CoVid-19: Test Count. Case Count. Hospitalizations. Deaths. What does it all mean? What about a second wave?

Moneyball and CoVid. Billy Beane revolutionized major league baseball by looking at "the right numbers," not batting averages, RBIs and home runs, but the ones that predict wins. We hear about case counts, hospital admissions, and deaths when we watch the news or read a new report. Are those the numbers we should care about?

Anchor & Helm completed a regression study of the experience in Tennessee—in the midst of the "spiraling pandemic"—during the period April 1, 2020 through June 30, 2020 to better understand the results reported by the CDC and state public health department. Experiences in other states and cities are different, but the themes are the same. Our analysis is not a medical recommendation, nor a political statement. Just the numbers.

Watching the Right Numbers. If you take a step back from the "Breaking News," you might remember that the city, state, and national economies were "locked-down" to "flatten the curve," so we wouldn't exceed the capacity of hospitals, their IUCs, and ventilators. That focus meta-morphosized into an expectation that we can arrest the spread of the CoVid-19 virus through social distancing and extended lockdowns until a vaccine or cure is developed. We keep score by Daily Case Count.

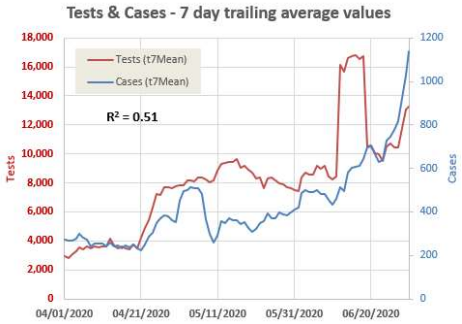
So, is Case Count an effective metric for judging population impacts? Probably not.

Understand the Data. We focused on data, reported by the Tennessee Department of Health (TDH), as of July 2, 2020. **Tests** are the count daily of CoVid-related polymerase chain reaction (PCR) diagnostic tests. **Cases** are the daily count of CoVid cases reported to the TDH, and were limited to confirmed cases until June 16, when the TDH began including probable cases in its count. **Hospital Cases** include confirmed and probable CoVid cases—people that reported *ever being hospitalized* for CoVid. **Deaths** included both confirmed and probable CoVid-related deaths.

All metrics Tests, Cases, Hospital Cases, and Deaths are included in their respective counts on the day they were reported, not the day of the event. Daily data may take more than a week to settle on final values. Finally, as with any correlation analysis, association is not causation: *A may be correlated with B; that does not prove A causes B.*

CoVid Cases. There are two logical reasons that reported case counts might be increasing: the disease is infecting more people (it undoubtedly is), and/or performing more tests might discover more (previously) infected people.

A linear regression model comparing Tests and Cases, and smoothing the data by using a trailing 7-day average yielded a strong correlation (R^2 = 0.51) between Testing and Cases. That means 51 percent of the variability in the trailing 7-day average of Case count is associated with changes (i.e., increases) in Test count. Conclusion: More tests "discover" more cases, whether the disease is spreading.

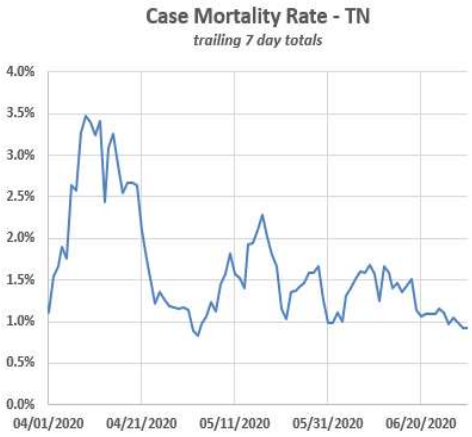


Hospital Cases. Using the same technique and smoothing with 7-day trailing averages, the correlation between Total Cases and Hospital Cases was weak (R^2 = 0.17)—17% of the variability in Hospital Cases was associated with changes in Case count. Adding a time lag between testing and admission did little to improve correlation. Conclusion: A dramatic increase in Cases will not necessarily be associated with a proportional increase in hospital cases. Other factors are more important. And remember: Hospital Cases included people that reported EVER being admitted with a CoVid diagnosis. The patient admitted today for injuries from falling off a ladder that was also hospitalized as

a suspected CoVid case two months ago is counted as a CoVid hospitalization again today.

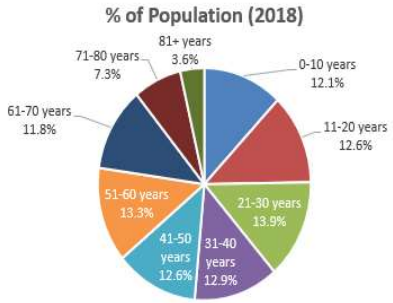
CoVid Deaths. Again, applying the regression technique and 7-day trailing average smoothing, the correlation between Total Cases and CoVid Deaths was weak (R^2 = 0.25)—25 percent of the change in Death count was associated with changes in Case count. Conclusion: Dramatic increases in Cases will not necessarily mean a dramatic increase in deaths.

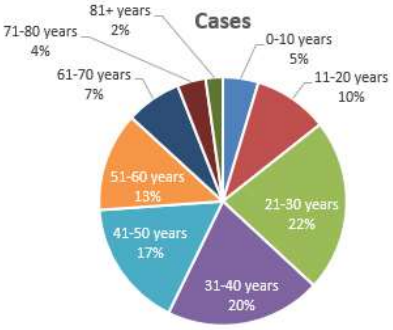
Mortality Rates. According to TDH, Tennessee had 2,522 active CoVid cases, as of April 1; there were 15,306 as of June 30—a six-fold increase. Case mortality rates decreased from a peak of 3.5% (trailing 7-day basis) to less than 1%. As noted above, changes in mortality are weakly associated with changes in cases. One reason is that CoVid-19 mortality is highly selective.

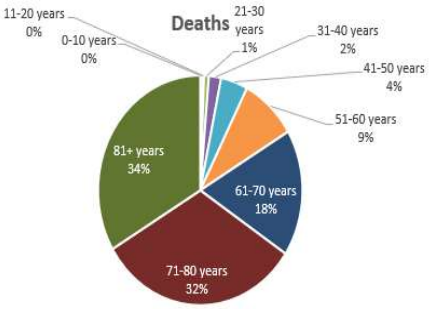


Vulnerable Groups. People over 81 years of age are 3.6% of the Tennessee population; those over 60 years of age are 22.7%. While those over 81 had 2% of the reported Cases, they represented 34% of the deaths. Those over 60 had 13% of the cases, and 84% of the deaths.

Conversely, those 21 to 30 years of age make-up 14% of the state's

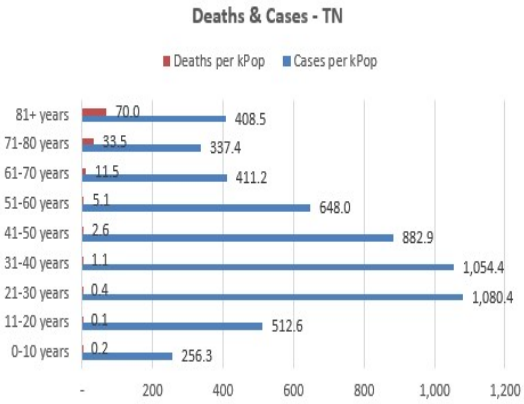






population, and had 22% of the reported cases, but only 1% of the reported deaths. Anecdotally, symptoms tend to be mild and recoveries fairly quick. Conclusion: Elderly and immuno-compromised patients face the greatest mortality risk—an order of magnitude more than patients under 40 years of age.

Numbers that Matter. Our analyses demonstrate that two numbers matter: Deaths, and Hospital Cases in the context of local hospital bed capacity. Other metrics—e.g., case counts—are poor predicters of mortality, particularly in light of emerging suspicions of large under-estimates of asymptomatic and mild symptom (i.e., non-reported) cases.



On a positive note, the mortality rate—percent of Cases that end with death—is down by a factor of 3.5 since its mid-April peak.

Anchor & Helm Decision Advisors helps its clients understand their data and develop actionable insights. We help clients develop business plans and budgets, better analyze data and communicate results, and implement reporting tools.

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