# UTAH HERO PROJECT

## Tracking Covid-19 to Inform the Return to Normal

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### Included in this Report

- Overview of HERO school testing in 2020-21

Utah Health & Economic Recovery Outreach

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# Introduction

The Utah Health and Economic Recovery Outreach (HERO) Project began in May 2020 as a collaborative statewide testing and analysis project to understand the community-based activity of the SARS-CoV-2 virus and Covid-19 infection rates. The goal of the HERO Project is to collect and utilize high-quality local data to help inform decision-makers seeking to guide Utah's citizens and economy through a safe return to normalcy.

In the first six-month Phase 1of the project, the HERO Project team of researchers, doctors, and statisticians designed a representative sampling method to estimate the prevalence of Covid-19 in the general population. Key findings from this phase included a low overall rate of infection in Utahns and a high rate of detection by health authorities, relative to other states, meaning that only a small number of Utahns had been infected, but that compared to other states, few cases were going undetected.

Phases 2 and 3 of the HERO Project focus on adding to the information available to decision-makers through several new efforts:

- Continued **community testing** throughout the state, coupled with longitudinal analyses, to provide insight into changing infection rates and detection by health authorities.
- Student- and teacher/staff-**testing in Utah K-12 schools**, to advise officials as they seek to return students to classrooms and sustain in-person learning safely and effectively.
- Surveying and analysis on the **impacts of Covid-19 on Utah businesses and consumers**, to support the state's economic recovery.
- Collecting information on **vaccine** uptake, impact, and implications, to inform the state's distribution efforts and ongoing management of the pandemic.

This report focuses on the **HERO Project's work in K-12 schools**, which the team began after realizing that as schools started to reopen this fall, understanding transmission trends within them would be critical to ensuring the continued ability of students to access safe education, with a preference towards in-person learning. This portion of the project is planned to continue through the end of the academic year, describing the testing efforts, results, and implications for ongoing decision-making about school policy in Utah. The school project has involved multiple collaborations with partners including the Utah Department of Health, Salt Lake County Health Department, and the Salt Lake City, Granite and Davis School Districts.

# Key Findings

## Findings as of March 20, 2021

### The Risk of Secondary Transmission is Low in Elementary School Settings

Based on case-triggered testing linking classroom exposure to a known positive case, the risk of secondary transmission is approximately 1%, provided mask use is high. Further, as part of a collaboration with UDOH and Salt Lake County Health Department epidemiologists, a comparison of infection rates from individuals participating in remote and in-person learning models in Salt Lake County found the risk of infection to be comparable in both elementary and middle school settings regardless of the learning model.

### Improved Testing and Monitoring Policies are Needed in High School Settings

High rates of Covid-19 have been observed in high school students in Utah. During the fall surge, the rate of asymptomatic infections in high school students may have been as high as 3-5% on average and possibly higher in some groups. A comparison of in-person and remote learning models in Salt Lake County found the rate of infection for students residing in school districts offering in-person learning was 60% higher than those residing in a district offering only remote learning.

### Positivity Rates Among Both Students and Staff are Trending Down Over Time

Since school testing began in October 2020, and especially since January, rates of infection among students and staff, both with and without symptoms, are generally trending downward. This follows the broader trends statewide towards lower test positivity rates and rates of infection across all age groups.

### Students are More Likely than Staff to Test Positive Without Symptoms

Based on surveys taken at the time of voluntary PCR testing, 2.4% of students and 0.7% of teachers/staff tested positive while reporting no symptoms at all. The percentage of students testing positive while asymptomatic has changed substantially since the fall when as many as 10% of those participating in our testing tested positive. In recent weeks this has declined to 1% or lower in many instances. These findings indicate that asymptomatic infection occurs in all populations and can lead to silent spread but may be more common among youth than adults.

### Earlier Return Policies Can be Safely Implemented Following Exposure in Schools

An analysis of two quarantine strategies (return to school after 7-day quarantine with a negative test result compared to 14-day quarantine) found the likelihood of infection in each case was comparable for the exposed individual, helping confirm the safety of earlier return policies after in-school exposures.

# HERO School-Based Testing

## Background

The HERO Project began school testing in October 2020 and has continued through March 2021, conducting tests for over 3000 participants representing 100 schools. The primary goal of school-based testing is to provide convenient access to SARS-CoV-2 testing to students, faculty, and staff to enhance safety in school communities by reducing transmission. By increasing testing, schools can better identify both symptomatic and asymptomatic cases, reducing the occurrence of school outbreaks that prevent in-person learning.

Increased understanding of school-based Covid-19 transmission further serves the State of Utah, local health departments, and local education agencies by helping to pilot test strategies that can refine current policies throughout the pandemic.

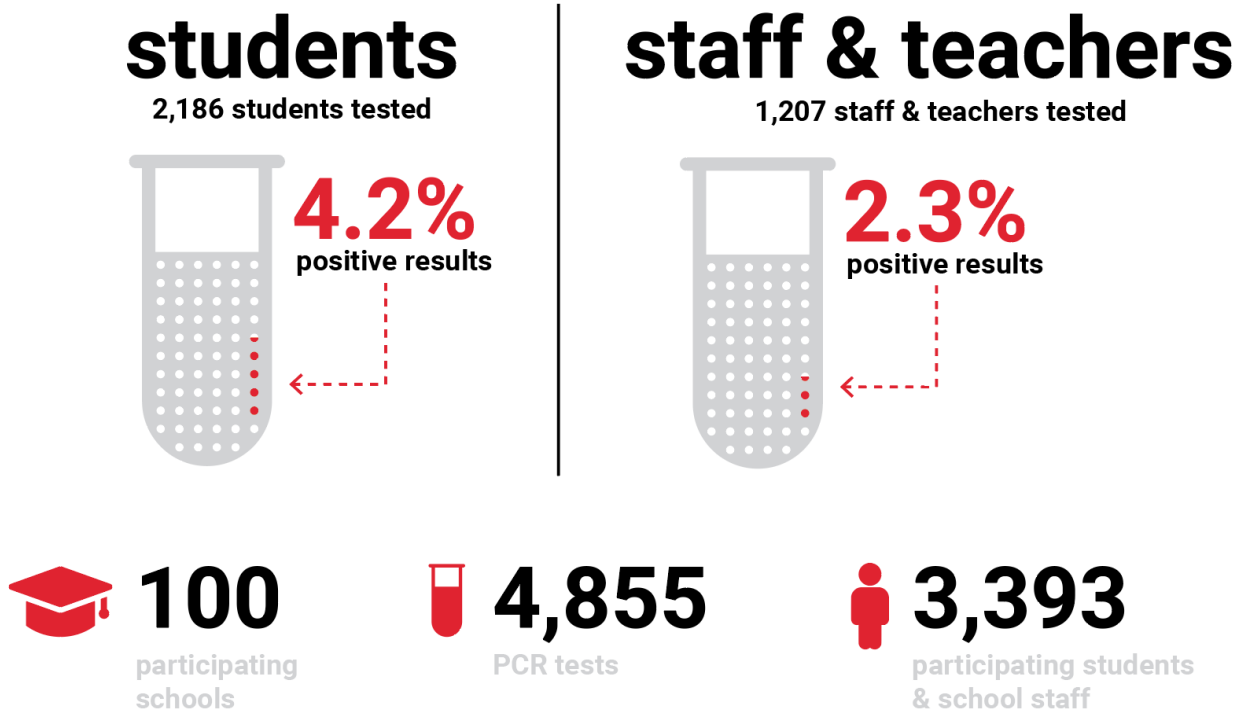
## HERO School-Based Testing Design

School-based testing has included 100 schools across multiple Utah school districts—Salt Lake City, Granite, and Davis—including both public and independent schools in these geographies. Project leaders used two strategies to establish school-based testing events. The first strategy, "Case-Triggered Testing," was used in response to an identified positive case in the elementary and middle school classroom setting to assess the likelihood of transmission in classrooms. The second strategy, "Voluntary Testing," was used to provide access to on-site testing for these communities. Each event provided no-cost PCR saliva testing and was coordinated in collaboration with school districts, local health departments, and school administration.

## Testing Results

### Overall Rates of Infection

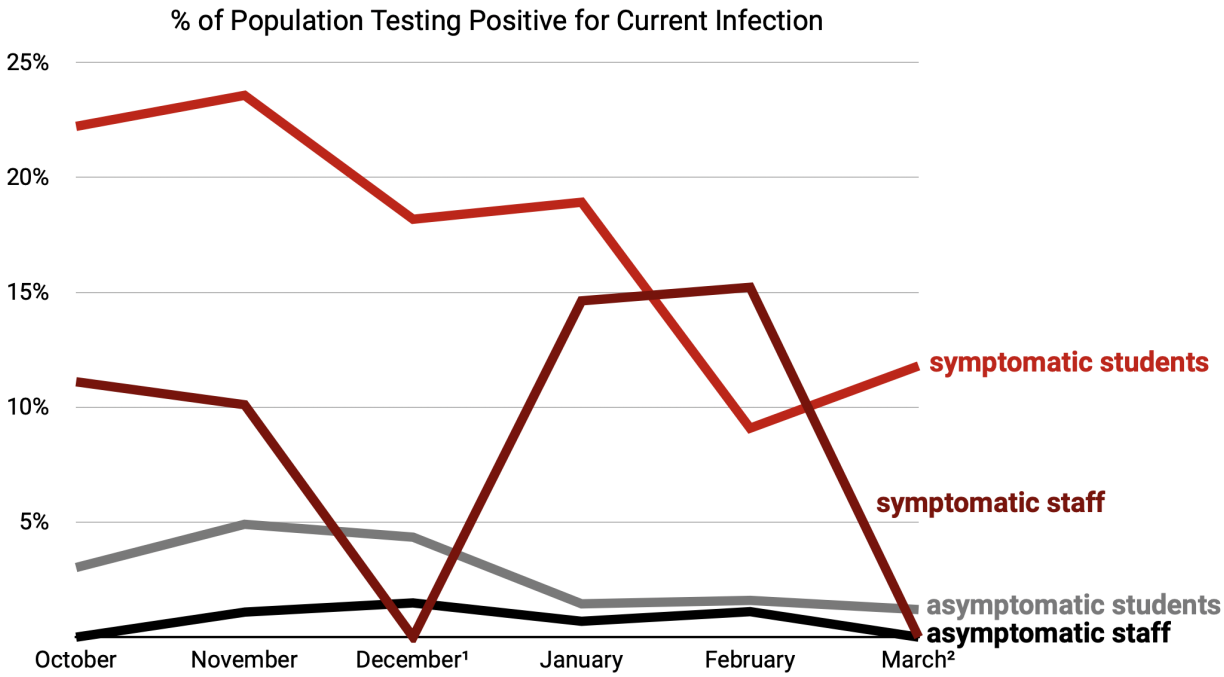
From October 2020 through the first week of March 2021, students had a higher rate of positive tests than did staff and teachers, but both groups were relatively low. However, this varied widely based between students and teachers/staff, between symptomatic and asymptomatic individuals, and between different schools. The range of positive tests by school varied from 0% to 14% depending on the date of testing.




### Rates of Infection Across Time

Intensive testing has taken place every month since October, with the exception of December due to the winter break limiting the amount of time students and staff were at their schools. These testing data have brought light to important trends in school infection rates.

Most importantly, positivity rates have generally decreased since testing began and especially since January. This is true for both students and staff, and both those with and without symptoms, as shown in the figure below.




[1] December testing included only the first two weeks due to Winter Break, decreasing the sample size as compared to other months.
[2] Testing data for March is as of the first round of in-school testing on March 1, 2021.

This figure also displays the substantial differences in positivity rate between staff and students, and between those with symptoms and without. Staff have generally tested positive at lower rates than students throughout the HERO Project's school testing, both when comparing symptomatic and asymptomatic individuals. Asymptomatic students and staff expectedly test positive at lower rates than symptomatic peers, never breaking a 5% positivity rate.

## Voluntary Testing Results

Out of all volunteer testing that has occurred to date, students and staff were represented in the sample as follows:

| | Student Population | Staff & Teacher Population |
|---|---|---|
| **Education Level** | | |
| Elementary School | 39% | 34% |
| Middle School | 30% | 24% |
| High School | 32% | 42% |

Voluntary testing included a mixture of symptomatic, asymptomatic, and those in quarantine or recently exposed. Before testing, students and staff were asked whether they were experiencing any symptoms of Covid-19. Roughly 13% of students and 14% of teachers reported experiencing recent symptoms at the time of testing. Among these, a higher percentage of students tested positive (18% of students and 11% of teachers). For those not experiencing recent symptoms, a higher percentage of students tested positive

(2.4%) than teachers (0.7%). This finding is consistent with the understanding that younger populations are more likely to be asymptomatic and therefore potentially more likely to unknowingly spread Covid-19. For those reporting recent contact with an individual who tested positive for Covid-19, 16.3% of students tested positive compared with 6.5% of staff.

### Case-Triggered Testing Results

Three elementary and one middle school participated in case-triggered testing events with the HERO Project. In a collaboration with CDC, an additional 19 elementary schools and 50 classrooms participated. These testing events are designed to test at least once and up to two times following initial in-school exposure. Testing typically occurs 7-14 days after the exposure date. In HERO testing, out of 530 tests, a total of 12 (including 8 students and 4 staff) positive cases were identified. Four positive cases were linked through households and therefore not considered school-associated leaving 8 as potentially school-associated for a secondary attack rate of approximately 1.5%.

## Additional School-Based Projects and Findings

Further inquiries were led or co-led by HERO Project leaders to address pertinent questions about school policies during the pandemic.

### What is the Risk of Covid-19 Infection Based on Learning Models?

Dr. Hersh from the HERO team collaborated in a study led by partners from Salt Lake County Health Department (Ian Buchta and Ilene Risk) and the Utah Department of Health (Abigail Collingwood and Angela Dunn) using data about school associated cases in Salt Lake County. One out of the five districts in Salt Lake County used an exclusively remote teaching model from the beginning of the 2020-2021 school year until February 2021. An analysis compared COVID risk across all districts in the county and found the rate of infection for in-person compared to remote learning was the same for elementary and middle school students. However, high school students in the districts using in-person learning had a 60% higher risk. Further study is necessary to determine whether this higher risk relates more to in-school or out-of-school exposures.

### Can Area Schools Shorten Quarantine Dismissals After Exposure Events?

Using a mathematical model, HERO leaders compared the risk of infection following different quarantine approaches used after known school exposures to Covid-19. These approaches included a seven-day quarantine with a negative test, and a 14 day quarantine period. The analysis predicted the likelihood of infection would be comparable for the exposed individual, helping support the safety of earlier return policies after dismissal. It is important to note the model assumed a low probability of in-school transmission consistent with data generated recently from Utah schools. This mathematical model was used by the CDC as part of their evidence base for revised quarantine guidelines for the general public.

### CDC Collaboration: What is the Risk of Elementary School Transmission?

Building on the work of the HERO Project's Case-Triggered testing, the HERO Project team collaborated with researchers from the Centers for Disease Control and Prevention (CDC) to investigate the prevalence of Covid-19 spread in elementary school settings. This study took place in the context of high community-wide infection rates and occurred in schools where students were spaced 3 feet apart on average. These schools used several prevention strategies to limit spread, the most important of which were strict requirements for mask use.

To conduct this study, researchers identified positive cases within participating elementary schools, connected each case to other individuals they had come in contact with through school and tested these school contacts. The researchers found only 5 positive cases out of the 735 contacts tested, an infection rate of 0.7%.

Overall, in-school transmission for elementary schools is low, especially when schools utilize methods like universal mask-wearing. Importantly, this was conducted when community-wide transmission is high and when students are spaced 3 feet apart, validating the ability of elementary schools to operate safely in-person under these conditions. This research contributed to the CDC's decision to revise schooling guidelines, now emphasizing that 3 feet of separation can be safe when combined with other prevention strategies.

## Implications and Next Steps

To date, HERO's school-based testing projects have established important baseline estimates for the rate of secondary transmission in schools among different populations and different learning models as well as the importance of asymptomatic infection. The project has also established a robust infrastructure to participate in nationwide collaborations with the CDC around classroom transmission. Findings to date indicate transmission rates in schools with strict adherence to mitigation strategies (including mask-wearing) are. Data from Salt Lake County provides strong support for continued emphasis on in-person learning in elementary and middle schools.  The insights gained about the frequency of asymptomatic infection have provided important background information to motivate the development and implementation of school-based testing strategies including Test to Stay and Test to Play.

In 2021, the HERO Project seeks to continue collecting and analyzing data about Covid-19 transmission in Utah's schools to support safe and effective provision of education to Utah's children. Specifically, the HERO Project plans to:

- Study the risk factors for infection for high school students. A survey has been designed to help characterize in and out of school behaviors and activities that will be administered to students across multiple districts. This will help us to better understand behavior and activities that increase the risk of infection specifically among high school students.
- Collaborate with colleagues from the Utah Department of Health to evaluate the impact of new testing strategies on safety in schools, such as Test to Play (regular screening for participation in extracurricular activities) and Test to Stay (school-wide testing when 1% of the school population has tested positive to remain in-person).
- Collaborate with local district and the Utah Department of Health to begin planning for school policies for fall 2021.
- Develop an understanding of plans for student vaccination and understand potential barriers and factors associated with hesitation.

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