

## Curriculum Vitae

**Date Prepared:** 4/22/2019  
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**Place of Birth:** Maryland, USA

### Education:

1998	BA <i>Magna cum Laude</i>	Economics	Francis Marion University Florence, SC
2003	PhD	Economics (Advisor: Dwight R. Lee)	University of Georgia Athens, GA
2006	PhD	Ecology (Advisor: Pejman Rohani)	University of Georgia Athens, GA

### Postdoctoral Training:

2006-2008	Postdoctoral Fellow	Sustainable Development (Mentor: Jeffrey Sachs)	Earth Institute at Columbia University New York, NY
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### Faculty Academic Appointments:

2008-2010	Research Associate	François Xavier Bagnoud Center for Health and Human Rights	Harvard School of Public Health Boston, MA
2009-2012	Lecturer	Health Policy, Economics and Management	National University of Rwanda School of Public Health Kigali, Rwanda
2010-2015	Research Associate	Department of Global Health and Social Medicine	Harvard Medical School Boston, MA
2015-	Assistant Professor	Department of Global Health and Social Medicine	Harvard Medical School Boston, MA

2015-2016	Blaustein Visiting Assistant Professor	Earth Systems Science	School of Earth, Energy, and Environmental Sciences Stanford University
2015-2017	Fellow	Center for Innovation in Global Health	Stanford School of Medicine
2015-2017	Visiting Assistant Professor	Program for Disease Ecology, Health, and Development,	Woods Institute for the Environment, Stanford University
2016-2017	Visiting Assistant Professor	Department of Medicine	Stanford School of Medicine

**Other Professional Positions:**

2009	Director of Research	Partners in Health Rwanda
2013-	Board of Directors	PIVOT Works, Inc.
2013-2014	Interim Executive Director	PIVOT Works, Inc.
2014-2015	Chief Executive Officer	PIVOT Works, Inc.
2015-2018	Co-Chief Executive Officer	PIVOT Works, Inc.
2018-	Scientific Director	PIVOT Works, Inc.

**Major Administrative Leadership Positions:**

**Local**

2017	Co-Organizer Madagascar: A Crucible for Science, Health, and the Environment	Stanford Global Health Research Symposium Stanford University Stanford, CA
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**National**

2013-	Principal Investigator and Co-organizer Working Group Series Land Use Change and Infectious Diseases	National Center for Ecological Analysis and Synthesis Santa Barbara, CA
2013-	Principal Investigator and Co-organizer Working Group Series Land Use Change and Infectious Diseases	National Socio-Environmental Synthesis Center Annapolis, MD
2015	Co-organizer Symposium on Global Change and Infectious Disease Dynamics	Ecological Society of America Annual Meeting Baltimore, MD
2016	Organizer Natural Capital, Human Health, and the Environment	Natural Capital Symposium Stanford University Stanford, CA

2017	Co-Organizer Ecological Levers for Health: State of the Science Summit	Science for Nature and People Partnership UC Santa Barbara Santa Barbara, CA
2018	Moderator Healthcare in Africa: Blending the Old with the New	SOCAP (Social Capital Markets) Annual Conference, San Francisco, CA

### **International**

2009	Moderator Economics Core Metrics Population Health Implementation and Training	African Health Initiative Doris Duke Charitable Foundation
2014	Co-organizer Working Group Ecology of Poverty and Economic Development	Paris School of Economics Universite Paris I Pantheon-Sorbonne Paris, France
2015	Co-organizer Working Group Ecology of Poverty and Economic Development	Institute for Advanced Studies Aix-Marseille School of Economics Marseille, France
2018	Organizer Research coordinating network: A model system for planetary health	Centre ValBio Ranomafana, Madagascar
2018	Co-organizer Integrating Health Systems and Planetary Health	Special Session Planetary Health Alliance Edinburgh, Scotland

### **Committee Service:**

#### **National**

2007	Panel on Markets, Freedom, and the Environment Colloquium	Member Political Economy Research Center Bozeman, MT
2007	Panel on the Contributions of Armen A. Alchian Liberty Fund Conference	Panelist Political Economy Research Center Emigrant, MT
2010	Working Group Infectious Diseases at the Wildlife/Livestock/Human Interface Emory University	Member Research and Policy for Infectious Disease Dynamics NIH Fogarty International Center

2013	Search Committee for Director	Member Global Health Institute Stony Brook University Stony Brook, NY
2013-	Working Group Series Land Use Change and Infectious Diseases	Member National Center for Ecological Analysis and Synthesis Santa Barbara, CA
2013-	Working Group Series Land Use Change and Infectious Diseases	Member National Socio-Environmental Synthesis Center Annapolis, MD
2015	Panel on Global Change and Infectious Disease Dynamics	Panelist Ecological Society of America Special Symposium Baltimore, MD
2016	Panel on Natural Capital, Human Health, and the Environment	Panelist Natural Capital Symposium Stanford University Stanford, CA
2017-	Ecological Levers for Health Working Group	Member Science for Nature and People Partnership/National Center for Ecological Analysis and Synthesis, Santa Barbara, CA
2018	Healthcare in Africa: Blending the Old with the New	Panelist SOCAP (Social Capital Markets) Annual Conference, San Francisco, CA
2019	Data Cohesion in Community Health	Panelist The Future of Primary Health Care San Francisco
<b>International</b>		
2006	Scope Meeting Biodiversity and Health Madison, WI	Member DIVERSITAS Paris, France
2007	Expert Panel Challenges of the Drylands Dubai, UAE	Member Global Humanitarian Forum Geneva
2009-2010	Data Collaborative Team Population Health Implementation	Member Africa Health Initiative

	and Training Lusaka, Zambia Rwinkwavu, Rwanda	Doris Duke Charitable Foundation
2010	Steering Committee	Member Rwanda Demographic and Health Survey-IV
2010	Technical Committee Environmental Health and Social and Demographic Characteristics	Member Rwanda Demographic and Health Survey-IV
2018	Community Health Impact Coalition	PIVOT Delegate

### **Editorial Activities**

#### *Ad hoc Reviewer*

Acta Tropica  
The American Naturalist  
Bulletin of Mathematical Biology  
BMJ Global Health  
EcoHealth  
Ecology Letters  
Ecosphere  
Evolutionary Applications  
Global Change Biology  
Integrative and Comparative Biology  
Journal of Economic Dynamics and Control  
Journal of Health Economics  
Journal of the Royal Society Interface  
Journal of Theoretical Biology  
Natural Resources Modeling  
Philosophical Transactions of the Royal Society, B  
PLOS Biology  
PLOS Medicine  
PLOS Neglected Tropical Diseases  
PLOS ONE  
Proceedings of the National Academy of Sciences  
Proceedings of the Royal Society, B  
Science Advances  
Scientific Reports

### **Honors and Prizes**

1994	Francis Marion Elmore Memorial Scholarship	Francis Marion University	Academic Merit
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1996	Knights of Columbus Scholarship	Francis Marion University	Academic Merit
1994	Jay Boone Aiken Scholarship	Francis Marion University	Academic Merit
1997	<i>Phi Kappa Phi</i>	Francis Marion University	Academic Merit
1997	Alumni Association Scholarship	Francis Marion University	Academic Merit
1997	Sigma Phi Epsilon/ Jay Williams Scholarship	Francis Marion University	Academic Merit
1998	Free Market Environmentalism Scholarship	Political Economy Research Center	Academic Merit
1998	Tropical Ecology Scholarship	Francis Marion University Pee Dee Sierra Club	Academic Merit
1999	Ramsey Center for Private Enterprise Foundation Scholarship	Department of Economics University of Georgia	Academic Merit
2002	Graduate Fellowship	Political Economy Research Center	Academic Merit
2003	Eugene Odum Fellowship	Odum School of Ecology University of Georgia	Academic Merit
2004-2005	ARCS Foundation Fellowship	ARCS Foundation and Sarain Lanier Foundation	Academic Merit
2005	Best Oral Presentation	Southeastern Ecology and Evolution Conference Athens, GA	
2013	Keynote Speaker	One Health Symposium University of Georgia Athens, GA	
2015	Keynote Speaker	Ecology and Evolution of Infectious Diseases Annual Meeting Athens, GA	

2018	Delegate	Skoll World Forum	Social Entrepreneurship
2018	Arnhold Rainer Fellowship	Mulago Foundation	Social Entrepreneurship
2018	Spotlight: Health Scholar	Aspen Institute	Social Entrepreneurship
2018	Lawrence F. Swails Award	Francis Marion University	Alumni Award for Biology
2019	Delegate	Skoll World Forum	Entrepreneurship

## **Report of Funded and Unfunded Projects**

### **Funding Information:**

#### **Past**

2009-2011	Strengthening and Studying Community Based Integrated Primary Health Care Systems in Rural Rwanda Doris Duke Charitable Foundation Co-Investigator (Co-PIs: M. Rich, P. Basinga) (\$8,500,000) The goal of this grant was to expand health care delivery programs in concert with implementation research in Rwanda. It included a range of policy and implementation and research initiatives.
2010-2015	The Economic Impacts of Community-Based Integrated Health Care in Rural Rwanda NIH/FIC K01TW008773 PI (\$669,470) This is a mentored International Research Career Development Award. The goal was to build a broad research program around estimating economic effects of health care in Rwanda (which transitioned to Madagascar). Mentors: Megan Murray (HMS), Sir Partha Dasgupta (U. of Cambridge), and Agnes Binagwaho (Minister of Health, Rwanda).
2013-2015	The Economic Burden of Human and Livestock Diseases in Madagascar Grand Challenges Explorations, Phase I Bill and Melinda Gates Foundation PI (\$100,000) This is a pilot grant to develop a new metric of measuring the economic burden of disease that is inclusive of human and livestock diseases in Madagascar.
2014	Baseline Assessment of Health and Economic Conditions for Ifanadiana District, Madagascar PIVOT Works, Inc. Co-PI (PI: A. Miller) (\$178,000) This is a baseline study of 1600 households in Ifanadiana District in Madagascar – the catchment district of PIVOT. The survey is in partnership with the Madagascar Institute of

Statistics, which is a subcontractor on the grant.

## **Current**

- 2012-2018 Poverty Traps and the Ecology of Economic Development  
Scholar Award in Complex Systems Science  
James S. McDonnell Foundation  
PI: M. Bonds (\$450,000)  
This is a scholar award in support of a broad research platform associated with developing mathematical frameworks for understanding relationships between poverty traps and ecology.
- 2013-2018 Ranomafana Area Health System Strengthening Project: Technical Assistance  
Jim and Robin Herrnstein Foundation (now Herrnstein Family Foundation)  
Co-PIs: M.H. Bonds and M.L. Rich (\$850,000)  
This is a technical assistance implementation grant to support the incubation of a new health care service and research organization in Madagascar. The organization is now called PIVOT.
- 2016-2017 Improving Zika control through models of transmission, vector control, and public health interventions  
National Science Foundation #1640780  
Co-PI (PI: Courtney C. Murdock) (\$200,000)
- 2018-2019 Arnold Rainer Fellowship for bringing global health solutions to scale  
Mulago Foundation (\$100,000)  
PI M. Bonds. Award to PIVOT.  
This is an unrestricted grant to PIVOT combined with leadership training to bring solutions to scale.
- 2018-2021 Establishing a Model Maternal and Reproductive Health Program for Madagascar:  
To Care for Women, Children, and an Entry into Planetary Health  
WT Rich Family  
PI: M. Bonds (\$440,000)  
This is a grant to PIVOT for the implementation of a community-based maternal health program in Ifanadiana District, Madagascar.
- 2017-2019 Establishing a New Science of Health System Integration  
PIVOT Works, Inc. # HMS-09112018  
PI: M. Bonds \$523,189  
This is a grant for leading a broad integrated research program in Madagascar to measure impacts of a health intervention, and establish data systems to improve health performance.

## **Report of Local Teaching and Training**

### **Teaching of Students in Courses**

2000-2003 Principles of Macroeconomics

Department of Economics



	50-300 undergraduate students	University of Georgia Athens, GA 3-hrs per week for 16 weeks
2001-2003	Economics of Environmental Quality 50-300 Upper-level undergraduate students	Department of Economics University of Georgia Athens, GA 3-hrs per week for 16 weeks
2009-2012	Applied Health Economics 30-35 MPH Students	National University of Rwanda School of Public Health Kigali, Rwanda 4hrs per day for 10-day modules
2011	Seminar on Poverty Traps HEB 1333 Primate Ecology and Evolution Upper level undergraduates	Harvard College, Cambridge, MA Course Instructor: Charlie Nunn 90 min session
2012	Health Economics MMSc in Global Health Delivery Master's students	Harvard Medical School Course Instructor: Joia Mukherjee 2-hr session
2016	Seminar on Planetary Health in Madagascar History of Life Internship Program High school students	School of Earth, Energy, and Environmental Sciences Course Instructor: Noel Heim. 90 minute session
2016	Health and Economic Development in Rwanda and Madagascar BIOHOPK 168H/268H Disease Ecology Upper level undergraduates	Department of Biology Stanford University Course Instructor: Giulio De Leo 2 60 minute sessions
2017	Tutorial on Economic Epidemiology EnvRes 399: Winter Quarter	Emmitt Interdisciplinary Program in Environment & Resources Stanford University 1 90 min session per week for 10 weeks.
2019	Population Health Metrics for Field Implementers MMSc in Global Health Delivery Master's students	Harvard Medical School Course Instructor: Joia Mukherjee 90 minute session

**Formally Mentored Harvard Medical, Dental and Graduate Students**

2012-2014 Fernet Leandre, MD, MMSc. Global Health Delivery  
Department of Global Health and Social Medicine, HMS. I served as Dr. Leandre's  
advisor. His Master's thesis was titled, "Comparative evaluation of household economic

metrics for monitoring impacts of health programs on livelihoods in Haiti.”

Now: Instructor in Medicine, Dana-Farber Cancer Institute; Chief Programs Officer, Zanmi Lasante; Senior Lecturer, Faculty of Global Health Delivery, University of Global Health Equity

2018- Melissa Sutton, MD, MPH Candidate in Epidemiology, Harvard T.H. Chan School of Public Health. I am advising Dr. Sutton Master’s practicum on causes and prevention of Buruli Ulcer in Benin.

- Recipient of Rose Traveling Fellowship,

2019- Yassah Lavelah, MMSC Candidate in Global Health Delivery, Blavatnik Institute, Harvard Medical School Department of Global Health and Social Medicine. I am on the committee of Ms. Lavelah Master’s thesis on maternal health financing in Liberia.

### **Other Mentored Trainees and Faculty:**

2013-2016 Calistus Ngonghala, Ph.D. Postdoctoral Fellow, Department of Global Health and Social Medicine, HMS. I was Dr. Ngonghala’s mentor. Publications from this work include articles in *PLOS Biology*, *Nature Ecology & Evolution*, *J Roy Soc Interface*, *Phil Trans of Roy Soc B*, *Proc Roy Soc B*, *Trends in Parasitology*, *One Health*, *Scientific Reports*.  
Now: Assistant Professor, Department of Mathematics, University of Florida

2014-2015 Cassidy Rist, DVM, MPH, Postdoctoral Fellow, Department of Global Health and Social Medicine, HMS. I co-supervised Dr. Rist with Dr. Tom Gillespie, Departmental of Environmental Studies, Emory University. Her work focused on the economic burden of human and livestock diseases in Madagascar. Her work produced two first author publications in *Trends in Parasitology* and *One Health*.  
Now: Assistant Professor, Center for Public and Corporate Veterinary Medicine, Department of Population Health Sciences, Virginia-Maryland College of Veterinary Medicine (Virginia Tech).

2015-2017 Andres Garchitorena, PhD, DVM, MPhil, Postdoctoral Fellow, Department of Global Health and Social Medicine, HMS. I supervised Dr. Garchitorena’s research on implementation science, and economic and environmental drivers of disease in Madagascar. We have now published two book chapters in Oxford University Press and thirteen peer-reviewed publications in scientific journals including *Health Affairs*, *BMJ Global Health*, *International Journal of Epidemiology*, *PLOS NTDs*, *Trends in Parasitology*, *Phil Trans Roy Soc B*, *One Health*, *Scientific Reports*, *Proc Roy Soc*, *Trends in Parasitology*, and *Global Health Action*.  
Now: Research Faculty, Infectious Diseases and Vectors: Ecology, Genetics, Evolution and Control (MIVEGEC), Institute for Research in Development (IRD) in Montpellier, France; Research Advisor, PIVOT.

2016-2017 Charles Brummitt, PhD, Research Associate, Department of Global Health and Social Medicine, HMS.  
I mentored Dr. Brummitt on new modeling techniques for coupled natural-human systems. Our first publication together was in *Nature Human Behaviour*. Our second manuscript is

titled, “Machine learned patterns reveal that diversification and complexity drive economic development,” and will be submitted in PNAS.

Now: Senior Innovation Scientist, Indigo Agriculture

- 2017 Camille Ezran, MSc Epidemiology, Stanford School of Medicine, “The impact of a health system strengthening initiative on the quality of healthcare in a rural district of Madagascar,” I coadvised Ms. Ezran on her Master’s thesis which is to be submitted in *Bulletin of the World Health Organization*.  
Now: Medical student at Rockefeller University.
- 2019 Karen Finnegan, PhD, Research Associate, Department of Global Health and Social Medicine, HMS.  
I mentor Dr. Finnegan on a broad range of implementation research projects and capacity building activities in Madagascar, including a costing analysis of a district level of model health system in Madagascar, an analysis of a vaccination campaign during the 2018-2019 measles epidemic, and the development of community health analytics.
- 2019 Sheetal Sharma, PhD, Postdoctoral Research Fellow, Department of Global Health and Social Medicine, HMS  
I mentor Dr. Sharma on a range of implementation research projects to understand and improve the efficacy boat-based mobile clinics for coastal and island communities in northern Kenya. These studies include the cost-effectiveness of vaccination programs.

**Local Invited Presentations:**

- 2007 Breaking the Disease-Driven Poverty Trap in Rwanda: Theory and Evidence  
Department of Social Medicine, Harvard Medical School
- 2008 Poverty Traps: Theory and Practice  
Earth Institute Fellows Symposium, Columbia University, New York, NY
- 2009 Poverty Trap Formed by the Ecology of Infectious Diseases  
Francois-Xavier Bagnoud Center for Health and Human Rights, Harvard School of Public Health
- 2011 Poverty and Disease as Coupled Economic-Ecological Systems  
Center for Population and Development Studies, Harvard University
- 2011 How Health Care Can Break Cycles of Poverty and Disease  
Department of Global Health and Social Medicine, Harvard Medical School
- 2013 Introducing PIVOT: Breaking Cycles of Poverty and Disease  
Partners in Health, Boston, MA
- 2014 Poverty, Disease, and Health Care Delivery  
Department of Global Health and Social Medicine, Harvard Medical School

- 2014 PIVOT: Breaking Cycles of Poverty and Disease  
Partners In Health, Boston, MA
- 2015 Ecology of Poverty and Disease: From Theory to Practice in Madagascar  
Stanford School of Medicine, Stanford, CA
- 2015 Ecology of Poverty Traps in Coupled Human-Natural Systems  
Woods Institute of the Environment, Stanford University, Stanford, CA
- 2016 Health System Strengthening in Madagascar  
Prakash Lab, Department of Bioengineering, Stanford University, Stanford, CA
- 2016 Ecology of Poverty and Disease: From Theory to Practice  
Natural Capital Symposium, Stanford University, Stanford, CA
- 2017 Crucible for Science Health and the Environment  
Stanford University, Stanford, CA
- 2017 Health System Strengthening in Rwanda  
Stanford School of Medicine, Stanford University, Stanford, CA
- 2017 Advancing a Science of Sustaining Health: A Model Health District in Madagascar  
Department of Global Health and Social Medicine, Harvard Medical School
- 2017 PIVOT's Integrated Approach to Health System Strengthening  
Partners In Health, Boston, MA
- 2017 PIVOT's Response to Plague Outbreak in Madagascar  
Partners In Health, Boston, MA

**Report of Regional, National and International Invited Teaching and Presentations:**

**Regional**

- 2010-2011 Seminar on Health and Economic Development (2 sessions)  
FAMCO Residency  
Partners In Health, Rwanda
- 2013 Ecology of Poverty and Disease: From Theory to Practice  
Department of Ecology and Evolutionary Biology  
Brown University, Providence, RI
- 2014 PIVOT: Breaking Cycles of Poverty and Disease  
Next Mile Project, Boston, MA
- 2017 Ecology of Poverty, Disease and Health Care Delivery: Lessons for Planetary Health  
Department of Integrated Biology, University of California, Berkeley

2017 Ecology of Poverty and Disease, with Lessons for Planetary Health  
School of Public Health, University of California Berkeley, Berkeley, CA

**National**

2002 Measuring Technical Efficiency of School Trust Timber Production  
Political Economy Research Center, Bozeman, MT

2005 On Long-term Consequences of Selfish Behavior, A Game-Theoretic Approach to Host-Pathogen Coevolution  
Southeastern Ecology and Evolution Conference, Athens, GA

2005 Infectious Diseases Can Induce Greater Sociality  
National Science Foundation, Human and Social Dynamics Grant Meeting, Arlington, VA

2006 Reducing Fertility Better Than Vaccinating for Improving Global Health and Economic Development: A Simple Ecological Framework  
Ecological Society of America Annual Meeting, Memphis, TE

2006 Sociality, Sterility, and Poverty: Host-Pathogen Coevolution with Implications for Human Ecology  
Consortium for Conservation Medicine Meeting, Madison, WI

2007 The Economics and Ecology of Poverty Traps  
Berry College, Rome GA

2007 Health Analysis in the Rwanda Millennium Villages  
Millennium Villages Project, Columbia University New York, NY

2009 The Ecology of Poverty, Disease, and Economic Development in Rwanda: Reconciling Science and Social Justice  
Francis Marion University, Florence, SC

2010 Economics of the Livestock/Wildlife/Human Disease Interface  
Research and Policy on Infectious Disease Dynamics (RAPIDD), Fogarty International Center, Emory University, Atlanta, GA

2010 Poverty Trap Formed by the Ecology of Infectious Diseases  
Program in Interdisciplinary Biological and BioMedical Sciences (PiBBs)  
University of New Mexico, Albuquerque, NM

2011 Can Health Care Break Cycles of Poverty and Disease? Theory and Implementation  
Research in Rwanda  
Institute of Health Metrics and Evaluation  
University of Washington, Seattle, WA

- 2011 Health and the Ecology of Economic Development  
Woodrow Wilson School, and Department of Ecology and Evolutionary Biology,  
Princeton University, Princeton, NJ
- 2013 Ecology of Poverty and Disease  
Center for Infectious Disease Dynamics  
Penn State University, State College, PA
- 2013 Ecology of Poverty and Disease  
One Health Symposium (Keynote Address)  
University of Georgia, Athens, GA
- 2013 Ecology of Poverty and Disease  
Institute for African Development  
Cornell University, Ithaca, NY
- 2014 Ecology of Poverty  
Complex Systems Conference  
James McDonnell Foundation  
Emory University, Atlanta, GA
- 2014 Ecology of Poverty Traps  
Hopkins Marine Station  
Stanford University, Monterey, CA
- 2015 Land Use Change and Infectious Diseases  
National Socio-Environmental Synthesis Center  
Annapolis, MD
- 2015 Poverty, Disease, and Healthcare Delivery: From Theory to Practice  
Ecology and Evolution of Infectious Disease Conference (Keynote Address)  
Athens, GA
- 2015 A general model for the economics of land–use change and pathogen dynamics  
Ecological Society of America Annual Meeting, Baltimore, Maryland
- 2015 PIVOT: Breaking cycles of Poverty and Disease  
Fortress Investment Group, New York, NY
- 2015 Population-Based Health Research in Ifanadiana, Madagascar  
Global Health Institute, Stony Brook University, Stony Brook, NY
- 2016 Health Systems in Madagascar  
ANP 391 Topics in Physical Anthropology  
Upper level undergraduates  
Stony Brook University Study Abroad  
Centre ValBio  
Course Instructor: Patricia Wright
- 2016 Integrating scalable mosquito-borne surveillance to strengthen responsiveness of local

health systems  
USAID, Washington, DC

- 2017 Breaking Down Barriers to Care: PIVOT's Integrated Approach to Health System Strengthening in Madagascar  
Unite For Sight Conference, New Haven, CT
- 2017 Advancing a Science of Sustaining Health: a New Model Health District in Madagascar  
Associate for Academic Health Centers, Global Issues Forum, Washington, DC
- 2017 Ecology of Poverty, Disease and Health Care Delivery: Lessons for Planetary Health  
Department of Infectious Disease, University of Georgia, Athens, GA
- 2017 Ecology of Poverty and a Model Health District in Madagascar  
National Institute of Mathematical and Biological Synthesis, University of Tennessee, Knoxville, TN
- 2018 Planetary Health (Bio 270) – two 60-minute sessions with PhD students  
Woods Institute for the Environment, Stanford University
- 2018 Ecology of Poverty and Disease and Health Care Delivery: Establishing a Model Health District in Madagascar  
Workshop on Socio-Epidemiology, Mathematical Biosciences Institute, The Ohio State University, Columbus, OH
- 2018 PIVOT: Establishing a Model Health District in Madagascar  
Bill and Melinda Gates Foundation, Innovative Technology Solutions, Seattle, WA
- 2018 Ecology of Poverty, Disease, and Health Care Delivery  
University of Vermont Complex Systems Center, Burlington, VT
- 2019 Data Coherence in Community Health  
The Future of Primary Health Care, Mulago, San Francisco, CA
- 2019 Building Resilient Health Systems in Rural Madagascar  
National Health Symposium, NDIA and the Johns Hopkins Applied Physics Lab, Laurel, MD
- 2019 Ecology of Poverty, Disease, and Health Care Delivery  
Triangle Comparative and Evolutionary Medicine Center (TriCEM), Duke University, Durham, NC
- 2019 A District Level Model Health System in Rural Madagascar  
Global Health Institute, Duke University, Durham, NC

- 2019 Disease ecology and evolution: has it significantly impacted human/animal health or the way we think about medicine?  
Department of Biology, Emory University, Atlanta, GA
- 2019 A Model Health System for Madagascar  
Gates Ventures, Seattle, WA
- 2019 A Model Health System for Madagascar  
VillageReach, Seattle, WA

**International**

- 2005 Higher Disease Prevalence Can Induce Greater Sociality  
Department of Zoology, University of Cambridge, UK
- 2005 Higher Disease Prevalence Can Induce Greater Sociality  
Department of Animal and Plant Sciences, University of Sheffield, UK
- 2005 Higher Disease Prevalence Can Induce Greater Sociality  
Department of Integrative and Comparative Biology, University of Leeds, UK
- 2005 Higher Disease Prevalence Can Induce Greater Sociality  
Ecological Society of America Annual Meeting, Montreal, Quebec
- 2008 Poverty Trap Formed by the Ecology of Infectious Diseases  
Centre de Recherche IRD, Infectious Disease Unit, Montpellier, France
- 2008 Infectious Diseases form Poverty Trap  
Partners in Health, Rwinkwavu, Rwanda
- 2009 Economic Evaluation  
Africa Health Initiative, Doris Duke Charitable Foundation, Lusaka, Zambia
- 2009 Ecology of Global Health and Economic Development  
French School of Public Health (EHESP), Paris, France
- 2009 Poverty Trap Formed by the Ecology of Infectious Diseases  
Workshop on Economic Epidemiology, Makerere University, Kampala Uganda
- 2009 Evolution of Virulence  
Advanced Study Institute on Economic Epidemiology, Makerere University, Kampala Uganda
- 2009 Three Paradigms of Global Health  
French School of Public Health (EHESP), Paris, France
- 2010 Poverty Trap Formed by Feedback Between Economics and the Ecology of Infectious



Diseases

French School of Public Health (EHESP), Paris, France

- 2011 Economic Impacts of Community Based Integrated Health Care in Rural Rwanda  
French School of Public Health (EHESP), Paris, France
- 2011 Disease-Driven Poverty Traps and the Ecology of Economic Development  
French School of Public Health (EHESP), Paris, France
- 2012 Disease-Driven Poverty Traps and the Ecology of Economic Development  
French School of Public Health (EHESP), Paris, France
- 2012 Poverty Traps Formed by the Ecology of Infectious Diseases  
Abdus Salam International Center for Theoretical Physics, Nelson Mandela Institute of Science and Technology, Arusha, Tanzania
- 2012 Disease Ecology and the Latitudinal Gradient in Income  
Abdus Salam International Center for Theoretical Physics, Nelson Mandela Institute of Science and Technology, Arusha, Tanzania
- 2012 Health and the Ecology of Economic Development  
Centre ValBio, Ranomafana, Madagascar
- 2012 Disease Ecology and Poverty Traps  
Institute of Regional Statistics, Pasteur Institute, Yaounde, Cameroon
- 2013 Poverty Trap formed by the Ecology of Infectious Diseases  
The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
- 2013 Disease Ecology, Biodiversity, and the Latitudinal Gradient in Income  
The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
- 2013 Integrating Disease Ecology and Public Health  
Workshop on Infectious Diseases  
Centre ValBio, Ranomafana, Madagascar
- 2014 Ecology of Poverty and Disease  
Workshop on Infectious Diseases  
Institut Pasteur, Antananarivo, Madagascar
- 2014 Integrating Ecology and Economics in Economic Development  
Workshop on Ecology of Poverty  
Universite Paris 1 Pantheon-Sorbonne
- 2015 Integrating Ecology and Economics in Economic Development  
Workshop on Ecology of Poverty  
Aix-Marseille School of Economics

- 2015 Ecology of Poverty Traps in Coupled Human-Natural Systems  
Centre ValBio at Stony Brook University, Ranomafana, Madagascar
- 2016 Advancing a Science for Sustaining Health: A New Platform in Madagascar  
Centre ValBio at Stony Brook University, Ranomafana, Madagascar
- 2016 PIVOT: Strengthening Systems of Healthcare and Research To Save Lives and Break  
Cycles of Poverty and Disease  
Workshop on Ecological and Epidemiological Modeling in Madagascar  
Centre ValBio at Stony Brook University, Ranomafana, Madagascar
- 2017 PIVOT: A Model Health District in Madagascar  
PIVOT, Ranomafana, Madagascar
- 2017 Ecology of Poverty, Disease, and Health Care Delivery: A Model District in Madagascar  
“Living On the Precipice: Interdisciplinary Conference on Resilience in Complex Natural  
and Human Systems”, University of Waterloo, Ontario, Canada
- 2018 A Model Health System  
A Crucible for Planetary Health, Centre ValBio, Ranomafana, Madagascar
- 2018 Plague Outbreak in Madagascar  
Planetary Health Alliance Annual Meeting, Edinburgh, Scotland
- 2018 A Model Health System in Madagascar  
Planetary Health Alliance Annual Meeting, Edinburgh, Scotland
- 2018 A Model Health System for Madagascar  
Rainer Arnhold Fellows Retreat, Mulago Salinas, CA

### **Report of Education of Patients and Service to the Community**

#### **Activities**

- 2002-2008 Adviser to the Millennium Villages Project Rwanda on Health Policy and Implementation  
Research
- 2008-2012 I worked with Partners In Health Rwanda to start an implementation research initiative in  
collaboration with the Government of Rwanda.
- 2011 With Dr. Michael Rich (HMS), I consulted the Maasai Wilderness Conservation Trust on  
Healthcare Agenda.
- 2011 Partners In Health, Boston, MA  
How Health Care Can Break Cycles of Poverty and Disease
- 2012 Partners In Health, Rwinkwavu, Rwanda  
How Health System Strengthening Breaks Cycles of Poverty and Disease

- 2013-2018 I co-founded and am the Scientific Director of a 501(c)3 health care and research organization called PIVOT. With 200 staff in Madagascar, PIVOT aims to deliver quality care for underserved populations, create impact-driven health systems change, and innovate science to advance health as a human right. In partnership with the Madagascar government, PIVOT has treated over 170,000 patients, decreasing under-five and maternal mortality by approximately 10% annually and neonatal mortality by 17% annually.
- 2016 Interview on Marc Steiner Show (Public Radio) on PIVOT's collaboration with Madagascar's government to create a model health system.
- 2016 Partners In Health West, San Francisco, CA  
PIVOT: Establishing a Model Health District in Madagascar
- 2016-2017 Friends School of Baltimore  
Monthly tutorial in global health given to high school students
- 2017 Friends School of Baltimore  
PIVOT: Health as a Human Right in Madagascar
- 2017 Interviews in *Science Magazine* and *Nature* on extremely low-cost, hand-powered, centrifuges and its applications in low resource settings.
- 2017 Interview with *Vice* on potential of drone technology to help Madagascar's health system.
- 2018 Friends School of Baltimore  
Health and Development in Madagascar – presentation to 9<sup>th</sup> Grade Africa History Class.
- 2018 Interview with *PLOS Research News* on Madagascar's 2018 plague epidemic.
- 2019 Friends School of Baltimore  
Health and Development in Madagascar – presentation to 9<sup>th</sup> Grade Africa History Class.
- 2019 Interviews in *Science Magazine* on integrated health care delivery and data science in Madagascar
- 2019 Interview with Prof Talks w/ Adam Vassallo (Podcast)

### **Recognition**

- |      |   |  |
|------|---|--|
| 2010 | Publicity on <i>Proc Roy Soc</i> article on poverty traps   | Nature   |
| 2011 | Publicity on <i>J Roy Soc Interface</i> article on poverty traps  | The Guardian   |
| 2012 | Publicity on <i>PLOS Biology</i> article on biodiversity, disease, and development                                | NPR, LA Times, PLOS Biologue, Decoded Science, Care2, UN Dispatch, Der Spiegel, Meteo Web, El Confidencial |
| 2013 | <i>PLOS Biology</i> article on biodiversity, disease, and development listed as Top 10 Article of first ten years | PLOS Biology Tenth Anniversary Collection  |

2013	Interview with postdoc Calistus Ngonghala on poverty trap research	Scientific American
2014	Publicity for <i>Conservation Biology</i> article on economic value of wildlife consumption in Madagascar	Smithsonian Magazine
2014	Publicity on poverty trap articles and working groups	National Socioenvironmental Synthesis Center Blog
2017	Publicity for <i>Nature Human Behaviour</i> article on contagious disruptions in economic development	New Scientist, MIT Technology Review, ZME Science, National Affairs
2017	Publicity for <i>Nature Ecology &amp; Evolution</i> article on ecological models for disease and development	Science Magazine, Wired, Xinhua, Nature Ecology & Evolution News & Views, Harvard Medical School News, Stanford University News, Scope Blog, Planetary Health Alliance
2017	Publicity for Health Affairs article on user fees in Madagascar	Harvard Medicine News
2017	Publicity for PIVOT implementation science program	Global Health Now
2018	Publicity for Nature Ecology & Evolution article on ecological models for disease and development and Working Group	Nature Ecology & Evolution Community Blog
2018	Publicity for PIVOT data-driven community-based care	Stanford Social Innovation Review
2018	Publicity for ecological and epidemiological modeling course in Madagascar	National Geographic
2018	Publicity for <i>Proc Roy Soc</i> article on effects of temperature on Zika virus transmission	The Scientist, Carbon Brief
2018	Publicity for BMJ Global Health articles on health system interventions in Madagascar and Rwanda	Harvard Medical School News, Partners In Health News
2018	Publicity for Lawrence F. Swails Award	The Morning News
2019	Publicity for PIVOT response to measles epidemic in Madagascar	Harvard Medical School News
2019	Publicity for integrated model health intervention and data science, and articles in BMJ Global Health	Science Magazine
2019	Publicity for integrated model health intervention and data science, and articles in BMJ Global Health and Science Magazine	Pulitzer Center, Global Health Now

## Report of Scholarship

### Peer reviewed publications in print or other media

#### Research investigations

1. **Bonds MH**, Pompe J. Calculating wetland mitigation banking credits; adjusting for function and location. *Natural Resources Journal* 2003; 43(4): 961-977.
2. **Bonds MH**, Pompe J. Improving institutional incentives for public land management; an econometric analysis of school trust land leases. *Journal of Institutional Economics* 2005; 1(2): 193-215.
3. **Bonds MH**, Keenan DC, Leidner A, Rohani P. Higher disease prevalence can induce greater sociality; a game theoretic coevolutionary model. *Evolution* 2005; 59(9): 1859-1866.
4. **Bonds MH**. Host life-history strategy explains pathogen-induced sterility. *The American Naturalist* 2006; 168: 433-444.
5. **Bonds MH**, Hughes DR. On the productivity of public forests: a stochastic frontier analysis of school trust timber production. *Canadian Journal of Agricultural Economics* 2007; 55(2): 171-183.
6. **Bonds MH**, Pompe JJ. Public land management and institutional reform: Evidence from Mississippi's School Trust Land history. *Southern Business and Economics Journal* 2008; 31(1&2):1-18.
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8. **Bonds MH**, Keenan DC, Rohani P, Sachs JD. Poverty trap formed by the ecology of infectious diseases. *Proceedings of the Royal Society of London B: Biological Sciences* 2010; 277:1185-1192
9. Plucinski MM, Ngonghala CN, **Bonds MH**. Health safety nets break cycles of poverty and disease: a stochastic ecological model. *Journal of the Royal Society Interface* 2011; 8:1796-1803.
10. Dhillon RS, **Bonds MH**, Fraden M, Ndahiro D, Ruxin J. The impact of removing financial barriers on utilization of a primary care facility in Rwanda. *Global Public Health* 2012; 7(1):71-86.
11. **Bonds MH**, Dobson AF, and Keenan DC. Disease ecology, biodiversity and the latitudinal gradient in income. *PLOS Biology* 2012; 10(12): e1001456.
  - o Synopsis. Chase J. Which Came First: Burden of Infectious Disease or Poverty? *PLOS Biology* 2012; 10(12): e1001457.
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12. Plucinski MM\*, Ngonghala CN\*, Getz W, and **Bonds MH\***, "Clusters of poverty and disease emerge from feedbacks on an epidemiological network. *Journal of the Royal Society Interface* 2013; 10 (80):20120656.
13. Golden CD, **Bonds MH**, Brashares JS, Rasolofoniaina BJR, Kremen C. An economic valuation of the subsistence harvest of wildlife in Madagascar. *Conservation Biology* 2014; 28(1):234-243.
14. Ngonghala CN\*, Plucinski M, Murray MB, Farmer PE, Barrett CB, Keenan DC, **Bonds MH\***. Poverty, disease, and the ecology of complex systems. *PLOS Biology* 2014; 12(4):e1001827.
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15. Ivers LC, Teng JE, Jerome JG, **Bonds MH**, Freedberg KA, Franke MF. A randomized trial comparing ready-to-use-supplementary food and corn-soy-blend as food rations for HIV-infected adults on antiretroviral therapy in rural Haiti. *Clinical Infectious Diseases* 2014; 58(8):1176-1184.
16. Binagwaho A. et al. Rwanda twenty years on: investing in life. *The Lancet* 2014; 384 (9940):371-375.
17. Rist CL, Ngonghala CN, Garchitorena A, Gillespie TR, **Bonds MH**. The burden of livestock parasite on the poor. *Trends in Parasitology* 2015; 31(11):527-530.
18. Rist CL, Ngonghala CN, Garchitorena AS, Naharimahefa A, Brook C, Miller AM, Ramananjato RH, Rabeza RV, Randrianarivelosia M, Wright PC, Gillespie TR, **Bonds MH**. Modeling the Economic Burden of Livestock Disease in the Ifanadiana District of Madagascar *One Health*, 2015; 1(1):60-65.
19. Garchitorena A, Ngonghala CN, Guegan JF, Texier G, Bellanger M, **Bonds MH\***, Roche B\*. Economic inequality caused by feedbacks between poverty and the dynamics of a rare tropical disease: the case of Buruli ulcer in sub-Saharan Africa. *Proceedings of the Royal Society of London B: Biological Sciences* 2015; 282(1818):20151426.
20. Garchitorena A, Ngonghala CN, Texier G, Landier J, Eyangoh S, **Bonds MH**, Guégan JF, Roche B. Environmental transmission of *Mycobacterium ulcerans* drives dynamics of Buruli ulcer in endemic regions of Cameroon. *Scientific Reports* 2015; 5:18055.
21. Odone A, Calderon R, Becerra MC, Zhang Z, Contreras CC, Yataco R, Galea J, Lecca L, **Bonds MH**, Mitnick CD, Murray MB. Acquired and transmitted multidrug resistant tuberculosis: the role of social determinants. *PLOS One* 2016; 11(1): e0146642.
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  - a. News & Views. Desmond, C. 2017. "The ecology of rural poverty," *Nature Ecology & Evolution*, 1:1060-1061.
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  37. Ryan, S. et al, 2019, “Climate change could expose 1.3 billion new people to Zika virus risk by the mid-century,” submitted.
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  40. Garchitorena, A., Murray, M.B., Hedt-Gauthier, B., Farmer, P.E., Bonds, M.H. 2019. “Reducing the knowledge gap in global health delivery: contributions and limitations of randomized controlled trials,” in review.

\* Authors contributed equally

### **Book chapters and other peer-reviewed publications**

1. **Bonds MH.** Notes from the Millennium Villages Project, Rwanda: Breaking the disease-driven poverty trap. *Consilience: The Journal of Sustainable Development* 2009; 1: 98-111.
2. **Bonds MH.** Garchitorena A, Farmer PE, Murray MB. Ecology of poverty, disease, and health care delivery: Lessons for Planetary Health, in Ecology and Evolution for the Control of Infectious Diseases in Low Income Countries: Broadening the Scope of Public Health eds Roche, Broutin, Simard. *Oxford University Press*, 2018; 283.
3. Garchitorena A, **Bonds MH**, Guegan JF, Roche B. Interactions between ecological and socio-economic drivers of Buruli ulcer burden in sub-Saharan Africa: Opportunities for improved control, in Ecology and Evolution for the Control of Infectious Diseases in Low Income Countries: Broadening the Scope of Public Health eds Roche, Broutin, Simard. *Oxford University Press*, 2018; 217.

### **Published abstracts and non-peer reviewed scientific or medical publications/materials in print or other media**

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5. De Leo GA, Sokolow SH, Garchitorena A, Ngonghala CN, Lund A, Barry M, Burke KS, Mordecai EA, Daily GC, Jones JH, Andrews JR, Bendavid E, Luby SP, LaBeaud AD, Seetah K, Guegan JF, Lafferty, K, Wood CL, **Bonds MH.** A novel framework to account for ecological drivers in the control and elimination of environmentally transmitted disease: a modelling study. *The Lancet* 2017;389:S5.
6. Garchitorena A, **Bonds MH**, Ngonghala CN, Guégan JF, Roche B. Modelling ecological and socioeconomic feedbacks of Buruli ulcer in sub-Saharan Africa: results from a field study in Cameroon. *The Lancet* 2017; 389:S9.
7. **Bonds M**, Garchitorena A, Cordier L, Miller AC, McCarty M, Andriamihaja B, Ratsirarson J, Randrianambinina A, Rabeza VR, Finnegan K, Gillespie T, Wright PC, Farmer PE, Loyd T, Murray MB, Herrnstein RM, Herrnstein J, PIVOT Impact Team, Gikic D, Ouenzar MA, Hall L, Rich ML. Advancing A Science For Sustaining Health: Establishing A Model Health District in Madagascar. *bioRxiv* 2017; 1:141549.
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9. Wild H, Glowacki L, Maples S, Mejía-Guevara I, Krystosik A, **Bonds MH**, Hiruy A, LaBeaud AD, Barry M. Making Pastoralists Count: Geospatial Methods for the Health Surveillance of Nomadic Populations. *bioRxiv* 2019; Jan (1):572685.



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**Theses**

**Bonds, MH**. Sociality, Sterility, and Poverty; Host-Pathogen Coevolution, with Implications for Human Ecology,” 2006 Ph.D. Dissertation (Ecology), University of Georgia, Athens, GA.

**Bonds, MH**. An Economic Analysis of the Mississippi School Trust Program, 2003 Ph.D. Dissertation (Economics), University of Georgia, Athens, GA.

## Narrative Report

My scholarship, training, and research have two main themes: 1) the ecology of poverty and economic development; and 2) the science of implementing global health delivery systems. The ecology of poverty refers to the complex network of interactions that drive dynamics of poverty and economic development. More directly, the rural poor rely on the natural environment for subsistence and suffer high rates of morbidity and mortality from infectious diseases, which are other biological organisms. Guided by a combination of ecological, economic, and mathematical approaches, I address questions such as: what can complex systems theory teach us about the process of economic development? How does the biophysical environment shape the dynamics of poverty and disease? How can we quantify effects of health interventions on these dynamics? How do health and economic conditions change as the environment changes? I have published a series of papers on this topic (notably in the *Proceedings of the Royal Society of London B*, *PLoS Biology*, *Nature Ecology & Evolution*, and *Nature Human Behaviour*) that have gained increasing exposure, including in *Nature* and *Science Magazine*. Our article on “Disease Ecology, Biodiversity and the Latitudinal Gradient in Income” was selected by *PLoS Biology* as one of its top 10 articles in the first decade of the journal.

Testing these theories empirically in the field was one of my initial motivations for co-founding PIVOT, a non-governmental health care organization. Since 2014, PIVOT has worked alongside the Ministry of Health to create a scalable, evidence-based model health district in Ifanadiana, Madagascar, which consists of over 200,000 people. The tenets of the model include (1) “vertical” clinical programs; (2) “horizontal” system readiness; and (3) integrated data systems to continuously improve quality of care, provide evidence on impacts for scale, and shed light on fundamental drivers of poverty and disease. By directly implementing programs and integrating unique population-based data systems (including a 9000 individual longitudinal cohort study) with health system data within and beyond our catchment population, we strive to pioneer a new science of health system integration. PIVOT has provided care for over 300,000 individuals. Our rapidly produced evidence has shown drops in neonatal and under-five mortality rates of 18% and 8.5% per year respectively, and declines in maternal mortality of 10% per year. These are among the most rigorously evaluated population-level impacts on maternal and child health outcomes that we are aware of, and was a recently a news feature in *Science*. All of this testifies to the commitment that patient-centered service, strengthening lasting health systems, and scientific innovation are self-reinforcing approaches.

I frequently have the opportunity to present this work to students and colleagues locally, throughout the US, and around the world. I have had the privilege of mentoring trainees who have taken these opportunities and moved onto faculty positions at world-class research universities. The gender and ethnic diversity of my lab has brought very important perspective and life experiences and materially improves the quality of our work.