

Modeling and Preparedness: The Transmission Dynamics of COVID-19 Outbreak in Provinces of Ecuador

Carlos Bustamante-Orellana^{1,*}, Jordy Cevallos-Chávez¹, Cesar Montalvo-Clavijo², Jeff Sullivan³, Edwin Michael⁴, and Anuj Mubayi^{3,5}

¹Arizona State University, Tempe

²University of Virginia

³PRECISIONheor, Precision Medicine Group, Los Angeles

⁴University of South Florida, Tampa

⁵College of Health Solutions, Arizona State University, Tempe

cbustam3@asu.edu

COVID-19 disease has become a pandemic just a few months after it was first detected. Ecuador has reported one of the highest rates of COVID-19 in Latin America, with more than 62,000 cases and 8,500 deaths in a country of approximately 17 million people. The dynamics of the outbreak is being observed quite different in different provinces of Ecuador with high reported prevalence in some low population density provinces. In this study, we aim to understand the variations in outbreaks between provinces and provide assistance in essential preparedness planning in order to respond effectively to ongoing COVID-19 outbreak. This study estimated the critical level of quarantine rate along with corresponding leakage in order to avoid overwhelming the local health care system. The results suggest that provinces with high population density can avoid a large disease burden provided they initiate early and stricter quarantine measures even under low isolation rate. To best of our knowledge, this study is first from the region to determine which provinces will need much preparation for current outbreak in fall and which might need more help.