Public Health Data, Trends and Inferences for Winter 2021 Semester
Introduction

While research continues to better understand, treat, and ultimately stop transmission of COVID-19, at present much remains unknown with regard to the novel virus and how it will evolve this winter. A vaccine and/or wholly effective therapeutic treatment is unlikely to be available for widespread distribution on a timeline that will impact the winter 2021 semester, given the current state of development, testing and production. There is also uncertainty regarding future transmission during winter months, but evidence of how other coronaviruses behave suggests that winter will be worse than fall. In this brief document, we provide a small subset of key indicators regarding COVID-19 data and projected trends and discuss select considerations relevant to the University of Michigan Ann Arbor campus activities this winter.

Current State and Winter 2021 Projections for COVID-19 Spread

The state of Michigan was severely impacted early in the pandemic during the months of March and April 2020 but made a noteworthy recovery following state-level orders restricting activities. As state restrictions eased, COVID-19 cases steadily increased and are now reaching record highs. A component of increased statewide activity and cases includes in person semesters at some universities, including the University of Michigan Ann Arbor. At present, increased COVID-19 spread is occurring in every region across the state and in every age group. As a result of the increase in cases, hospitalizations are also increasing sharply. [See Figures 1-4 for corresponding data displays]

Likewise, nationally, many states are experiencing peak levels of new COVID-19 cases. Although patterns of SARS-CoV-2 transmission during the coming winter months are currently unknown, other common coronaviruses (not COVID-19) generally show upticks during the months of December through March [See Figure 5]. Current model-based projections suggest likely increases and persistence of high rates of disease throughout the winter, rather than a decline. [See Figures 6-7]

Considerations for UM Campus

National, state, and regional COVID-19 spread and anticipated increases during the winter signal the need for aggressive public health management strategies, including potential adjustments for the UM
Winter may bring unique challenges that make managing the virus even more difficult. Students will return to Ann Arbor from states/regions with high levels of COVID-19 transmission. The weather poses challenges, given that there will be less outdoor activity relative to the fall semester, which may intensify indoor spread. Influenza season is expected to critically increase demand on public health and medical capacity and may add risk for severity of COVID-19 (i.e., COVID-19 and influenza coinfection or sequential infections lead to more severe impacts). A strong proactive policy promoting influenza vaccination across the entire campus community will be an important component of the public health response going into the winter semester.

While this document does not directly address testing, a high-volume, multifaceted, and well-designed testing protocol will be a critical component of campus public health resources and will need to be layered with commitment to other public health and student support strategies (such as reduced density in buildings, social distancing, masking, and robust student engagement and partnership in adhering to rules and norms needed to reduce transmission and manage cases). Infrastructure, readiness and capacity will be needed both for testing (on the front end) and for critical downstream public health and student care activities such as prompt case investigation, contact tracing, quarantine and isolation housing and coordination of care and transportation for those who require quarantine/isolation.

During the fall semester, the spread of the virus primarily impacted undergraduate students. [Figure 8] Case investigation data further reveal that a substantial amount of spread stemmed from the impacts of social gatherings that exceeded recommended size and that did not adhere to recommended public health behaviors like wearing masks and social distancing. Furthermore, spread was intensified in high-density, congregate living settings like residence halls and high-density off-campus housing. High density housing also contributed to strain on quarantine and isolation resources as roommates and close contacts of cases also needed to be removed from buildings as a precaution to reduce further spread. Spread among roommates in residence halls was evident by way of identifiable case clusters throughout the fall semester. Thus far in the fall semester, there have been 499 student COVID-19 cases in residence halls, including 111 instances in which multiple roommates were infected (n=227). Data show variability in case counts by residence hall, with case spikes in halls where primarily freshmen reside. Residence halls in which upperclassmen and graduate students reside have not been associated with high levels of COVID-19 spread during the fall term.

A general public health principle with regard to reducing the spread of COVID-19 is that de-densified spaces help reduce transmission. This is especially relevant in congregate living settings both on and off campus as we saw spread and outbreaks primarily in these settings this fall. Epidemiologic models support the idea that COVID-19 cases on campus can be reduced by decreasing residence hall density. [Figure 9] Further, a second component to reducing spread in congregate living settings is a robust
contact tracing and quarantine/isolation plan and infrastructure. Models demonstrate that decreasing the days from disease onset to isolation can have a marked impact on controlling the number of new cases, underscoring the importance of public health infrastructure along the entire pathway from disease onset through isolation and recovery. [Figure 10] The residence halls housed roughly 6400 students during the fall semester (approximately 67% capacity). Further reductions in density during the winter semester will be important to decrease transmission risk; ease demand on contact tracing, quarantine, and isolation; and facilitate monitoring, enforcement, and engagement efforts.

Finally, the landscape has shifted rapidly over the last several months concerning our understanding of and response to COVID-19 and this will continue in the foreseeable future. UM will need to monitor emerging data and insights about COVID-19 and adjust plans accordingly to mitigate transmission risks for students, staff, and faculty. For instance, a new CDC report shows that infection can occur after an accumulation of brief exposures (e.g., 17 brief encounters—each under 1 minute—over an 8 hour shift). An additional CDC report released this week found an infection rate of 53% in household members of cases. This report is evidence that rapid separation is needed between infected cases and those they live with, which demonstrates the importance of de-densifying on-campus living spaces. Such new evidence should be incorporated into the university’s plans concerning dining, residence halls, transportation, and other activities. As new research and data emerge, the University strategy must remain agile and responsive in order to best control and reduce virus transmission.
Figures

Figure 1:

![Michigan: statewide Cases Per Million Over Time](source: mistartmap.info)

Figure 2: Cases are currently increasing across every region in the state of Michigan.

![Regional Graphs](source: mistartmap.info)

Figure 3: Cases are currently increasing in every age group within the state of Michigan.
Figure 4: Statewide hospitalizations are sharply increasing.

Figure 5: Other types of coronavirus cases typically increase in winter months, which means the same could be true for COVID-19.
Seasonal trends of the four coronavirus strains currently endemic in the U.S.

Figure 6: Various national models project increases through winter.

Source: National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases
Figure 7: National winter outlook summary points

- Case surge will persist
- High incidence plateau
- Very few states with slow viral spread (yellow & green)

Figure 8: Fall case data shows spread is mostly amongst undergraduates

Sources: Left: CDC COVID-19 Forecasting ensemble model, with 3 selected submodels (COVIDSim, UM, and Columbia-UNC); Right: IHME model projections
Figure 9: Models show that reducing residence hall density can reduce cases.

- Moving to single rooms (no roommates) also reduces cases, based on occupancy in the compartmental model (~50% occupancy) and occupancy plus contact reductions in the network model (not shown).

- Dashed line indicates the median simulation and distribution quantiles are shown as shaded regions (central 25%, 50%, and 90% regions).

- Currently assumes off-campus student population size is unchanged from Fall (some off-campus students move home, some residential students move off-campus, but overall total is unchanged).
Figure 10: Models indicate that fast and effective testing & isolation of symptomatic students can substantially reduce infections.

- Reducing time from onset to isolation depends on:
  - Student engagement
  - Testing resources
  - Contact tracing and case investigation resources
  - Q & I resources

- Dashed line indicates the median simulation and distribution quantiles are shown as shaded regions (central 25%, 50%, and 90% regions).