

Tomás Martín León, PhD – Modeling Section Chief

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Personal Statement

I am the Modeling Section Chief (Team Lead) in the Division of Communicable Disease Control at the California Department of Public Health (CDPH). I was hired on the COVID-19 Modeling and Advanced Analytics Team at CDPH in 2020 as the first formally trained infectious disease modeler on what may still be the only state health department modeling team in the United States. I was involved in many forecasting and analytics efforts for California's COVID-19 response, including the Regional Stay at Home Order, variant nowcasting and scenario modeling with the emergence of Alpha, and surveillance-based analyses of post-vaccination and reinfection COVID-19 outcomes. I became Team Lead in 2021 and hired several other infectious disease modelers who have done pioneering work at CDPH in flu forecasting and scenario modeling, the mpox response, expanding our public-facing state modeling website CalCAT, wastewater-based modeling, and building automated SaTScan dashboards. In my role, I interact directly with our leadership and policymakers and guide our team in developing evidence to inform their decision making. I support making data and projections as publicly available as possible through CalCAT and our Open Data Portal and also work closely with our local health jurisdictions to meet their modeling needs. Our team's portfolio continues to evolve, as we begin modeling work on respiratory syncytial virus (RSV), West Nile virus, and congenital syphilis.

My background is in environmental health and engineering, with particular attention to the role the environment plays in modulating disease transmission (my PhD focused on parasitic diseases and my postdoc focused on vector-borne diseases). I have experience bringing multiple disciplines to bear on modeling problems; in my PhD I used hydrologic modeling to understand parasite fate and transport, and in my postdoc I used movement models to simulate releases of gene-edited mosquitoes. I have a strong track record of supporting evidence-based decision making for policy questions and exemplified this throughout the COVID-19 pandemic on the Modeling Team. I am excited to continue to work to benefit all Californians and the greater community with cutting-edge modeling and advanced analytics applied to priority public health questions for an ever-expanding range of communicable diseases.

Professional Positions

Modeling and Advanced Analytics Section, California Department of Public Health	2020–
Section Chief	2021–
Statistician Modeler	2020–2021
Climate Sciences Consultant, Pacific Island Health Officers Association	2021–
Project: Dengue early warning systems in Micronesia and the Marshall Islands	
Lecturer, School of Public Health, UC-Berkeley	2019–2022
Postdoctoral Researcher, School of Public Health, UC-Berkeley	2018–2020
Marshall Lab: Research on <i>Aedes</i> and <i>Anopheles</i> mosquito movement, ecology, and modeling	

Education

PhD in Environmental Health Sciences, University of California, Berkeley	2018
Designated Emphasis in Development Engineering	
Dissertation: Elucidating Liver Fluke Transmission Dynamics: Synthesizing Lab, Field, & Modeling Methods	
Advisor: Robert C. Spear	
MS in Global Health and Environment, University of California, Berkeley	2014
Thesis: Environmental Factors Impacting Liver Fluke Transmission in Natural Waters and Aquaculture Systems	

BS in Environmental Engineering, Georgia Institute of Technology

2012

Minor in Sociology

Awards and Fellowships

Templeton Ideas Challenge Prize (https://www.templeton.org/models-winners)	2020
Presidential Management Fellowship (declined)	2018
National Science Foundation Graduate Research Fellowship	2012–2017
Foreign Language and Area Studies Fellowship	2015–2016
Fulbright Student Research Scholarship (Thailand)	2014–2015
CDC ORISE Fellowship	2011–2012
Georgia Tech President's Scholarship	2008–2012
Outstanding Senior in CEE (Georgia Tech)	2011

Teaching

University of California, Berkeley

Introduction to GIS for Public Health – instructor of record and lecturer (2020, 2021, 2022)
Environmental and Occupational Epidemiology – guest lecture, “WaSH and Helminth Disease Epidemiology” (2019, 2020)
CRISPR Genome Editing: From Biology to Technology – guest lecture, “Gene Drives” (2020)
Infectious Disease Modeling – guest lecture, “Introduction to Stochastic Modeling” (2019)
Intro to Environmental Health Sciences (for MPH students) – graduate student instructor (2017)
Intervention Trial Design – graduate student instructor and guest lectures (2016)
Intro to Environmental Health Sciences (for MPH students) – guest lecture, “Environmental Pathways for Infectious Disease” (2015)

Mount Tamalpais College/Patten University

Public Health – curriculum designer and lead instructor (2019)
Environmental Justice Workshop – research assistant and guest lecturer (2019)

Relevant Experience

Tropical Disease Research Laboratory (Khon Kaen University) / Chinese Center for Disease Control and Prevention **Khon Kaen, Thailand/ Jiangmen and Chengdu, China**
Graduate Researcher/Fulbright Scholar **2013 - 2018**

- Developed hydrology-driven metapopulation disease transmission model for liver flukes in Thailand
- Conducted field work for M.S. and Ph.D. in Thai and Chinese villages studying the transmission of the liver flukes *Opisthorchis viverrini* and *Clonorchis sinensis* in aquaculture and natural settings
- Planned and coordinated research experiments and lab operations with collaborators and local field teams, processing water, snail, fish, and reservoir host samples

Centers for Disease Control and Prevention (NCEH/ATSDR) **Chamblee, GA**
Collegiate Leader in Environmental Health Intern/ORISE Fellow **2011 - 2012**

- Prepared environmental chemical exposure reports for brownfield sites across United States
- Developed programming tool to calculate doses of chemical and particulate emission exposures
- Modeled and analyzed emissions from contaminated Chinese drywall to determine human health effects

- Studied strains of *E. coli* to differentiate between them in order to better determine which species indicate fecal contamination in water sources through isolation work and metagenomic mapping

Recent Peer-Reviewed Publications

- E. Lin, A. Bilinski, P.A. Collender, V. Lee, S. Sud, **T.M. León**, L.A. White, J.V. Remais, J.R. Head (2024, *JAMA Network Open*). Association of COVID-19 incidence with age eligibility for elementary school in California.
- S. Zhu, K. McCullough, J.M. Pry, S. Jain, L.A. White, **T.M. León** (2024, *Scientific Reports*). Modeling the burden of long COVID in California with quality adjusted life-years (QALYS).
- C.M. Hoover, E. Estus, A. Kwan, K. Raymond, T. Sreedharan, **T.M. León**, S. Jain, P.B. Shete (2024, *Health Affairs*). California's COVID-19 Vaccine Equity Policy: Cases, Hospitalizations, And Deaths Averted In Affected Communities: Study examines California's COVID-19 vaccine equity policy.
- J.R. Head, P.A. Collender, **T.M. León**, L.A. White, S.R. Sud, S.K. Camponuri, V. Lee, J.A. Lewnard, J.V. Remais (2024, *JAMA Network Open*). COVID-19 Vaccination and Incidence of Pediatric SARS-CoV-2 Infection and Hospitalization.
- S. Zhu, J. Quint, **T.M. León**, M. Sun, N.J. Li, M.W. Tenforde, S. Jain, R. Schechter, C. Hoover, E.L. Murray (2024, *MMWR: Morbidity & Mortality Weekly Report*). Interim Influenza Vaccine Effectiveness Against Laboratory-Confirmed Influenza--California, October 2023-January 2024. 73(8).
- S.M. Mathis, A.E. Webber, **T.M. León**, et al. (2024, *Nature Communications*). Evaluation of FluSight influenza forecasting in the 2021–22 and 2022–23 seasons with a new target laboratory-confirmed influenza hospitalizations.
- S. Ravuri, E. Burnor, I. Routledge, N. Linton, M. Thakur, A. Boehm, M.K. Wolfe, H.N. Bischel, C.C. Naughton, A.T. Yu, L.A. White, **T.M. León** (2024, under review, available on *medRxiv*). Real-time county-aggregated wastewater-based estimates for SARS-CoV-2 effective reproduction numbers.
- A.T. Kwan, J. Vargo, C. Kurtz, M. Panditrao, C.M. Hoover, **T.M. León**, D. Rocha, W. Wheeler, S. Jain, E.S. Pan, P.B. Shete (2024, under review, available on *medRxiv*). The Integration of Health Equity into Policy to Reduce Disparities: Lessons from California during the COVID-19 Pandemic.
- H.J. Park, S.T. Tan, **T.M. León**, S. Jain, R. Schechter, N.C. Lo (2023, *Open Forum Infectious Diseases*). Predicting the Public Health Impact of Bivalent Vaccines and Nirmatrelvir-Ritonavir Against Coronavirus Disease 2019.
- A. Rabe, S. Ravuri, E. Burnor, J.A. Steele, R.S. Kantor, S. Choi, S. Forman, R. Batjiaka, S. Jain, **T.M. León**, D.J. Vugia, A.T. Yu (2023, *Journal of Water & Health*). Correlation between wastewater and COVID-19 case incidence rates in major California sewersheds across three variant periods.
- M.R. Sternberg et al. (2023, *PLoS ONE*). Application of a life table approach to assess duration of BNT162b2 vaccine-derived immunity by age using COVID-19 case surveillance data during the Omicron variant period.
- K.C. Ma, V. Dorabawila, **T.M. León**, H. Henry, A.G. Johnson, E. Rosenberg, et al. (2023, *MMWR*). Trends in Laboratory-Confirmed SARS-CoV-2 Reinfections and Associated Hospitalizations and Deaths Among Adults Aged ≥ 18 Years—18 US Jurisdictions, September 2021–December 2022.

L.A. White, R. McCorvie, D. Crow, S. Jain, **T.M. León** (2023, *BMC Public Health*). Assessing the accuracy of California county level COVID-19 hospitalization forecasts to inform public policy decision making.

T.M. León, V. Dorabawila, L. Nelson, E. Lutterloh, U.E. Bauer, B. Backenson, M.T. Bassett, H. Henry, B. Bregman, C.M. Midgley, J.F. Myers, I.D Plumb, H.E. Reese, R. Zhao, M. Briggs-Hagen, D. Hoefler, J.P. Watt, B.J. Silk, S. Jain, E.S. Rosenberg (2022, *MMWR*). COVID-19 cases and hospitalizations by COVID-19 vaccination status and previous COVID-19 diagnosis—California and New York, May–November 2021.

L.A.C. Chapman, P. Shukla, I. Rodríguez-Barraquer, P.B. Shete, **T.M. León**, K. Bibbins-Domingo, G.W. Rutherford, R. Schechter, N.C. Lo (2022, *Scientific Reports*). Comparison of COVID-19 vaccine prioritization strategies in the United States.

A. Yu, B. Hughes, M. Wolfe, **T.M. León**, D. Duong, A. Rabe, L. Kennedy, S. Ravuri, B. White, K. Wigginton, A. Boehm, D. Vugia (2022, *Emerging Infectious Diseases*). Estimating relative abundance of two SARS-CoV-2 variants through wastewater surveillance at two large metropolitan sites.

S.L. Wu, J.B. Bennett, H.M. Sánchez C., A.J. Dolgert, **T.M. León**, J.M. Marshall (2021, *PLoS CompBio*). MGDriVE 2: A simulation framework for gene drive systems incorporating seasonality and epidemiology dynamics.

T. Ha, **T.M. León**, K. Lalangui, P. Ponce, J.M. Marshall, V. Cevallos (2021, *Parasites & Vectors*). Household-Level Risk Factors for *Aedes aegypti* Pupal Density in Guayaquil Ecuador.

T.M. León, J. Vargo, E.S. Pan, S. Jain, P.B. Shete (2021, *Open Forum Infectious Diseases*). Nonpharmaceutical Interventions Remain Essential to Reducing COVID-19 Burden Even in a Well-Vaccinated Society: A Modeling Study.

J.M. Marshall, R. Raban, N.P. Kandul, J.R. Edula, **T.M. León**, O. Akbari (2019, *Frontiers in Genetics*). Winning the tug-of-war between effector gene design and pathogen evolution in vector population replacement strategies.

J.C. Utazirubanda, **T.M. León**, P. Ngom (2019, *Communication in Statistics: Simulation and Computation*). Variable selection via Group LASSO Approach: Application to the Cox Regression and frailty model.

T.M. León, T.C. Porco, C.S. Kim, S. Kaewkes, W. Kaewkes, B. Sripa, R.C. Spear (2018, *Acta Tropica*). Modeling liver fluke transmission in northeast Thailand: impacts of development, hydrology, and control.

P. Echaubard, **T.M. León**, K. Suwanatrai, J. Chaiyos, C.S. Kim, F.F. Mallory, S. Kaewkes, R.C. Spear, B. Sripa (2017, *International Journal for Parasitology*). Experimental and Modeling Investigations of *Opisthorchis viverrini* Miracidium Transmission Over Time and Across Temperatures: Implications for Control.

Mentoring

Students Supervised

Phoebe Lu, PhD(c), UCLA	2022-
Sophie Zhu, PhD, UC-Davis	2022
Sindhu Ravuri, BS & BA, Bioengineering and Molecular & Cell Biology, UC-Berkeley	2021
Darpa Anireddy, BA, Public Health, UC-Berkeley	2020
Daniel Lopez, BA, Molecular & Cell Biology, UC-Berkeley	2020
Thien-An Ha, MPH, Epidemiology & Biostatistics, School of Public Health, UC-Berkeley	2019–2020

Luis Rodrigo Careaga Sotomayor, MS Computer Science, Tecnológico de Monterrey, México

2019

Cheyenne Butcher, MS, Environmental Health Sciences, School of Public Health, UC-Berkeley

2017–2018

Skills

Languages: English – native; Spanish – conversational; Thai – conversational

Programming/Software: R, QGIS, Git, Microsoft/Google tools – proficient; Python, SQL, ArcGIS – intermediate; MATLAB, C++, Julia – basic