Dr Nefel Tellioglu

Modelling Research Fellow
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Research Interests

I am a Modelling Research Fellow in the Department of Infectious Diseases at the Melbourne Medical School, University of Melbourne. Currently, I am investigating the effectiveness of various pneumococcal vaccination schedules using computational modelling. During my PhD at the School of Computing and Information Systems at the University of Melbourne, I worked on the transmission of *Sarcoptes scabiei* and group A *Streptococcus* and estimated the effectiveness of interventions using individual-based models. I have also been a part of the Australian COVID-19 modelling team, worked on the risk assessment of COVID-19 spread in Australia and intervention strategies to reduce COVID-19 burden for Australian First Nation communities.

While my current research primarily revolves around infectious disease modelling, especially using agent-based models and exploring multi-strain pathogens to inform policy, my broader interests include computational biology, model calibration, pathogen evolution, and within-host competition.

Education

Oct 2019 - Jul 2024 **Ph.D.**, Computing and Information Systems, The University of Melbourne
– Thesis title: "Computational modeling of the epidemiological dynamics of the skin pathogens Group A *Streptococcus* and *Sarcoptes scabiei*"
– Received Melbourne Research Scholarship

Sep 2016 - Aug 2019 **M.Sc.**, Industrial Engineering, Bogazici University
– Thesis title: "Estimating causal relations of dynamic models from real-life data"
– Received Graduate Research Fellowship from The Scientific and Technological Research Council of Turkey

Sep 2010 – Jan 2016 **B.Sc.**, Industrial Engineering, Bogazici University
– Thesis title: "Modelling the long-term dynamics of obesity as a societal epidemic"

Sep 2013 – Jan 2014 – Exchange student (Erasmus) at ENSTA ParisTech

Jun 2010 – Top 0.001% in Nationwide University Entrance Exam, Turkey

Appointments

Aug 2023 - Present **Modelling Research Fellow**, Melbourne Medical School, The University of Melbourne
– Working on computational models to estimate the effectiveness of pneumococcal vaccination strategies in Australia

Feb 2020 – Mar 2022 **Research Assistant**, Computing and Information Systems, The University of Melbourne
– Worked on developing intervention strategies to reduce COVID-19 burden for Australian First Nation communities

– Worked on the risk assessment of COVID-19 spread in Australia, prepared reports for the Australian Department of Foreign Affairs and Trade

Feb 2017 – Aug 2019 **Research Assistant**, Socio-Economic System Dynamics Research Laboratory, Bogazici University

Teaching

Aug 2020 – Present **Tutor**, The University of Melbourne
Aug 2024 – Present – POPH90271 – Infectious Disease Modelling
Aug 2022 – Dec 2022 – COMP10001 – Foundations of Computing
Aug 2022 – Dec 2022 – COMP90083 – Computational Modelling and Simulation
Aug 2022 – Dec 2022 – POPH90271 – Infectious Disease Modelling
Mar 2022 – Aug 2022 – COMP10001 – Foundations of Computing
Aug 2021 – Dec 2021 – COMP90083 – Computational Modelling and Simulation
Aug 2021 – Dec 2021 – POPH90271 – Infectious Disease Modelling
Mar 2021 – Aug 2021 – COMP10001 – Foundations of Computing
Aug 2020 – Dec 2020 – COMP90083 – Computational Modelling and Simulation

Feb 2017 – Jun 2019 **Graduate Teaching Assistant**, Industrial Engineering, Bogazici University
Feb 2019 – Jun 2019 – IE 550 – Dynamics of Socio-Economic Systems
Feb 2019 – Jun 2019 – IE 220 – Materials & Processes in Manufacturing
Sep 2018 – Jan 2019 – IE 305 – Operational Research II
Sep 2018 – Jan 2019 – IE 312 – Facilities Design & Planning
Feb 2018 – Jun 2018 – IE 533 – Systems Theory
Sep 2017 – Jan 2018 – IE 305 – Operational Research II
Sep 2017 – Jan 2018 – IE 312 – Facilities Design & Planning
Feb 2017 – Jun 2017 – IE 306 – Systems Simulation

Sep 2015 – Jan 2016 **Undergraduate Teaching Assistant**, Flexible Automation and Intelligent Manufacturing Systems (BUFAIM) Laboratory
– IE 414 – Computer Integrated Manufacturing System

Supervision

2024 **Co-supervisor for Vishnupriya Vishnupriya's Master of Public Health Thesis**
– Melbourne Medical School, The University of Melbourne
– Title: "Understanding the Dynamics of Waning Antibody Levels Post-Pneumococcal Vaccination in the Elderly"
– Primary supervisor: Dr Patricia Campbell

2021 **Co-supervisor for Jyoti Munjal's Master of Science Thesis**
– Computing and Information Systems, University of Melbourne
– Title: "Network Modelling of Surveillance Strategies for Infectious Disease Outbreaks"
– Primary supervisor: A/Prof Nic Geard

Professional memberships

2022 – 2023 Australian Mathematical Society
2021 – 2022 The Lancefield Society

2018 – 2019 & 2021 – 2022	System Dynamics Society

Awards

Sep 2024	**Trish Campbell Good Citizen Award** – Supporting Participatory Evidence generation to Control Transmissible diseases in our Region Using Modelling (SPECTRUM) CRE & Strengthening Preparedness in the Asia-Pacific Region through Knowledge (SPARK)
Oct 2022	**Award for Excellence in Interdisciplinary Research** – "Mathematical modelling to reduce the burden of skin pathogens in Indigenous communities" – The University of Melbourne
Jul 2022	**Dana Meadows Award** – International System Dynamics Conference, 2022, Frankfurt, Germany
May 2022	**Conference Travel Grant** – SPECTRUM/SPARK
May 2021	**Travel Grant for "Early- & Mid-Career Researchers Networking Retreat in Townsville, Australia"** – SPECTRUM/SPARK
May 2021	**Conference Travel Grant** – SPECTRUM/SPARK
Dec 2021	**Best Postgraduate Student Presentation** – SPECTRUM/SPARK Annual Meeting, Virtual
Aug 2021	**Finalist, Engagement Australia Excellence Award** – Epidemiologic Modelling Team, Engagement Australia
Sep 2021	**Award for Excellence in Engagement** – Epidemiologic Modelling Team, The University of Melbourne
Nov 2020	**Award for Excellence in Engagement** – Epidemiologic Modelling Team, The Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne
Feb 2020	**Best Student Paper Award** – 3rd Asia Pacific System Dynamics Conference, Brisbane, Australia

Research Fundings

Jun 2025	Assessment of comparative health benefits of moxidectin and ivermectin-based mass drug administrations against scabies infestation. – Contract: Medicines Development for Global Health (MDGH) – Led by: Jodie McVernon || **Budget**: AUD$75,044.
Sep 2024	Pneumococcal disease modelling work. – Contract: Australian Government Department of Health, Disability and Ageing – Led by: Jodie McVernon || **Budget**: AUD$414,885.
Apr 2023	Modelling assessment of comparative health benefits of vaccination options against pneumococcal disease using Pneumococcal Conjugate Vaccines. – Contract: Australian Government Department of Health, Disability and Ageing – Led by: Jodie McVernon || **Budget**: AUD$451,237.
Feb 2022	Using disability-adjusted life-years (DALYs) as a summary statistic for estimating efficacy of interventions in modelling studies.

– Seed Funding: SPECTRUM/SPARK Seed Grant
– Co-Investigator with Angela Devine || **Budget**: AUD$20,000.

Aug 2021 Modelling Workplan to Support Vaccine Coverage and Impact Considerations (COVID-19)
– Contract: Commonwealth Government of Australia
– Led by: Jodie McVernon & James McCaw || **Budget**: AUD$1,944,645.

Feb 2020 Provision of technical support and preparedness modelling of COVID-19.
– Contract: Australian Government Department of Health, Disability and Ageing
– Led by: Jodie McVernon || **Budget**: AUD$446,000.

Publications Google Scholar

†: Equal contribution

Journal Articles

J1. Xie, O., Chisholm, R. H., Featherstone, L., Nguyen, A., Hayes, A. J., Jespersen, M., Zachreson, C., **Tellioglu, N.**, Tonkin-Hill, G., Dotel, R., *et al.* Temporal and Geographic Strain Dynamics of Invasive Streptococcus Pyogenes in Australia: A Multi-Centre Clinical and Genomic Epidemiology Study 2011-2023. *The Lancet Microbe* **6,** 101053 (June 2025).

J2. **Tellioglu, N.**, Chisholm, R. H., Campbell, P. T., Collinson, S., Timothy, J., Kollie, K., Zayzay, S., Devine, A., McVernon, J., Marks, M., *et al.* Modelling mass drug administration strategies for reducing scabies burden in Monrovia, Liberia. *Epidemiology & Infection* **151,** e153. ISSN: 0950-2688 (2023).

J3. Geard, N., Bradhurst, R., **Tellioglu, N.**, Oktaria, V., McVernon, J., Handley, A. & Bines, J. E. Model-based estimation of the impact on rotavirus disease of RV3-BB vaccine administered in a neonatal or infant schedule. *Human Vaccines & Immunotherapeutics* **18,** 2139097 (2022).

J4. Shearer, F. M., Walker, J., **Tellioglu, N.**, McCaw, J. M., McVernon, J., Black, A. & Geard, N. Rapid assessment of the risk of SARS-CoV-2 importation: case study and lessons learned. *Epidemics* **38,** 100549 (2022).

J5. **Tellioglu, N.**, Chisholm, R. H., McVernon, J., Geard, N. & Campbell, P. T. The efficacy of sampling strategies for estimating scabies prevalence. *PLOS Neglected Tropical Diseases* **16,** e0010456 (2022).

J6. **Tellioglu, N.**, Geard, N. & Chisholm, R. H. Modelling the effect of within–host dynamics on the diversity of a multi-strain pathogen. *Journal of Theoretical Biology* **548,** 111185 (2022).

Preprints

Pp1. **Tellioglu, N.**, Price, D. J., Chen, X., Spirkoska, V., Wang, Y., Moss, R., Carvalho, N., Carville, K., Campbell, P. T. & McVernon, J. A flexible agent-based modelling framework of multi-serotype pneumococcal carriage to evaluate vaccine strategies in large populations. *medRxiv,* 2025–05 (2025).

Pp2. Zarebski†, A. E., **Tellioglu†, N.**, Stockdale, J. E., Spencer, J. A., KhudaBukhsh, W. R., Miller, J. C. & Zachreson, C. Including frameworks of public health ethics in computational modelling of infectious disease interventions. *arXiv preprint arXiv:2502.00071* (2025).

Peer-reviewed Conference Proceedings

C1. **Tellioglu, N.** & Barlas, Y. *Automated Discovery of Causality and Polarity from Data* in *Proceedings of 3rd Asia Pacific System Dynamics Conference* (2020).
– Won the Best Student Paper Award.

C2. **Tellioglu, N.** & Barlas, Y. *Automated Discovery of Polarity from Data in System Dynamics Context* in *Proceedings of in 38th International Conference of the System Dynamics Society, Bergen, Norway* (2020).

C3. Akoguz, E. C., **Tellioglu, N.** & Barlas, Y. *The Dynamics of Food Waste in Relation to Consumption, Production, and Shopping Patterns* in *Proceedings of in 36th International Conference of the System Dynamics Society, Reykjavík, Iceland* (2018).

C4. Dursun†, I., **Tellioglu†, N.**, Elhuseyni, M. & Celik, N. *Estimating Gene Expression in Breast Cancer: A Hybrid Learning Framework* in *IISE Annual Conference Proceedings* (2018), 2068–2073.

C5. Aktaş†, G., **Tellioglu†, N.**, Barlas, Y. & Yaşarcan, H. *Modeling the long term dynamics of obesity as a societal epidemic* in *The 34th International System Dynamics Conference, July 2016, Delft, Netherlands* (2016).

Theses

Th1. **Tellioglu, N.** *Computational modeling of the epidemiological dynamics of the skin pathogens Group A Streptococcus and Sarcoptes scabiei* (School of Computing and Information Systems, University of Melbourne, 2024).

Th2. **Tellioglu, N.**, Barlas, Y. & Yucel, G. *Estimating causal relations of dynamic models from real-life data* (Institute for Graduate Studies in Science, Bogazici University, 2019).

Presentations

Invited Talks

IT1. **Tellioglu, N.** *Seminar: A flexible agent-based modelling framework of multi-serotype pneumococcal carriage to evaluate vaccine strategies in large populations* National Institute for Public Health and the Environment (RIVM) (Bilthoven, Netherlands). 2025.

IT2. **Tellioglu, N.** *Seminar: Modelling mass drug administration strategies for reducing scabies burden in Monrovia, Liberia* The Peter Doherty Institute for Infection and Immunity (Melbourne, Australia). 2024.

IT3. **Tellioglu, N.** *Seminar: Modelling mass drug administration strategies for reducing scabies burden in Monrovia, Liberia* University of Antwerp (Antwerp, Belgium). 2023.

IT4. **Tellioglu, N.** *Seminar: Evaluation of the effectiveness of mass drug administration strategies for reducing scabies burden in Monrovia, Liberia: An agent-based modelling approach* Murdoch Children's Research Institute (Melbourne, Australia). 2022.

IT5. **Tellioglu, N.** *Webinar: Evaluation of the effectiveness of mass drug administration strategies for reducing scabies burden in Monrovia, Liberia: An agent-based modelling approach* The International Alliance for the Control of Scabies Annual Scientific Webinar (Virtual). 2022.

IT6. **Tellioglu, N.** *Webinar: Using cross-sectional survey data in modelling scabies transmission* Australian Centre for Control & Elimination of Neglected Tropical Diseases (Virtual). 2021.

IT7. **Tellioglu, N.** *Workshop: A simulation-based approach to explore sampling bias in estimates of scabies prevalence* "Mechanistic models and observational data in biosecurity, ecology and epidemiology" Melbourne Centre for Data Science (Melbourne, Australia). 2021.

Conference Presentations

T1. **Tellioglu, N.** *Modelling mass drug administration strategies for reducing scabies burden in Monrovia, Liberia* ANZIAM (Cairns, Australia). 2023.

T2. **Tellioglu, N.** *Evaluation of the effectiveness of mass drug administration strategies for reducing scabies burden in Monrovia, Liberia: An agent-based modelling approach* Doctoral colloquium, School of Computing and Information Systems, University of Melbourne. 2022.

T3. **Tellioglu, N.** *Modelling the effect of within-host dynamics on the diversity of a multi-strain pathogen* 2022 International System Dynamics Conference (Frankfurt, Germany). 2022.
– Won Dana Meadows Award given to best student paper.

T4. **Tellioglu, N.** *Modelling scabies transmission in Monrovia, Liberia* Epidemics8 (Virtual). 2021.

T5. **Tellioglu, N.** *Modelling the effect of within-host dynamics on the diversity of a multi-strain pathogen* Epidemics8 (Virtual). 2021.

T6. **Tellioglu, N.** *Automated Discovery of Causality and Polarity from Data* 3rd Asia Pacific System Dynamics Conference (Brisbane, Australia). 2020.
– Won Best Student Paper Award.

T7. **Tellioglu, N.** *Automated Discovery of Polarity from Data in System Dynamics Context* 38th International Conference of the System Dynamics Society (Bergen, Norway). 2020.

T8. **Tellioglu, N.** *Modeling the Long-Term Dynamics of Obesity as a Societal Epidemic* 34th International Conference of the System Dynamics Society (Delft, Netherlands). 2016.

Posters

P1. **Tellioglu, N.** *A flexible agent-based modelling framework of multi-serotype pneumococcal carriage to evaluate vaccine strategies in large populations* 43rd Annual Meeting of the European Society for Paediatric Infectious Diseases (ESPID) (Bucharest, Romania). 2025.

P2. **Tellioglu, N.** *Modelling mass drug administration strategies for reducing scabies burden in Monrovia, Liberia* Epidemics9 (Bologna, Italy). 2023.

P3. **Tellioglu, N.** *Modelling the effect of within-host dynamics on the diversity of a multi-strain pathogen* Lancefield Symposium (Stockholm, Sweden). 2022.

P4. **Tellioglu, N.** *The efficacy of scabies sampling strategies for estimating prevalence: A simulation study* Epidemics8 (Virtual). 2021.

P5. **Tellioglu, N.** *The Dynamics of Food Waste in Relation to Consumption, Production, and Shopping Patterns* 36th International Conference of the System Dynamics Society (Reykjavík, Iceland). 2018.

Seminars, Meetings, and Workshops

S1. **Tellioglu, N.** *Workshop: Agent-based modelling in Python: Introduction to Polars library* SPECTRUM/SPARK Annual Meeting (Byron Bay, Australia). 2024.
– Designed and organised the workshop.

S2. **Tellioglu, N.** *Agent-Based Modelling of Neglected Tropical Diseases* The Australian Centre for the Control and Elimination of Neglected Tropical Diseases (ACE-NTDs) (Virtual). 2022.

S3. **Tellioglu, N.** *Modelling the effect of within-host dynamics on the diversity of a multi-strain pathogen* SPECTRUM/SPARK Annual Meeting (Virtual). 2021.
– Won Best Postgraduate Student Presentation.

S4. **Tellioglu, N.** *Workshop: Understanding Infectious Disease Modelling* 10th South East Asia and Western Pacific Bi-Regional TEPHINET Scientific Conference (Virtual). 2021.

Academic Services

2021 - Present	**Reviewer** – Bulletin of Mathematical Biology, Epidemiology & Infection, Archives of Public Health, Epidemics
2024	**Member of Planning Committee**, SPECTRUM/SPARK Annual Meeting
2022	**Chair of Planning Committee**, SPECTRUM/SPARK Annual Meeting
2021	**Session Chair**, SPECTRUM/SPARK Annual Meeting – Session Title: "AI & Machine Learning/Methodology"
2021	**Member of Planning Committee**, SPECTRUM/SPARK Annual Meeting

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