infR - Infection Rate

popPrs - Presenting Population

Analysis of Output for Run_3

Prerequisites
1. Open the web page containing the Input/Output Table
    COVID-19 Infection Dynamics: How to Know When It Is Safe
2. Download and open the output text file for Run_03.

Analysis
We are looking at the results of "opening up" a sheltered population when the infection rate has dropped to zero, and the "all clear" signal has been given to resume business as usual in an unprotected manner.

We assume that 20 percent of the total population of 1,080, 000 had been infected in the recent epidemic, and has been "cured", that is, they are no longer presenting with symptoms and have been released into the general population, or if not cured, then remain totally isolated.

We initialized the model with a susceptible population of 864,000, which represents the remaining 80 % of the population that had not contracted COVID-19. The graph of the presenting population (isolated or cured persons in this version of the model) begins with an initial value of 215,990 which represents the twenty percent of the population that had been infected.

> **Note**: Recall that we are only modeling the infection dynamics at this time and have no need to model the recovery portion of the model. We have also assumed that once a person presents with the disease, that they are isolated from the susceptible population for the remainder of the simulation. This assumption is expalined in more detail in Article 1.

We are jumping the gun a bit by modeling the return of a sheltered population, but are perfectly capable of doing so because the impact of a shelterd population is to lower the ratio of the susceptible population to the total population. Since the infection multiplier is a function of this ratio, it will change in proportion to that ratio. (see the graph for the *Infection Multiplier Function* in Article 2.)

With everyone not infected in sheltered mode, the susceptible population would be zero, the infection multipliier would necessarily be zero, and the infection rate would be zero once the incubating population was no longer capable of infecting anyone.

Once the sheltering population is released, the susceptible population jumps from 0 to 864,000 and the infection multiplier jumps from 0 to 0.3. overnight. See the data file column **infMul**. We are not saying that the "opening up" would happen in this manner; we will save our discussion of "opening up" scenarios for the Policy Analysis.

It takes a couple of weeks for all hell to break loose, and by that time it is too late to do any contact tracing, as the number of infected people has reached 211 from a starting value of 10. Those 10 could have arisen from the first incubating population by having an abnormally long incubation period of say 14 daya or more, or from some virus that remained in a viable state for the waiting period between the last day that a newly infected person appeared to the day of the opening up.

The final tally shows a total of 860, 512 persons in the presenting population after six months (again, most of these have been cured). Up from 215,990 at the start: a gain of 644,522 newly infected persons that resulted from opening up before the herd protection threshold HPT) had beem attained. It is instructive to compare these results of with those of Run_02, where the HPT had been attained when the sheltered popultion was released from lockdown. Under those circumstances only 184 new infections occurred from an initial susceptible population of approximately 480,000.