Social D i s t a n c i n g in the Midst of COVID-19

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Introduction

The beginning of 2020 brought to light new terminology for the general public amidst a coronavirus later called SARS-CoV-2. According to the CDC we have known of coronaviruses since the 1960s and have encountered variations like SARS-CoV and MERS-CoV. However, most of us have never encountered a pandemic to the scale of SARS-CoV-2, the cause of COVID-19 (coronavirus disease 2019). This disease has created the need for local and federal governments to implement guidelines for social distancing in order to keep vulnerable populations healthy and to not overload our healthcare system.

"Social distancing is a public health practice that aims to prevent sick people from coming in close contact with healthy people in order to reduce opportunities for disease transmission. It can include large-scale measures like canceling group events or closing public spaces, as well as individual decisions such as avoiding crowds. With COVID-19, the goal of social distancing right now is to slow down the outbreak in order to reduce the chance of infection among high-risk populations and to reduce the burden on health care systems and workers. Experts describe this as 'flattening the curve,' which generally refers to the potential success of social distancing measures to prevent surges in illness that could overwhelm health care systems" (Pearce, 2020).
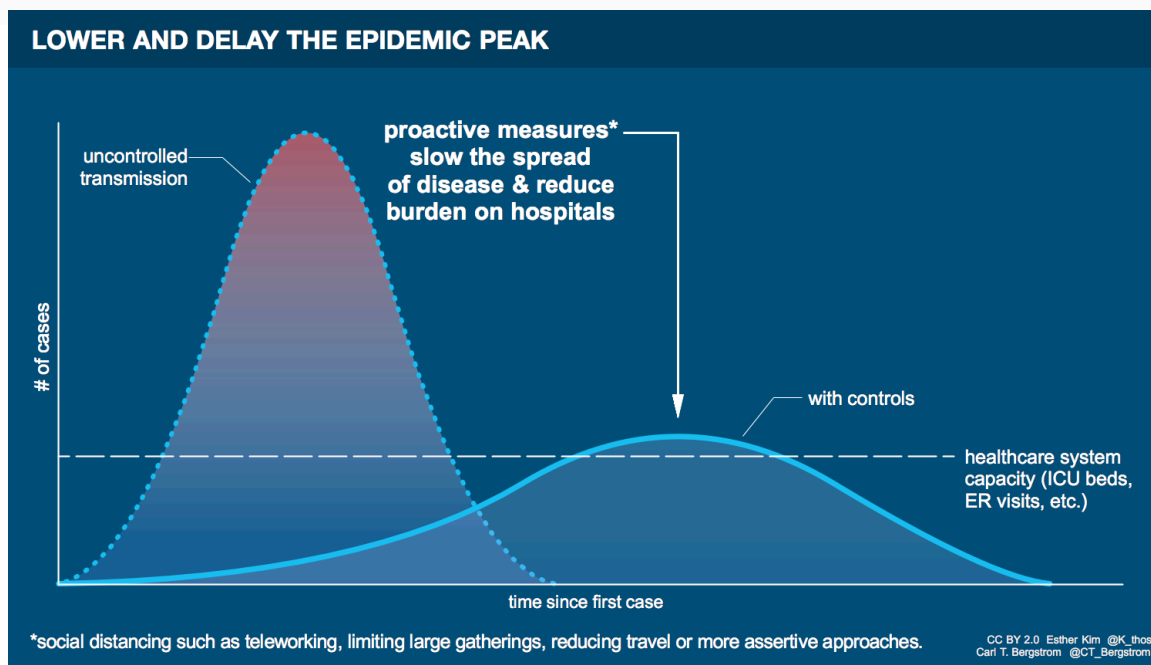

Figure 1. Slowing the spread. Esther Kim and Carl T. Bergstrom, CC BY 2.0, <https://commons.wikimedia.org/wiki/File:SlowTheSpread.png>

Part I – Washington State

To understand the need for social distancing let's begin by looking at the first reported case of COVID-19 in the United States and some of the demographics of the area. The first reported case of COVID-19 came on January 21, 2020 in the state of Washington from a man returning from Wuhan China, the epicenter for COVID-19. By March 26, 2020 the ten counties listed in Table 1 reported the following data.

Questions

1. Using spreadsheet software plot the number of confirmed cases by population size. Does your graph support a relationship between number of cases and population size?

2. Next, plot the number of cases in each county per 100,000 residents. Does your graph support a relationship between percent of cases in each county per 100,000 residents?

3. What could account for any differences in the relationship you identified in Question 1 versus Question 2?

4. The population density map below (Figure 1) appears to shed light on why counties with low population have a high number of cases. However, referring to the graph showing number of cases per 100,000 residents, what outlier counties do not support that claim?
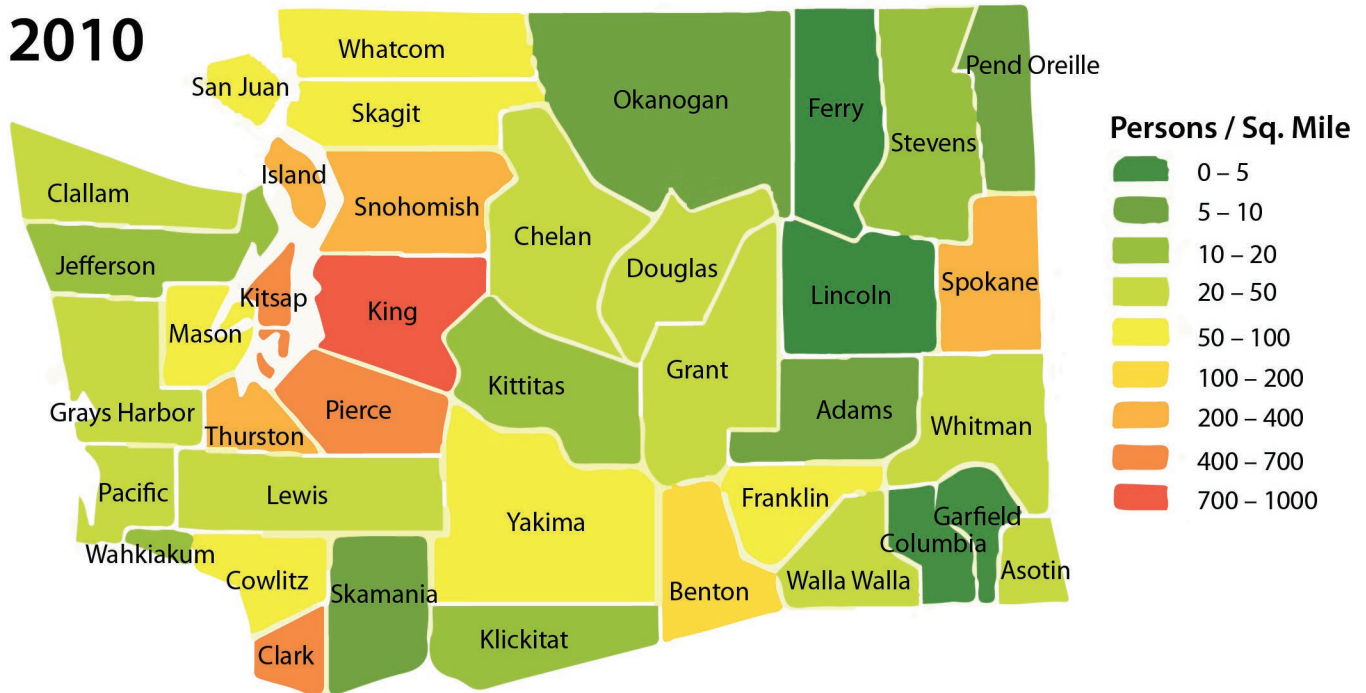
Table 1. Positive/confirmed cases of COVID-19 as of March 26, 2020. (Case data from Washington State Department of Health; population data from Washington State Office of Financial Management, http://www.ofm.wa.gov.)

County	Number of Cases	2019 Population
King	1577	2,226,300
Snohomish	778	818,700
Pierce	186	888,300
Island	64	84,820
Skagit	78	129,200
Kitsap	33	270,100
Grant	33	98,740
Whatcom	86	225,300
Yakima	61	255,950
Thurston	24	285,800

Figure 2. Population density by county in Washington state. *Source:* Washington State Office of Financial Management.

5. Based on your analysis of the previous question and county proximity are you able to conclude that population density plays a significant factor in COVID-19 spread in Washington state or is proximity of county a more likely underlying factor?

Consider the following timeline for the state of Washington. (*Source:* Office of the Governor, Washington Governor Jay Inslee, <https://www.governor.wa.gov/news-media/news-media>.)

March 11, 2020: Governor announces new rules around nursing homes and assisted living facilities that focus on better protecting older adults.

March 12, 2020: Governor announces new community strategies and social distancing plans to minimize COVID-19 exposure, particularly in counties hit hardest by the virus.

March 13, 2020: Governor announces that all public and private K-12 schools in King, Snohomish and Pierce counties will close for the next six weeks.

March 13, 2020: Governor speaks to Vice President Pence to request the federal government immediately declare COVID-19 a national emergency under the Stafford Act.

March 16, 2020: Governor announces an emergency proclamation that mandates the immediate two-week closure of all restaurants, bars, and entertainment and recreational facilities, as well as additional limits on large gatherings. The new orders go into effect through March 31.

March 19, 2020: Governor announced new restrictions today on non-urgent medical and dental procedures so the state can make sure Washington health care workers have enough protective equipment to wear as they work the front lines of the COVID-19 pandemic.

March 23, 2020: Governor spoke directly to Washingtonians to announce he will sign a statewide order that requires everyone in the state to stay home. The order will last for two weeks and could be extended.

Fifty days after the first reported case, government recommendations for social distancing were initiated to decrease the likeliness of COVID-19 spread. The observed spread of COVID-19 follows an exponential growth model. The World Health Organization estimates that for every one infected person an additional 2–2.5 individuals will become infected assuming the community makes no changes to normal, daily life. According Harvard Health Publishing (2020), "symptoms could appear as soon as three days after exposure to as long as 13 days later. Recently published research found that on average, the incubation period is about five days."

Question

6. Based on the date of the first reported case, the quantity of cases reported on March 26, and your graphical interpretation of geographical data, do you feel the above timeline for implementing social distancing practices is justified?

Now, consider the following timeline for the state of New York. (*Source:* New York State Department of Health.)

March 1, 2020 "This evening we learned of the first positive case of novel coronavirus or COVID-19 in New York state."

March 4, 2020 Governor Andrew M. Cuomo today announced that the State University of New York's and the City University of New York's study abroad programs in China, Italy, Japan, Iran and South Korea have been suspended effective immediately in response to concerns over novel coronavirus - or COVID-19.

March 9, 2020 Governor will send to legislature paid sick leave bill that specifically protects people who stay home from work because they are being isolated or quarantined as a result of novel coronavirus. NYS Health Department and Education Department will issue guidance for schools who have students who test positive for novel coronavirus. State will produce up to 100,000 Gallons of hand sanitizer per week and distribute to most impacted and high-risk communities and state agencies

March 12, 2020   Governor announced that events with 500 or more individuals in attendance to be cancelled or postponed. Any gathering under 500 individuals in attendance will be required to cut capacity by 50 percent. New limits on visitations to nursing homes are put into place. Only medically necessary visits will be allowed to protect the most vulnerable.

March 16, 2020   Governor announces that state will limit crowd capacity for recreational and social gatherings to 50 people. Restaurants and bars will close for on premise service and move to take-out and delivery only. Movie theaters, gyms and casinos will temporarily close.

March 20, 2020   Governor issues 100% closure of non-essential businesses statewide, exceptions made for essential services such as groceries and healthcare.

Question

7. According to the timeline above, the first confirmed case appeared on March 1, 2020. By March 20, 2020 the total number of confirmed cases had risen to 7,102.
   a. What timeline difference(s) between Washington and New York do you notice?
   b. Which graph from the Washington state scenario may support the trend in disease spread in New York state?

Part II – Colorado

Use the information below to see the quantity of new cases of COVID-19 by date and executive orders for social distancing. (*Source:* Colorado Department of Public Health and Environment.)

March 11, 2020   Governor urged Coloradans to exercise personal responsibility to protect public health, especially vulnerable populations.

March 13, 2020   The Governor recommends canceling or postponing events with more than 250 people unless there are steps taken to ensure a distance of at least six feet between parties at the event.

March 14, 2020   Governor issues Executive Order Suspending Down Hill Ski Area Operations for One Week.

March 15, 2020   Colorado Department of Public Health and Environment recommends that Colorado follow CDC guidance to cancel or postpone in-person events of 50 people or more.

March 16, 2020   The Colorado Department of Public Health and Environment issues a public health order to close bars, restaurants, gyms, theaters, and casinos to slow the spread of the COVID-19 virus for 30 days.

March 18, 2020   The Governor signed an executive order suspending in-person learning in public and private schools across the state from March 23 to April 17.

March 19, 2020   Ordering the temporary cessation of all elective and non-essential surgeries and procedures and preserving personal protective equipment and ventilators in Colorado due to the presence of COVID-19.

March 22, 2020   Ordering Colorado employers to reduce in-person workforce by fifty percent due to the presence of COVID-19 in the state.

March 25, 2020   Governor announces emergency stay at home order.

Table 2. Total cases of COVID-19 in Colorado by date.

Date	Cases
February 18, 2020	1
February 19, 2020	2
February 20, 2020	5
February 23, 2020	6
February 26, 2020	7
February 27, 2020	8
February 28, 2020	10
February 29, 2020	12
March 1, 2020	21
March 2, 2020	28
March 3, 2020	38
March 4, 2020	52
March 5, 2020	55
March 6, 2020	67
March 7, 2020	78
March 8, 2020	94
March 9, 2020	106
March 10, 2020	129
March 11, 2020	139
March 12, 2020	141
March 18, 2020	216
March 20, 2020	363
March 22, 2020	720
March 24, 2020	1086
March 26, 2020	1430

Questions

8. By March 26, 2020, the number of confirmed cases of COVID-19 reported in Colorado was 1,430. Using spreadsheet software plot the total number of cases over time. Does your graphical analysis of this data justify the timeline for social distancing measures in Colorado?

9. The data used to produce your graph assumes that we know all infected individuals on the date listed. How would not knowing the total number of individuals infected change your graph?

10. There are a variety of factors that play a role in how or initial data on COVID-19 was collected. For example, the initial and ongoing availability of test kits has been limited and therefore hinders our ability to know the true scale of the pandemic. What other factors may contribute to incomplete data for the spread of COVID-19? It may be helpful to conduct research through the CDC website, World Health Organization website, or scientific journals for further information about COVID-19 spread.

Modeling the spread of COVID-19 is also difficult. For example, the incubation period can be between 3–13 days and symptoms are different from person to person. However, a simplistic visual from *The Washington Post* shows how social distancing strategies are intended to work for a fake disease ("simulitis") that spreads easier than COVID-19. Access this simulation by visiting <https://www.washingtonpost.com/graphics/2020/world/corona-simulator/>.

11. When considering social distancing, what other variables alter our ability to accurately model the spread of COVID-19?

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