ID: 60967377
Wastewater Surveillance - Host Site Description
California Department of Public Health

Assignment Location: Richmond, US-CA
California Department of Public Health
Division of Communicable Disease Control (DCDC)

Primary Mentor: Alexander T. Yu, MD, MPH
Chief, Surveillance Section, Coronavirus Control Branch
California Health and Human Services, California Department of Public Health

Secondary Mentor: Tomas M. Leon, PhD
Chief, Modeling Section, Coronavirus Control Branch
California Health and Human Services, California Department of Public Health

Work Environment
Hybrid

Assignment Description

The CSTE fellow will have a primary mentor and placement within the Wastewater Surveillance (WWS) team in the Surveillance section, a cross-cutting team that collaborates closely with the Modeling section and team (secondary mentor). The WWS and modeling teams also collaborate closely with pathogen subject matter experts across various branches, including the Immunization Branch (IZB) and Infectious Diseases Branch (IDB). This interdisciplinary collaboration aims to address cross-cutting topics relevant to wastewater surveillance and modeling in the context of communicable disease control. Both the WWS and modeling teams are situated within the California Department of Public Health (CDPH), Division of Communicable Disease Control (DCDC), Coronavirus Control Branch (CCB).

Anticipated Day-to-Day Activities:
The fellow's day-to-day activities will involve a diverse range of responsibilities, including but not limited to:
As part of the Wastewater Surveillance team:

- Evaluation of the utility of WWS for public health:
- Help assess the utility of wastewater surveillance for monitoring of additional pathogens, such as influenza B, Enterovirus D68 (EVD68), West Nile Virus (WNV), Candida auris (C. auris), etc.
- Collaborate with subject matter experts (SMEs) to understand the utility of wastewater in monitoring different pathogens for public health.
- Improve understanding of genomic epidemiology for COVID and other pathogens (e.g., influenza) using wastewater data.
- Interpret and validate wastewater data within the context of other surveillance methods.
- Contribute to the development of WWS for different pathogens to address public health needs.
- Conduct investigations of wastewater data, correlating findings with available epidemiologic datasets.
- Routine Reporting:
    - Generate and develop routine reports (including data visualizations, metrics, indicators, geospatial maps) of wastewater data for COVID, influenza, RSV, norovirus, and other pathogens that are incorporated into the WWS program (e.g., C.auris, EVD68, WNV).
- Coordinate with laboratories to receive laboratory and utility wastewater data.
- Perform data management and cleaning for wastewater and epidemiological data.
- Perform analyses to improve reports and interpretability of WWS data
- Help develop dashboards for effective communication of findings.
- Summarize and interpret data for routine internal calls and stakeholders.

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For Modeling Team:

1. Data Processing and Model Runs:
   - Process wastewater data and run simple models (of increasing complexity as the fellow's capacity allows).
   - Post-process data for sharing with the Modeling team.
   - Develop and monitor processing and evaluation pipelines for simple model runs.
2. Model Visualization and Evaluation:
   - Create visualizations of model output.
   - Evaluate model performance and contribute to iterative model improvements.
   - Collaborate in the development of more complex models, incorporating shedding and other factors as capacity allows.

Cross-Cutting Topics:
The fellow will actively engage in cross-cutting topics, collaborating with experts from different branches to gain exposure to a wide array of issues relevant to wastewater surveillance and modeling. This includes exploring the intersection of wastewater data with genomic epidemiology and investigating novel approaches to enhance the predictive capabilities of surveillance systems.

In summary, the fellow's assignment is a dynamic and multifaceted role within the Division of Communicable Disease Control at CDPH, contributing to the cutting-edge efforts of the Wastewater Surveillance and Modeling teams, and collaborating with experts to address important public health challenges.

Describe Statistical and Data Analysis Support, Such as Databases, Software, and Surveillance Systems Available to the Fellow

The CSTE fellow will have access to the CDPH wastewater surveillance database which contains viral concentrations of various pathogens, normalization factors, sewershed-related factors and metadata such as flow rates, that is shared by participating laboratories from over 100 sites in California and representing over 60% of the state's 40 million population. Other CDPH databases that will be available to the fellow include public health county and state level disease case counts, hospitalizations, emergency department admissions, vaccination, and other epidemiologic data stored and accessed via Snowflake. R is the preferred statistical software and R workbench is used for collaborative projects. R scripts used for accessing data from Snowflake and creating weekly reports will be shared by the team. Other software available include, but are not limited to SAS, Tableau, ArcGIS, Databricks, and Python.

Projects

Surveillance Activity Title: Enhancing Pathogen Monitoring - Focus on Candida auris (C. auris)

Surveillance Activity Description:
Wastewater surveillance can be a powerful tool in monitoring various pathogens, including for COVID, influenza, RSV, mpox, and norovirus. However, the performance and utility of wastewater surveillance for emerging pathogens like C. auris remain unknown. The fellow will lead a targeted surveillance activity to explore the value of wastewater data in monitoring and responding to C. auris outbreaks.

Key Components of the Surveillance Activity:

1. Pathogen Expansion:
   - Collaborate with the Wastewater Surveillance (WWS) team and academic research partners at Stanford and Emory university to expand the scope of monitored pathogens to include C. auris.
   - Work closely with laboratories to process and integrate wastewater data specifically for C. auris.

2. Interdisciplinary Collaboration:
   - Work closely with the Hospital-Acquired Infections (HAI) team to coordinate efforts in processing, summarizing, and visualizing C. auris-related wastewater data.
   - Collaborate with local health department epidemiologists to ensure a comprehensive understanding of the regional context and to improve interpretation of results.
3. Data Processing and Visualization:
   - Process and manage wastewater data for C. auris, ensuring data integrity and accuracy.
   - Create visualizations that effectively communicate C. auris detections and concentrations and trends over time.
4. Evaluate the value for monitoring C. auris through wastewater:
   - Work closely with the HAI team and local health department epidemiologists to evaluate the utility and reliability of wastewater data for C. auris surveillance.
   - Assess the correlation between wastewater concentrations and clinical surveillance data for C. auris.
5. Role in Response Activities:
   - Explore the potential role of wastewater data in enhancing response activities for C. auris outbreaks.
   - Develop protocols for integrating wastewater surveillance findings into existing public health response strategies.
6. Knowledge Exchange:
   - Facilitate knowledge exchange sessions with the Wastewater and HAI teams, sharing insights and findings.
   - Collaborate with subject matter experts to build a holistic understanding of the role for C. auris WWS within the broader public health framework at the state and local level.

Surveillance Activity Objectives:
Expected Outcomes: Whether WWS can be effectively used for monitoring of C. auris is uncertain. The goal of this project is to help evaluate whether there is value for incorporating C.auris into routine and continued WWS testing across the program. Specific objectives include:

1. Insights into C. auris Surveillance:
   - The fellow's engagement in this activity is expected to provide valuable insights into the utility of wastewater surveillance for C. auris (if any).
2. Informed Response Strategies:
   - Findings will contribute to the development of informed response strategies, incorporating wastewater data into a broader framework of C. auris surveillance and control (as applicable).
3. Enhanced Collaboration:
   - The collaborative effort with the Wastewater and HAI teams will foster stronger interdisciplinary collaboration, laying the groundwork for future joint initiatives using wastewater surveillance (e.g., monitoring antimicrobial resistance genes).

Deliverables
The surveillance activity outlined for monitoring C. auris through wastewater surveillance will generate several key deliverables:
1. Comprehensive Data Reports, Visualizations and Graphical Representations:
   - Detailed reports summarizing the processed wastewater data for C. auris, including concentrations, trends over time, and any observed patterns and comparisons with clinical surveillance data.
2. Interpretation and Report:
   - A report evaluating the utility and reliability of wastewater data for C. auris surveillance, highlighting the strengths, limitations, and recommendations for future improvements.

3. Final Presentation and publication:
   - A final presentation summarizing the entire surveillance activity, from the rationale and methodology to key findings and recommendations. This presentation could be delivered to relevant stakeholders, team members, and leadership.
   - A publication (abstract for conference and/or publication in journal), in collaboration with HAI and the WWS team, summarizing key analyses and takeaways.

Surveillance Activity Impact:
C. auris is a potentially severe, emerging, multi-drug resistant fungal infection that is not known to be widely circulating currently in many parts of California. As such, monitoring and control of C. auris in California is an important HAI priority. However, existing surveillance is resource-intensive and data are limited. The public health impact from this project is understanding if C. auris can be successfully monitored through wastewater surveillance, a currently unknown but important question that many states, countries, and the CDC are interested in. If effective, the additional impact of this project is delineating how wastewater surveillance could be leveraged to augment existing surveillance systems and improve public health prevention efforts. Such information would inform future design, implementation, and of WWS monitoring programs for C. auris in California and beyond. More specific potential public health impacts include:

1. Early Detection of Outbreaks: Wastewater surveillance for C. auris has the potential to serve as an early warning system for outbreaks. By detecting the presence of C. auris in wastewater before clinical cases are identified, public health authorities can communicate risk and implement timely response measures to contain the spread of the pathogen.
2. Improved Surveillance Accuracy: Integrating wastewater surveillance data with traditional clinical surveillance may enhance the accuracy and completeness of surveillance efforts. This comprehensive approach would provide a more nuanced understanding of C. auris transmission dynamics, allowing for more targeted public health interventions.
3. Enhanced Response Strategies: Findings from wastewater surveillance can inform and enhance response strategies for C. auris outbreaks. Public health authorities can use the data to identify high-risk areas, allocate resources effectively, and implement targeted infection control measures in healthcare settings.
4. Community Awareness and Engagement: Wastewater surveillance for C. auris raises awareness among healthcare providers, public health professionals, and the general public about the importance of infection control measures or risk of C. auris infection in patients and healthcare facility residents.
5. Long-Term Public Health Preparedness: Improved understanding of the utility of wastewater surveillance for C. auris strengthens public health preparedness and understanding of tools available to monitor for other HAI infections and for future outbreaks by similar pathogens.

Overall, the project's expected public health impact extends beyond the immediate detection and control of C. auris outbreaks, contributing to broader efforts to strengthen infectious disease surveillance, prevention, and control measures.

Surveillance System Evaluation Title: Evaluation of California's Wastewater Surveillance Network as a Sentinel Surveillance System for Respiratory Syncytial Virus (RSV) and Influenza Monitoring

Surveillance System Evaluation Description:
This project entails a comprehensive evaluation of California's wastewater surveillance network to assess its effectiveness as a sentinel surveillance system for monitoring respiratory syncytial virus (RSV) and influenza. The evaluation will focus on various aspects, including understanding the timeliness, geographic coverage, and demographic representation of the existing wastewater surveillance network monitoring for RSV and influenza.

It also includes evaluating the overall equity of the current wastewater surveillance program, including what populations are underrepresented in the current system (e.g., by socioeconomic status, rural vs urban). The fellow will also work with the Immunization Branch (IZB) RSV and influenza subject matter experts to understand the current needs of existing surveillance systems for RSV and influenza, and evaluate the ability of existing WWS to meet those needs. Additionally, the fellow will estimate the relative importance that each participant wastewater site has towards coverage, representativeness, and equitability as part of the network. Finally, the evaluation aims to identify opportunities for improvement in the wastewater surveillance network to address barriers to ensure robust surveillance coverage across diverse populations in California.

Surveillance System Objectives:
Objectives:

1. Evaluation of Surveillance System Components:
    - Assess the timeliness, geographic coverage, and demographic representation of California's wastewater surveillance network for monitoring RSV and influenza.
    - Evaluate the overall equity of the current wastewater surveillance program, including identification of populations underrepresented in the system based on social vulnerability index or healthy places index score, rural versus urban residence, and other factors.
    - Compare current wastewater surveillance network coverage with existing RSV and influenza surveillance, to understand:
        - Coverage needed for improved state-wide and regional WWS representativeness
        - Coverage neededl by WWS to meet other gaps or needs in existing surveillance
2. Site Importance Estimation:
    - Estimate the relative importance of each participant wastewater site in contributing to coverage, representativeness, and equity within the surveillance network.
3. Identification of Improvement Opportunities:
    - Identify and document potential ways to improve system coverage and address barriers to equitable participation, including strategies for enhancing geographic and demographic representation.

Project Deliverables:

1. Comprehensive Evaluation Report and Presentation:
    - A report summarizing the findings of the evaluation, including assessments of timeliness and coverage, and recommendations for improvement.
    - A final presentation summarizing the surveillance system evaluation, including key findings and recommendations. This presentation could be delivered to IZB, other relevant stakeholders, team members, and leadership.
2. Site Importance Analysis Report:
    - A short report summarizing findings of the relative importance of participant wastewater sites in contributing to surveillance network coverage, representativeness, and equity. This document will include recommendations on how to assess potential future WWS sites towards improving network representativeness.

Surveillance System Impact:

1. Enhanced Disease Surveillance:
    - Findings and recommendations will contribute to enhancing the effectiveness of California's wastewater surveillance network as a sentinel system for monitoring RSV and influenza, leading to improved disease detection and monitoring capabilities.
    - Findings will improve understandings of strengths and gaps of existing WWS network monitoring for RSV and influenza and identify areas for improvement; this will improve public health usefulness and interpretation of WWS data.

- Enhance our ability to effectively conduct surveillance for RSV and influenza, strengthening the state's capacity to detect, monitor, and respond to respiratory disease threats effectively.

Major Project Title: Understanding and Modeling the Relationship Between Wastewater Data and Clinical Surveillance for Respiratory Syncytial Virus (RSV)

Major Project Description:
The major project the CSTE fellow will conduct aims to investigate and understand how age demographics, environmental attributes, and other factors such as commute patterns influence the relationship between wastewater data and clinical surveillance data (e.g., sentinel surveillance positive tests, hospitalizations) for respiratory syncytial virus (RSV). By elucidating these relationships, the project seeks to develop a predictive model using RSV wastewater concentrations for positive tests and hospitalizations, accounting for relevant demographic, environmental, and other factors. The insights gained from this project will enhance our understanding of RSV transmission dynamics and improve our ability to forecast expected RSV cases and hospitalizations.

Key Components of the Project:

1. Data Analysis and Integration:
- Collect, clean and process existing datasets containing wastewater surveillance data, clinical surveillance data, demographic information, and other factors such as socioeconomic indicators, environmental data, and commute patterns.
- Integrate and harmonize these datasets to facilitate comprehensive analysis.
2. Relationship Assessment:
- Investigate how age demographics and other factors such as socioeconomic status, and commute patterns influence the relationship between wastewater RSV concentrations and clinical outcomes (e.g., positive tests, hospitalizations).
- Utilize statistical methods and data visualization techniques to explore these relationships.
3. Model Development:
- Develop a predictive model to estimate RSV wastewater concentrations based on relevant important factors identified from analytical work.
4. Validation and Calibration:
- Validate and calibrate the predictive model using historical data and cross-validation techniques.
- Assess the model's accuracy and reliability in predicting RSV wastewater concentrations and clinical outcomes.

Major Project Objectives:
Respiratory syncytial virus (RSV) poses a significant public health challenge, particularly for vulnerable populations such as young children, older adults, and individuals with underlying health conditions. Understanding the dynamics of RSV transmission and predicting outbreaks is important for effective public health preparedness and response. In this major project, we aim to investigate the relationship between wastewater data and clinical surveillance for RSV, with a focus on demographic and other factors that may influence this relationship. Through an improved understanding of this relationship, wastewater surveillance data may be better leveraged as a surveillance tool and for predictive forecasting models. The CSTE fellow will then incorporate factors identified as important into a predictive model of RSV cases and hospitalizations using wastewater concentrations, working closely with the modeling and wastewater surveillance teams. Such a predictive model will enhance our ability to understand WWS data for RSV and increase awareness and preparedness for increased cases or hospitalizations.

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Objectives:

1. Investigate Relationship Factors:
   - Analyze how age demographics and other factors such as socioeconomic status, environmental factors, and commute patterns influence the relationship between wastewater RSV concentrations and clinical outcomes, such as positive tests and hospitalizations.
2. Model Development:
   - Develop a predictive model to estimate RSV wastewater concentrations based on demographic and other factors.
3. Validation and Calibration:
   - Validate and calibrate the predictive model using historical data and cross-validation techniques to ensure accuracy and reliability.

Deliverables:

1. Summary report and presentation:
   - A report and final presentation summarizing the methodology and key findings of the analysis, model, and model performance. This presentation could be delivered to IZB, other relevant stakeholders, team members, and leadership.
2. Predictive Model:
   - The developed predictive model, accompanied by documentation outlining its structure, variables, and predictive performance metrics.
3. Technical Report:
   - A comprehensive technical report detailing the methodology used in investigating relationship factors, developing the predictive model, and validating/calibrating it. The report will include detailed findings and analyses and could be submitted as a conference abstract and/or publication.

Major Project Impact:
Improved Interpretation of WWS RSV data:

- Analyses from this project will enable improved understanding of factors that impact RSV wastewater concentrations. This is a current gap in wastewater surveillance understanding, but directly relevant to public health practitioners trying to extrapolate information from wastewater surveillance for public health action.
- Resource Allocation Optimization:
- Development of a WWS-based predictive model for RSV cases and hospitalizations can help inform resource allocation decisions including at the local health department level.
- Enhanced surveillance capabilities and predictive modeling will strengthen public health preparedness for RSV seasons and outbreaks.
- Future Preparedness for other Diseases:
- Improved understanding of the relationship between WWS for RSV and clinical surveillance data strengthens understanding of WWS use and interpretation for other respiratory pathogens and can be used as a template for understanding WWS performance for surveillance of other pathogens.
- Predictive models developed for RSV could be adapted for other similar pathogens.

Additional Project #1 Title: Wastewater Population Down-sampling Analysis
Project #1 Type:

Project #1 Description:
This project aims to test whether a sewershed or a group of sewersheds that cover only a portion of a county population may be used to infer disease transmission for the entire county.

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Wastewater monitoring provides a timely tool to track disease transmission – whether symptomatic or asymptomatic – within a community. Samples collected at wastewater treatment plants represent input from the entire population living or traveling within the wastewater treatment plant catchment area, called a 'sewershed'. Although this monitoring method provides useful insights about community transmission, it is geographically limited by sewershed boundaries. Sewershed boundaries often do not align with geographic boundaries relevant to public health disease monitoring, such as cities and counties. Additionally, cities or counties in rural areas often have portions of the population that are not connected to centralized wastewater utility networks. Given this, it is important to understand how well we can understand about disease transmission in broader communities surrounding sewersheds where wastewater data are provided.

The wastewater monitoring network in California provides an ideal scenario to investigate this question. Multiple counties in California contain multiple sewersheds with active wastewater monitoring programs that cover more than 50% of the total county population. These sewersheds may be utilized to investigate how down-sampled wastewater monitoring data from a subset of sewersheds within each county compare with more complete wastewater monitoring data from all sewersheds within each county. To assess the performance of downsampled wastewater data, wastewater-derived R-effective values will be calculated from all available wastewater data within each county, aggregated by a population-weighted average. Then, populations from each county will be downsampled by utilizing data from different subsets of sewersheds within the county, and R-effectives will be derived from these downsampled wastewater data. These downsampled R-effective trajectories will be compared against the full-coverage R-effective trajectories by calculating mean absolute error. Additionally, R-effective values will be grouped into transmission strength categories (Re of <0.7, 0.7-0.9, 0.9-1.1, 1.1-1.3, >1.3, representing a sharp decrease, decrease, stability, increase, and sharp increase in Re, respectively). A confusion matrix will be used to assess the agreement of categories between R-effective trajectories derived from all available wastewater data vs. downsampled data. Finally, downsampled R-effective trajectories will be compared against clinically-derived county-level R-effective trajectories using the same two validation metrics (mean absolute errors and confusion matrices).

Project #1 Objectives and Expected Deliverables:
The objective of this project is to assess the representativeness of wastewater monitoring data from subsets of county populations in California. Expected deliverables include quantitative validation results assessing the effectiveness of downsampled wastewater data for representing disease transmission within the entire county. Another objective is to identify a lower limit of population coverage by wastewater monitoring that is sufficient to represent a county population. Results will directly inform how existing models (e.g., R-effective) can be improved or expanded to additional geographies in the future.

Project #1 Impact:
Overall, the project deliverables of this analysis will aid in the appropriate interpretation of wastewater monitoring data and identify the limits of wastewater monitoring for understanding disease circulation in broader communities. If downsampled data for each county performs similarly to more complete population data, this will aid in data analysis for other counties in California. For example, if population coverage of 20% is sufficient to infer disease transmission for a county, then counties in California with lower wastewater monitoring population coverage may have increased confidence in using wastewater data to assess disease transmission within the entire county. Conversely, if population coverage below 50% performs poorly in representing transmission within the county, then this is also useful information for counties with lower wastewater monitoring population coverage. Evaluating the representativeness of wastewater data from restricted geographic areas for broader communities will also be useful for decision-making about ongoing wastewater surveillance efforts and for identifying how many wastewater monitoring sites are sufficient to capture disease trends within counties, regions, and the state. In addition, products of this project may directly inform the design and coverage of existing surveillance products (e.g., existing R-effective models) important to public health.

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Please Describe the Fellow's Anticipated Role in Preparedness and Response Efforts – Include Activities and Time Allocation (Required Competency of Fellowship)

The fellow will play an important role in preparedness and response efforts, leveraging their expertise in wastewater surveillance and collaboration with key stakeholders to develop strategies and protocols for the rapid deployment of wastewater surveillance during outbreaks or emergencies. By synthesizing knowledge from various sources and considering the infrastructure, partnerships, and coordination networks required, the fellow will contribute to enhancing California's readiness to respond effectively to public health threats such as polio or outbreaks (e.g., C. auris or norovirus).

Key Responsibilities:

1. Preparedness and Response Document Development:
   - Utilize understanding of wastewater surveillance and insights gathered from key stakeholder interviews to create a comprehensive protocol document for the rapid deployment of wastewater surveillance during outbreaks or emergencies. This protocol will focus on response to the emergence of a specific disease (polio) in California as the main example but will include considerations for adapting to other diseases/situations.
2. Infrastructure Assessment:
   - Identify the wastewater surveillance infrastructure needed to implement surveillance during an emergency response or outbreak, including wastewater treatment plant sampling sites, laboratory facilities, and any technical equipment requirements.
3. Partnership and Coordination Networks:
   - Outline the partnerships and coordination networks required at different stages of a response, including collaboration with local health departments, laboratory facilities, regulatory agencies, and community stakeholders.
4. Geographic Sampling Considerations:
   - Define considerations for determining the geographic level of sampling needed, balancing factors such as population density, disease transmission dynamics, ethics, and resource cost and availability.
5. Laboratory and Technical Needs:
   - Specify laboratory and technical needs for wastewater surveillance during outbreaks, including sample collection protocols, testing methodologies, and data analysis procedures.
   - Identify considerations for laboratories during an emergency that will need to be considered (e.g., poliovirus potentially infectious material [PIM], special agent, biosafety level)
6. Communications Plan Establishment:
   - Develop a communications plan to facilitate timely and effective dissemination of surveillance findings to relevant stakeholders, including public health authorities, policymakers, and the general public.
7. Regulatory, Legal, and Ethical Considerations:
   - Identify any regulatory, legal, and ethical considerations associated with the deployment of wastewater surveillance during emergency and outbreaks, and/or contacts necessary to address these issues.

The fellow's anticipated role in preparedness and response efforts will be important to strengthening California's ability to detect, monitor, and respond to public health threats through the rapid deployment of wastewater surveillance. By developing protocols, facilitating partnerships, and supporting outbreak response efforts, the fellow will contribute to enhancing the resilience of California's public health infrastructure and safeguarding the health and well-being of its residents. This activity is anticipated to span four months, with an average of 10 hours spent on this activity per week.

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Please Describe the Fellow's Anticipated Role in Cluster and Outbreak Investigations – Include Activities and Time Allocation (Required Competency of Fellowship)

Support in Cluster / Outbreak Response:

- The fellow will actively support a cluster or outbreak response effort. Such a response effort can include for pathogens such as C. auris, norovirus, or mpox. Such activities will include working with the WWS team to process related WWS data, working with state subject matter experts and epidemiologists leading the response, and coordinating with utility, laboratory, and/or local health departments to understand needs for WWS to support the cluster and/or outbreak response. The fellow will leverage their expertise in wastewater surveillance to provide real-time data and insights to inform public health decision-making.

This activity is anticipated to span three months, with an average of 10-20 hours spent on this activity per week.

Please Describe the Fellow's Anticipated Role in the COVID-19 Response – Include Activities and Time Allocation

The CSTE fellow will be primarily situated on the wastewater surveillance team, with secondary mentorship with the modeling team. Both the wastewater surveillance and modeling teams are within the COVID control branch (CCB); the primary purpose of both teams is to support the COVID-19 response. The CSTE fellow will be expected to:

- Generate and develop routine reports (including data visualizations, metrics, indicators, geospatial maps) of wastewater data for COVID.
- Perform data management and cleaning for COVID-19 wastewater and epidemiological data.
- Contribute to analyses to improve reports and interpretability of WWS data, and develop dashboards for effective communication of findings.
- Conduct analyses and investigations of wastewater data, and correlate findings with available epidemiologic datasets, to improve our understanding of effective ways for wastewater to supplement existing COVID-19 surveillance data.
- Improve understanding of genomic epidemiology for COVID variants using wastewater data.

Please Describe Opportunities for Fellows to Work in Health Equity as well as Incorporating Diversity, Equity, and Inclusion into their Work

The fellow will have the opportunity to work on projects evaluating equity in wastewater surveillance coverage. One ongoing project for instance includes evaluating CA WWS coverage during the 2022 global mpox outbreak. The aim of the project is to determine if trends in wastewater mpox detections varied by sewershed-level Healthy Places Index (HPI) score, a measure of health equity, and compare these findings to where the most clinical testing was utilized and where mpox cases were identified. Using hotspot and cluster analysis, we will identify the most informative sites in each CA region where wastewater sentinel surveillance can continue cost-effective monitoring of mpox, as mpox testing declines. These methods can also be extended to measure how equitable wastewater monitoring for influenza and RSV is in CA and how it compares to sentinel case-based surveillance.