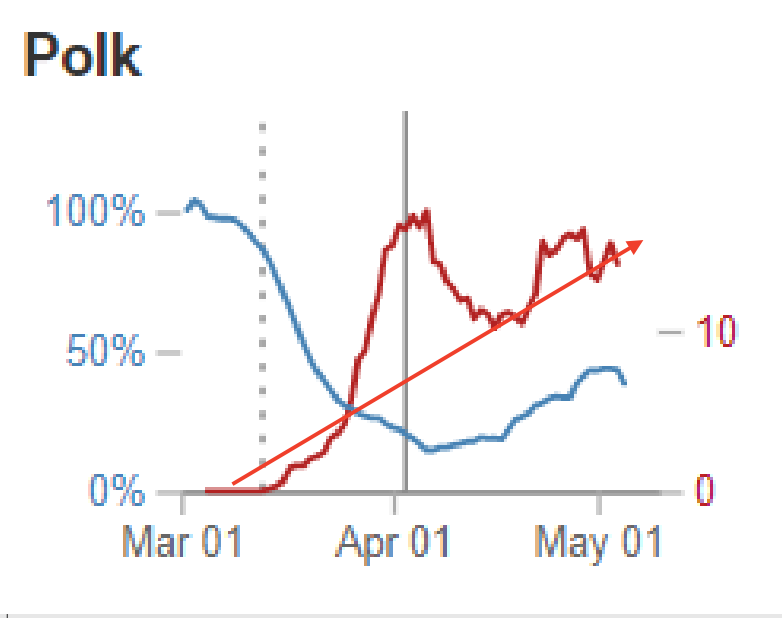
Movement (%△) vs. New Cases (#)

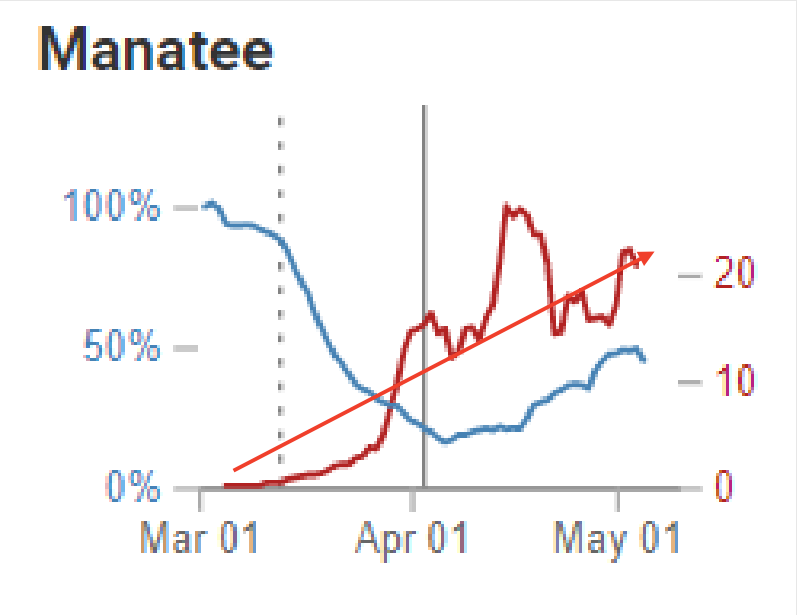


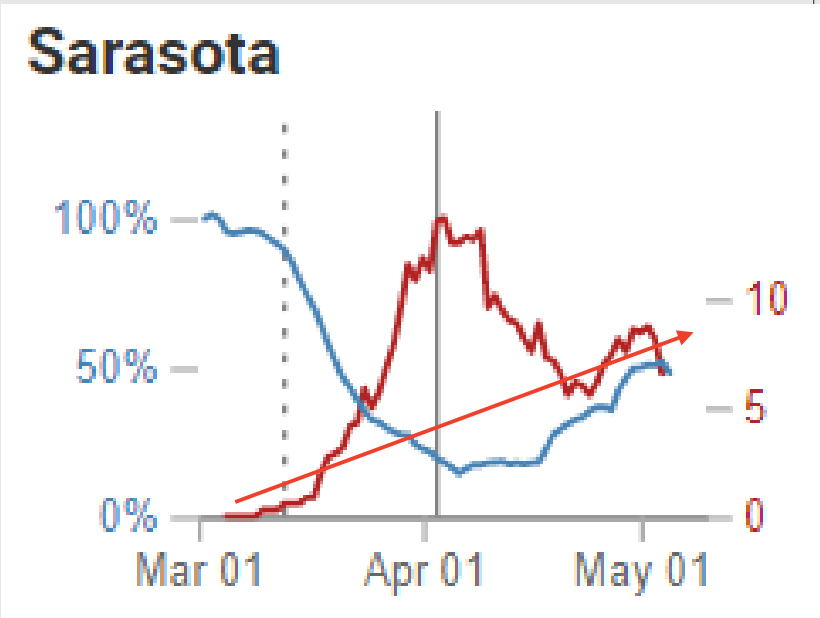


Reference: Playford et. al. How Florida slowed coronavirus: everyone stayed home before they were told to, Tampa Bay Times, 5/10/2020.

Movement (%△) vs. New Cases (#)

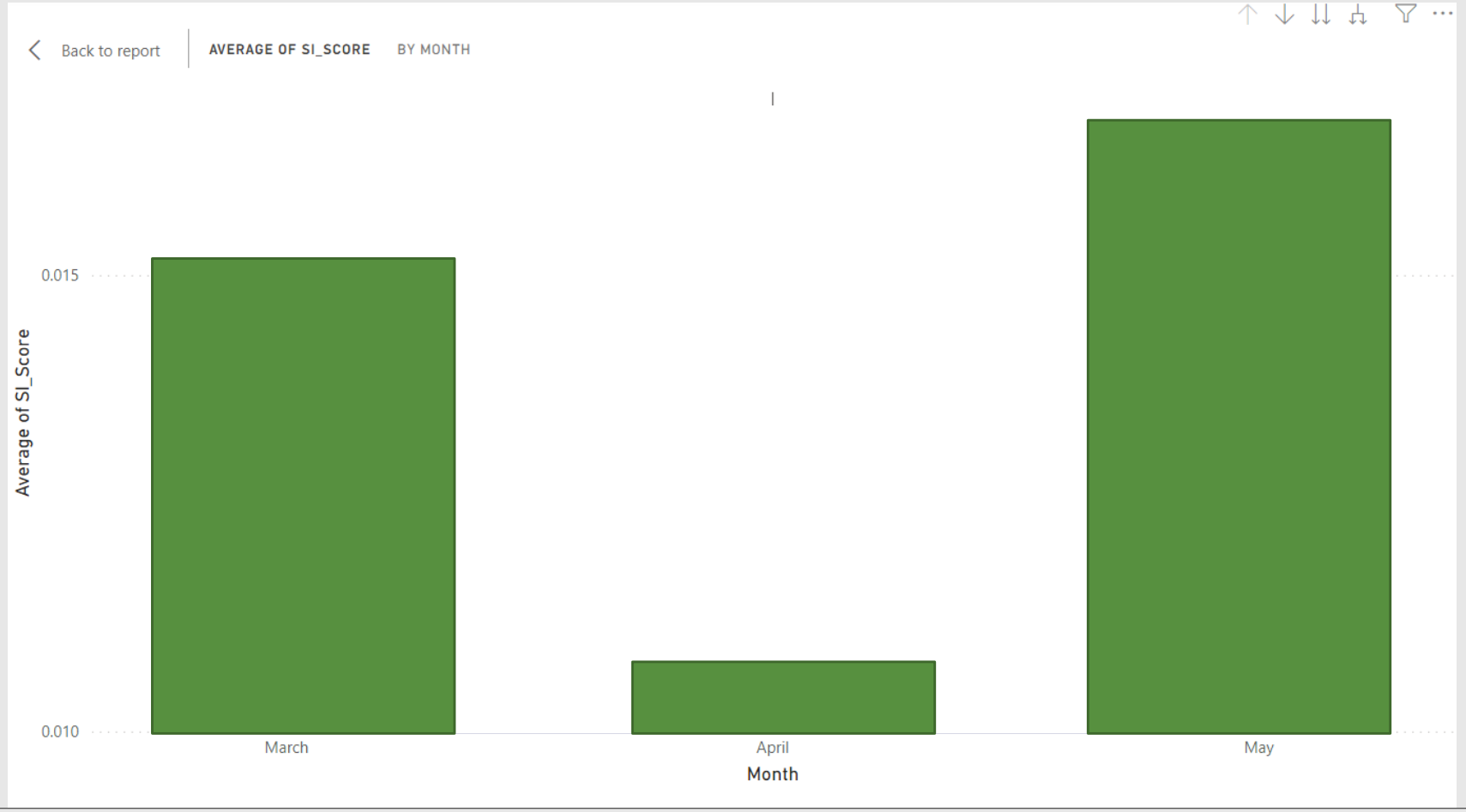






Reference: Playford et. al. How Florida slowed coronavirus: everyone stayed home before they were told to, Tampa Bay Times, 5/10/2020.

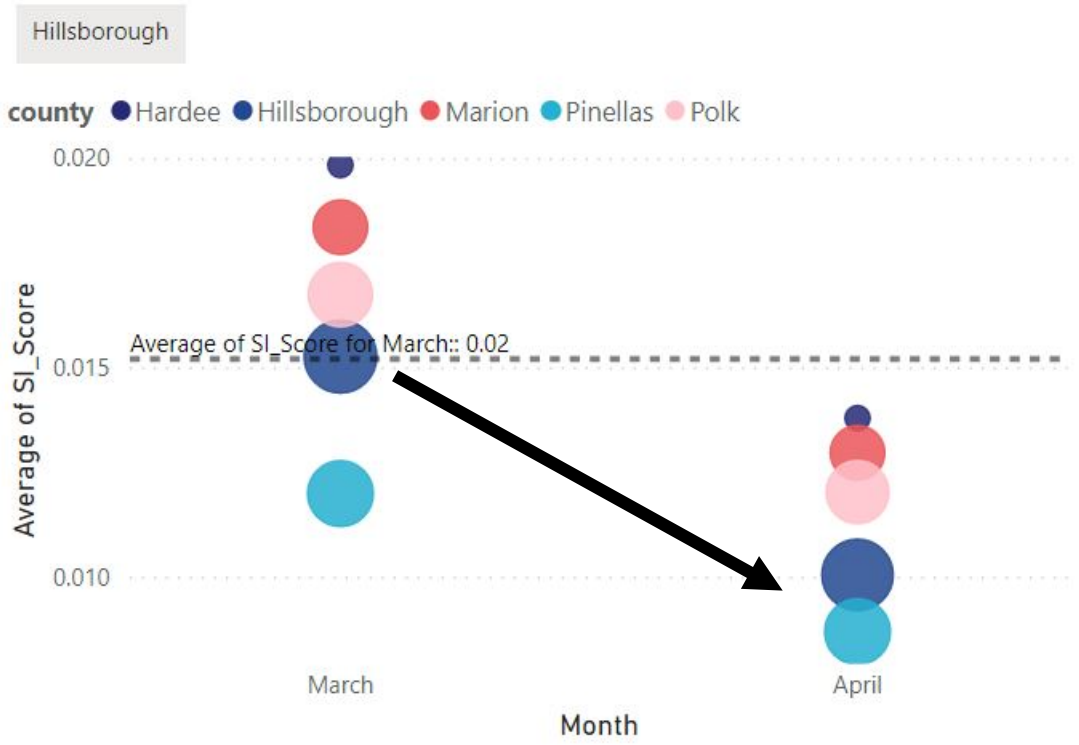
Region: Movement Behavior
Macro SI Score: calculated by 3 mobility measures



Here's the analysis of the 29.17% decrease in Average of SI_Score between March and April

Average of SI_Score and Count of SI_Score
BY COUNTY AND MONTH

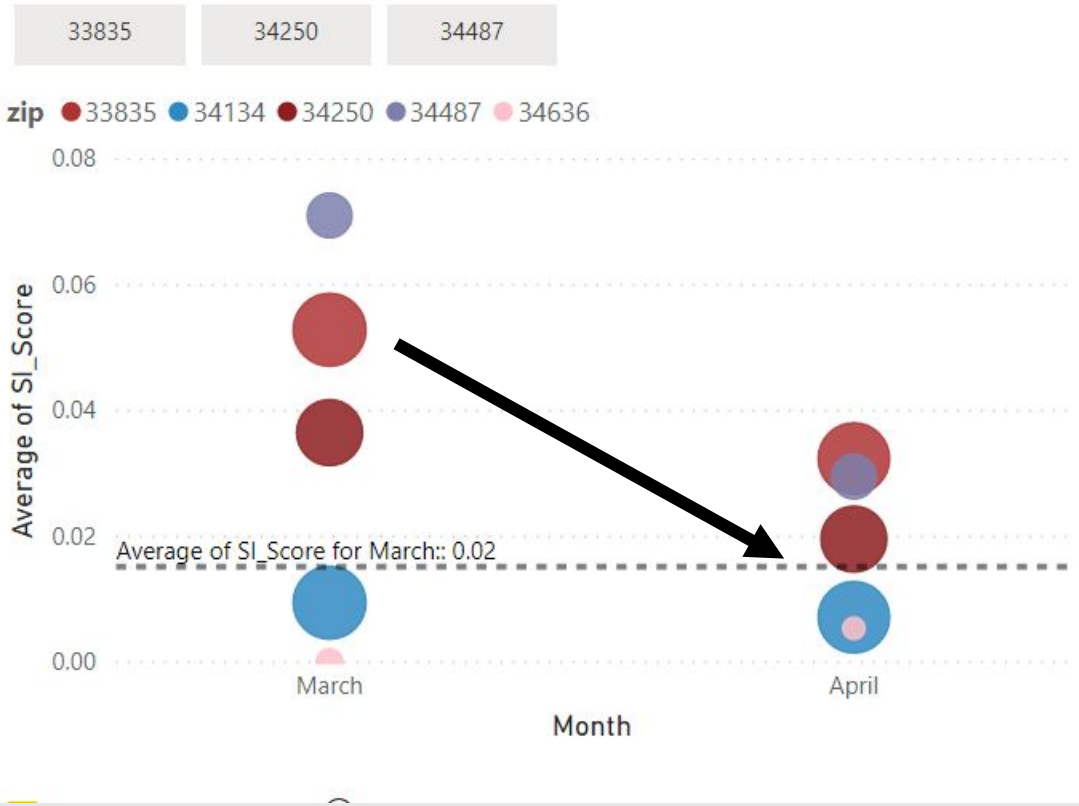
'Hillsborough' had the most significant impact on the decrease among county .



Here's the analysis of the 29.17% decrease in Average of SI_Score between March and April

Average of SI_Score and Count of SI_Score
BY ZIP AND MONTH

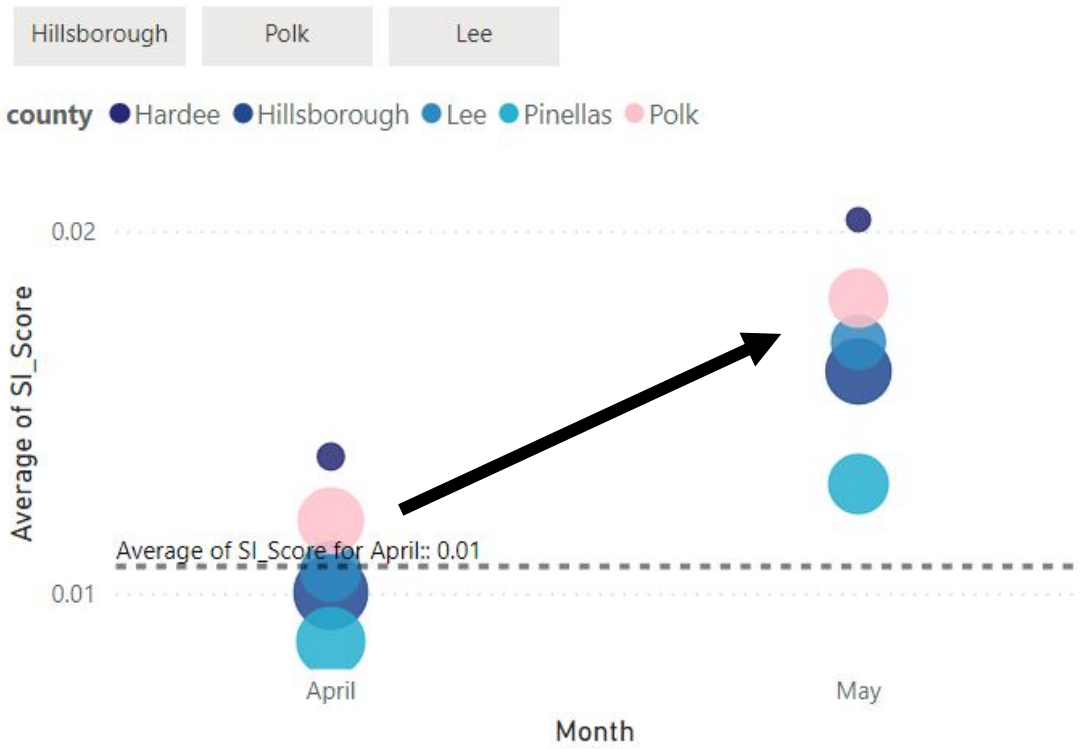
33835, 34250, and 34487, among others, had the most significant impact on the decrease among zip .



Here's the analysis of the 55.34% increase in Average of SI_Score between April and May

Average of SI_Score and Count of SI_Score
BY COUNTY AND MONTH

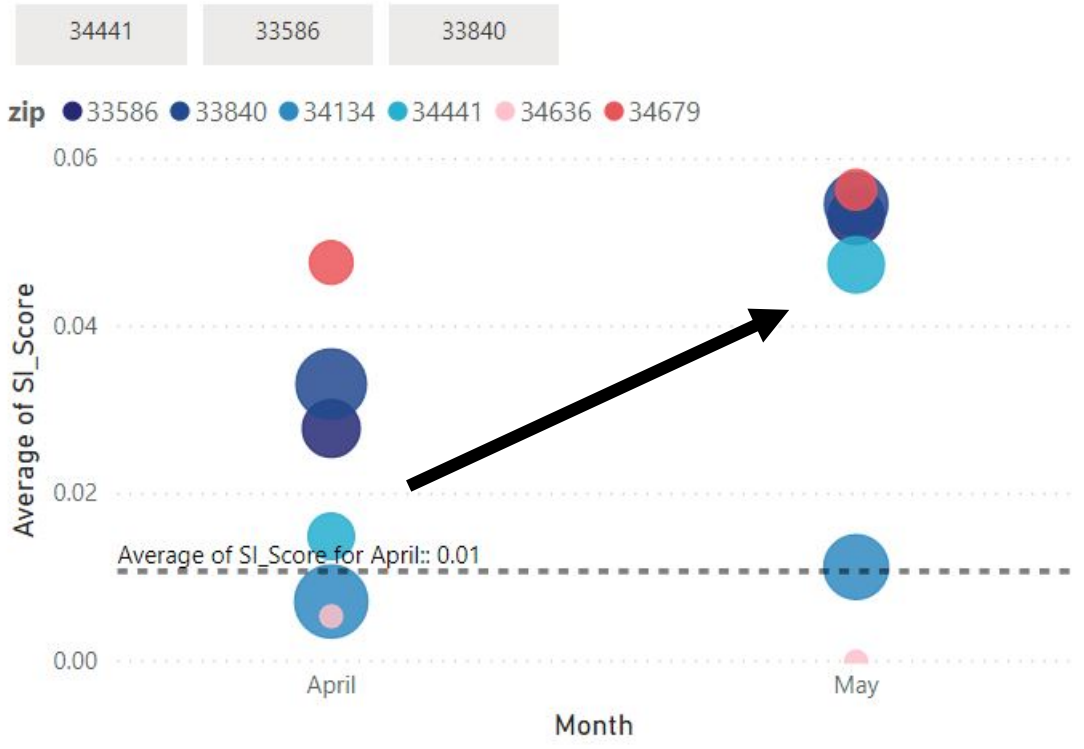
'Hillsborough', 'Polk', and 'Lee', among others, had the most significant impact on the increase among county .



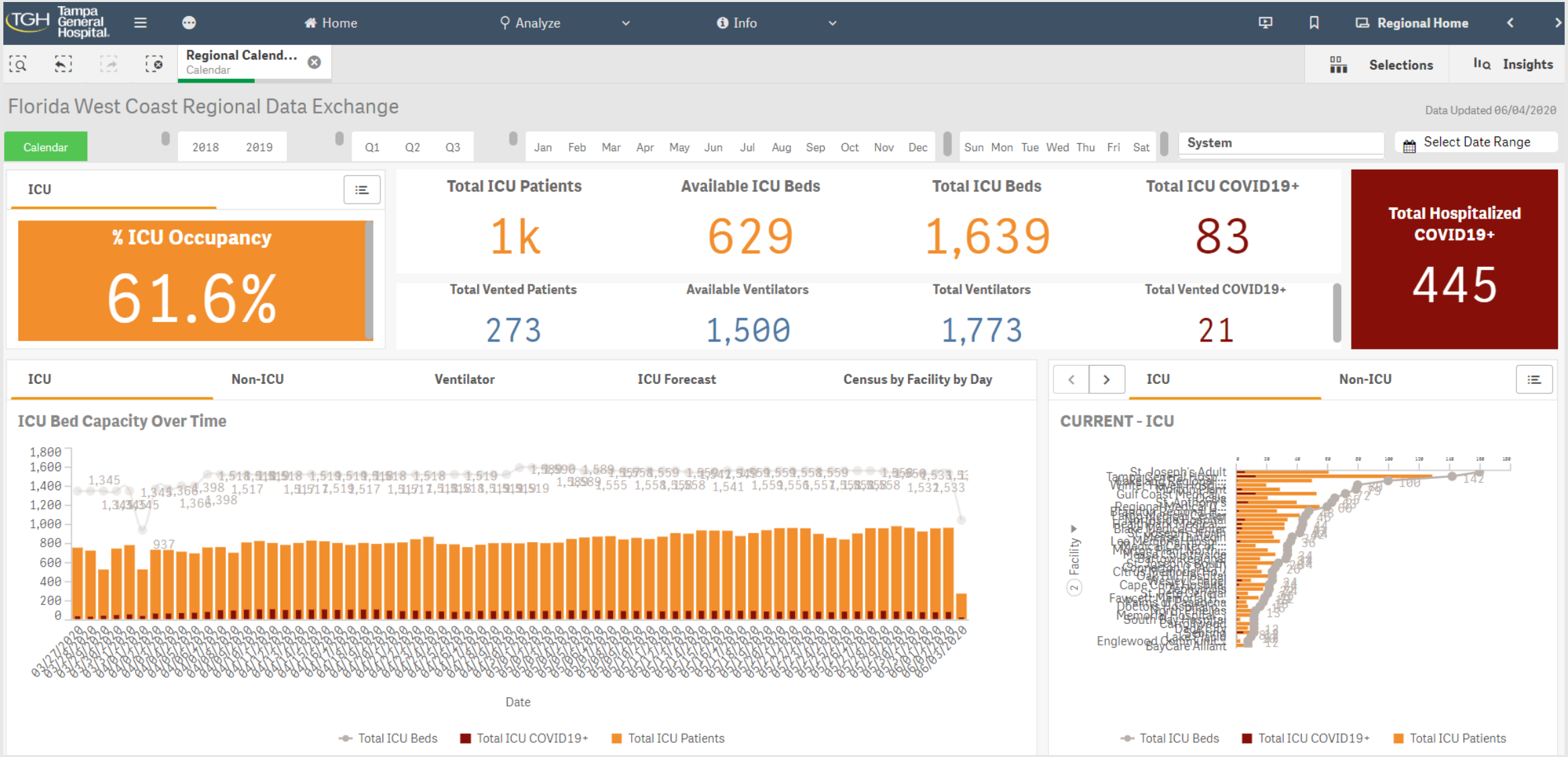
Here's the analysis of the 55.34% increase in Average of SI_Score between April and May

Average of SI_Score and Count of SI_Score
BY ZIP AND MONTH

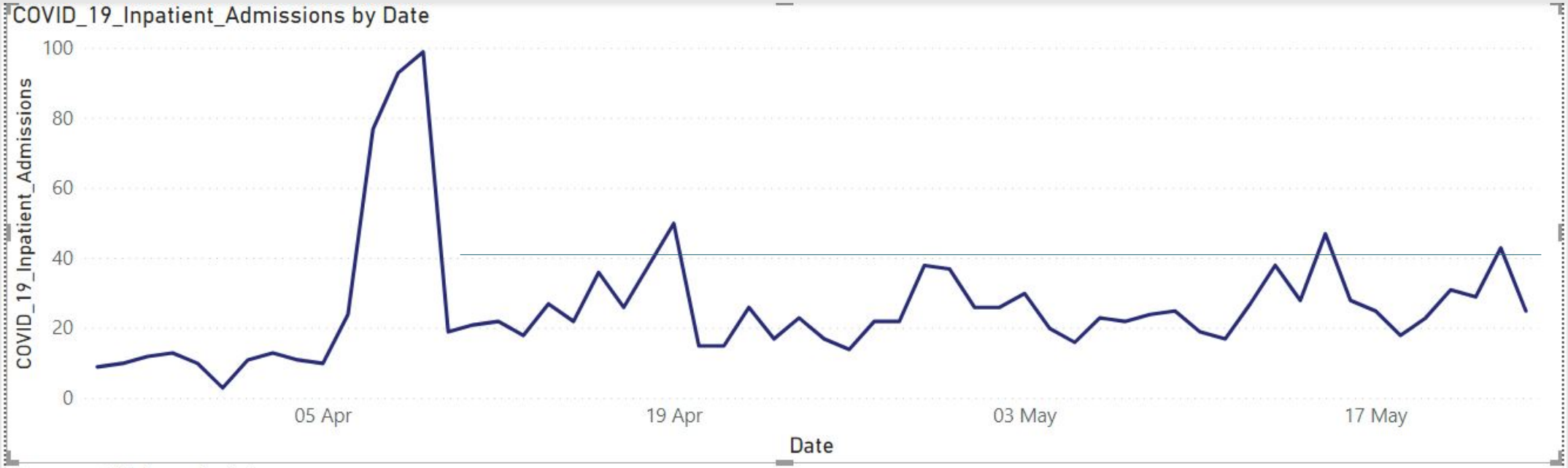
34441, 33586, and 33840, among others, had the most significant impact on the increase among zip .



Capacity Dashboard – Region 6/4/2020

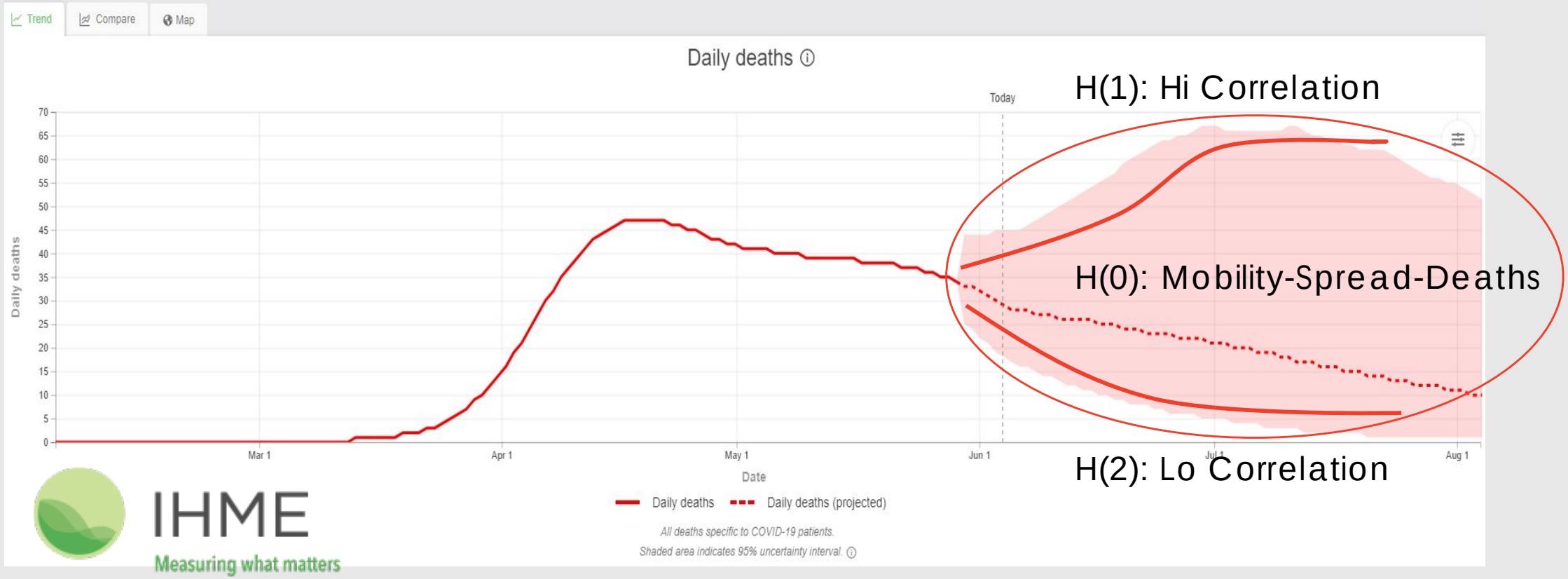


Region: Comparison of movement to admissions



State: Infections Continue to Rise w/ Movement

State: Daily Deaths Show Wide Range of Possibilities Related to Assumptions



Personal Privacy Protections

- Not tracing
- Not individual tracking
- Consultative support for the county
- Leverages data supplied in accordance with comprehensive data protection laws (CCPA, GDPR)
- Typically available anonymized movement data similar to those used in airports, traffic flow and shopping malls
- Identifies and spatially highlights mobile movement on the aggregate
- Compares movement to hospital bed utilization without resolution to specific individual or location
- Perform statistical correlation analysis using data on movement and density to:
  - Probability of needed beds, PPE and key medical equipment like ventilators in hospitals
  - Where best to resource first responders to avoid resurgence of the virus
- Response is a function of well established first responder protocols and public policy including personal confidentiality and security.

- **All data presented:**
  - Contains no personally identifiable information
  - Contains no HIPPA protected information
  - Complies with comprehensive data protection laws in 80+ countries including GDPR (EU) and CCPA (California Consumer Privacy Act)
  - Device data is Opt-In and Cleaned Daily for Opt-Out

Largest Risks to COVID Hospital Capacity

- Map Targeted Nursing/Group Home Facilities
- Conduct Targeted Daily Cluster Analysis
- Evaluate Daily Correlation Graph (by Hospital)

Data Driven

- Centralize Comprehensive Dashboard (spread, capability, outcomes)
- Explore and Test Key Parameters in the Models
- Pose Tough Questions and Find Insights in the Data

Actionable

- Create daily feeds to Coordinating Officials & EPG Access
- Deploy Mobile testing teams
- Deploy Mobile care triaging/monitoring teams

Data Science

- Automate: How and When to send alerts to key officials…
- Learn: How to use other datasets (syndromic/tracing/demographic) to improve model accuracy…

Actions Moving Forward

- Continue to increase the power and accuracy of the predictive models
- Add prescriptive modeling and generate key insights
- Generate actionable alerts for immediate response and strategic decision making

TGH Tampa General Hospital

University of South Florida

Steering Team

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- Wolfgang Jank, Ph.D., USF Muma College of Business, ISDS
- Marissa Levine, M.D., USF College of Public Health
- Lori Collins, Ph.D., USF College of Arts & Sciences, Geo Sciences
- Daniel McSkimming, Ph.D., USF College of Medicine, Bio Informatics
- Alya Limayem, Ph.D., College of Arts & Sciences, Microbiology
- Sidney Fernandes, CIO, USF
- Peter Chang, M.D., Tampa General Hospital
- Brian Hammond, CTO, Tampa General Hospital
- Mike Merrill, County Administrator, Hillsborough County
- Ramin Kouzehkanani, CIO, Hillsborough County
- Dennis Jones, Fire Chief, Hillsborough County
- Gene Early, Health, Hillsborough County

Project ASPeCT

(Anonymized, systematic, population e-(geo-fenced) Contagion Tracking)

Geo-fenced Contagion Tracking System

+

Comprehensive Decision Support Dashboard Approach

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