

# ANDREW F. BROUWER

## ASSISTANT RESEARCH SCIENTIST

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### *Education*

<b>UNIVERSITY OF MICHIGAN</b> , Ann Arbor, MI	2011–2015
PhD and MS, Applied and Interdisciplinary Mathematics	
MA, Statistics	
<b>CLARKSON UNIVERSITY</b> , Potsdam, NY	2009–2011
MS, Environmental Science and Engineering	
<b>SUNY COLLEGE AT POTSDAM</b> , Potsdam, NY	2005–2009
MA, with distinction, Mathematics	
BA, summa cum laude, Mathematics, Chemistry (majors), English Literature (minor)	
Academic Commencement Honoree and Faculty Award Recipient (highest GPA)	
SUNY Chancellor's Award for Student Excellence (state-wide achievement)	

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### *Work and Research Experience*

<b>UNIVERSITY OF MICHIGAN</b> , Ann Arbor, MI	
Assistant Research Scientist, Epidemiology	2019–present
LEO Adjunct Lecturer, Epidemiology	2018–present
Research Investigator, Epidemiology	2016–2018
Postdoctoral Research Fellow, Epidemiology	2015–2016
Graduate Student Research Assistant, Epidemiology	2013–2015
Graduate Student Instructor, Mathematics	2011–2013
<b>DEPARTMENT OF ENERGY</b> , Washington, DC	
DOE Scholar, Office of Environmental Management	2012
<b>CLARKSON UNIVERSITY</b> , Potsdam, NY	
Instructor, Mathematics and Statistics	2011
Teaching Assistant, Civil and Environmental Engineering	2009–2010

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### *Peer-reviewed Publications*

1. Tam J, **Brouwer AF**. (2021). Comparison of e-cigarette use prevalence and frequency by smoking status among youth in the United States, 2014-2019. *Addiction*.
2. **Brouwer AF**, Jeon J, Hirschtick JL, Jimenez-Mendoza E, Mistry R, Bondarenko IV, Land SR, Holford TR, Levy DT, Taylor JMG, Fleischer NL, Meza R. (2020). Transitions between cigarette, ENDS, and dual use in adults in the PATH study (Waves 1–4): multistate transition modeling accounting for complex survey design. *Tobacco Control*.

3. **Brouwer AF**, Myers JL, Martin ET, Konopka KE, Luring AS, Eisenberg MC, Lephart PR, Nguyen T, Jaworski A, Schmidt CJ. (2020). SARS-CoV-2 surveillance in decedents in a large, urban medical examiner's office. *Clinical Infectious Diseases*.
4. **Brouwer AF**, He K, Chinn SB, Mondul AM, Chapman CH, Ryser MD, Banerjee M, Eisenberg MC, Meza R, Taylor JMG. (2020). Time-varying survival effects for squamous cell carcinomas at oropharyngeal and non-oropharyngeal head and neck sites in the United States, 1973–2015. *Cancer*.
5. Carey TE, Nair T, Thomas T, Yang L, Kakaraparthi BN, Morris A, Clark A, Campredon L, **Brouwer AF**, Eisenberg MC, Meza R. (2020). Characteristics of Head and Neck Squamous Cell Carcinoma Cell Lines Reflect Human Tumor Biology Independent of Primary Etiologies and HPV Status. *Translational Oncology*.
6. **Brouwer AF**, Zelner JL, Eisenberg MC, Kimmins L, Ladisky M, Eisenberg JNSE. (2020). The impact of vaccination efforts on the spatiotemporal patterns of the hepatitis A outbreak in Michigan, 2016–18. *Epidemiology*.
7. **Brouwer AF\***, Delinger RL\*, Eisenberg MC, Campredon LP, Walline HM, Carey TE, Meza R. (2019). HPV vaccination has not increased sexual activity or accelerated sexual debut in a college-aged cohort of men and women. *BMC Public Health*. \*co-first author
8. **Brouwer AF**, Eisenberg MC, Love NG, Eisenberg JNS. (2019). Phenotypic variations in persistence and infectivity between and within environmentally transmitted pathogen populations impact population-level epidemic dynamics. *BMC Infectious Diseases*.
9. **Brouwer AF**, Eisenberg MC, Carey TE, Meza R. (2019). Multisite HPV infections in the United States (NHANES 2003–2014): an overview and synthesis. *Preventive Medicine*.
10. **Brouwer AF**, Meza R, Eisenberg MC. (2019). Integrating measures of viral prevalence and seroprevalence: a mechanistic modeling approach to explaining cohort patterns of HPV in women in the U.S. *Journal of the Royal Society: Philosophical Transactions B*.
11. **Brouwer AF**, Eisenberg JNS, Pomeroy CD, Shulman LM, Hindiyeh M, Manor Y, Grotto I, Koopman JS, Eisenberg MC. (2018). Epidemiology of the silent polio outbreak in Rahat, Israel based on modeling of environmental surveillance data. *PNAS*.
12. Eisenberg MC, Campredon LP, **Brouwer AF**, Walline HM, Marinelli BM, Lau YK, et al. (2018). Dynamics and Determinants of HPV Infection from the Michigan HPV and Oropharyngeal Cancer (M-HOC) Study: Study Protocol. *BMJ Open*.
13. **Brouwer AF**, Eisenberg MC, Meza R. (2018). Case studies of gastric, lung, and oral cancer connect etiologic agent prevalence to cancer incidence. *Cancer Research*.
14. **Brouwer AF**, Masters NB, Eisenberg JNS. (2018). Quantitative microbial risk assessment and infectious disease transmission modeling of waterborne enteric pathogens. *Current Environmental Health Reports*.
15. Kraay ANM, **Brouwer AF**, Lin N, Collender PA, Remais JV, Eisenberg JNS. (2018). Modeling environmentally mediated rotavirus transmission: The role of temperature and hydrologic factors. *PNAS*.
16. **Brouwer AF**, Weir MH, Meza R, Eisenberg MC, Eisenberg JNS. (2017). Dose-response relationships for environmentally mediated transmission models. *PLOS Computational Biology*.
17. Kraay ANM, Trostle J, **Brouwer AF**, Trujillo WC, Eisenberg JNS. (2017). Determinants of short-term movement in a developing region and implications for disease transmission. *Epidemiology*.
18. **Brouwer AF**, Meza R, Eisenberg MC. (2017). Parameter estimation for multistage clonal expansion

models from cancer incidence data: a practical identifiability analysis. *PLOS Computational Biology*.

19. **Brouwer AF**, Eisenberg MC, Remais JV, Meza R, Collender PA, Eisenberg JNS. (2017). Modeling biphasic environmental decay of pathogens and implications for risk analysis. *Environmental Science & Technology*.
20. **Brouwer AF**, Meza R, Eisenberg MC. (2016). A systematic approach to determining the identifiability of multistage carcinogenesis models. *Risk Analysis*.
21. **Brouwer AF**, Eisenberg MC, Meza R. (2016). Age effects and temporal trends in HPV-related and HPV-unrelated oral cancer in the United States: A multistage carcinogenesis modeling analysis. *PLOS One*.
22. **Brouwer AF**, Eisenberg MC, Carey TE, Meza R. (2015). Trends in HPV cervical and seroprevalence and analysis of multisite (oral, genital, sero) concurrence and type-concordance in NHANES 2003–2010. *BioMed Central Infectious Diseases*.
23. **Brouwer AF**, Meza R, Eisenberg MC. (2015). Transmission heterogeneity and autoinoculation in a multisite infection model of HPV. *Mathematical Biosciences*.
24. **Brouwer AF**, Grimberg SJ, Powers SE. (2012). The Dynamic Anaerobic Reactor and Integrated Energy System (DARIES) Model: Model Development, Validation, and Sensitivity Analysis. *Water Environment Research*.
25. **Brouwer AF**, Davis RM, Larkin AJ, Studenmund DH, Tucker CA. (2007). Intrinsically  $S^1$  3-Linked Graphs and Other Aspects of  $S^1$  Embeddings. *The Rose-Hulman Undergraduate Mathematics Journal*.

#### *Non-peer-reviewed and Media Publications*

1. Eisenberg MC, **Brouwer AF**, Eisenberg JNS. (2018). Sewage surveillance is the next frontier in the fight against polio. *The Conversation*. [\[link\]](#)
2. **Brouwer AF**. (2019). Bridging the Gap between Cancer Risk-factor Prevalence and Cancer Incidence. *SIAM News Blog*. [\[link\]](#)

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#### *Ongoing research funding, **Principal Investigator***

HPV Multisite Self-sampling and Cervical Cancer Prevention in a Transmasculine Population

Role: Principal investigator

Agency: University of Michigan Rogel Cancer Center

Project period: 07/2019–06/2020 (in no cost extension through 06/2022)

Determinants of tobacco use transitions among smokers and dual users of cigarettes and e-cigarettes

Role: Principal investigator

Agency: University of Michigan Center for the Assessment of Tobacco Regulations

Project period: 09/2020–08/2021

Collaborative Research: Efficient Methods for Identifiability of Dynamic Models (1853032)

Role: Co-principal investigator (PI: M. Eisenberg)

Agency: National Science Foundation (NSF) Division of Mathematical Sciences (DMS)

Project period: 7/2019–6/2022

#### *Ongoing research funding, **Co-Investigator***

Mathematical Models to Address Policy-relevant WASH Questions

Role: Co-investigator (PI: J. Eisenberg)

Agency: Bill and Melinda Gates Foundation

Project period: 7/2020–7/2022

Center for the Assessment of the Public Health Impact of Tobacco Regulations (U54 CA229974)

Role: Co-investigator (PIs: R. Meza, D. Levy)

Agency: National Cancer Institute (NCI)

Project period: 09/2018–08/2023

Centers of Excellence for Influenza Research and Surveillance (CEIRS) (HHSN272201400006C)

Role: Co-investigator (PI: R. Webby)

Agency: National Institute of Allergy and Infectious Disease (NIAID)

Project period: 08/2018–12/2021

### *Completed research funding, **Co-Investigator***

COVID-19 Early Detection and Regional Epidemic Alert System:

Role: Co-investigator (PI: S. Kardia)

Agency: Michigan Department of Labor and Economic Opportunity

Project period: 08/2020–12/2020

Tools to Model Time-Dependent Effects on Cancer Survival Outcomes in Large Databases

Role: Co-investigator (PI: J. Taylor)

Agency: University of Michigan Rogel Cancer Center

Project period: 1/2020–12/2020

From Mechanism to Population: Modeling HPV-related Oropharyngeal Carcinogenesis (U01 CA182915)

Role: Co-investigator (PIs: R. Meza, M. Eisenberg)

Agency: National Cancer Institute (NCI)

Project period: 09/2014–08/2020

Modeling the Effects of the Environment on Enteric Pathogen Dynamics (U01 GM110712)

Role: Co-investigator (PI: J. Eisenberg)

Agency: National Institute of General Medical Sciences (NIGMS)

Project period: 09/2014–06/2021

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### *Selected Conference and Workshop Participation*

Society for Industrial and Applied Mathematics (SIAM) Dynamical Systems	2021
Society for Research on Nicotine and Tobacco (SRNT) Annual Meeting	2021
Centers for Excellence in Influenza Research and Surveillance (CEIRS) Annual Meeting	2021
Tobacco Centers of Regulatory Science (TCORS) Grantee Meeting	2020
University of Michigan Resilient Teaching Workshop	2020
Society for Research on Nicotine and Tobacco (SRNT) Annual Meeting	2020
Epidemics: International Conference on Infectious Disease Dynamics	2019
American Society of Tropical Medicine and Hygiene (ASTMH) Annual Meeting	2019
National Institutes of Health Tobacco Regulatory Science Conference (NIH-TRS)	2019
American Institute of Mathematics (AIM): Identifiability Problems in Systems Biology	2019
Society for Industrial and Applied Mathematics (SIAM) Dynamical Systems	2019
University of Michigan's Michigan Road Scholars Tour	2019
American Society of Tropical Medicine and Hygiene (ASTMH) Annual Meeting	2018

Society for Industrial and Applied Mathematics (SIAM) Uncertainty Quantification	2018
Models of Disease Agent Study (MIDAS) Annual Meeting	2018
Joint Mathematics Meetings (JMM)	2018
Cancer Systems Biology Consortium (CSBC) Annual Meeting	2017
Integrated Training in Microbial Systems (ITiMS) Workshop on Models	2017
Society for Industrial and Applied Mathematics (SIAM) Parameter Space Dim. Red.	2017
Society for Industrial and Applied Mathematics (SIAM) Dynamical Systems	2017
Institute for Disease Modeling (IDM) Symposium	2017
American Society of Tropical Medicine and Hygiene (ASTMH)	2016
Cancer Systems Biology Consortium (CSBC) Annual Meeting	2016
European Conference on Mathematical and Theoretical Biology (ECMTB)	2016
Models of Disease Agent Study (MIDAS) Annual Meeting	2016
Institute for Disease Modeling (IDM) Symposium	2016
Casa Matemática Oaxaca (CMO-BIRS): Viral Dynamics and Cancer	2015
Summer Institute in Statistics and Modeling of Infectious Diseases (SISMID)	2014
Society for Industrial and Applied Mathematics (SIAM) Life Sciences	2014
SAMSI Industrial Mathematical and Statistical Modeling (IMSM)	2013
New York Water Environment Association (NYWEA) Conference	2011
Northeast Agricultural/Biological Engineering Conference (NABEC)	2010

### *Invited Talks*

Michigan Institute for Computational Discovery and Engineering “Computing our way out of a pandemic: modeling in the face of COVID-19” Symposium	2021
Michigan Communicable Disease Conference	2021
International Atomic Energy Agency’s 2nd Research Coordination Meeting on the Application of Stable Isotope Techniques in Environmental Enteric Dysfunction Assessment and Understanding its Impact on Child Growth	2020
Michigan Communicable Disease Conference Keynote (cancelled due to COVID-19)	2020
Michigan Department of Health and Human Services Seminar	2020
Intermountain West HPV Vaccination Coalition Seminar	2019
Duke University Mathematical Biology Seminar	2019
Models: At the Intersection of Data & Discovery Workshop	2017
University of Michigan Epidemiology Seminar	2016

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*Didactic Teaching*

**UNIVERSITY OF MICHIGAN**, Ann Arbor, MI

Fall 2020	EPID 633 – Intro to Math Modeling in Epidemiology and Public Health
Summer 2020	EPID 703 – Applied Infectious Disease Modeling
Fall 2018	EPID 633 – Intro to Math Modeling in Epidemiology and Public Health
Winter 2013	MATH 116 – Calculus II
Fall 2012	MATH 116 – Calculus II
Winter 2012	MATH 115 – Calculus I
Fall 2011	MATH 115 – Calculus I

**CLARKSON UNIVERSITY**, Potsdam, NY

Summer 2011	SB 550 – Pre-MBA Statistics
Spring 2011	STAT 383 – Probability and Statistics (two sections) STAT 282 – General Statistics

*Non-didactic Teaching*

**UNIVERSITY OF MICHIGAN**, Ann Arbor, MI

Winter 2021	PUBHLTH 479 – Independent Research in Public Health
Winter 2020	EPID 604 – Applications of Epidemiology
Winter 2019	EPID 624 – Readings in Epidemiology

*Guest Lecturing*

**UNIVERSITY OF MICHIGAN**, Ann Arbor, MI

Fall 2020	EPID 644 – Contemporary Methods (two sections)
Fall 2019	BIOSTAT 803 – Cancer Biostatistics Seminar EPID 591 – Social Epidemiology: From Frameworks to Policy EPID 644 – Contemporary Methods (two sections)
Fall 2018	EPID 644 – Contemporary Methods (two sections)
Fall 2017	EPID 644 – Contemporary Methods MATH 463 – Introduction to Mathematical Biology
Fall 2016	BIOSTAT 803 – Cancer Biostatistics Seminar MATH 463 – Introduction to Mathematical Biology
Winter 2015	EPID 636 – Cancer Risk and Epidemiology Modeling

*Dissertation Committees*

- Emily Andrus, Epidemiology, 2020–present
- Derrick Sund, Mathematics, 2019–present
- Peter DeJonge, Epidemiology, 2019–present

### *Capstone & Research Project Mentorship*

- Claire Sandler, BS, Public Health Sciences, 2021
  - Jason Engle, MPH, Epidemiology, 2019–20
  - Joseph Ballardo, MA, Mathematics, 2017–19
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### *Committee Service*

- Epidemiology Diversity, Equity, and Inclusion Committee, 2017–present
    - Acting co-chair, Winter 2021
  - Epidemiology Recruitment Committee (ad hoc), 2019
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### *University of Michigan Affiliations*

- Rogel Cancer Center: Cancer Epidemiology & Prevention (CEP; 2016–present)
- Michigan Institute for Computational Discovery and Engineering (MICDE; 2021–present)
- Michigan Institute for Data Science (MIDAS; 2021–present)

### *Professional Memberships*

- Society of Research for Nicotine and Tobacco (SRNT; 2020–present)
  - Society of Mathematical Biology (SMB; 2016–present)
  - Society for Industrial and Applied Mathematics (SIAM; 2011–2015, 2017–present)
  - Eagle Scout (2003)
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### *Interviews and Media Mentions*

- U.S. Covid-19 Metrics Signal Hopeful Turn. (5/7/2021). *The Wall Street Journal*. [\[link\]](#)
- Michigan Governor Urges Pause in Youth Sports, Indoor Dining as Covid-19 Cases Surge Again. (4/9/2021). *The Wall Street Journal*. [\[link\]](#)
- Covid-19 Vaccinations Are Picking Up Pace, but New Cases Are Still Rising. (3/31/2021). *The Wall Street Journal*. [\[link\]](#)
- What Rand Paul gets wrong -- and right -- on wearing masks after COVID vaccination. (3/24/2021). *Lexington Herald-Leader*. [\[link\]](#)
- U.S. Covid-19 Hospitalizations Have Been Falling for Two Months. (3/12/2021). *The Wall Street Journal*. [\[link\]](#)
- Pandemic in Retreat. (2/11/2021). *The New York Times*. [\[link\]](#)
- Brutal Covid-19 Surge in the U.S. Weakens Significantly. (2/10/2021). *The Wall Street Journal*. [\[link\]](#)
- Covid-19 Winter Surge Saw January Daily Cases Peak Before Dropping. (1/29/2021). *The Wall Street Journal*. [\[link\]](#)
- January Has Been the Deadliest Month of the Pandemic for the U.S. (1/28/2021). *The Wall Street Journal*. [\[link\]](#)
- COVID Cases Fell in Donald Trump's Last Week as President. Here's the Sad Reason Why. (1/26/2021). *Newsweek*. [\[link\]](#)
- U.S. Covid-19 Hospitalizations Fall From Record Highs. (1/21/2021). *The Wall Street Journal*. [\[link\]](#)
- Experts Say Worst May Still Be Ahead With Expected Holiday COVID-19 Surge. (1/9/2021). *The Wall Street Journal*. [\[link\]](#)
- Covid-19 Positivity Rate Rising in Many States. (1/6/2021). *The Wall Street Journal*. [\[link\]](#)
- Midwest Sees Some Respite From Prolonged Surge. (12/10/2020). *The Wall Street Journal*. [\[link\]](#)

- Health Experts on What's Ahead: 'Things Are Going to Likely Get Very Bad'. (11/20/2020). *The Wall Street Journal*. [\[link\]](#)
- Should You Cancel Thanksgiving? What Fauci and Other Experts Say About Celebrating During COVID. (10/22/2020). *Newsweek*. [\[link\]](#)
- Testing the deceased could aid virus surveillance, study shows. (9/15/2020). *The University Record*. [\[link\]](#)
- No Sign of Second Wave Before Election, but U.S. COVID-19 Cases Could Get Worse. (9/14/2020). *Newsweek*. [\[link\]](#)
- Labor Day Could Become Coronavirus Superspreader as Millions Prepare to Travel. (9/4/2020). *Newsweek*. [\[link\]](#)
- Why COVID-19 Deaths Are Rising in Some States and Not Others. (7/15/2020). *Newsweek*. [\[link\]](#)
- U.S. COVID-19 Cases Are Skyrocketing, so Why Are Deaths Down? (7/8/2020). *Newsweek*. [\[link\]](#)
- New evidence suggests the coronavirus was likely spreading in the US and France as early as December. (5/7/2020). *Business Insider*. [\[link\]](#)
- Some scientists think COVID-19 may have been spreading far earlier than previously thought. (5/6/2020). *Newsweek*. [\[link\]](#)
- Coronavirus could be here 'permanently,' says top adviser to the U.K. government. (4/23/2020). *Newsweek*. [\[link\]](#)
- Could we be living with COVID-19 forever? (3/30/2020). *Discover Magazine*. [\[link\]](#)
- HPV on the rise for unvaccinated women under 40. (4/11/2019). *UPI* [\[link\]](#) and republished by others.
- HPV rates for women under 40 increasing, putting them at higher risk of related cancers, study shows. (4/11/2019). *Michigan Public Health News Center* [\[link\]](#), and republished by *The University Record* [\[link\]](#), *ASPPH* [\[link\]](#) and others.
- With polio eradication on the horizon, health officials tread carefully. (10/31/2018). *Contagion*. [\[link\]](#)
- Polio: environmental monitoring will be key as world reaches global polio eradication. (10/22/2018). *Michigan Public Health News Center*. [\[link\]](#).