



Genomic Sequencing Enables the Right Response in Ecuador

RISE-supported Labs Help Meet Pandemic Threats

As a leader in the genome sequencing of the COVID-19 virus in South America, the government of Ecuador was uniquely positioned in the region to reduce COVID-19 cases by tracking the spread through variants identified by genomic sequencing. The Reaching Impact, Saturation, and Epidemic Control (RISE) project partnered with the government to support its efforts by strengthening laboratory capacity by donating special equipment and providing training in genome sequencing of SARS-CoV-2.

Working in close collaboration with the Ministry of Public Health (MoPH) and the University of San Francisco De Quito (USFQ), RISE, funded by the U.S. Agency for International Development, expanded the use of advanced patient sampling to improve disease surveillance. The project enhanced the capacity of the USFQ Department of Microbiology's genomic sequencing laboratory – one of only three such advanced labs in Ecuador – with additional staff and new policies, procedures and equipment.

Genomic Sequencing

For genomic sequencing surveillance to provide the MoPH with a precise picture of where a pathogen is surging, samples are required from all over the country and need to be processed quickly. RISE supported the development of all aspects of this effort.

“Thanks to the RISE project we have been able to improve our equipment. This will allow us to continue monitoring which variants are circulating in a specific population, knowing that SARS-COV-2 will continue to stay among us.”

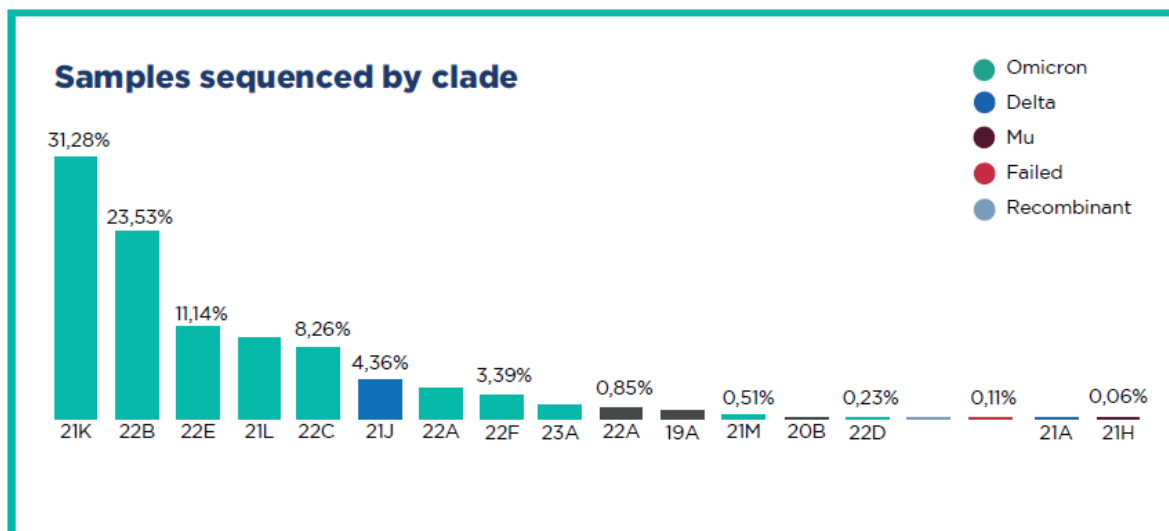
Patricio Rojas, Director of the Master's Program in Microbiology, USFQ.

RISE improved the efficiency of the USFQ lab by hiring and strengthening competencies of staff through enhanced training, and developing a reliable, quick process to collect patient samples and convey them to the labs without spoilage. Each of these improvements occurred while RISE facilitated the implementation of [Whole Genome Sequencing](#). All of these changes enabled the MoPH to respond

locally and globally. Through this support, the MoPH can anticipate the need for oxygen supply, availability of beds and can prepare for a public health emergency and restrictions for surging areas. The MoPH also can inform global communities that may be impacted, and consider steps for border control.

RISE strengthened the capacity of Ecuador's national-level genome sequencing laboratories through hiring and training laboratory specialists to collect and process samples, and by procuring a genome sequencer as well as the supplies required for sample processing. With the RISE-donated equipment, the USFQ lab can now sequence five times more samples than before; computer analysis is also faster. RISE's support enabled the expansion of genomic sequencing coverage from 0.1% to almost 1% of the national population diagnosed with COVID-19 – the percentage needed for reliable population projections. This means that by





As of March 31, 2023, 1059 samples from 18 provinces were transported in a timely manner with the support of RISE Ecuador. USFQ Laboratory sequenced a total of 1,768 samples. Samples were collected at hospitals where RISE hosted practice-based trainings and from primary health centers. Of the total samples sequenced, Omicron (21k) and (22B) were the leading variants during RISE's support.

processing samples faster and in greater quantity the lab can find new outbreaks in days, instead of watching COVID-19 cases rise over weeks.

RISE further supported these pandemic surveillance efforts by creating a network of facilities across Ecuador to collect patient specimens for sequencing. "RISE helped us to establish direct contact and collaboration with the MoPH and specific health centers, allowing us to do nationwide sampling in a uniform way. Furthermore, RISE supported us in the training and creation of manuals that helped health professionals take COVID-19 samples in a proper way and with informed consent from patients," said Verónica Barragan, Undergraduate Microbiology Coordinator, USFQ.

RISE hired a country-wide courier to transport the collected specimens safely and without damage. By the end of the project, RISE had supported the processing and genomic sequencing of 1,768 virus samples from 18 provinces, and transported 1,059 samples for sequencing at the national laboratory.

Surveillance Tool that Will Last

Genomic sequencing is essential to national epidemiological surveillance. The government of Ecuador has already asked the national labs and USFQ to expand sequencing from COVID-19 to other contagions of concern like avian flu, Mpox, and leptospirosis. Full access to genome sequencing capabilities allows the government to rapidly identify new variants of concern when there are new clusters, atypical cases, or surges.

"Working together with RISE allowed us to efficiently share valuable information at critical moments of the pandemic with the Ministries of Health and the Municipality of Quito, helping them to take important decisions knowing which variants are circulating in the country," said Paúl Cárdenas, Director of the Center of Bioinformatics, USFQ.

At the height of the COVID-19 pandemic, the scope of sequencing at the national level in Ecuador enabled timely decision-making. This support for genomic sequencing favors sustainability in the surveillance of virus transmission and pathogen drug resistance and contributes to Ecuador's long-term health security.