

PERSONAL INFORMATION

Name: Ross Mathew Boyce

Address: 123 West Franklin Street, Suite 2151, Chapel Hill, NC 27516

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Email: roboyce@med.unc.edu

EDUCATION

July 2015 – June 2017	Fellowship, Infectious Diseases University of North Carolina School of Medicine, Chapel Hill, NC
July 2012 – June 2015	Internship & Residency, Internal Medicine Massachusetts General Hospital, Boston, MA
August 2006 – May 2012	Doctor of Medicine (M.D.) University of North Carolina School of Medicine, Chapel Hill, NC
September 2010 – May 2012	Masters of Science (M.Sc.), Public Health in Developing Countries London School of Hygiene and Tropical Medicine London, United Kingdom
August 1997 – June 2001	Bachelor of Science (B.S.) in Chemistry with Honors Davidson College, Davidson, NC

LICENSURE & CERTIFICATION

2017 - Present	Diplomate, American Board of Internal Medicine Certification in Infectious Diseases
2015 - Present	Diplomate, American Board of Internal Medicine Certification in Internal Medicine
2015 - Present	Medical License No: 2015-01104 North Carolina Medical Board

PROFESSIONAL EXPERIENCE

2021 – Present	Faculty Fellow, Carolina Population Center University of North Carolina School of Medicine, Chapel Hill, NC
2021 – Present	Assistant Professor, Department of Epidemiology Gillings School of Global Public Health, Chapel Hill, NC
2019 – Present	Assistant Professor, Division of Infectious Diseases University of North Carolina School of Medicine, Chapel Hill, NC
2017 – 2019	Clinical Instructor, Division of Infectious Diseases University of North Carolina School of Medicine, Chapel Hill, NC
2009 – 2010	Civil-Military Officer 1 st Cavalry Division, United States Army, Mahmudiyah, Iraq
2004 – 2005	Reconnaissance Platoon Leader

1st Cavalry Division, United States Army, Baghdad, Iraq

2003 – 2004 Aide-de-Camp to the Assistant Division Commander
7th Infantry Division, United States Army, Fort Carson, CO

2002 – 2003 Rifle Platoon Leader
2nd Infantry Division, United States Army, Camp Casey, Republic of Korea

HONORS

2021 Doris Duke Charitable Foundation Clinician Scientist Development Award
2018 Best Clinical Article of the Year, *American Journal of Tropical Medicine & Hygiene*
2017 ASTMH/Bill & Melinda Gates Annual Travel Meeting Award
2016 Global Partnership Award, UNC Global
2016 Global Health Scholar, UNC School of Medicine
2015 First Prize, *International Journal of Epidemiology* Photo Essay Competition
2015 Elsevier Clinical Research Award, ASTMH Annual Meeting
2015 Outstanding Resident Research Award, MGH Internal Medicine
2012 The Merck Manual Award, UNC School of Medicine
2011 Okeke Prize & William Simpson Prize, London School of Hygiene & Tropical Medicine
2010 *Alpha Omega Alpha* Honor Society, UNC School of Medicine
2009 Bronze Star Medal, United States Army
2006 Fullerton Scholarship, UNC School of Medicine
2004 Bronze Star Medal with Valor Device
United States Army
2002 Honor Graduate, Infantry Officer Basic Course, United States Army Infantry School
2001 *Phi Beta Kappa*, Davidson College
2001 James Baker Woods Award, Davidson College
2000 *Alpha Epsilon Delta* Premedical Honor Society, Davidson College
1993 Eagle Scout, Boy Scouts of America

BIBLIOGRAPHY AND PRODUCTS OF SCHOLARSHIP:

Refereed Papers/Articles:

1. **Boyce RM**, Hollingsworth BD, Baguma E, Xu, E, Goel V, Brown-Marusiak A, Muhindo R, Reyes R, Ntaro M, Siedner MJ, Staedke SG, Juliano JJ, Mulogo EM. Dihydroartemisinin-piperazine chemoprevention and malaria incidence after severe flooding: evaluation of a pragmatic intervention in rural Uganda. *Clin Infect Dis*. 2021 Sep 9;ciab781. doi: 10.1093/cid/ciab781. PMID: 34499116.
2. Cote C, Goel V, Muhindo R, Baguma E, Ntaro M, Shook-Sa BE, Reyes R, Staedke SG, Mulogo EM, **Boyce, RM**. Malaria prevalence and long-lasting insecticidal net use in rural western Uganda: results of a cross-sectional survey conducted in an area of highly variable malaria transmission intensity. *Malar J*. 2021 Jul 5;20(1):304. doi: 10.1186/s12936-021-03835-7. PMID: 34225756
3. Gorret AM, Muhindo R, Baguma E, Ntaro M, Mulogo EM, Deutsch-Feldman M, Juliano JJ, Nyehangane D, Boyce RM. Comparison of capillary versus venous blood for the diagnosis of Plasmodium falciparum malaria using rapid diagnostic tests. *J Infect Dis*. 2021 Jul 2;224(1):109-113. doi: 10.1093/infdis/jiab032. PMID: 33502531.
4. Walekhawa WA, Ntaro M, Kawungezi PC, Achangwa C, Muhindo R, Baguma E, Matte M, Migisha R, Reyes R, Thompson P, **Boyce RM**, Mulogo EM. Measles outbreak in western Uganda: A case-control study. *BMC Infect Dis*. 2021 Jun 22;21(1):596. doi: 10.1186/s12879-021-06213-5. PMID: 34157990.
5. Cunningham C, Hennelly C, Lin J, Ubalee R, **Boyce RM**, Mulogo E, Hathaway N, Thwai KL, Phazu F, Kalonji A, Mwandagirwa K, Tshetu A, Juliano JJ, Parr JB. A novel CRISPR-based malaria diagnostic

capable of *Plasmodium* detection, speciation, and drug-resistance genotyping. *EBioMedicine*. 2021 Jun;68:103415. doi: 10.1016/j.ebiom.2021.103415. PMID: 34139428.

6. Patel MD, Rosenstrom E, Ivy JS, Mayorga ME, Keskinocak P, **Boyce RM**, Lich KH, Smith RL, Johnson KT, Delamater PD, Swann JL. Association of Simulated COVID-19 Vaccination and Nonpharmaceutical Interventions with Infections, Hospitalizations, and Mortality. *JAMA Netw Open*. 2021 Jun 1;4(6):e2110782. doi: 10.1001/jamanetworkopen.2021.10782. PMID: 34061203.
7. Brandt, K, Goel V, Keeler C, Bell GJ, Aiello AE, Corbie-Smith G, Wilson E, Fleischauer A, Emch M, **Boyce RM**. SARS-CoV-2 Testing in North Carolina: Racial, ethnic, and geographic disparities. *Health Place*. 2021 May;69:102576. doi: 10.1016/j.healthplace.2021.102576. PMID: 33915376.
8. Ciccone EJ, Zivich PN, Lodge EK, Zhu D, Law E, Miller E, Taylor JL, Chung S, Xu J, Volfovsky A, Beatty C, Abernathy H King E, Garret HE, Markmann AJ, Rebuli ME, Sellers. S, Weber DJ, Reyes R, Alavian N, Juliano JJ, **Boyce RM**, Aiello AE. SARS-CoV-2 infection in healthcare personnel and their household contacts at a tertiary academic medical center: Protocol for a longitudinal cohort study. *JMIR Res Protoc*. 2021 Apr 30;10(4):e25410. doi: 10.2196/25410. PMID: 33769944.
9. Root HB, **Boyce RM**, Robinson WR. Learning from LMICs: Best practices for leveraging sentinel surveillance systems to track the U.S. COVID-19 pandemic. *BMJ Glob Health*. 2020 Dec;5(12):e004685. doi: 10.1136/bmjgh-2020-004685. PMID: 33380417.
10. **Boyce RM**, Shook-Sa BE, Aiello AE. A tale of two studies: Study design and our understanding of SARS-CoV-2 seroprevalence. *Clin Infect Dis*. 2020 Dec 18:ciaa1868. doi: 10.1093/cid/ciaa1868. PMID: 33338219.
11. **Boyce RM**, Collins, MC, Muhindo R, Nakakande R, Ciccone EJ, Grounds S, Espinoza D, Zhu Y, Matte M, Ntaro M, Nyehangane D, Juliano J, Mulogo EM. Dengue in western Uganda: A prospective cohort of children presenting with undifferentiated febrile illness. *BMC Infect Dis*. 2020 Nov 11;20(1):835. doi: 10.1186/s12879-020-05568-5. PMID: 33176708.
12. Shook-Sa B, **Boyce RM**, Aiello AE. Estimation without Representation: Early SARS-CoV-2 Seroprevalence Studies and the Path Forward. *J Infect Dis*. 2020 Sep 1;222(7):1086-1089. doi: 10.1093/infdis/jiaa429. PMID: 32750135.
13. Hustedt J, **Boyce R**, Bradley J, Hii J, Alexander N. Use of pyriproxyfen in control of *Aedes* mosquitoes: a systematic review. *PLoS Negl Trop Dis*. 2020 Jun 12;14(6):e0008205. doi: 10.1371/journal.pntd.0008205. PMID: 32530915
14. **Boyce R**, Reyes R. Implementing and scaling verbal autopsies: into the unknown. *BMC Med*. 2020 Mar 9;18(1):53. doi: 10.1186/s12916-020-01527-8. PMID: 32146905.
15. **Boyce R**, Speight C, Lin J, et al. Errors in diagnostic test use and interpretation contribute to the high number of Lyme disease referrals in a low-incidence state. *Open Forum Infect Dis*. 2020 Jan 11;7(1):ofaa009. doi: 10.1093/ofid/ofaa009. PMID: 31988970.
16. **Boyce R**, Brazeau N, Fulton T, et al. Prevalence of molecular markers of antimalarial drug resistance across altitudinal transmission zones in highland Western Uganda. 2019 Oct;101(4):799-802. doi: 10.4269/ajtmh.19-0081. PMID: 31436149; PMCID: PMC6779209.
17. **Boyce RM**, Delamater P, Muhindo R *et al*. Accessible metrics of access: Novel tools to measure immunization coverage in rural sub-Saharan Africa. *Gates Open Res* 2019 Sep; **3**:1540. doi.org/10.12688/gatesopenres.13066.1 (No PMID).

18. Buhler C, Winkler V, Runge-Ranzinger S, **Boyce R**, Horstick, O. Environmental methods for dengue vector control – A systematic review and meta-analysis. *PLoS Negl Trop Dis*. 2019 Jul 11;13(7):e0007420. doi: 10.1371/journal.pntd.0007420. PMID: 31295250.
19. Nabukalu D, Ntaro M, Seviiri M, Reyes R, Wiens M, Sundarajan R, Mulogo E, **Boyce R**. Community health workers trained to conduct verbal autopsies provide better mortality measures than existing surveillance: Results from a cross-sectional study in rural western Uganda. *PLoS One*. 2019 Feb 13;14(2):e0211482. doi: 10.1371/journal.pone.0211482. PMID: 30759139.
20. Horstick, O, **Boyce, R**, Runge-Ranzinger, S. Building the evidence base for dengue vector control: Searching for certainty in an uncertain world. *Pathog Glob Health*. 2018 Dec;112(8):395-403. doi: 10.1080/20477724.2018.1547541. PMID: 30521408.
21. **Boyce, R**, Sanfilippo AM, Boulos JM, Cleinmark M, Schmitz, J, Meshnick S. *Ehrlichia* infections, North Carolina, USA, 2016. *Emerg Infect Dis*. 2018 Nov;24(11):2087-2090. doi: 10.3201/eid2411.180496. PMID: 30334725.
22. Chang JL, Reyes R, Matte M, Ntaro M, Mulogo E, Wiens MO, Meshnick SR, Siedner MJ, R Boyce. Who stays and who goes: Predictors of admission among patients presenting with febrile illness and a positive malaria rapid diagnostic test in a rural Uganda health center. *Am J Trop Med Hyg*. 2018 Oct;99(4):1080-1088. doi: 10.4269/ajtmh.18-0338. PMID: 30062988.
23. Wang LT, Bwambale R, Keeler C, Reyes R, Muhindo R, Matte M, Ntaro M, Mulogo E, Sundararajan R, **Boyce R**, 2018. Private sector drug shops frequently dispense parenteral anti-malarials in a rural region of Western Uganda. *Malar J*. 2018 Aug 22;17(1):305. doi: 10.1186/s12936-018-2454-7. PMID: 30134987.
24. **Boyce RM**, Hathaway N, Fulton T, Reyes R, Matte M, Ntaro M, Mulogo E, Waltmann A, Bailey JA, Siedner MJ, Juliano JJ. Reuse of malaria rapid diagnostic tests for amplicon deep sequencing to estimate Plasmodium falciparum transmission intensity in western Uganda. *Sci Rep*. 2018 Jul 5;8(1):10159. doi: 10.1038/s41598-018-28534-3. PMID: 29977002.
25. **Boyce, R**, Reyes, R, Keeler, C, Matte, M, Ntaro, M, Mulogo, E, Siedner, M. Anemia was an uncommon complication of severe malaria in a high-transmission, rural area of Western Uganda. *Am J Trop Med Hyg*. 2018 Mar;98(3):683-691. doi: 10.4269/ajtmh.17-0681. PMID: 29280423.
26. **Boyce, R**, Reyes, R, Matte, M, Ntaro, M, Mulogo, E, Siedner, M. Use of a dual-antigen rapid diagnostic test to screen children for severe P. falciparum malaria in a high-transmission, resource-limited setting. *Clin Infect Dis*. 2017 Oct 16;65(9):1509-1515. doi: 10.1093/cid/cix592. PMID: 29020298.
27. Samuel, M, Maoz, D, Manrique, P, Ward, T, Ranzinger, S, Toledo, S, **Boyce, R**, Horstick, O. Community Effectiveness of Indoor Residual Spraying as a Method: A Systemic Review. *PLoS Negl Trop Dis*. 2017 Aug 31;11(8):e0005837. doi: 10.1371/journal.pntd.0005837. PMID: 28859087.
28. Maoz, D, Ward, T, Moody, S, Runge Ranzinger, S, Toledo, J, **Boyce, R**, Horstick, O. Community Effectiveness of Pyriproxyfen as a Dengue Vector Control Method: A systematic review. *PLoS Negl Trop Dis*. 2017 Jul 17;11(7):e0005651. doi: 10.1371/journal.pntd.0005651. PMID: 28715426.
29. Ward, T., Samuel, M., Maoz, D., Runge-Ranzinger, S., **Boyce, R**, Toledo, J., Velayudhan, R. and Horstick, O. Dengue data and surveillance in Tanzania: A systematic literature review. *Trop Med Int Health*. 2017 Aug;22(8):960-970. doi: 10.1111/tmi.12903. PMID: 28556417.
30. Murungi, M, Fulton, T, Reyes, R, Matte, M, Ntaro, M, Mulogo, E, Juliano, J, Siedner, M, Boum, Y, **Boyce, R**. Improving the specificity of *P. falciparum* malaria diagnosis in high transmission settings with a two-step

RDT and microscopy algorithm. *J Clin Microbiol*. 2017 May;55(5):1540-1549. doi: 10.1128/JCM.00130-17. PMID: 28275077.

31. Horstick, O, **Boyce, R**, Runge-Ranzinger, S. Dengue vector control: Assessing what works. *Southeast Asian Journal of Tropical Medicine and Public Health*. 2017 Jan; 48(S1): 181-185. (No PMID)
32. Boyce, R, Reyes, R, Mulogo, E, Ntaro, M, Matte, Metlay J, Band, L, Siedner, M. Severe flooding and malaria transmission in a highland area of Uganda: Implications for disease control in an era of global climate change. *J Infect Dis*. 2016 Nov 1;214(9):1403-1410. doi: 10.1093/infdis/jiw363. PMID: 27534686.
33. Burgo-Black, A, Brown, J, **Boyce, R**, Hunt, S. The Importance of Taking a Military History. *Public Health Rep*. 2016 Sep;131(5):711-713. doi: 10.1177/0033354916660073. PMID: 28123212.
34. **Boyce, R**, Reyes, R, Mulogo, E, Ntaro, M, Matte, M, Lin, FC, Siedner, M. Practical implications of the non-linear relationship between test positivity rate and malaria incidence. *PLoS One*. 2016 Mar 28;11(3):e0152410. doi: 10.1371/journal.pone.0152410. PMID: 27018990.
35. **Boyce, R**, Reyes, R, Bwambale, S. The Health Centre Community. *Int J Epidemiol*. 2016 Feb;45(1):29-32. doi: 10.1093/ije/dyv371. PMID: 26971320.
36. **Boyce, R**, Mitton, J, Chu, J, Finn, K. South Sudan to Martha's Vineyard: Malaria. *Am J Med*. 2016 Feb;129(2):163-6. doi: 10.1016/j.amjmed.2015.08.030. PMID: 26394268.
37. Boyce, R, Reyes, R, Mulogo, E, Ntaro, M, Matte, M, Boum, Y, Siedner, M. Association between HRP -2/pLDH rapid diagnostic test band positivity and malaria-related anemia at a peripheral health facility in Western Uganda. *J Glob Health*. 2015 Dec;5(2):020402. doi: 10.7189/jogh.05.020402. PMID: 26207181.
38. **Boyce, R**, Rosch R, Finlayson A, Handuleh D, Ahmed SW, Whitwell S, Leather A. Use of a bibliometric literature review to assess medical research capacity in post-conflict and developing countries: Somaliland 1991-2013. *Trop Med Int Health*. 2015 Nov;20(11):1507-1515. doi: 10.1111/tmi.12590. PMID: 26293701.
39. **Boyce, R**, Muiru, A, Reyes, R, Mulogo, E, Ntaro, M, Matte, M, Siedner, M. Impact of rapid diagnostic tests for the diagnosis and treatment of malaria at a peripheral health facility in Western Uganda: An interrupted time series analysis. *Malar J*. 2015 May 15;14:203. doi: 10.1186/s12936-015-0725-0. PMID: 25971788.
40. **Boyce, R**. The Forever War. *Ann Intern Med*. 2014 Nov 4;161(9):676-7. doi: 10.7326/M14-1054. PMID: 25364891.
41. **Boyce, R**, Lenhart, A, Kroeger, A, Velayudhan, R, Roberts, B, Horstick, O. *Bacillus thurengiensis irsraelensis* (Bti) for the control of Dengue vectors: systemic literature review. *Trop Med Int Health*. 2013 May;18(5):564-77. doi: 10.1111/tmi.12087. PMID: 23527785.
42. **Boyce, R**. Waiver of Consent: The Use of Pyridostigmine Bromide during the Persian Gulf War. *Journal of Military Ethics*. 2008 Mar; 8(1): 1-18. (No PMID).

In Press:

1. Kim MK, Smedberg JR, Boyce RM, Miller MB. The Brief Case: "Great Pretender" – Disseminated Blastomycosis in Western North Carolina. *J Clin Micro*. 2021. In Press.

*Names of mentored trainees underlined

Under Review / Submitted:

1. Ciccone EJ, Kabugho L, Baguma E, Muhindo R, Juliano JJ, Mulogo EM, **Boyce RM**. Rapid diagnostic tests to guide case management of and improve antibiotic stewardship for pediatric acute respiratory illnesses in resource-constrained settings: a prospective cohort study in southwestern Uganda. Under Review *J Clin Micro*.
2. Miller EM, Law EA, Ajeen R, Karasik J, Mendoza C, Abernathy H, Garrett H, King E, Wallace J, Zelek M, Edwards JK, Xiong K, Beatty C, Fleischauer AT, Ciccone EJ, Shook-Sa BE, Aiello AE, **Boyce, RM**. SARS-CoV-2 infection in central North Carolina: Protocol for a population-based longitudinal cohort study. Under Review. *PLoS One*.
3. Rosenstrom E, Mele J, Ivy J, Mayorga M, Patel M, Lich KH, Johnson K, Delamater P, Keskinocak P, **Boyce RM**, Smith R, Swann J. Can Vaccine Prioritization Reduce Disparities in Covid-19 Burden for Historically Marginalized Populations? Submitted. *JAMA Network Open*.
4. Ciccone EJ, Zhu DR, Ajeen R, K. Lodge E, Shook-Sa BE, **Boyce RM**, Aiello AE. SARS-CoV-2 seropositivity after infection and antibody response to mRNA-based vaccination. *J Infect Dis*.

Other Publications/Products:

1. **Boyce RM**. The Wildlife We Fear. In *Wildlife in North Carolina*. Vol 84(3). North Carolina Wildlife Resources Commission; 2020:3.
2. **Boyce, RM**. Tickborne Ehrlichia in North Carolina. Emerging Infectious Diseases podcase. November 2018. Available at <https://tools.cdc.gov/medialibrary/index.aspx#/media/id/393173>.

TEACHING ACTIVITIES:

Lectures:

1. Boyce, R. Tick-Borne Diseases in North Carolina. Lecturer for Infectious Diseases Fellowship "Bootcamp." UNC Infectious Diseases Fellowship Training Program, UNC School of Medicine. July 2021. Oral Presentation.
2. Boyce, R. Geography as Destiny: Health Outcomes in Rural Uganda. HHV 280: Introduction to Global Health, Davidson College, Davidson NC, October 2020. Oral Presentation (Virtual).
3. Boyce, R. Use of Routine Data Sources in the Vector-Borne Disease Epidemiology, Ecology, and Response (VERR) Creativity Hub. Lecturer for EPID 795: Data in Public Health. UNC Gillings School of Global Public Health. September 2020. Oral Presentation (Virtual)
4. Boyce, R. Chatham County COVID-19 Cohort Study. Lecturer for Applied Epidemiology MPH Seminar. UNC Gillings School of Global Public Health. September 2020. Oral Presentation.
5. Boyce, R. Tick-Borne Diseases in North Carolina. Lecturer for Noon Conference. UNC Infectious Diseases Fellowship Training Program, UNC School of Medicine. April 2020. Oral Presentation.
6. Boyce, R. Tick-Borne Diseases in North Carolina. Lecturer for Noon Conference. UNC Internal Medicine Residency Program, UNC School of Medicine. February 2020, July 2020. Oral Presentation.
7. Boyce, R. Fever in the Returning Traveler. Lecturer for the Infectious Diseases Block. UNC Physician Assistant Program, UNC School of Medicine. July 2019-21. Oral Presentation.
8. Boyce, R. Bacterial Pathogens & Tick-Borne Infections. Lecturer for the EPI 799. UNC Gillings School of Global Public Health. September 2018. Oral Presentation.

9. Boyce, R. Principles and Ethics of Military Aid in Counterinsurgency Warfare. Guest Lecturer for the Applied Medical Anthropology Course. University College London. November 2010. Oral Presentation.
10. Boyce R. Counterinsurgency in Iraq. Guest Lecturer at the Insurgency and Counterinsurgency Course, Davidson College, June 2008. Oral Presentation.

Grand Rounds:

At UNC:

1. Boyce, R. Geography as Destiny: Malaria in the Highlands of western Uganda. Carolina Population Center Interdisciplinary Research Seminar, Chapel Hill, NC, April 2021. Oral Presentation.
2. Boyce, R. Chatham County COVID-19 Cohort. UNC Institute of Global Health and Infectious Diseases, Chapel Hill, NC, March 2021. Oral Presentation.
3. Boyce, R. Tick-Borne Diseases in North Carolina: the known and unknown unknowns. UNC Department of Medicine Grand Rounds, Chapel Hill, NC, February 2021. Oral Presentation.
4. Boyce, R. Geography as Destiny: Health Outcomes in Rural Uganda. UNC Institute of Global Health and Infectious Diseases, Chapel Hill, NC, September 2018. Oral Presentation.

Outside UNC:

1. Boyce, R. Tick-Borne Infections in North Carolina: The Known Unknowns. Coastal Area Health Education Center (AHEC), Wilmington, NC, September 2017. Oral Presentation.
2. Boyce, R. Impact of rapid diagnostic tests for the diagnosis and treatment of malaria at a peripheral health facility in Western Uganda. Department of Medicine, Massachusetts General Hospital, Boston, May 2015. Oral Presentation
3. Boyce, R. Ghost Soldiers: Caring for Veterans Outside the VA. Department of Psychiatry, Jamaica Plain Veterans Affairs Hospital. Boston, October 2013. Oral Presentation

Continuing Education Lecture:

At UNC:

1. Boyce, R. The Consult Commandments: Getting the Most from Your Consult. Department of Medicine Noon Conference, University of North Carolina at Chapel Hill, September 2017. Oral Presentation
2. Boyce, R. Ghost Soldiers: Caring for Veterans Outside the VA. Department of Family Medicine, University of North Carolina at Chapel Hill, November 2016. Oral Presentation
3. Harek S, Boyce R. Endgame Iraq. Guest Speaker for the Great Decisions Lecture Series hosted by the UNC Foreign Policy Association. University of North Carolina at Chapel Hill, March 2008. Oral Presentation.

Outside UNC:

1. Boyce, R. Tickborne Ehrlichia in North Carolina. Emerging Infectious Diseases Podcast. Centers for Disease Control and Prevention. November 2018. Podcast.
2. Boyce, R. Ghost Soldiers: Caring for Veterans Outside the VA. Department of Medicine, Massachusetts General Hospital. Boston, December 2013. Oral Presentation

3. Boyce, R. The Laws of War. Guest Speaker for the President's Lecture Series. Davidson College, September 2008. Oral Presentation.

Research Mentorship:

- 2021 – Present Aidin Alejo, MD Candidate (Research Mentor)
Project: Association between travel burden and HIV care in rural Uganda
*IDSA Grants for Emerging Researchers Mentorship (GERM) awardee
UNC School of Medicine, Chapel Hill, NC
- 2021 – Present Victor Arahiwa, MD Candidate (Research Mentor)
Project: Delays in Tick-Borne Disease due to the COVID-19 Pandemic
*Carolina Medical Student Research Program (CMSRP) awardee
UNC School of Medicine, Chapel Hill, NC
- 2021 – Present Tiffany Rucker, MPH Candidate (Practicum Mentor)
Project: Needs assessment for Sickle Cell Disease in western Uganda
UNC Gillings School of Global Public Health, Chapel Hill, NC
- 2021 – Present Joseph Davis, MS Candidate, Biology (Thesis Committee)
Project: Risk factors for LaCrosse Encephalitis in western North Carolina
Western Carolina University, Cullowhee, NC
- 2020 – Present Brian Turigye, MPH Candidate
Project: Prevalence and risk of chronic Hepatitis B in rural Uganda.
Mbarara University of Science and Technology, Mbarara, Uganda
- 2019 – Present Cate Hendren, MD Candidate (Research Mentor)
Project: Association between travel burden and HIV care in rural Uganda
*IDSA Grants for Emerging Researchers Mentorship (GERM) awardee
UNC School of Medicine, Chapel Hill, NC
- 2019 – Present Erin Xu, MD Candidate (Research Mentor)
Project: Impact of global climate change on *Anopheles* species distribution and density across altitudinal zones in the western Ugandan highlands
* Benjamin H. Kean Travel Fellowship in Tropical Medicine awardee
UNC School of Medicine, Chapel Hill, NC
- 2018 – Present Victoria Shelus, PhD Candidate (Thesis Advisor) – Health Behavior
Project: Malaria case management practices at private-sector drug shops
*Fulbright-Fogarty Fellow in Public Health (2020-21)
UNC Gillings School of Global Public Health, Chapel Hill, NC
- 2020 – 2021 Nishma Vias, Senior Honors Thesis, Biostatistics (Thesis Committee)
Project: Adaptation of the Rao-Wu rescaling bootstrap for seroprevalence estimation in complex survey studies
University of North Carolina at Chapel Hill
- 2019 – 2021 Claire Cote, MPH Candidate (Practicum Mentor)
Project: Distribution and condition of insecticide-treated nets in western Uganda
UNC Gillings School of Global Public Health, Chapel Hill, NC
- 2019 – 2021 Abel Wilson, MPH Candidate
Project: Measles outbreak investigation in rural western Uganda
Mbarara University of Science and Technology, Mbarara, Uganda

2018 – 2021 Emily Ciccone, MD, MPH, Clinical Fellow, Division of Infectious Diseases
 Project: Stewardship for Acute Respiratory Illness
 *Thrasher Research Fund Early Career Award awardee
 *Burroughs Wellcome Fund-ASTMH Fellowship in Tropical Infectious Diseases
 Division of Infectious Diseases, UNC School of Medicine

2018 – 2020 Abalinda Gorrett, MSc Candidate – Laboratory Medicine
 Project: Peripheral vs. Venous Blood for Malaria Diagnosis
 Mbarara University of Science and Technology, Mbarara, Uganda

2018 – 2020 Regina Nakakende, MSc Candidate – Laboratory Medicine
 Project: Dengue as a cause of non-malarial febrile illness
 Mbarara University of Science and Technology, Mbarara, Uganda

2017 – 2018 Jonathan Chang, MPH Candidate (Practicum Mentor)
 Project: Predictors of admission at a rural Uganda health center
 *Awarded 2nd Place, 2018 ASTMH Elsevier Clinical Research Award
 UNC Gillings School of Global Public Health, Chapel Hill, NC

2017 – 2018 Lawrence Wang, MD Candidate
 Project: Antimalarial dispensing at private sector drug shops
 University of California at San Diego School of Medicine, San Diego, CA

2016 – 2018 Doreen Nabukulu, MPH Candidate
 Project: Using Community health workers to collect vital statistics in Uganda
 *Selected for Oral Presentation, 2018 CUGH Annual Meeting
 *WHO/TDR Grants for Implementation Research in Infectious Diseases of Poverty
 Mbarara University of Science and Technology, Mbarara, Uganda

2015 – 2016 Moses Murungi, MSc Candidate – Laboratory Medicine
 Project: Rapid diagnostic tests (RDTs) to identify severe malaria
 Mbarara University of Science and Technology, Mbarara, Uganda

Clinical Teaching:

2020 – Present Attending Physician
 General Infectious Diseases Consult Service

2018 – Present Clinical Preceptor
 UNC Infectious Diseases Clinic

GRANTS:

Active Grants:

Title: Getting Malaria “Off the Back” of women and children in western Uganda: A Phase III randomized control trial
 Dates: 7/2021 – 6/2024
 Source: Doris Duke Charitable Foundation Clinical Scientist Development Award
 Role: PI
 Amount: \$450,000 Direct Costs (10% FTE)

Title: Emergence of pyrethroid resistance in response to permethrin-treated uniforms
 Award: Not assigned

Dates: 1/2020 – 12/2022
Source: Triangle Center for Evolutionary Medicine (TricEM)
Role: PI
Amount: \$24,000 (0% FTE)

Title: From serial killers to mosquitos: The spatial targeting of mosquito breeding sites using geographic profiling
Award: K23AI141764
Dates: 12/2018 – 11/2022
Source: National Institutes of Health/NIAID
Role: PI
Amount: \$951,770 (75% FTE)

Title: Vector-Borne Disease Epidemiology, Ecology, and Response (VEER) Creativity Hub
Dates: 7/2020 – 6/2022
Source: UNC Office of the Vice Chancellor of Research
Role: PI
Amount: \$500,000 Direct Costs (0% FTE)

Title: Epidemiology and Laboratory Capacity Grant: Active surveillance of spotted fever group rickettsia and ehrlichia in central North Carolina
Award: Not assigned
Dates: 7/2021 - 6/2022
Source: Centers for Diseases Control and Prevention
Role: Site-PI
Amount: \$100,000 (5% FTE)

Loan Repayment Program (3rd Renewal)
Source: National Institutes of Health/NIAID
Dates: 7/2016 – 6/2022

Title: Chatham County Cohort Study (C3)
Dates: 6/2020 – 5/2022
Source: NC Department of Health and Human Services / Centers for Disease Control and Prevention
Role: PI
Amount: \$940,000 Direct Costs (10% FTE)

Title: Assessing Aedes Adaptation and Introgression using machine learning and population genomics
Award: ECCR_010
Dates: 2/2020 – 4/2022
Source: Emerging Challenges in Biomedical Research Pilot Award, UNC SOM Office of Research
Role: Co-Investigator
Amount: \$50,000 (0% FTE)

Title: Vector or Victim: SARS-CoV-2 Infection in Healthcare Workers and Their Household Contacts
Dates: 6/2020 – 12/2021
Source: UNC Policy Collaboratory / Internal Funds / Private Donation
Role: Co-I (Aiello/Ciccone)
Amount: \$579,000 Direct Costs (2% FTE)

Completed Grants:

Title: More than a machine: Exploring the ancillary systems and processes required to make point-of-care HIV-1 viral load testing effective in rural western Uganda

Award: P30AI050410

Dates: 8/2019 – 7/2021

Source: UNC Center for AIDS Research (CFAR)/NIAID

Role: PI

Amount: \$30,000 (0% FTE)

Title: Getting malaria “off the back” of women and children in Uganda

Source: Conservation, Food, and Health Foundation

Dates: 1/2018 – 12/2020

Role: PI (Trainee)

Amount: \$29,960 (0% FTE)

Title: North Carolina Surveillance Network

Dates: 7/2020 – 12/2020

Source: UNC Policy Collaboratory

Role: Co-I (Gordon-Larsen)

Amount: \$533,613 Direct Costs (5% FTE)

Title: Accessible metric of access: Novel tools to measure immunization coverage

Award: OPP1199232

Source: Bill & Melinda Gates Foundation

Dates: 11/2018 – 11/2020

Role: PI

Amount: \$100,000 (5% FTE)

Title: Healthcare Worker Exposure Response and Outcomes of Hydroxychloroquine Trial (HERO-HCQ)

Award: COVID-19-2020-01

Dates: 4/2020 – 9/2020

Source: Patient-Centered Outcomes Research Institute (PCORI)

Role: Site-PI

Amount: \$457,000 Direct Costs (20% FTE)

Title: Dengue as a cause of non-malarial febrile illness in western Uganda

Source: Takeda Vaccines - Investigator Initiated Sponsored Research

Dates: 7/2017 – 12/2019

Role: PI (Trainee)

Amount: \$67,613 (0% FTE)

Title: Pathogenesis Training in Infectious Diseases

Award: T32 AI007151

Source: National Institutes of Health/NIAID

Dates: 7/2016 – 11/2018

Role: Post-doctoral trainee

Global Health Scholar Award

Source: UNC Office of International Activities

Dates: 7/2015 – 6/2017

Role: PI (Trainee)

Amount: \$6,000 (0% FTE)

Small Grants for Implementation Research in Infectious Diseases of Poverty

Source: World Health Organization / Tropical Disease Research (TDR)
Dates: 7/2015 – 6/2017
Role: Co-Investigator / Research Mentor (Nabukulu - PI)
Amount: \$15,000 (0% FTE)

Title: Rapid Diagnostic Tests for Severe Malaria
Project 13469
Source: Early Career Award, Thrasher Research Foundation
Dates: 9/2014 – 8/2016
Role: PI (Trainee)
Amount: \$26,750 (0% FTE)

Title: Planning and Research Award
Source: Harvard Global Health Institute
Dates: 6/2014 – 12/2015
Role: PI (Trainee)
Amount: \$25,000 (0% FTE)

Professional Service

- To Discipline:
 - Associate Editor, *BMC Infectious Diseases* (2020 – Present)
 - Associate Editor, *International Health* (2018 – 2020)
 - Journal Review (ad hoc):
 - *Acta Tropica*
 - *American Journal of Public Health*
 - *American Journal of Tropical Medicine and Hygiene*
 - *BMC Medicine*
 - *BMC Health Services Research*
 - *BMJ Global Health*
 - *Bulletin of the World Health Organization*
 - *Clinical Infectious Diseases*
 - *Clinical Microbiological Reviews*
 - *Global Health Action*
 - *Journal of Global Health*
 - *Journal of Infectious Diseases*
 - *Lancet Global Health*
 - *Malaria Journal*
 - *PLOS Neglected Tropical Diseases*
 - *PLOS One*
 - *Transactions of the Royal Society of Tropical Medicine and Hygiene*
 - *Wellcome Open Research*
 - Grant Review
 - Early Career Reviewer, NIH Center for Scientific Review, Vector Biology Study Section, October 2021
 - Peer-Reviewed Medical Research Program Congressional Directed Medical Research Program (CDMRP), May 2021
 - Wellcome Trust International Training Fellowship, August 2020
 - Research for Health in Humanitarian Crises (R2HC), Call 7, January 2020
 - UJMT Fogarty Global Health Fellowship, January 2020, 2021
 - Wellcome Trust International Intermediate Fellowship, August 2019
- Within UNC-Chapel Hill
 - Advisory Board Member, UNC Africa Studies Center, 2019 – Present
 - Interviewer, UNC Division of Infectious Diseases Fellowship Program, 2018 – Present

- Coordinator, “Not So Grand Rounds.” UNC Division of Infectious Diseases, 2018 – 2020
- Member, UNC Infectious Diseases Fellowship Program Evaluation Committee, 2016 - 2018
- Other
 - Expert Medical Reviewer, North Carolina Medical Board, January 2020
 - Invited Participant, Department of Defense Congressionally Directed Medical Research Program (CDMRP) Stakeholder Meeting, Ft. Detrick, MD. March 25, 2019.
 - Invited Judge, AMR/Diagnostics Clinical Case Challenge, International Diagnostics Centre, London School of Hygiene and Tropical Medicine, April 2018
 - Joining Forces Initiative, Harvard Medical School, 2012 – 2014

Research Statement

I am a physician scientist who uses epidemiological tools to identify, evaluate, and disseminate practical and sustainable solutions to public health problems, especially those related to vector-borne diseases. My overarching approach to these issues derives not only from advanced training in clinical infectious diseases and core public health methods, but is also informed by and grounded in meaningful “real world” experience in conflict zones and low-resource settings. Specifically, I am interested in leveraging accessible spatial analysis tools, simple diagnostic methods, and low-cost, targeted interventions to achieve improved health outcomes earlier in the care cascade, thus overcoming the well-documented structural barriers that limit access to tertiary referral centers. The majority of my research takes place in rural western Uganda – a region of highly heterogeneous malaria transmission and frequent outbreaks of zoonotic and emerging infectious diseases. As a cornerstone of this work, I have established a mutually-respectful and growing research collaboration with academic partners at the Mbarara University of Science and Technology (MUST). Recently I have also started applying many of the same approaches and methods I use in Uganda to address the emerging, but largely neglected epidemic of tick-borne disease in the Southeastern United States with the long-term goal of developing a vibrant, interdisciplinary partnership between investigators at UNC and North Carolina State University. While early in my academic career, I have been relatively productive with 43 peer-reviewed publications through September 2021 with another four currently submitted or under review. My publications include original research articles in *Clinical Infectious Diseases* (2), *Emerging Infectious Diseases*, *The Journal of Infectious Diseases* (2), *PLOS Neglected Tropical Diseases* (4) and the *American Journal of Tropical Medicine and Hygiene* (3), among others. I have maintained consistent external funding dating back to 2014 when I was a medical resident. Specific themes of my work, include:

Elucidating the spatial epidemiology of malaria in an era of global climate change: Much of my early work was motivated by an urgent need to establish local priorities in regard to malaria prevention and control at our partner site in the highlands of western Uganda. Since then, we have employed a variety of methods to achieve this goal, including novel uses of existing tools such as rapid diagnostic tests and dried blood spots. We have also leveraged these approaches to examine the impact of severe precipitation and flooding on malaria transmission. This study, which has been cited twenty-six times since publication in 2016, was accompanied by an editorial in the *Journal of Infectious Diseases* emphasizing the potential for global climate to influence vector-borne disease transmission.

Novel Strategies for Malaria Control in sub-Saharan Africa: Over the past two decades, the burden of *Plasmodium falciparum* malaria-related mortality in SSA has decreased by more than 35%. Yet current strategies are insufficient to drive vectorial capacity below the critical thresholds needed to interrupt transmission. Thus, innovations in vector control are urgently needed. As part of my NIH career development award (K23AI141764), I am exploring the utility of a novel spatial analysis tool, geographic profiling (GP), to more efficiently locate mosquito breeding sites. GP uses the location of incident malaria cases to narrow the search area for breeding sites, thus reducing the time and effort required to conduct larval control programs.

In another effort to reduce interactions between humans and mosquito vectors, I am leading a randomized controlled trial of insecticide-treated *lesus*, which are the swathes of cloth used by women to carry infants on their back funded by a Clinical Scientist Develop Award from Doris Duke Charitable Foundation – the first at UNC in more than a decade. Our hypothesis is that with many malaria vectors adapting outdoor feeding behaviors in response to the widespread deployment of bed nets, an additional layer of protection could be achieved through the application of permethrin to the *lesus*.

Understanding and reducing the burden of tick-borne disease: North Carolina lies at the crossroads of an emerging tick-borne disease epidemic that will only be exacerbated by the effects global climate change.

Despite a relatively high burden of disease, there are large gaps in our knowledge of disease risk, transmission, and pathogenesis. With the support of a Creativity Hub Award from the UNC Office of the Vice Chancellor for Research, I have assembled a trans-disciplinary, multi-institutional collaboration including physicians, epidemiologists, veterinarians, entomologists, and medical geographers that is pursuing multiple avenues of investigation to better define the clinical and spatial epidemiology of tick-borne disease, while also developing novel, evidence-based intervention to prevent and treat these neglected diseases. The research complements my clinical work in the UNC Infectious Diseases Clinic, which will eventually provide opportunities for patients to enroll in prospective studies.

Teaching Statement

While I am relatively early in my professional career, I have deliberately pursued opportunities to mentor students and trainees, which I consider to be one of the most important responsibilities and rewarding experiences of my academic appointment. I am particularly committed to supporting students and trainees at my partner institution in Uganda, who do not always have access to engaged mentors and are frequently expected to pay the costs of their research projects. In recognition of my efforts, I received an appointment as a Visiting Associate Professor in the MUST Department of Community Health. I am also very excited about expanding my mentorship role with graduate students in the Department of Epidemiology and the Carolina Population Center. Specific elements are addressed in more detail below:

Didactic Instruction: I have taught in the classroom setting across the health professional schools including lectures in the Gillings School of Global Public Health (EPID 795 and 799) and the School of Medicine, (Infectious Diseases Fellowship, Internal Medicine Residency and the Physician Assistant Programs). My approach to didactic instruction is to provide clear learning objectives and, to the extent possible, practical application of the materials to real world problems, while also attempting to highlight limitations. I am very interested in opportunities to participate in inter-disciplinary instruction that may bring together course leaders from a variety of fields including clinical and veterinary medicine, epidemiology, entomology, and geography in what is essentially a “One Health” approach to teaching about communicable diseases.

Research and Professional Mentorship: Having spent five years of my life as an infantry officer in the United States Army, including two combat tours in Iraq, my philosophical approach to mentorship is to set high standards, provide direct support, when necessary, but allow the utmost independence and responsibility as appropriate to the individual’s level of training. I take seriously the axiom from T.E. Lawrence, “Do not try to do too much with your own hands. Better [they] do it tolerably than you do it perfectly,” and having stumbled many times in my own life, recognize the value of learning from mistakes and adapting, especially in the challenging and ever-evolving field of global health research. In my experience, I have found that when provided with this type of mentorship, students far exceed my expectations.

I attempt to guide trainees towards meaningful projects that form a key component of my own research portfolio, which means I am highly invested in the success of the work. Our emerging partnership in Uganda has generally allowed trainees to assume more responsibility and tackle independent projects that may not be possible in more established programs. Without exception, these students have successfully completed their projects and published their results of their work, typically as first authors, in peer-reviewed journals. A number have also received specialty society grants and awards including two travel grants and two conference awards from the American Society of Tropical Medicine and Hygiene, two summer research grants from the Infectious Diseases Society of America, a Burroughs-Wellcome Fund Award, and a Fulbright-Fogarty Fellowship in Public Health.

Precepting / Clinical Instruction: During the first two years of my faculty appointment in the Department of Medicine, I served as the outpatient clinic preceptor for a second-year infectious diseases fellow. Due to the increasing specialization of my outpatient clinic (e.g., tick-borne disease consultations), I have recently stepped down from this role. However, I continue to provide supervision of trainees and mid-level providers on an *ad hoc* basis. In addition, I spend 2-4 weeks each year attending on the General Infectious Diseases Consult Service, where I have the opportunity to teach first- and second-year fellows.

Diversity, Equity, and Inclusion Statement

As a researcher working in the fields of global health and tropical medicine, both of which have historical ties to colonialism, I am keenly aware of and highly sensitive to issues of representation and the power imbalances that can emerge when working with vulnerable populations in low- and middle-income settings. I have been intentional in my desire to mentor and support junior faculty, trainees, and students at our partner site in western Uganda. To date, I have mentored six graduate students from the Departments of Community Health and Laboratory Medicine at the Mbarara University of Science and Technology. Most of these students have carried out projects in conjunction with ongoing research projects, but in at least two cases, I have supported Ugandan-led research with discretionary funds. Each of these scholarly projects has resulted in a peer-reviewed publication, most with Ugandan trainees as first-author. In recognition of this work, I received an appointment as a Visiting Associate Professor in the MUST Department of Community Health.

I am similarly committed to ensuring opportunities for students and trainees at UNC and our partner institutions in the Research Triangle. Again, working in fields such as global health and vector-borne diseases that have traditionally been dominated by men – and more specifically white men - I am intentional in my efforts to recruit, mentor, and retain talented individuals from historically under-represented and disadvantaged populations. Specific examples are outlined below:

For the past three years, I have enthusiastically participated in the university work-study program, which provides funds to low-income students, by offering research-based experiences in our laboratory. To date, I have supported six undergraduate work-study students, including one who is in her third year with our group. These students not only earn a salary, but as full members of our team, gain valuable exposure to and firsthand experience with research.

While I cannot directly influence who approaches me for research mentorship, I take pride in the fact that the majority of the trainees and students I have mentored have been women. I am especially proud that these talented women have been incredibly successful, having received highly competitive awards such as the Burroughs Wellcome Fund-ASTMH Postdoctoral Fellowship in Tropical Infectious Diseases and the Fulbright-Fogarty Fellowship in Public Health. I attribute this success mostly to the motivation and ability of the individual students and trainees, but also believe that I have established an environment where they feel safe, supported, and challenged.

Lastly, I am in the early stages of working with partners at historically black colleges and university (HBCU) and other minority serving institutions (MSI) to develop a formal program (i.e., NIH R25) to increase exposure to the fields of global health and vector-borne diseases. My long-term goal is to leverage the resources available through our leading research programs both in Uganda and North Carolina to increase diversity and representation in these fields.

COVID-19 Pandemic Related Activities/Impact

With the emergence of the global COVID-19 pandemic, I rapidly shifted my research focus to address gaps in our knowledge of SARS-CoV-2 transmission. Repurposing many of the skillsets and lessons derived from my work in Uganda, I focused my efforts on understanding population risk of SARS-CoV-2 infection with particular emphasis on the potential for underestimation attributable to asymptomatic and mild disease. Given the critical shortages of personal protective equipment (PPE) early in the pandemic, we first turned our attention to infection risk among healthcare personnel and their household contacts, assuming this group would be a high-risk population. Partnering with Allison Aiello, PhD in the Department of Epidemiology, we were rapidly able to obtain seed funding and launch a prospective cohort based at the UNC Medical Center. This study has received additional funding from the General Assembly via the North Carolina Policy Collaboratory and a contract with the National Institute for Occupational Safety and Health (NIOSH).

On a larger scale, I quickly became interested in establishing a representative, longitudinal cohort to monitor the incidence and cumulative seroprevalence of SARS-CoV-2 infection in the community. Leveraging an existing cohort in Chatham County, and again in collaboration with Dr. Aiello, we were able to receive support from the North Carolina Department of Health and Human Services to launch the Chatham County COVID Cohort Study (C4). In this study, which has recruited approximately 150 participants to date, we are obtaining monthly nasal swabs for RT-PCR testing and sera for SARS-CoV-2 antibodies. In addition, all participants complete baseline regular symptom surveys. Once enrollment is complete, we will have a relatively unique cohort that can be leveraged for future epidemiological studies of COVID-19 or other infectious diseases.

Given my longstanding interest in spatial epidemiology, I also worked with the Spatial Health group led by Michael Emch, PhD in the Departments of Geography and Epidemiology on a project examining geographic and racial/ethnic disparities in SARS-CoV-2 testing. This project used datasets available through the North Carolina Department of Health and Human Services. Our initial manuscript, which highlights stark racial/ethnic disparities, particularly among LatinX populations, was recently published in *Health & Place*.