

# Challenges and Opportunities for Precision and Personalized Nutrition

*A few examples of tools in other fields*

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August 2021



# Topics for today

- 1 A few examples of epidemiology at scale
- 2 Some anonymized, aggregated datasets that researchers and public health teams are using (and that you can use, too)



## Disclosures

Employed by Google (and own equity in Alphabet)

Royalties from

- ***Understanding Healthcare Delivery Science*** book (McGraw-Hill)
- **UpToDate** (rapid response systems) (Wolters Kluwer)

Prior funding from

- **NIH** (R01 NR010006-06A1, R01 GM123193)
- **CDC** (Public Health Prevention Fund)
- **CMS** (1C1CMS33102, 1L1CMS331444)
- **RWJF, CIMIT, NPSF**

Previously served on

- ***National Academy of Medicine***. Artificial Intelligence and Machine Learning Working Group
- **CDC**. Healthcare Infection Control Practices Advisory Committee (HICPAC)
- **CMS**. Co-chair, Hospital Inpatient and Outpatient Process and Structural Measure Technical Expert Panel for CMS

## Tools and methods to help researchers & public health

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Aggregated, anonymized search queries

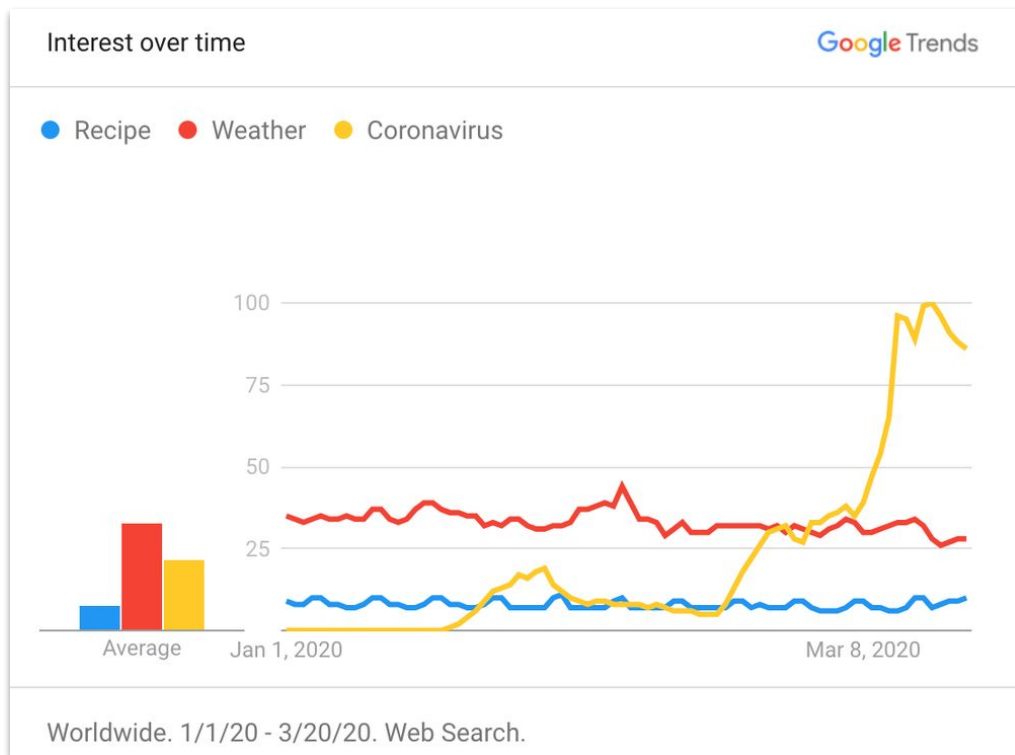
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A white search bar with rounded ends, a magnifying glass icon on the left, and a microphone icon on the right.

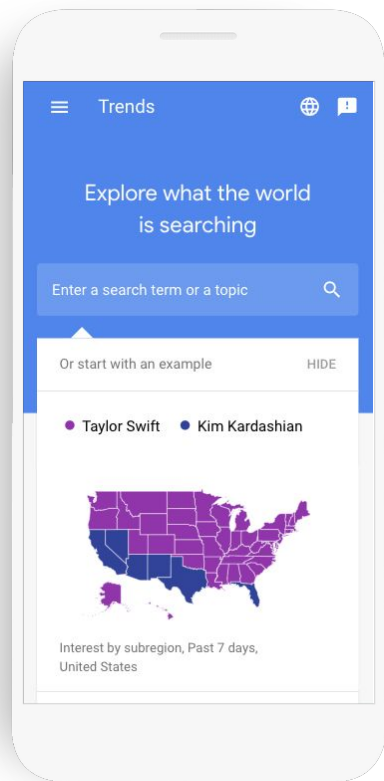
Google Search

I'm Feeling Lucky

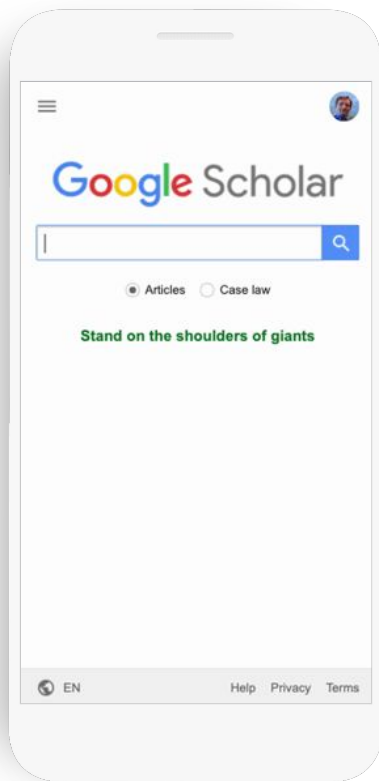
# COVID-19 rapidly became the largest information need for our users



# For researchers and public health: Google Trends, Search Symptoms Dataset, and Vaccine Search Insights



[trends.google.com](https://trends.google.com)



[scholar.google.com](https://scholar.google.com)



[blog.google/technology/health/using-symptoms-search-trends-inform-covid-19-research/](https://blog.google/technology/health/using-symptoms-search-trends-inform-covid-19-research/)



[blog.google/technology/health/new-tools-support-vaccine-access-and-distribution/](https://blog.google/technology/health/new-tools-support-vaccine-access-and-distribution/)



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## Understanding distance and how it relates to travel time

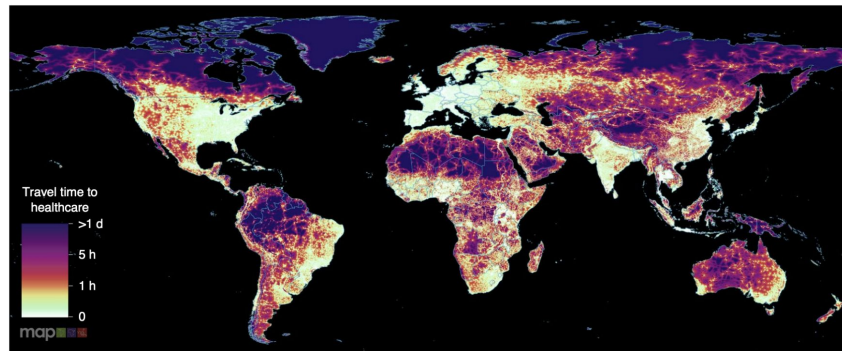
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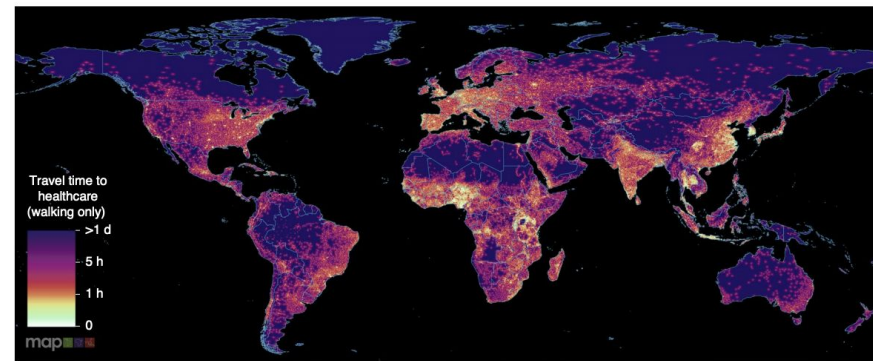
## Global maps of travel time to healthcare facilities

D. J. Weiss<sup>1,2,3</sup>✉, A. Nelson<sup>4</sup>, C. A. Vargas-Ruiz<sup>1</sup>, K. Gligorić<sup>5</sup>, S. Bavadekar<sup>6</sup>, E. Gabrilovich<sup>6</sup>, A. Bertozzi-Villa<sup>1,7</sup>, J. Rozier<sup>2</sup>, H. S. Gibson<sup>8</sup>, T. Shekel<sup>6</sup>, C. Kamath<sup>6</sup>, A. Lieber<sup>6</sup>, K. Schulman<sup>8</sup>, Y. Shao<sup>9</sup>, V. Qarkaxhija<sup>10</sup>, A. K. Nandi<sup>1</sup>, S. H. Keddie<sup>2</sup>, S. Rumisha<sup>1</sup>, P. Amratia<sup>1</sup>, R. Arambepola<sup>1</sup>, E. G. Chestnutt<sup>1</sup>, J. J. Millar<sup>1</sup>, T. L. Symons<sup>1</sup>, E. Cameron<sup>2,3</sup>, K. E. Battle<sup>7</sup>, S. Bhatt<sup>11</sup> and P. W. Gething<sup>2,3</sup>

Weiss, D. J., et al. "Global maps of travel time to healthcare facilities." [Nature Medicine](#) 26.12 (2020): 1835–1838.

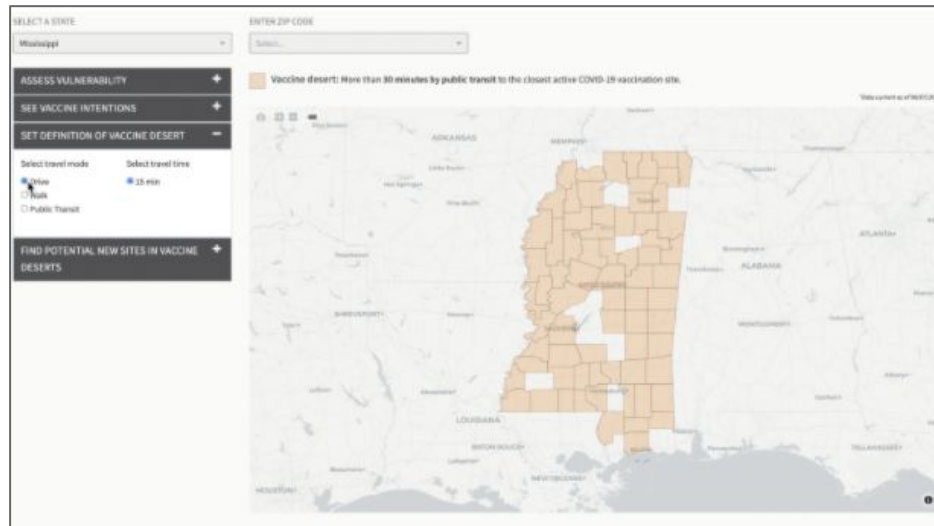
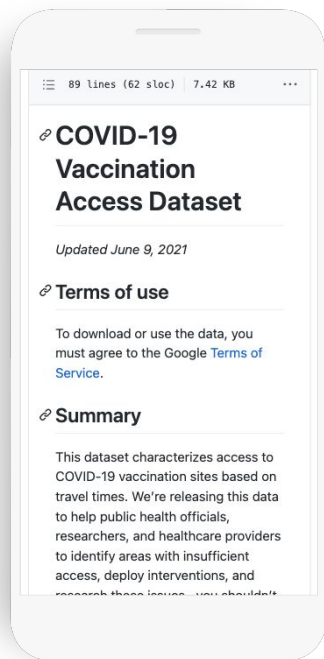
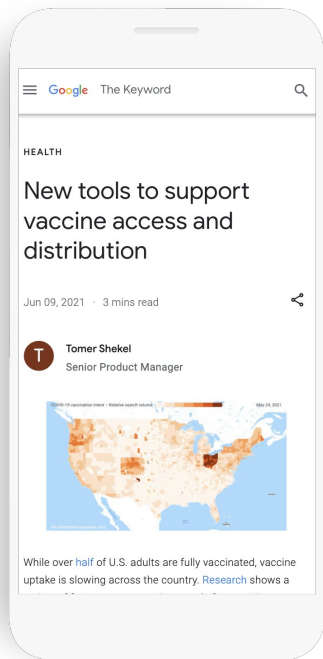


**Fig. 1 |** The global map of optimal travel time to healthcare with access to motorized transport. Color-coded logarithmic timescale from minutes (yellow) to 24 h (dark purple).

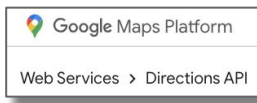


**Fig. 2 |** The walking-only map of travel time to healthcare without access to motorized transport. Color-coded logarithmic timescale from minutes (yellow) to 24 h (dark purple).

# Announced last month: COVID-19 Vaccination Access Dataset



<https://vaccineplanner.org/>



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## Aggregated, anonymized community mobility

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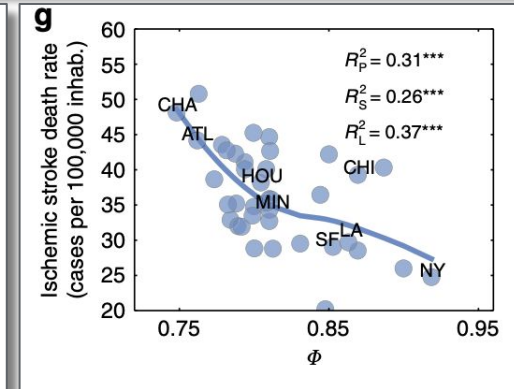
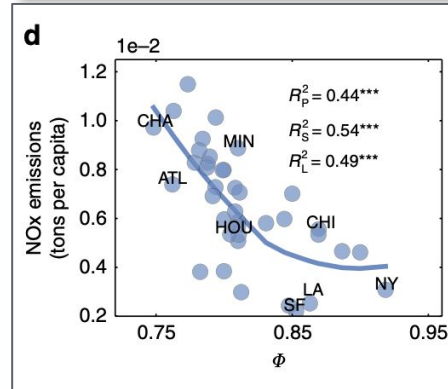
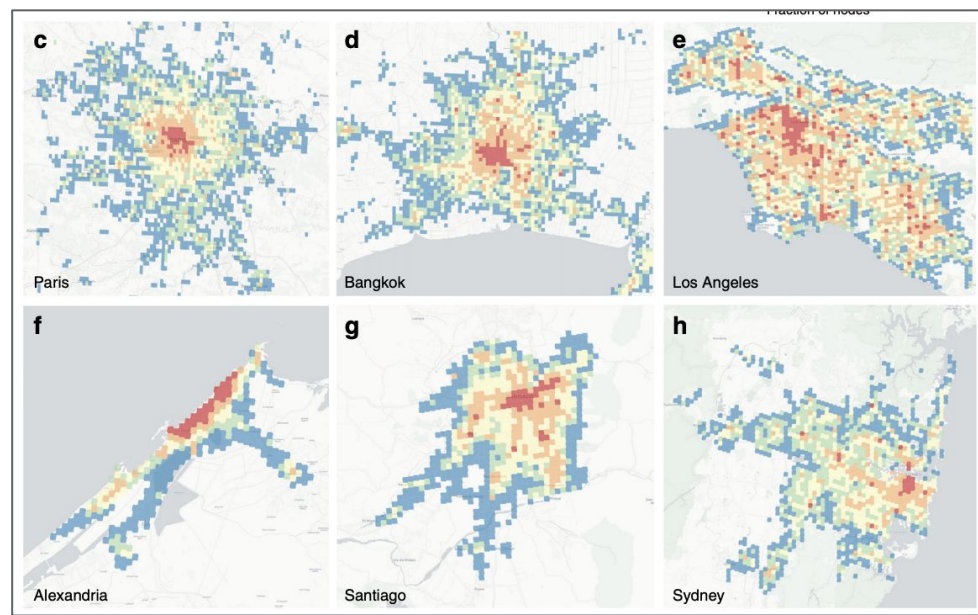
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<https://doi.org/10.1038/s41467-019-12809-y>

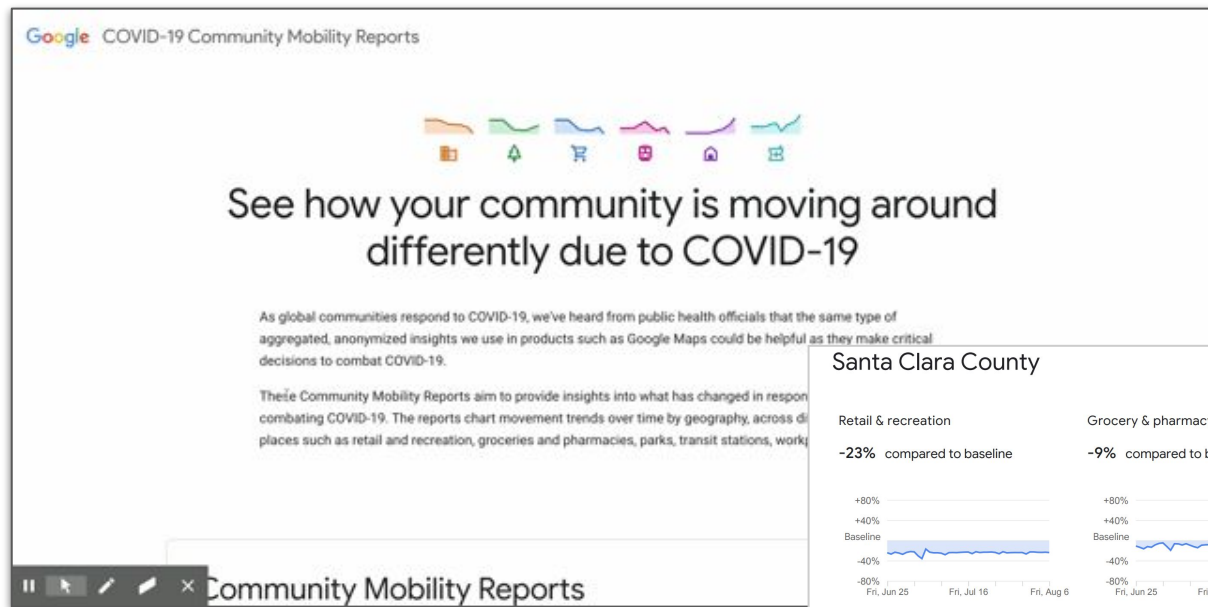
OPEN

# Hierarchical organization of urban mobility and its connection with city livability

Aleix Bassolas<sup>1</sup>, Hugo Barbosa-Filho<sup>2</sup>, Brian Dickinson<sup>3</sup>, Xerxes Dotiwalla<sup>4</sup>, Paul Eastham<sup>4</sup>, Riccardo Gallotti<sup>5</sup>, Gourab Ghoshal<sup>2,6\*</sup>, Bryant Gipson<sup>4</sup>, Surendra A. Hazarie<sup>2</sup>, Henry Kautz<sup>3,6</sup>, Onur Kucuktunc<sup>4</sup>, Allison Lieber<sup>4</sup>, Adam Sadilek<sup>4</sup> & José J. Ramasco<sup>1\*</sup>



# Supporting public health assessment & decision making



## Santa Clara County

### Retail & recreation

-23% compared to baseline



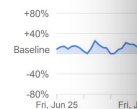
### Grocery & pharmacy

-9% compared to baseline



### Parks

+7% compared to baseline



### Transit stations

-56% compared to baseline



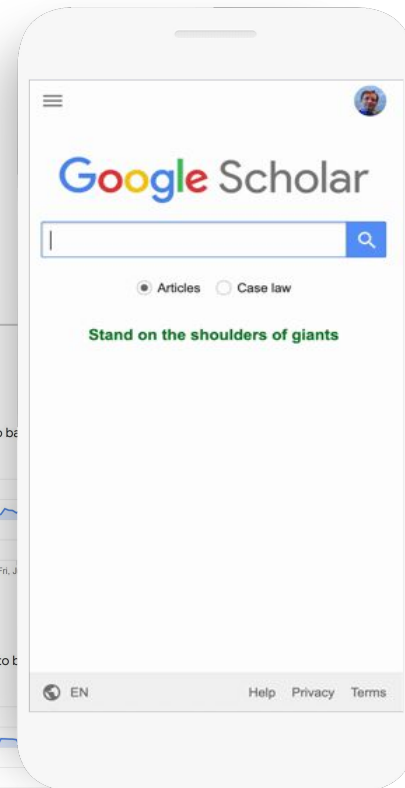
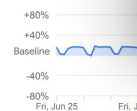
### Workplaces

-51% compared to baseline



### Residential

+16% compared to baseline



Overview: <https://www.google.com/covid19/mobility/>

Anonymization Process Description: <https://arxiv.org/pdf/2004.04145.pdf>

# What we talked about

- 1 A few examples of epidemiology at scale
- 2 Some anonymized, aggregated datasets that researchers and public health teams are using (and that you can use, too)