

# Rafael Lopes, Ph.D.

Postdoctoral Associate · Department of Epidemiology of Microbial Diseases & Public Health Modeling Unit

Yale School of Public Health, Yale University · 350 George St., New Haven, CT 06510, USA

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## PROFILE

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Quantitative modeling of infectious diseases and climate-sensitive epidemics. I build statistical and mathematical models for incomplete, delayed, and heavy-tailed data, from ecological and mosquito-borne disease systems to national epidemics and pandemics. Lead developer of an open R package used by a national ministry of health, with experience in research leadership, competitive grant applications, and the supervision of PhD, MSc, and MPH students.

## ACADEMIC & RESEARCH APPOINTMENTS

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**2023–present Postdoctoral Associate (Microbial Diseases)** — Yale School of Public Health, Yale University

- 2025–present: climate epidemiology of arboviruses — attribution of climate impacts on dengue, chikungunya, and Zika in the Americas.
- 2023–2025: CDC Advanced Molecular Detection program — integration of pathogen genomic and epidemiological data streams to inform real-time decision-making.
- Development of early-warning and nowcasting methods for outbreak detection.

**2022–23 Researcher (Nowcasting)** — All for Health Institute, São Paulo, Brazil

- Developed and applied nowcasting and machine learning models to electronic health records, building a municipal-level early-warning system for dengue outbreaks in Brazil.

**2022 Data Scientist / Full-Stack Developer (Surveillance)** — São Paulo State CDC, Brazil

- Built and deployed internal surveillance dashboards and reports for notifiable respiratory diseases (influenza, COVID-19); integrated them into the center’s routine surveillance workflow and trained public health practitioners in their use.

## EDUCATION

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**2022 Ph.D., Theoretical Physics** — Institute for Theoretical Physics - São Paulo State University (UNESP), Brazil

*“Dengue dynamics under climate drivers: Analysis with ecological and epidemiological frameworks”*

*Supervisor: Roberto A. Kraenkel*

**2021–22 Visiting doctoral researcher** — Barcelona Institute for Global Health (ISGlobal), Spain (CAPES exchange fellowship)

**2018 M.Sc., Theoretical Physics** — São Paulo State University (UNESP), Brazil

**2014 B.S., Physics** — University of Campinas (UNICAMP), Brazil

## GRANTS & FELLOWSHIPS

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**2026–2028 Helios Foundation Fellowship for Visiting Researchers** — Université Libre de Bruxelles (ULB), Brussels, Belgium

**2021–2022 Exchange period fellowship** — Coordination for the Improvement of Higher Education Personnel (CAPES), Brazil

**2018–2022 Ph.D. fellowship** — National Council for Scientific and Technological Development (CNPq), Brazil

**2016–2018 M.Sc. fellowship** — National Council for Scientific and Technological Development (CNPq), Brazil

## PUBLICATIONS

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*\* first, co-first or senior author; ° corresponding author. Publications up to 2022 appear under the name R. L. P. da Silva.*

### Preprints and manuscripts under review

[P1] Porzucek AJ, **Lopes R\***, Chew YT, Li K, Brady OJ, Warren JL, Carlson CJ, Weinberger DM, Grubaugh ND. Variations in annual dengue intensities are explained by temperature anomalies. *medRxiv* (2025). Under review at *Proceedings of the National Academy of Sciences*.

- [P2] Emma Taylor-Salmon, Yi Ting Chew, **Rafael Lopes\***, Timothy Locksmith, Edgar Kopp, Julieta Vergara, Amanda Davis, Molly Mitchell, Pamela Colarusso, Sarah Schmedes, Valerie Mock, Blake Scott, Rebecca Zimler, Chalmers Vasquez, Maday Moreno, Lauren M Paul, Scott F Michael, Mallery I Breban, Chantal BF Vogels, Joshua L Warren, Colin J Carlson, Danielle Stanek, Lea Heberlein, Verity Hill, Andrea Morrison, Nathan D Grubaugh. Frequent introductions and climate suitability drive increasing dengue risk in Florida. *medRxiv* (2026). Under review at *Nature Communications*.
- [P3] Hill V, Dudas G, Ji X, Huits R, Hamer DH, Joshi HK, Porzucek AJ, **Lopes R**, Robertson H, Whittaker CF, et al. Phylodynamic analysis reveals asymmetric and accelerating global spread of dengue virus. *bioRxiv* (September 2026).
- [P4] Good S, Porzucek AJ, Chew YT, **Lopes R\***, Rankin N, Carrington CVF, Ooi EE, Brito AF, Hill V, Grubaugh ND. Tracking two decades of global dengue virus lineage dynamics. *bioRxiv* (October 2026).

#### Peer-reviewed original research

- [1] Ellie Bourgikos, Simon Dellicour, Philippe Lemey, Nicole M Feriancek, Angela B Bransfield, Mallery I Breban, Michael J Misencik, Tanya A Petrucci, John J Shepard, Theodore G Andreadis, John F Anderson, Kiet A Ngo, Joseph G Maffei, Alan P Dupuis, Stephen M Rich, Guang Xu, Gabrielle Sakolsky, Keith J Price, Madeline L Metzger, Marc A Suchard, **Rafael Lopes**, Fabiana Gámbaro, Colin J Carlson, Guy Baele, Alexander T Ciota, Chantal BF Vogels, Verity Hill, Philip M Armstrong, Nathan D Grubaugh. Evolutionary history of Jamestown Canyon virus reveals complex multi-vector ecology, *Current Biology* 36(9): 2343–2356 (2026)
- [2] **Lopes R\***, Lan Y, Chitwood MH, Klaassen F, Salomon JA, Menzies NA, Warren JL, Grubaugh ND, Cohen T, Swartwood NA. Quantifying the spatiotemporal dynamics of the first two epidemic waves of SARS-CoV-2 infections in the United States. *PLOS Computational Biology* 22(3): e1013983 (2026).
- [3] Klaassen F, Swartwood NA, Chitwood MH, **Lopes R**, Haraguchi M, Salomon JA, Cohen T, Menzies NA. National- and state-level SARS-CoV-2 immunity trends from January 2020 to December 2023: a mathematical modeling analysis. *Journal of Infectious Diseases* 233(4): 714–724 (2026).
- [4] Mikdashi F, Murray-Watson RE, **Lopes R**, Bilinski A, Yaesoubi R. Estimating the quality-adjusted life-year loss due to fatal and nonfatal COVID-19 outcomes across US states and counties, July 2020 to December 2022. *MDM Policy & Practice* 11(2): 23814683261461551 (2026).
- [5] Pham K, Chaguza C, **Lopes R**, Cohen T, Taylor-Salmon E, Wilkinson M, Katebi V, Grubaugh ND, Hill V. Large-scale genomic analysis of SARS-CoV-2 Omicron BA.5 emergence in the United States. *Emerging Infectious Diseases* (2025), supplemental issue: Advances in Pathogen Genomics for Infectious Disease Surveillance, Control and Prevention.
- [6] Chen NFG, Pham K, Chaguza C, **Lopes R**, Klaassen F, Kalinich CC, Yale SARS-CoV-2 Genomic Surveillance Initiative, Kerantzas N, Pandya S, Ferguson D, et al. Integrated analysis of the 2022 SARS-CoV-2 Omicron lineage replacement dynamics in Connecticut, US. *Viruses* 17(7): 1020 (2025).
- [7] Chen NFG, Pham K, Chaguza C, **Lopes R**, Klaassen F, Weinberger DM, Pitzer VE, Warren JL, Grubaugh ND, Hahn AM. Escalating combinations of enhanced infectivity and immune escape define SARS-CoV-2 Omicron lineage replacement. *Viruses* (2025).
- [8] **Lopes R\***, Bastos LS. On the verge: outbreak risk after two years of record-breaking dengue epidemics in Brazil. *The Lancet Regional Health – Americas* 45 (2025).
- [9] **Lopes R\***, Pham K, Klaassen F, Chitwood MH, Hahn AM, Redmond S, et al. Combining genomic data and infection estimates to characterize the complex dynamics of SARS-CoV-2 Omicron variants in the United States. *Cell Reports* 43(7) (2024).
- [10] **Lopes R\***, Basagaña X, Bastos LSL, Bozza FA, Ranzani OT. Ambient temperature and dengue hospitalization in Brazil: a 10-year period case time series analysis. *Environmental Epidemiology* 9(1): e360 (2025).
- [11] Marra AR, Sampaio VS, Ozahata MC, **Lopes R**, Brito AF, Bragatte M, Kalil J, Miraglia JL, Malheiro DT, Guozhang Y, et al. Risk factors for long coronavirus disease 2019 (long COVID) among healthcare personnel, Brazil, 2020–2022. *Infection Control & Hospital Epidemiology* 44(12): 1972–1978 (2023).
- [12] Lubiana T, **Lopes R**, Medeiros P, Silva JC, Goncalves ANA, Maracaja-Coutinho V, Nakaya HI. Ten quick tips for harnessing the power of ChatGPT in computational biology. *PLoS Computational Biology* 19(8): e1011319 (2023).
- [13] Sampaio VS, **Lopes R**, Ozahata MC, Nakaya HI, Sousa E, Araujo JD, Bragatte MAS, Brito AF, Grespan RMZ, Capuani MLD, et al. Thinking out of the box: revisiting health surveillance based on medical records. *Antimicrobial Stewardship & Healthcare Epidemiology* 3(1): e185 (2023).
- [14] Ferreira LS, Marquitti FMD, da Silva RLP, Borges ME, da Costa Gomes MF, Cruz OG, Kraenkel RA, Coutinho RM, Prado PI, Bastos LS. Estimating the impact of implementation and timing of the COVID-19 vaccination program in Brazil: a counterfactual analysis. *The Lancet Regional Health – Americas* 17 (2023).

- [15] Boing AF, Boing AC, Veras MA, de Lacerda JT, **da Silva RLP**, Barbato PR, Fabrin C, Subramanian SV. Area-level inequalities in COVID-19 outcomes in Brazil in 2020 and 2021: an analysis of 1,894,165 severe COVID-19 cases. *Preventive Medicine* 164 (2022).
- [16] Coutinho RM, Marquitti FMD, Ferreira LS, Borges ME, **da Silva RLP**, Canton O, Portella TP, Poloni S, Franco C, Plucinski MM, Lessa FC. Model-based estimation of transmissibility and reinfection of SARS-CoV-2 P.1 variant. *Communications Medicine* 1(1) (2022).
- [17] Souto Ferreira L, Canton O, **da Silva RLP**, Poloni S, Sudbrack V, Borges ME, Franco C, Marquitti FMD, de Moraes JC, Veras MADSM, Kraenkel RA. Assessing the best time interval between doses in a two-dose vaccination regimen to reduce the number of deaths in an ongoing epidemic of SARS-CoV-2. *PLOS Computational Biology* 18(3):e1009978 (2022).
- [18] Marquitti FMD, Coutinho RM, Ferreira LS, Borges ME, Portella TP, **da Silva RLP**, Canton O, Poloni S, Franco C, Coelho V, Barberia L. Brazil in the face of new SARS-CoV-2 variants: emergencies and challenges in public health. *Revista Brasileira de Epidemiologia* 24 (2021).

#### Conference abstracts

Swartwood NA, Klaassen F, Chitwood MH, **Lopes R**, Salomon JA, Cohen T, Menzies N. Trends in United States long-COVID incidence and prevalence over 2020–2023: a Bayesian modeling analysis. *Medical Decision Making* 45(7) (2025). [Conference abstract]

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#### SUPERVISION & MENTORING

**2025–present** **Bruna Jesuino**, M.Sc. student — co-supervised with Leonardo S. Bastos, Fiocruz, Rio de Janeiro, Brazil  
**2024–present** **Hailey Robertson**, Ph.D. student — Yale School of Public Health  
**2024–present** **Abigail Porzucek**, Ph.D. student — Yale School of Public Health (first author, publication P1)  
**2023–present** **Yi Ting Chew**, Ph.D. student — Yale School of Public Health  
**2023** **Kien Pham**, M.P.H. — Yale School of Public Health (first author, publication 4)

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#### TEACHING & TRAINING

**2022** **Practitioner training** — delivered training to public health practitioners at the São Paulo State CDC on the use of surveillance dashboards and nowcasting outputs in routine epidemic response.  
**2018–2022** **Teaching assistant and group-work mentor** — Southern Summer School on Mathematical Biology (ICTP-SAIFR), during PhD. Assisted the mini-course and guided interdisciplinary student projects in epidemiological, ecological, and evolutionary modeling.  
**2023–present** **Mentoring of PhD students** — individual and weekly group mentoring in the Grubaugh and Carlson labs, Yale School of Public Health.

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#### SOFTWARE & OPEN SCIENCE

**2022–present** **nowcaster** — lead developer. Open R package implementing Bayesian hierarchical correction for reporting delay in disease surveillance; used by Brazil’s Ministry of Health for dengue, chikungunya, Zika, COVID-19, and RSV. [covid19br.github.io/nowcaster](https://covid19br.github.io/nowcaster)  
**2020–2022** **Observatório COVID-19 BR** — contributor. Open modeling and data platform for the Brazilian COVID-19 response. [covid19br.github.io](https://covid19br.github.io)

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#### INVITED PRESENTATIONS

2025 “Dengue under climate variability” — WHO Pandemic and Epidemic Intelligence Hub, Berlin, Germany  
 2025 “SARS-CoV-2 spatial modeling and genomics in the USA: waves and variants” — Kretzschmar group, Julius Center, UMC Utrecht, Netherlands  
 2024 “Combining genomic data and infection estimates to characterize the complex dynamics of SARS-CoV-2 Omicron variants in the United States” — RSV/COVID all-sites call, Council of State and Territorial Epidemiologists (CSTE)

2023 *“Combining genomic data and infection estimates to characterize the complex dynamics of SARS-CoV-2 Omicron variants in the United States”* — Advanced Molecular Detection program, US Centers for Disease Control and Prevention

## SERVICE

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**Peer review** — Science Advances; The Lancet Planetary Health; Communications Medicine; PLOS Pathogens; PLOS Computational Biology; PLOS One; BMC Infectious Diseases; GeoHealth; Bulletin of Mathematical Biology

**2025–present Communications Committee** — Department of Epidemiology of Microbial Diseases, Yale School of Public Health

**2023–2024 Treasurer** — Yale Postdocs Association; prepared and presented the annual budget

**Professional societies** — Society for Mathematical Biology (2021–2023); Brazilian Physical Society (2018)