Sonoma County COVID-19 Response
Phase 1 Modeling
Phase 1: Key Questions

1. What will be the impact of Shelter-in-Place in Sonoma county?

2. What might happen after we eventually lift the Shelter-in-Place without additional mitigation measures in place?

3. What is the projected numbers of individuals needing hospitalization?
Epidemiology Assumptions

• Estimate number of likely new infections resulting from one diagnosed case ($R_0$ between 2 and 3 – also called the reproduction number)

• Three age groups: (Less than 18 years old, 18-64 years old, and 65 years old and older)

• Age group assumptions:
  • The number of people who have COVID19 who require hospitalization
  • Case fatality rate – the proportion of patients who die from COVID19 among the total diagnosed

• Symptomatic infections assumption:
  • Two-thirds of infected patients develop symptoms
  • Symptomatic patients are 50% more infectious than asymptomatic
Demographic and Mitigation Assumptions

- 70% of county population is urban, remainder rural \(^1\)
- Age distribution is proportionally the same in urban and rural settings
- \(R_0\) in rural settings is three-fourths that of urban settings
- Assume that shelter in place coincides with the first COVID-19 death in Sonoma, and takes 10 days to come into full effect
- Assume the shelter in place succeeds in cutting the \(R_0\) by half. \(^2,^3\)

\(^1\) http://sonomacounty.ca.gov/Health/Public-Reports/Health-Need-Assessments/Demographics/

\(^2\) Wuhan, e.g. Kucharski et al, Lancet Inf. Dis. 2020

What will be the impact of Shelter in Place?

2.5 infections per case

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\( R_0 = 2.5 \)

- **Solid line:** No intervention

3 infections per case

3 infections per case

\( R_0 = 3 \)

- **Dashed line:** Shelter in Place initiated at time of first death in county

**Substantial reductions in hospital load, although a scenario of \( R_0 = 3 \) will challenge existing capacity**
What would be the implications of eventually lifting Shelter in Place without additional mitigation measures in place?

*Assuming no vaccine and no influence of weather or season on transmission*

- Secondary wave could again threaten healthcare capacity
- Implication is not that we need extended Shelter in Place, rather that additional mitigation measures are also needed
Age-specific mortality

Solid line: no intervention

Dashed line: with Shelter in Place

The >65s, despite being less prominent than working adults in terms of absolute mortality, would still be hardest hit in relation to their population size.
Conclusions and Next Steps

• Shelter-in-Place is working to flatten the curve.
• We will continue to share information with the community even when it is preliminary
• Sonoma County will model additional mitigation measures to flatten the curve and work toward lifting shelter in place:
  • Increased testing, robust contact tracing, strict isolation and quarantine
  • Masking guidance for general population, health care workers and first responders
  • Staged/gradual lifting of restrictions, starting with some workplaces and ending with schools.