DATA 698 – Final Project Proposal

How effective are general cloth masks in preventing the spread of Covid-19

Deepak Mongia

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Introduction

A new coronavirus emerged in China towards the end of 2019 which led to the new disease Covid-19, which has completely changed the face of the earth. With its initial roots in China, it spread around the world starting January 2020, with US reporting the first case of Covid-19 on January 20, 2020. By March, the disease was already spreading like a wild fire, and World Health Organization (W.H.O.) declared Covid-19 a pandemic. Covid-19 has changed the world and lives across the world. Governments across the world have adopted many measures to try containing the spread of the covid-19 in their respective countries or states / provinces. These measures include but are not limited to lockdowns, face covering or masks mandates, schools closing and many other measures. The countries which took initial strict measures were able to control the Covid-19 affected counts in their respective countries.

This project will check the effect of wearing general cloth masks on the spread of Covid-19. Many governments have been pressing hard the mandates or recommendations around wearing masks while going out in public places. The people have been following the guidelines or the mandates as per their respective local governments in their areas, and covering their faces by different kinds of masks they can afford or can get easily or even sometimes make their own masks at home. Many of us are wearing cloth masks while in community settings. How effective are cloth masks in preventing Covid-19 spread ?

As a part of this project, we will explore the data around Covid-19 and try to understand if we can figure out if wearing any mask actually helps reduce the risk of catching or infecting Covid-19. There are some masks which are preferably reserved for healthcare workers or their supporting staff. These masks are either N-95 masks or surgical masks. Many of the governments have been giving guidelines to their public to cover their faces while they go out in public places, but at the same time don’t use these N-95 and surgical masks as these are the preferred masks by healthcare workers, and their production as well will be limited. Hence that would mean the governments are suggesting the public should wear cloth masks which they can either buy or they can make on their own at their homes. We will explore how these cloth masks fare as against the ones which are preferred by healthcare workers.

Problem

The question we are dealing with in this project is – are the cloth masks really beneficial enough in preventing the spread of coronavirus ?

Data

We will use the following data sources for our research around the topic mentioned.

1. COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University

<https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data>

1. Oxford University data for – USA state level Covid-19 Policy Responses

<https://github.com/OxCGRT/USA-covid-policy>

1. Oxford University data Covid policy tracker

<https://github.com/OxCGRT/covid-policy-tracker/tree/master/data>

Literary Review:

1. To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic – by Steffen E.Eikenberry, Marina Mancuso, Enahoro Iboi, Tin Phan, Keenan Eikenberry, Yang Kuang, Eric Kostelich, Abba B.Gumel

<https://www.sciencedirect.com/science/article/pii/S2468042720300117>

1. Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks – by Christopher T. Leffler, Edsel Ing, Joseph D. Lykins V, Matthew C. Hogan, Craig A. McKeown, Andrzej Grzybowski

<https://www.medrxiv.org/content/10.1101/2020.05.22.20109231v5.full.pdf>

Methodology:

We will be getting the data from the John Hopkins University dataset – timeseries data over the days for months of all the counties of the US how the affected counts moved. Side by side we will also consume the data related to the mask usage. We are using 2 data sources for mask usage:

1. Oxford Government Policy data – given above
2. NY Times mask wearing survey data – <https://github.com/nytimes/covid-19-data/tree/master/mask-use>

We will compare the 2 types of data, perform hypothesis testing and check the results. We will also see how SIR model can be utilized, or the existing papers which use SIR model to explain the Covid-19 spread can be used or extended to understand the effects of masks on spread of Covid-19.

Assumptions:

1. The survey data from NY Times has been used to give the predicted values of how the masks were used in various counties. The values of the per centages of these are correct.
2. Masks don’t really change anything for an affected person beyond the time she / he is affected. That means if an infected person survives r dies does not really depend on the mask usage after the person is infected.