

Jiyeon Suh

Postdoctoral Researcher
Department of Environmental Health Sciences
Columbia University Mailman School of Public Health
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RESEARCH INTERESTS

- **Applied Mathematics**

Data analysis, Optimization, Data assimilation, Uncertainty quantification, Machine learning

- **Mathematical Biology**

Infectious disease modeling, Compartmental model, Agent-based model, Economic evaluation

PROFESSIONAL EXPERIENCES

Columbia University, New York, United States

Postdoctoral Research Scientist in Environmental Health Sciences

Sep 2022 – Present

- *Supervisor*: Prof. Jeffrey Shaman

EDUCATION

Yonsei University, Seoul, Republic of Korea

Ph.D. in Computational Science and Engineering (CSE)

Mar 2016 – Aug 2022

- *Thesis*: Mathematical modeling to evaluate interventions for infectious diseases
- *Supervisor*: Prof. Jeehyun Lee

B.S. in Mathematics

Mar 2010 – Feb 2016

PUBLICATIONS

Accepted / In press / Published

- [1] H. Seong*, **J. Suh***, J. Y. Choi, J. Lee, and J. S. Yeom, “[Development of a *Plasmodium vivax* malaria model for evaluating the effects of control strategies on the malaria burden in Democratic People’s Republic of Korea](#)”, *Frontiers in Public Health*, vol. 12, 2024.
- [2] S. Kim, J.-K. Choi, **J. Suh**, J. Lee, and S. H. Park, “[The epidemiologic and economic impact of varicella and herpes zoster vaccination in South Korea: a mathematical modelling study](#)”, *Vaccine*, vol. 42, no. 19, pp. 4046–4055, 2024.
- [3] **J. Suh**, H.-D. Kwon, and J. Lee, “[A model of *Plasmodium vivax* malaria with delays: Mathematical analysis and numerical simulations](#)”, *Mathematics and Computers in Simulation*, vol. 217, pp. 169–187, 2023.
- [4] **J. Suh***, J. H. Kim*, J.-D. Kim, C. Kim, J. Y. Choi, J. Lee, and J. S. Yeom, “[Cost-benefit analysis of tafenoquine for radical cure of *Plasmodium vivax* malaria in South Korea](#)”, *Journal of Korean Medical Science*, vol. 37, no. 27, e212, 2022.
- [5] **J. Suh**, J.-K. Choi, J. Lee, and S. H. Park, “[Estimation of single-dose varicella vaccine effectiveness in South Korea using mathematical modeling](#)”, *Human Vaccines & Immunotherapeutics*, 2022.

- [6] **J. Suh**, T. Lee, J.-K. Choi, J. Lee, and S. H. Park, “The impact of two-dose varicella vaccination on varicella and herpes zoster incidence in South Korea using a mathematical model with changing population demographics”, *Vaccine*, vol. 39, no. 18, pp. 2575–2583, 2021.
- [7] T. Lee, **J. Suh**, J.-K. Choi, J. Lee, and S. H. Park, “Estimating the basic reproductive number of varicella in South Korea incorporating social contact patterns and seroprevalence”, *Human Vaccines & Immunotherapeutics*, pp. 1–6, 2021.
- [8] J. H. Kim*, **J. Suh***, W. J. Lee, H. Choi, J.-D. Kim, C. Kim, J. Y. Choi, R. Ko, H. Kim, J. Lee, and J. S. Yeom, “Modelling the impact of rapid diagnostic tests on *Plasmodium vivax* malaria in South Korea: a cost–benefit analysis”, *BMJ Global Health*, vol. 6, no. 2, e004292, 2021.
- [9] H. Choi*, **J. Suh***, W. Lee, J. H. Kim, J. H. Kim, H. Seong, J. Y. Ahn, S. J. Jeong, N. S. Ku, Y. S. Park, J. S. Yeom, C. Kim, H.-D. Kwon, D. M. Smith, J. Lee, and J. Y. Choi, “Cost-effectiveness analysis of pre-exposure prophylaxis for the prevention of HIV in men who have sex with men in South Korea: a mathematical modelling study”, *Scientific Reports*, vol. 10, no. 1, pp. 1–11, 2020.

In preparation / Submitted / In revision

- [10] R. Kaondera-Shava, M. Galanti, M. Perini, **J. Suh**, S. Farley, S. Chicumbe, I. Jani, A. Cassy, I. Macicame, N. Manafe, W. El-Sadr, and J. Shaman, “SARS-CoV-2 transmission dynamics in Mozambique and Zimbabwe during the first three years of the pandemic”, *submitted*.
- [11] **J. Suh**, M. Galanti, T. Yamana, M. Perini, R. Kaondera-Shava, and J. Shaman, “COVID-19 transmission dynamics in South Korea prior to vaccine distribution”, *submitted*.
- [12] M. Perini, T. Yamana, M. Galanti, **J. Suh**, R. Kaondera-Shava, and J. Shaman, “Modelling COVID-19 in the North American region with a metapopulation network and Kalman filter”, *submitted*.
- [13] H. Seong, Y. Lee, **J. Suh**, J. Lee, and J. Y. Song, “Mathematical modeling of the long-term impact of latent tuberculosis treatment in South Korea”, *in preparation*.

* Co-first authors

RESEARCH EXPERIENCES

Postdoctoral Research Training Department of Environmental Health Sciences, Mailman School of Public Health, Columbia University, <i>Supervisor</i> : Prof. Jeffrey Shaman	Sep 2022 – Present
<ul style="list-style-type: none"> • Modeling of Coronavirus Disease 2019 (COVID-19) <ul style="list-style-type: none"> – Developed a metapopulation model for COVID-19 transmission, coupled the model with a data assimilation method (the ensemble adjustment Kalman filter), and inferred the ascertainment rate and total number of infections. – Conducting counterfactual simulations and analyses using the model. 	
Integrated Master and Ph. D. Program School of Mathematics and Computing (Computational Science and Engineering), Yonsei University, <i>Supervisor</i> : Prof. Jeehyun Lee	Mar 2016 – Aug 2022

- **Modeling of *Plasmodium vivax* malaria**

- Developed a *P. vivax* malaria transmission model based on delay differential equations and performed mathematical analysis and cost-benefit analysis of rapid diagnostic tests and tafenoquine.
- Collaborated with the team of Prof. Joon-Sup Yeom in Division of Infectious Diseases, Yonsei University Severance Hospital.

- **Modeling of age structured varicella zoster virus**

- Developed an age-stratified varicella zoster virus transmission model, assessed the impact of two-dose varicella vaccination, and estimated its effectiveness using nonlinear regression techniques. In addition, a cost-effectiveness analysis of herpes zoster vaccination was conducted.
- Collaborated with Prof. Sun Hee Park in Division of Infectious Diseases, The Catholic University of Korea Seoul St. Mary's Hospital.

- **Modeling of human immunodeficiency virus**

- Developed an human immunodeficiency virus (HIV) transmission model in men who have sex with men and performed a cost-effectiveness analysis of pre-exposure prophylaxis.
- Collaborated with the team of Prof. Jun Yong Choi in the Department of Internal Medicine and AIDS Research Institute, Yonsei University Severance Hospital.

Undergraduate Research Program

Mar 2015 – Feb 2016

School of Mathematics and Computing (Computational Science and Engineering), Yonsei University, *Supervisor*: Prof. Eunjung Lee

- **Algorithm development for molecular diagnosis**

- Developed numerical algorithms for determination of the baseline threshold in real-time polymerase chain reaction and discrimination of two targets in one channel in MuDT™ technology.
- Collaborated with *Seegene*

CONFERENCES

- [1] **J. Suh**, M. Galanti, T. Yamana, M. Perini, R. Kaondera-Shava, and J. Shaman, “[Characterizing the distinctive epidemiological dynamics of COVID-19 in South Korea](#)”, *Joint annual meeting of the Korean Society for Mathematical Biology and the Society for Mathematical Biology*, Seoul, Republic of Korea, July 2024. – Oral
- [2] **J. Suh**, M. Galanti, T. Yamana, M. Perini, R. Kaondera-Shava, H. Y. Wunrow, and J. Shaman, “Quantification of the unique epidemiological characteristics of COVID-19 in South Korea”, *Epidemics* 9, Bologna, Italy, November 2023. – Poster
- [3] **J. Suh**, J. H. Kim, J.-S. Yeom, and J. Lee, “Cost-benefit analysis of tafenoquine for the relapse prevention of *Plasmodium vivax* malaria in South Korea”, *Society for Mathematical Biology 2021 Annual Meeting*, Online, June 2021. – Oral
- [4] **J. Suh**, S. H. Park, and J. Lee, “Assessing the impact of two-dose varicella vaccination on varicella and herpes zoster incidences in the Republic of Korea”, *Korean Society for Industrial Applied Mathematics 2020 Annual Meeting*, pp. 113–114, Jeju, Republic of Korea, November 2020. – Oral

- [5] **J. Suh**, J. H. Kim, J.-S. Yeom, and J. Lee, “Cost-benefit analysis of rapid diagnostic tests for *Plasmodium vivax* malaria in South Korea: A mathematical modeling study”, *Korean Mathematical Society 2020 Annual Meeting*, Online, October 2020. – Oral
- [6] **J. Suh**, “The cost-effectiveness analysis of preexposure prophylaxis for HIV prevention in men who have sex with men”, *Korean Society for Industrial Applied Mathematics 2017 Annual Meeting*, Busan, Republic of Korea, November 2017. – Poster

CERTIFICATES

Deep Learning Nanodegree , Udacity	Jun 2018
Business Analyst Nanodegree , Udacity	Mar 2018
Epidemiological Data Analysis Using R , The Korean Society of Health Informatics and Statistics, Seoul, Republic of Korea	Feb 2018
Machine Learning , Prof. Andrew Ng, Stanford University, Coursera	Apr 2017

COMPUTER AND OTHER SKILLS

Computer: Python (proficient), R (proficient), MATLAB (professional), C++ (basic), SAS (basic), Git/Github (professional), LaTeX (professional)

Languages: Korean (native), English (proficient)

Soft skills: Great communication, Highly organized, Self-management

OTHER ACADEMIC ACTIVITIES

18th CSE Poster Exhibition , “Cost-benefit analysis of rapid diagnostic tests for <i>Plasmodium vivax</i> malaria in South Korea: A mathematical modeling study”, School of Mathematics and Computing, Yonsei University	Nov 2020
Seminar , “Economic evaluations of interventions for infectious disease”, Department of Pediatrics, Severance Children’s Hospital, Yonsei University College of Medicine	Sep 2020
Workshop , “Control and Economic Evaluation of Interventions for Infectious Diseases through Mathematical Modeling”, Department of Mathematics and Computational Science and Engineering, Yonsei University	Feb 2020
Seminar , “The economics of infectious disease”, Department of Internal Medicine and AIDS Research Institute, Yonsei University College of Medicine	Sep 2019
Summer Bootcamp of Infectious Disease Modeling 2019 , Prof. Hiroshi Nishiura, Tachikawa, Tokyo, Japan	Aug 2019
Medical Mathematics Modeling Summer School , National Institute for Mathematical Sciences, Dajeon, Republic of Korea	July 2019
CSE Poster Exhibition Joint with 2019 KSIAM Spring Conference , “Age-Structured Varicella Zoster Virus Model”, Department of Computational Science and Engineering, Yonsei University	May 2019
16th CSE Poster Exhibition , “The Cost-Effectiveness of PrEP for HIV Prevention in MSM in Korea”, Department of Computational Science and Engineering, Yonsei University	Sep 2018

The 8th KIAS CAC Summer School on Parallel and Scientific Computing, Korea Institute for Advanced Study, Seoul	June 2017
11th CSE Poster Exhibition, “UAV path-finding problem in 2D”, Department of Computational Science and Engineering, Yonsei University	Apr 2016
10th CSE Poster Exhibition, “Application of numerical method in MuDT™”, Department of Computational Science and Engineering, Yonsei University	Oct 2015

AWARDS

Excellence Doctoral Thesis Award, Yonsei University	Dec 2022
Merit Academic Paper Award, Yonsei University	Dec 2020
CSE Best Poster Awards, The Best prize in URP, Department of Computational Science and Engineering, Yonsei University	Oct 2015
Academic Excellence Award, College of Science, Yonsei University	Oct 2014

SCHOLARSHIPS AND GRANTS

Brain Korea 21 Plus scholarship for Yonsei Mathematical Sciences and Computation, National Research Foundation of Korea, USD 5,200	Sep 2020 – Feb 2021
Yonsei Junior Convergence Research Group grant for the development of numerical methods for the simulation of galaxy evolution, Institute of Convergence Science, Yonsei University, USD 2,200	Jul 2019 – Feb 2020
Brain Korea 21 Plus scholarship for Computational Science and Engineering, National Research Foundation of Korea, USD 70,700	Feb 2016 – Aug 2020
National Scholarship, Korea Student Aid Foundation, USD 10,700	Sep 2012 – Feb 2015
Lotte scholarship, Lotte Foundation, USD 3,600	Mar 2012 – Aug 2012
National Excellence Scholarship (Natural Sciences and Engineering), Korea Student Aid Foundation, UDS 4,600	Mar 2010 – Aug 2010

TEACHING EXPERIENCES

Topics in Mathematics I (MAT4105) Teaching assistant. Covered MATLAB classes of estimating the effectiveness of vaccine by age, cost-effectiveness analysis, and sensitivity analysis.	Spring 2021
Infectious disease modeling tutorial using MATLAB Instructor and teaching assistant. Covered a lecture and MATLAB class for economic evaluation and sensitivity analysis.	Winter 2020
Infectious disease modeling tutorial using Python Instructor and teaching assistant. Covered a lecture and Python class for cost-effectiveness of seasonal influenza vaccination.	Summer 2020
Infectious disease modeling tutorial using R Instructor and teaching assistant. Covered lectures and R classes for heterogeneous mixing, basic reproduction number, and economic evaluation.	Winter 2019
Infectious disease modeling tutorial using MATLAB Instructor and teaching assistant. Covered lectures and MATLAB classes for heterogeneous mixing and basic reproduction number.	Summer 2019