



COVID-19 Population Level Analytics: PLAn *Publicly available tool to support response to Covid-19 pandemic*

BBS Seminar: March 7, 2021 Anne-Marie Meyer, PhD & Elizabeth Little, PhD



Purpose Slides



Hypothesis: Do broader epidemiologic data "explain" deviations in traditional SEIR infectious disease prediction models?

How can we best enable large, disparate, ecological, RWD datasets for discovery & hypothesis generation?

What are the best ways to visualize these ecological data for different users & decision making?

Methods: Identify population-based datasets with demographic, epidemiologic, social-determinants, environmental, public health & health system variables

Link to COVID-19 data at appropriate population level (e.g., county FIPS code, census)

Enable user-interface to visualize & interact with data

Burden of COVID Wave 1: A Tale of Two Counties (Wave 1: Jan-May 2020)



	Alameda, California	Wayne Co. Michigan
Population	1,666,753	1,753,893
COVID		
COVID Cases to date	22,279	37,236
COVID Cases per 100K	1,336	2,123
COVID Deaths to date	431	3,010
Deaths per 100K	63	172
Shelter in Place	March 16	March 24
Emergency Declaration	March 16	March 10
Measured Mobility		
Mobility Index on March 18 (range <2.8 to >4.3)	2	3
Mobility Index on May 29 Post-labor day	3	4
% sheltered in place day after declarations	48%	53%

	Alameda, California	Wayne Co. Michigan
Population	1,666,753	1,753,893
Poor or Fair Health	12%	19%
Obesity	19%	35%
Smoking	10%	21%
Diabetes	7%	12%
Hypertension	53%	65%
Flu vaccine (Medicare)	44%	44%
PM 2.5 μg/m ³	10	11
% population above 65	14%	15%
Uninsured	6%	7%
Food insecurity	12%	20%
Segregation Index	36	69
High School Graduation	87%	86%
Median Household Income	\$101,700	\$46,400
Life Expectancy	82.9	75.3





"Modeling COVID19 mortality in the US: Community context and mobility matter" https://www.medrxiv.org/content/10.1101/2020.06.18.20134122v1

COVID Insights Wave 1: "Health & Wealth"

Health and Wealth





The health and wealth profile of New Orleans-area counties elevates death rates by **2.5-5x** compared to Bay Area counties

Health: COPD, diabetes, obesity, smoking, preventable hospital stays, premature death, life expectancy

Wealth: median income, unemployment

COVID Insights Wave 2/3: Mobility & Lags

Used population mobility (cell phone data) as a proxy for lock down.

The lag in COVID cases associated with mobility is much longer than the 5~14 day incubation period.

In fact, we see 30 - 60+ day lags in impact (fully adjusted).

- 10% increase at 30 days = 30% decrease (RR 0.69; 95% CI 0.58-0.83)
- 10% increase at 60 days = 50% decrease (RR 0.46; 95% CI 0.35-0.61)
- 10% increase at 60 days = >2-fold increase (RR 2.49; 95% CI 1.79-3.46)



PLAn: Demo

Illustration



RWD: Mapping race and vaccine hesitancy in the US





Race & Non-Medical Exemptions





Dark Red: Highest NME rates, and highest (relative) minority populations.

Education & MMR





MMR Vaccination Rate and % Adults 25-44 with Some Post-Secondary Education

Insurance & MMR





Lessons Learned



- 1. Cross-walks between datasets at population-level can be challenging (i.e., zip code to county to census to HRR)
- 2. Careful checking required on data quality, representation & systematic assessment of construct (ie, 'lockdown'/NPIs, commercial claims)
- 3. Broad heterogeneity in users experience/skill with navigating data
 - UI/UX tailoring needed for key stakeholders
- 4. Insights need to be generated 'bespoke' outside platform by use-case/question.



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- Use Cases & Feedback send to: <u>covid19@aetion.com</u>
- https://www.aetion.com/population-level-analytics-for-covid-19

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"It was the best of times, it was the worst of times....epoch of belief..of incredulity..Season of Light....of Darkness...**in the superlative degree** of comparison only", Charles Dickens, A Tale of Two Cities



Doing now what patients need next