STANDARD DEVIATIONS: All for Naught

Greetings,

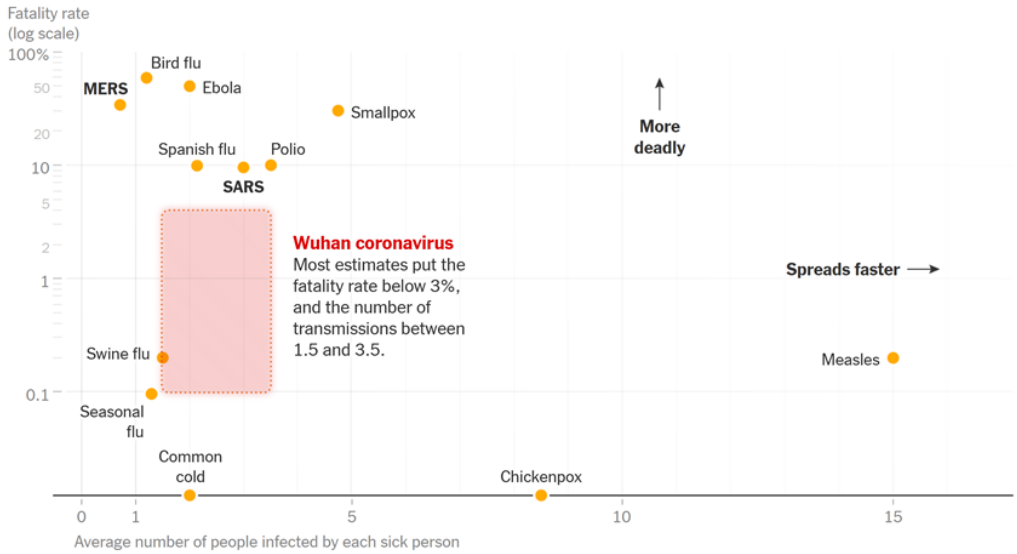
When we look at outbreaks that can be spread from person to person, like Ebola, like influenza, like measles, and now like 2019-nCoV, the question that comes up a lot is, “How bad will it be?”

That’s a tough question. But one parameter that helps us predict the trajectory of an epidemic is the **Ro, or R naught**. This is basically the reproductive strength of a disease vector. Or, in another sense, the power of its transmissibility.

Ro is one of the numbers epidemiologists use to describe how an infectious agent spreads through a population. It’s important to remember that it’s simply a statistic that describes some of the numbers we see. It’s not a rating of how deadly a virus is, or how difficult it might be to contain. We need more information for that.

But when a new virus pops up and it’s something we don’t have vaccine, or antibody, against, then Ro lets us grasp the danger of the virus spreading. Some virus are better spreaders than others. Measles is notorious as a super-spreader, MERS-CoV is not so good at person-to-person movement. Millions have contracted measles and only a (relative) handful of MERS cases have occurred. On the other hand MERS is far deadlier than measles.

Here is a graph that shows Ro for several virus diseases (X axis) and the relative lethality (Y axis)



{Ro for some known viruses. NY Times.}

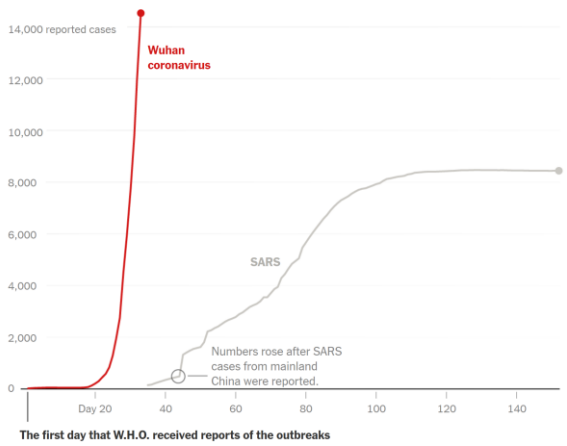
Finding the R0 for 2019-nCoV is important in determining how aggressive all these quarantine and isolation strategies being deployed need to be and for how long. For us in the trenches, it indicates the number of patients we see and that **translates to test numbers and reagent orders and PPE stock and staff lost to illness.**

The R0 for coronavirus is unknown. These values become sharper in retrospect when we can look at the fallout and pick up the pieces of outbreak data. The asymptomatic and unreported population is just one fudge-factor that shows how tricky it can be to nail down an R0 in the early stages of emergence**. Guesses put 2019-nCoV R0 at around 2.0-2.5.** Each infected person is likely to infect at least two others.

It doesn't take much math to see how things can get out of hand pretty quick.

Travel bans and quarantines are used to control the spread of an epidemic vector, by altering the environment but they don't change the R0. The effort to control Chinese populations where the novel coronavirus is thought to have originated may have helped to stifle a horrendous outbreak; it may have been just a little slow.

Millions of citizens of Wuhan left the city when travel constraints were announced. The incidence of infection may have been much higher than thought, at first. And, our ability to move lots of people great distances on short notice and in short order make control of a virus spreading very challenging. Given an R0 of 2-2.5, this does not bode well. Even with the controls and bans in place, the spread of this virus is worrisome.



{Early trajectory data show the risk of widespread infection. NY Times.}

Thankfully, 2019-nCoV is not as lethal as some other coronaviruses (yet). It is, however, a wake-up call for our awareness and preparedness efforts. Its emergence in other sites around the world is guaranteed and any vaccine is at least a year out. Understanding just how infectious this virus is (its R0), allows us to anticipate the burden we'll see, eventually.

Have a great week and be safe,

Bryan