

Kyueun Lee

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RESEARCH INTERESTS

- Forecasting the burden of disease
- Evaluating the cost-effectiveness of new health technology
- Improving calibration practice in modeling disease and health policy

EDUCATIONS

2020 - 22	Postdoctoral Research Associate	University of Pittsburgh, United States
2015 - 20	Ph.D., Health Policy Concentration: Decision Science Advisor: Jeremy Goldhaber-Fiebert Thesis: <i>Trends in Health Behaviors and Impact of New Health Technology in China: Modeling Approach</i>	Stanford University, United States
2014	M.S., Health Services Research, Policy and Administration	University of Minnesota, United States
2012	B.S., Life Science	Pohang University of Sci. & Tech., South Korea

RESEARCH EXPERIENCES

Forecasting the burden of disease

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| 2020 | <i>Predicting the impact of low influenza activity in 2020 on population immunity and future influenza season in the United States</i> <ul style="list-style-type: none">• Constructed a compartmental model for influenza transmission (SEIR) that considers immunity over multiple influenza seasons. The study estimated the expected increase in influenza hospitalization in the 2021-22 season due to low influenza activity and consequent waning immunity in 2020-21• Preprint is available at https://www.medrxiv.org/content/10.1101/2021.08.29.21262803v1 |
| 2020 | <i>Prominent Spatiotemporal Waves of COVID-19 Incidence in the United States: Implications for Causality, Forecasting, and Control</i> <ul style="list-style-type: none">• Visualized spatio-temporal patterns of COVID-19 in the North American region using a network analysis• Preprint is available at: https://www.medrxiv.org/content/10.1101/2021.06.29.21259726v1 |
| 2019 | <i>Estimating lifetime quality-adjusted life years lost due to syphilis in the United States</i> <ul style="list-style-type: none">• Constructed a stochastic Markov model of syphilis natural history and estimated lifetime quality-adjusted life-years lost due to syphilis in the US |

- 2018 *Temporal and age trend in harmful drinking behavior in China: a modeling approach*
- Constructed a stochastic Markov model to forecast future trends in heavy drinking and quantified the potential benefit of interventions with Chinese men in a target age group
 - Presented at 2019 Annual Meeting of Society for Medical Decision Making in Portland
 - Published in *BMJ Open* (doi: 10.1136/bmjopen-2020-043261)
- 2018 *Modeling Birth Cohort Trends in Hepatitis C Virus (HCV) Infection and Their Implications among Chinese Men*
- Developed a population natural history model of HCV infection (stochastic Markov model) that incorporates generational trends in HCV epidemiology and projected the future burden of HCV infection among Chinese men
 - Presented at 2016 Annual Meeting of Society for Medical Decision Making in Vancouver and 2017 Asia Pacific ISPOR in Singapore

Evaluating cost-effectiveness of new health technology

- 2018 *Health and cost impact of increased management for hepatitis C virus infection in China*
- Employed an empirically calibrated microsimulation model to quantify health benefits when new HCV treatment is offered to patients with low grade-fibrosis and identified a need for improvement in HCV screening coverage and accuracy in fibrosis diagnosis to amplify health benefits of new HCV treatment in China
- 2017 *Quality, cost, and value: studying the net value of diabetes management*
- Quantified the change in health outcomes and medical expenses among diabetic patients at the Stanford Hospital
 - Presented at 2018 Annual Meeting on Healthy Aging and Chronic Disease Management in China and India in International Comparison in Beijing
- 2015 *Cost-effectiveness of stereotactic body radiation therapy versus radiofrequency ablation for hepatocellular carcinoma: a Markov modeling study*
- Constructed a Markov Cohort model of patients with inoperable localized hepatocellular carcinoma to assess the cost-effectiveness of an innovative radiation therapy
 - Published in *Radiology* 283(2) (<https://doi.org/10.1148/radiol.2016161509>)
- 2015 *When and how often to screen for cervical cancer in three low- and middle-income countries: A cost-effectiveness analysis*
- Evaluated the cost-effectiveness of screening for human papilloma virus (HPV) infection and pre-cancers at various start ages, intervals, and frequencies in India, Nicaragua, and Uganda
 - Published in *Papillomavirus Research* 1 (<https://doi.org/10.1016/j.pvr.2015.05.003>)
- 2015 *Racial and ethnic disparities in HPV-associated cancer burden with first-generation and second-generation human papillomavirus vaccines*
- Used a decision-analytic model to quantify the impact of HPV vaccine on racial and ethnical disparity of HPV-associated cancers
 - Published in *Cancer* 122(13) (<https://doi.org/10.1002/cncr.30007>)
- 2015 *Expanded program on immunization costing and financing (EPIC2) studies in six countries*
- Harmonized data from EPIC phase 1 studies in six countries (Benin, Ghana, Uganda, Zambia, Moldova, and Honduras)

- 2013 *Cost-effectiveness of antibiotic prophylaxis following prostate biopsy*
- Evaluated cost-effectiveness of antibiotic prophylaxis strategies for transrectal prostate biopsy as a function of the prevalence of antibiotic resistance by using a decision-analytic model in TreeAge
 - Published in *Value in Health* 21(3) (<https://doi.org/10.1016/j.jval.2017.08.3016>)

Improving calibration practice in modeling disease and health policy

- 2020 *Bayesian Calibration of Compartmental Model Using a Deep Learning and Artificial Neural Network Metamodeling*
- Used the combination of artificial neural network (ANN) metamodeling and Bayesian calibration (Hamiltonian Monte Carlo algorithm) to reduce the computational cost of calibrating a multi-strain multi-year compartmental model in R and Stan
- 2019 *Calibration to Cross-sectional Data When Temporal Trends Exist As Exemplified by Models of Heavy Drinking in China*
- Evaluated how the assumption of no birth cohort-effects in model calibration can lead to different calibrated parameters, future burden projections, and intervention effect estimates when compared to calibration that employs birth cohort-specific parameters
 - Presented at 2019 Annual Meeting of Society for Medical Decision Making in Portland
 - Received Lee B. Lusted Student Award for Quantitative methods and Theoretical Development, Society for Medical Decision Making 2019

PUBLICATIONS

Peer-reviewed

1. **Lee K**, Salomon JA, Goldhaber-Fiebert JD. Patterns of Heavy Drinking Behavior over Age and Birth Cohorts among Chinese Men: a Markov model. *BMJ Open*. 2021; 11:e043261. doi:10.1136/bmjopen-2020-043261
2. Wallace SL, Martin BS, **Lee K**, Sokol ER. A cost-effectiveness analysis of vaginal carbon dioxide laser therapy compared with standard medical therapies for genitourinary syndrome of menopause-associated dyspareunia. *Am J Obstet Gynecol*. 2020 Jun 17;S0002-9378(20)3064-2. Doi: 10.1016/j.ajog.2020.06.032.
3. **Lee K**, Enns EA, Drekonja D. Selecting appropriate antibiotic prophylaxis for trans-rectal prostate biopsy in an era of increasing antimicrobial resistance. *Value in Health*. 2018 Mar;21(3):310-317. doi: 10.1016/j.jval.2017.08.3016. Epub 2017 Oct. 18
4. Pollom EL, **Lee K**, Durkee BY, Grade M1, Mokhtari DA, Wahl DR, Feng M, Kothary N, Koong AC, Owens DK, Goldhaber-Fiebert J, Chang DT. Cost-effectiveness of Stereotactic Body Radiation Therapy versus Radiofrequency Ablation for Hepatocellular Carcinoma: A Markov Modeling Study. *Radiology*. 2017 Jan. 3:161509. doi: 10.1148/radiol.2016161509
5. Campos NG, Sharma M, Clark A, **Lee K**, Geng F, Regan C, Kim JJ, Resch S. The Health and Economic Impact of Scaling Cervical Cancer Prevention in 50 Low- and Lower-Middle Income Countries. *American Cancer Society report Int J Gynaecol Obstet*. 2017 Jul.;138 Suppl 1:47-56. doi: 10.1002/ijgo.12184
6. Campos NG, Tsu V, Jeronimo J, Mvundura M, **Lee K**, Kim JJ. To Expand Coverage, or Increase Frequency: Quantifying the Tradeoffs between Equity and Efficiency Facing Cervical Cancer Screening Programs in Low-Resource Settings. *Int J Cancer*. 2017 Mar 15;140(6):1293-1305. doi: 10.1002/ijc.30551
7. Campos NG, Sharma M, Clark A, **Lee K**, Geng F, Kim JJ, Stephen C. Resch Comprehensive Global Cervical Cancer Prevention Costs and Benefits of Scaling up within a Decade, *American Cancer Society, 2016*

8. Burger EA, **Lee K**, Saraiya M, Thompson TD, Chesson HW, Markowitz LE, Kim JJ. Racial and ethnic disparities in human papillomavirus-associated cancer burden with first-generation and second-generation human papillomavirus vaccines. *Cancer*. 2016 Jul. 1;122(13):2057-66. doi: 10.1002/cncr.30007. Epub 2016 Apr 28.
9. Campos NG, Tsu V, Jeronimo J, Mvundura M, **Lee K**, Kim JJ. When and how often to screen for cervical cancer in three low- and middle-income countries: A cost-effectiveness analysis. *Papillomavirus Research*, 2015 Dec. <https://doi.org/10.1016/j.pvr.2015.05.003>

Upcoming

1. **Lee K**, Jalal H, Raviotta JM, Krauland MG, Zimmerman RK, Burke DS, Roberts MS. Predicting the Impact of Low Influenza Activity in 2020 on Population Immunity and Future Influenza Season in the United States. Preprint available at <https://www.medrxiv.org/content/10.1101/2021.08.29.21262803v1>
2. **Lee K**, Salomon JA, Goldhaber-Fiebert JD. Modeling Birth Cohort Trends in Hepatitis C Virus Infection and Their Implications among Chinese Men. *Under review*
3. **Lee K**, You S, Li Y, Chesson H, Gift TL, Berruti AA, Hsu K, Yaesoubi R, Salomon JA, Rönn M. Estimation of the Lifetime Quality-Adjusted Life Years (QALYs) Lost Due to Syphilis in the United States. *Under CDC Clearance*
4. Jalal H, **Lee K**, Burke DS. Prominent Spatiotemporal Waves of COVID-19 Incidence in the United States: Implications for Causality, Forecasting, and Control. Preprint available at <https://www.medrxiv.org/content/10.1101/2021.06.29.21259726v1>
5. Jalal H, **Lee K**, Burke DS. Role of Seasonality in the Recent Surge of COVID-19 Cases in the United States. *Under review*
6. Chen B, Silvestri G, Dahne J, **Lee K**, Carpenter MJ. The Cost Effectiveness of Nicotine Replacement Therapy Sampling in Primary Care: A Markov Cohort Simulation Model. *Under review*
7. Wallace S, Syan R, **Lee K**, Sokol E. Vaginal Hysteropexy Compared to Vaginal Hysterectomy with Apical Suspension for the Treatment of Pelvic Organ Prolaps: A 5-year Cost-Effectiveness Markov Model. *Under review*

HONORS, FELLOWSHIPS AND RESEARCH GRANTS

2020	Graduate Dissertation Fellowship <i>King Center for Global Development, Stanford University</i>
2019	Lee B. Lusted Student Award for Quantitative methods and Theoretical Development <i>2019 Annual Meeting of Society for Medical Decision Making, Portland</i>
2019	Fellowship in Medical Decision Making <i>Society of Medical Decision Making</i>
2019	SCP KU Pre-doctoral Fellowship <i>Stanford Center at Peking University, Stanford University</i>
2013	School of Public Health Scholars of Excellence Award <i>School of Public Health, University of Minnesota</i>
2012	Magna cum laude Summer Graduation <i>Life Science Department, Pohang University of Science and Technology</i>
2010	Scholarship for Exchange Student Program <i>Mirae Asset</i>

- 2009 - 12 **Dean's List**
Life Science Department, Pohang University of Science and Technology
- 2008 - 12 **Undergraduate Scholarship**
Pohang University of Science and Technology

TEACHING EXPERIENCES

- 2018 *Analysis of Costs, Risks, and Benefits of Health Care, Stanford University*
- This graduate-level class aimed to introduce how to evaluate risks, costs and benefits of alternative health care technologies and services using a decision analytic framework to students in various backgrounds (medicine, business, health service research, public policy, and engineering)
 - Lectured on model implementation in TreeAge software
 - Guided student group projects in designing decision-analytic models and supported programming in TreeAge
 - Managed class logistics
- 2017 *Health Care System around the World, Stanford University*
- This undergraduate-level class overviewed the role and structures of health care systems in different countries
 - Led weekly TA sessions to review the key points from the lectures of the week and to discuss case studies to facilitate debate under the learning object of the week
 - Managed class logistics

CONFERENCE PRESENTATIONS

“Predicting the Impact of Low Influenza Activity on Population Immunity and Future Influenza Seasons in the United States”

- 43rd Annual North American Meeting of the Society for Medical Decision Making, Virtual 2021

“Modeling Birth Cohort Trends in Hepatitis C Virus Infection and Their Implications in China”

- 42nd Annual North American Meeting of the Society for Medical Decision Making, Virtual 2020

“Estimated Burden of Syphilis in Terms of Quality-adjusted Life Years Lost”

- National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention Epidemiologic and Economic Modeling Agreement (NEEMA) 2020, Centers for Disease Control and Prevention

“Calibration to Cross-sectional Data When Temporal Trends Exists as Exemplified with Heavy Drinking in China”

- 41st Annual North American Meeting of the Society for Medical Decision Making, Portland, OR 2019 (Top Rated Abstract Oral Presentation, Poster for Student Prize Competition)

“Age- and Time-trend in Harmful Drinking Behavior Among Men in China”

- 41st Annual North American Meeting of the Society for Medical Decision Making, Portland, OR 2019 (Poster)
- Global Health Research Convening, Stanford, CA, 2019 (Poster)

“Empirical Calibration of A Hepatitis C Virus (HCV) Natural History Model in HCV-Infected Chinese Population”

- 38th Annual North American Meeting of the Society for Medical Decision Making, Vancouver,

Canada, 2016 (Poster for Student Prize Competition)

“Comparative Study in Empirical Calibration of A Hepatitis C Virus (HCV) Natural History Model in HCV-Infected Chinese Population with The United States Population”

- 7th Asia-Pacific Meeting of International Society for Pharmacoeconomics and Outcomes Research, Singapore, 2016 (Poster)

“ Selecting Appropriate Antibiotic Prophylaxis for Trans-Rectal Prostate Biopsy in An Era of Increasing Antimicrobial Resistance”

- 36th Annual North American Meeting of the Society for Medical Decision Making, Miami, FL, 2014 (Poster)

INVITED TALKS AND MEDIA INTERVIEWS

“Predicting the Impact of Low Influenza Activity on Population Immunity and Future Influenza Seasons in the United States”

- Erasmus MC, Decision science and modeling research group, 2021

Interview with *Atlantic*

- Wu, K.J. “The Most Important Vaccine I’ll Get This Fall” September, 2021. *Atlantic*. Available at: <https://www.theatlantic.com/science/archive/2021/09/flu-season-2021/620163/>

“Trends in Heavy Drinking Behaviors and Hepatitis C Virus Infections in China: a Mathematical Modeling Study”

- Erasmus MC, Decision science and modeling research group, 2021

“Model Calibration and Example of Modeling Heavy Drinking in China”

- China Pharmacoeconomics Conference, Anhui, China, 2019

“Net Value Analysis on Health Care Management of Type II Diabetes Patients”

- Annual Meeting on Healthy Aging and Chronic Disease Management in China and India in International Comparison, Beijing, China 2018

PROFESSIONAL AND SERVICE ACTIVITIES

Society of Medical Decision Making Annual North American Meeting

2020 - present Co-chair of Global Health Interest Group
2019 - present Early Career Development Fellow
2018 - present Abstract Reviewer
2015 - present Member

International Society for Pharmacoeconomics and Outcomes Research

2017 - 2019 Manuscript reviewer (Value in Health regional issue)

REFERENCES

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