

2016 Thomas C. Alber Science & Engineering Fellow

Robert Snyder, PhD Candidate, School of Public Health, Lee Riley Lab

Robert Snyder is a PhD candidate in the division of epidemiology, working in the Riley lab. His research interests focus on using various methods in epidemiology, microbiology, and molecular epidemiology to quantify and contrast disease burden inside and outside of urban slums in Brazil. He has spent significant time in Brazil, working with various community groups, universities, and resident organizations since starting his graduate work at Berkeley in 2010. He has active research projects involving diabetes, urinary tract infections, and community-based participatory research to learn with the community about diabetes. He is also interested in scientific communication with the general public, and hopes to work in the public sector after receiving his degree. He received his MPH in Infectious Diseases and Vaccinology from Berkeley in 2012, and a BS and BA from the Ohio State University in 2009.



Fellowship Proposal

Urinary tract infections (UTI) are the most common community-acquired infection of women worldwide. A subset of women infected with UTI develop recurrent infections (rUTI), defined as two UTI episodes in six months, or three or more in 12 months. These UTIs are most often caused by the bacterium *Escherichia coli*, which, especially in cases of rUTI, is frequently drug resistant. Diabetes mellitus (DM) is a major risk factor for UTI; the most common infections in diabetics are UTIs. The impacts of DM on infectious disease are particularly acute among residents of urban slums. This population has reduced access to healthcare and poor antibiotic stewardship.

Preliminary data from a 2014 pilot study that Robert helped conduct showed a DM prevalence of 18.5% (267/4147) among those aged 18 and older. This was in contrast to the Ministry of Health's estimate of 7.4% for the 2013 adult population in the same population. In addition, Robert found a very high burden of UTI, and an even higher burden of rUTI. However, it remains unknown whether these rUTI represented treatment failures due to infection with a drug-resistant *E. coli*, or reinfections with a new strain.

Robert intends to determine the relative proportion of new strain infection vs. treatment failure caused by drug-resistant *E. coli* among diabetic and non-diabetic patients with rUTI. Robert will estimate the incidence of UTI and rUTI in a cohort of diabetic and non-diabetic slum residents, as well as compare drug resistance profiles of *E. coli* that cause UTI and rUTI. Finally, Robert will genotype uropathogenic *E. coli* isolates from rUTI cases to determine the proportion of cases due to re-infection vs. treatment failure; and dynamics of transmission of genotypes in the study community. He plans to conduct his work in Brazil, in collaboration with Dr. Fabio Alves at the Federal Fluminense University (UFF) in Rio de Janeiro. In Brazil, Robert will conduct timely collection of urine samples, drug-resistance testing, and genotyping of the *E. coli* isolates.

Robert hopes that understanding whether or not rUTI are due to antibiotic treatment failure or whether it is due to reinfection with another bacterial strain will help to mechanistically understand how much diabetes contributes to the emergence of drug-resistant infectious disease among the urban poor, with the potential to understand a major component of antibiotic resistance.