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Graphic Insights: Predicting Coronavirus Risks (Carrot Health, 3/16)

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Abstract

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What is the message? Graphical tools can help predict the geographic intensity of COVID-19 risks.

What is the evidence? Analysis based on published data concerning risk factors for coronavirus infection, including smoking, COPD, high blood pressure, diabetes, age, and gender.

Timeline: Submitted: March 12, 2020; accepted after revisions: March 14, 2020

Cite as: Kurt Waltenbaugh & Won Gabriel Chung. 2020. Graphic Insights: Predicting Coronavirus Risks. *Health Management, Policy and Innovation* (HMPI.org), volume 5, Issue 1, special issue on COVID-19, March 2020.

Two Tool Kits When Disease Breaks Out: Medical Intervention and Data

Infectious disease outbreaks like the Coronavirus Disease 2019 (COVID-19) are frightening and disruptive. As a society, we have two major toolkits at our disposal to limit the spread of outbreaks, and to minimize their impact on health, life, and the economy.

Medical intervention: The first toolkit is direct medical intervention. Right now, public health officials, medical researchers and clinicians are working to quarantine people with the virus, discourage travel to impacted areas, and identify and treat carriers as quickly as possible. Testing kits are being distributed, and a vaccine is in development.

Data: The second toolkit is data. With the right data, public health personnel can turn panic and passivity into preparation and progress, directing intervention efforts and resources more effectively and appropriately.

In London in 1854, Dr. John Snow, an obstetrician, used data to trace incidents of cholera infection to its source: a contaminated well. With COVID-19, we already know the source of the SARS-CoV-2 virus, but we can use data to predict the vulnerability of a given community, should the outbreak arrive.

Carrot Health's COVID-19 Risk Index

At Carrot Health, we use robust data analytics to predict and help manage the health risks of patients and members for our health plan and provider customers. We have developed a risk index that we believe can help providers, plans, communities, public health workers, and political leaders make more informed decisions around forecasting and managing the impact of COVID-19.

Our index predicts the populations and communities that are most susceptible to the negative impacts from an outbreak. In other words, we're not predicting where and when a COVID-19 outbreak will occur – we're identifying who is most vulnerable. This analysis can be used to help inform public health and intervention decisions at the national, regional and community levels.

As of March 11, 2020, scientific research on the SARS-CoV-2 virus is still limited. We based our initial index on research published in two recent studies published by the Journal of the

American Medical Association[i] and the New England Journal of Medicine[ii]. These articles identified six factors that influence both the risk of the Coronavirus transmission and the severity of its impact, including: Smoking status; COPD status; high blood pressure status; diabetes status; age (increase in risk for those over 65); and gender (increase in risk for males).

As scientists and public health professionals learn more about COVID-19, our index will evolve. For example, current research suggests that approximately 2-4 percent of people with the virus die, depending on where in the world they live. So far, no children have died, and deaths are higher in males and much higher for those over age 65. New data and additional studies might change those assumptions. In addition, the actual infection rate may be higher than reported, which would mean that mortality rates could be lower than currently estimated.

With those caveats in mind, Figure 1 shows our predicted COVID-19 population risk index at the county level (red = high, green = low):

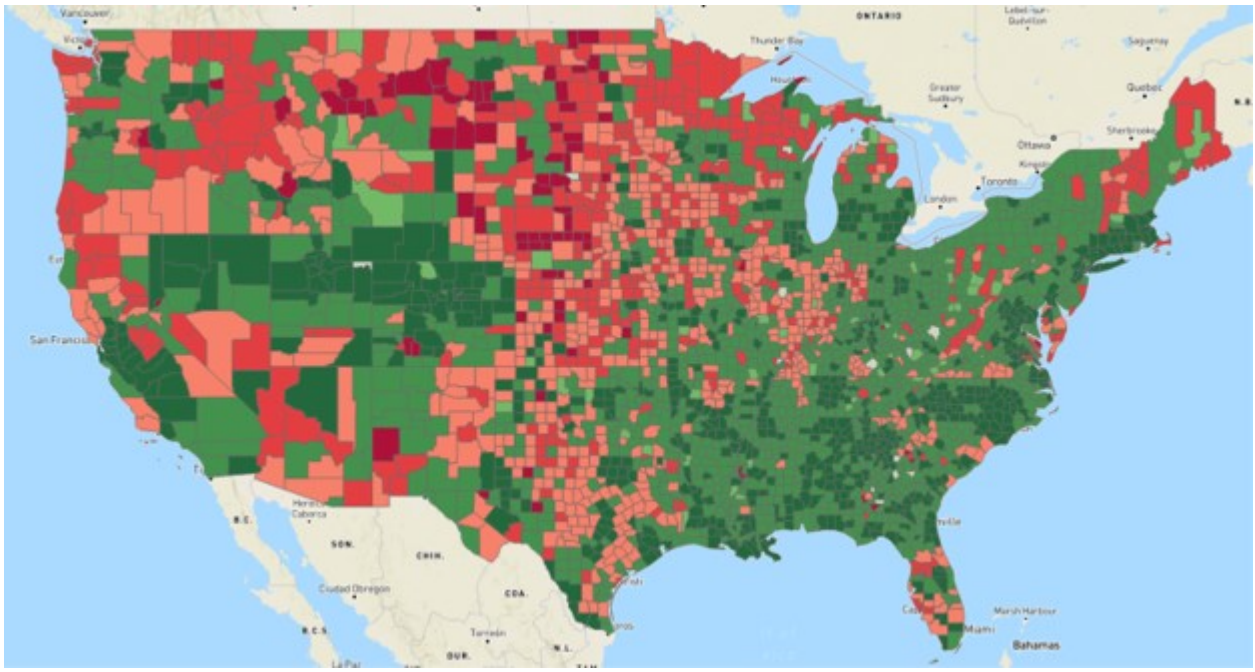

Figure 1. Forecasted COVID-19 Population Risk, County-Level

Examining the national map, we can see the age-related impact. Counties which skew older

show up with higher risk levels. Older adults also show higher rates of chronic disease, specifically COPD, hypertension, and diabetes – which further increases their vulnerability.

We can learn a great deal by zooming in to the local ZIP code level. For example, Figure 2 shows forecasted risk levels in the Seattle metropolitan area (red = high, green = low):

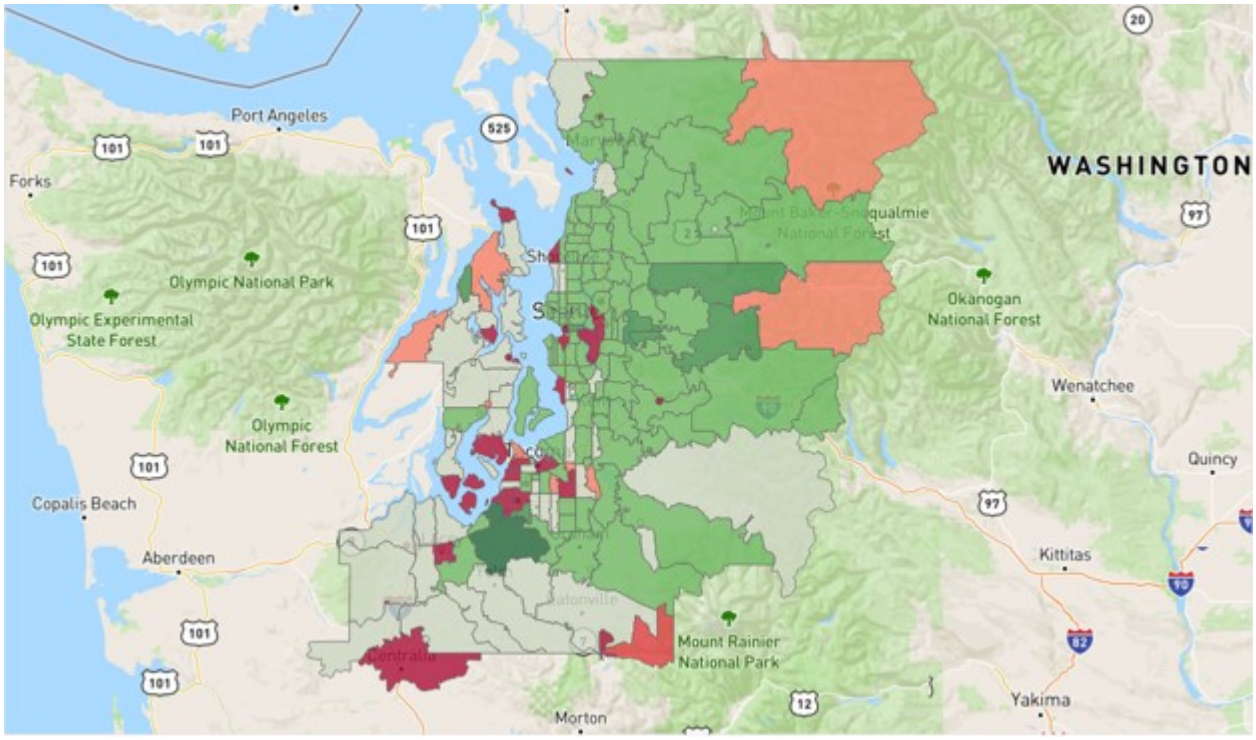

Figure 2. Forecasted COVID-19 Population Risk, Seattle-Tacoma

As the map in Figure 2 shows, variations across a metro area can be significant. Identifying these more granular pockets of risk can help coordinate resources to protect those most vulnerable. With such insights, public health officials or and health providers can decide what kind of advance preparation is necessary. They can then determine where to divert scare resources like ventilators and test kits, should an outbreak occur. They can monitor specific populations or neighborhoods and move in more quickly when circumstances warrant.

Each year, 5 to 20 percent of the U.S. population gets the flu. If SARS-CoV-2 has a similar overall infection rate, the impacts will be enormous. Take Seattle as an example: in the scenario where

an outbreak affects 10 percent of the at-risk population, we would expect 26,307 critical cases, and (assuming that resources are available for appropriate treatment of these critical cases) 5,266 deaths – and the relative risk to different sub-populations in different geographies is highly variable.

Looking Forward

These insights are not meant to inspire panic, but to promote thoughtful preparation. Data-driven insights will be critical in saving lives, deploying resources, and minimizing disruption, both for this public health crisis and for future ones. Ultimately, a vaccine will be produced and COVID-19 contagion may become a cyclical event similar to the current “cold & flu” season.

In the meantime, the United States remains less affected than some parts of the world — but we are more vulnerable. Our healthcare system does not promote prevention or early intervention. The combination of high cost deductibles and lack of sick days for employees discourages people from seeking or taking the care they need.

Fortunately, we also have powerful data tools at our disposal to better prepare and deploy resources, and a culture of helping those who are vulnerable. Carrot Health is making this research and analysis available to all of our customers to aid in their response to the communities they serve. We urge you to take good care of yourself, your loved ones, and your coworkers and community members during this time of uncertainty.

Please contact us if you are interested in learning more about your community.

Endnotes and References

[1] Carrot Health, Inc. is based in Minneapolis, Minnesota. The Carrot MarketView™ software platform incorporates social, behavioral, environmental, and economic barriers to health data to deliver a 360 degree view of the consumer, providing actionable insights to inform growth, health, and quality. Contact: https://carrothealth.com/contact/

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