Student: Lucia Abascal Miguel
Mentor: Alicia Fernandez
Title: Impact of Health Literacy Interventions on Outcomes of Patients with Diabetes in Latin America: A Systematic Review

Background: Diabetes in Latin America is increasingly prevalent with approximately 8.4% of the population suffering from it. Many adults with the disease do not benefit fully from medical and lifestyle management because of low literacy skills. Therefore, this study aims to review and synthesize the effectiveness of educational interventions for diabetes targeted at patients with low general literacy and health literacy in Latin American countries.

Research Question: What is the impact of individual-level low literacy-focused interventions for diabetes in Latin America?

Methods: A systematic review of observational studies and controlled trials was conducted. Main data sources included PubMed, EMBASE, CENTRAL, LILACS, SciELO, and LATINDEX from January 1, 1990, to April 30, 2018. Languages included Spanish, English and, Portuguese. Included participants were adults with diagnosed diabetes and low levels of literacy; all types of educational interventions were searched. Primary outcomes were HbA1c, BMI, and serum glucose levels. Two reviewers independently assessed study quality using the GRADE risk of bias tool for observational studies and randomized controlled trials. Data extraction was also done by two independent reviewers following Cochrane guidelines. A meta-analysis was performed using the randomized controlled trials for the primary outcomes. A subgroup analysis and a sensitivity analysis were also done.

Results: We included 14 studies, six RCTs and eight observational studies. Only one study had a high risk of bias and four a moderate risk, the rest had low risk. Five observational studies included HbA1c as an outcome. All of these studies showed a reduction of HbA1c after the intervention. Diabetes knowledge increased in three of four observational studies and in 25% of the randomized controlled trials. The meta-analysis for the randomized controlled trials showed that compared to standard care, educational interventions were more likely to reduce HbA1c. The pooled mean difference was -0.97% (CI95% -1.57 to -0.36) favoring educational intervention. Compared to usual care, educational interventions were not more likely to impact BMI in participants. A subgroup analysis of regions showed that the studies done in Mexico had a larger mean HbA1c difference, -1.36% (CI95% -2.3 to -0.42), compared to a -0.54% (CI95% -0.91 to -0.16) mean difference in the Brazilian studies.

Conclusion: While there is limited high-quality data to recommend one specific type of educational intervention for low literacy in Latin America, this review shows that educational interventions that facilitate patient understanding of their disease and management are effective in reducing HbA1c levels and increasing diabetes knowledge. Although educational interventions for this population should be included in usual care, further high quality randomized controlled trials are required to understand the effectiveness of individual interventions in this setting.
Student: Rah-Sha Al-Hassan
Mentors: Monika Roy, Michael Reid
Title: Interventions to improve Cardiovascular Disease prevention in sub-Saharan Africa: a systematic review and meta-analysis

Background: In 1990, cardiovascular disease (CVD) was responsible for approximately 530,000 deaths. Compared to in 2013, CVD caused nearly one million deaths, which accounted for 11% of total deaths in sub-Saharan Africa (SSA). Much of this population risk is attributed to modifiable risk factors including smoking, hypertension, diabetes, obesity, and lack of physical activity. This is despite the fact there are scientifically proven strategies to improve CVD prevention, such as reducing elevated blood pressure using pharmacologic interventions. In fact, the World Health Organization (WHO) deemed that approach as a “best buy intervention”, which is a cost-effective, highly impactful, and feasible intervention for implementation even in resource-constrained settings. However, there is still a gap in the implementation of these intervention strategies, which results in poor CVD prevention in SSA. In order to bridge the gap, the first step was to improve our understanding of the effectiveness of implemented interventions.

Research Question: What is the effectiveness of different implementation interventions used in sub-Saharan Africa to reduce cardiovascular disease risk?

Methods: We carried out a systematic review to identify and describe interventions addressing CVD risk in SSA dating from 1996 to 2018. We described core components of the interventions and categorized each intervention type into intervention “approaches” in order to summarized key features of each intervention. We performed a meta-analysis to derive a pooled estimate of effectiveness for similar interventions.

Results: Our 1996 to 2018 search yielded 5,589 studies. After duplicates were removed, 4,823 studies were screened through a title-abstract review. After completing the title-abstract review, 167 studies were screened again through a full text-review. In total, there were 122 studies included in the descriptive analysis, in which 104 were unique studies. 2 studies were included in the meta-analysis. 70% were observational studies. 65% were published between 2014 and 2018. 21% reported the study being conducted in South Africa and 37% occurred in a rural setting. Within the 6 intervention approaches, 33% were categorized as using an infrastructure/management approach. Pooled estimates of the technology interventions did not show a statistically significant effect in reducing SBP at 3 or 6 months.

Conclusion: The data synthesized and analyzed in this systematic review and meta-analysis did not show a benefit of technology on overall CVD outcomes, such as a change in systolic blood pressure, compared to usual care, which aligns with the results of prior technology interventions. These effects may be driven by short intervention duration periods, as well as, small number of participants. There were a large number of studies, in which there were very few randomized controlled trials. Majority of the studies were published in the last three to four years, which demonstrated the novelty of the interventions assessed in this systematic review. Further research is needed to better understand the role of observational studies when determining the most effective intervention approach and type.
Student: Ridhi Arun
Mentor: Susan Meffert
Title: Evaluating Mental Health Care Services for Refugees and Asylum-Seekers in Berkeley, California: A Mixed Methods Process Evaluation

Background: Mental illnesses remain among the top causes of morbidity among refugee populations worldwide. There is a paucity of data regarding the mental health burden among refugee and asylum-seeking populations in California and the United States as a whole, and even fewer studies note the availability of treatment or therapy. Non-profit organizations seek to fill this gap; however, their efficacy is unclear. In this study, we evaluate the process by which Partnerships for Trauma Recovery (PTR) in Alameda County seeks to provide holistic mental health care for refugees and asylum-seekers.

Research Question: How do Partners for Trauma Recovery’s mental health care services impact clients’ overall health (physical, social, emotional) for refugees and asylum-seekers living in Alameda County, California?

Methods: A mixed methods approach was utilized to evaluate the process and understand the extent to which PTR fulfills its mission. 58 clients with a baseline intake (Timepoint 1) and follow-up survey (Timepoint 2) were included for the quantitative analysis. The survey topics include Sociodemographic Status, Family and Social Support, Physical Health, Emotional and Mental Wellbeing, Feelings of Safety, and three validated health surveys: PTSD Checklist 5 (PCL-5), Refugee Health Screener 15 (RHS-15), and Hopkins Symptoms Checklist 25 (HSCL-25). 10 semi-structured qualitative interviews were conducted, then analyzed using the Framework Analysis Theory. All clients were referred to the clinic and receive therapy from licensed psychologists. We did not include clients under the age of 18 and excluded all clients who have not completed at least one follow-up survey.

Results: The variables Female gender, Age group 34-44 years, and Asylum-seeking status was most significantly related to PTSD+ outcome. Female gender and Asylum-seeking status was most significantly related to HSCL+ outcome. Unstable housing was most significantly associated with PTSD+, HSCL+, and RHS+ outcome. Between Timepoint 1 and Timepoint 2, PCL-5 mean score reduced by 9.11* and HSCL-25 mean score reduced by 0.38**. Physical Health Rating, Current Housing, Meeting Basic Needs, Access to Food Security, and Emotional and Mental Wellbeing improved by 44.23%, 19.64%, 32.14%, 10.71%, and 27.17%, respectively. Through the qualitative analysis, all clients found services to be useful and beneficial to their mental and physical health, although the improvement in their health was a work in progress. All clients cited finding tangible services, such as assistance with transportation, finding food, clothing, work opportunities, legal assistance and social cohesion. In addition to mental health therapy, case management is a critical part of the services provided at PTR.

Conclusion: The quantitative findings in conjunction with the qualitative interviews provide ample evidence to support the conclusion that PTR is in fact providing the services they intend to provide. For those who continue to use the services at PTR, they find the services to be beneficial to their mental health, physical health, social relationships, and feelings of safety. Through case management and individualized therapy, PTR is able to adequately ameliorate mental and physical suffering. Future research should explore long-term impacts of mental healthcare and delve into longitudinal analyses for individual clients.
Student: Emma Bohannon  
Mentors: Wayne Steward, Shannon Fuller, Emily Arnold  
Title: Understanding the impact of anti-immigrant policy and rhetoric on access to HIV care and prevention in the San Francisco Bay Area

Background: It is estimated that more than one-quarter of the undocumented immigrants estimated to be living in the United States reside in California. Little research has been conducted on the impact that immigration reform has had on the HIV Care Continuum for the immigrant population. This study aimed to better understand the situation from the perspective of HIV providers, in order to document best practices for strategically engaging and treating the immigrant community members affected and effected by HIV.

Research Question: What impact is immigration reform having on accessibility to HIV care and prevention services in the San Francisco Bay Area? A qualitative research study with HIV medical and support service providers.

Methods: This pilot project used theoretical sampling to recruit immigrant-serving HIV medical and support service providers (N=10). These providers were from both clinical and non-clinical professions. Three of the providers were from Alameda County, while the other seven providers were from San Francisco. One-on-one, semi-structured interviews were conducted with each of the key informants using an interview guide and then transcribed and coded using a priori codes via the online Dedoose software. The data analysis was conducted using the Thematic Framework Analysis approach.

Results: The data analysis revealed that there are many internal and external barriers to prevention and care services for immigrant community members—some of which are directly related to immigration reform, and others independent of anti-immigrant rhetoric and policy making. Some of the main barriers to care were unstable housing, substance use, cultural stigmatization, and circulation of misinformation. Agencies with large immigrant populations have developed and implemented strategies to engage, link, treat, and keep such populations in services. Providers shared ways for other agencies in the Bay Area to do the same, thus enhancing the quality of care efforts for this marginalized population. This study demonstrates the need for provider networking and legal education for cohesive care throughout the Bay Area.

Conclusion: These results have important implications for public health and clinical health officials working to control the HIV epidemic in the San Francisco Bay Area as immigrants who have recently moved to the area, and those newly-diagnosed with HIV, need to be linked and engaged in prevention and care services. Recommendations made by key informants in this study should be considered in technical and capacity building assistance efforts at the agency levels. The parent study—led by researchers with the Center for AIDS Prevention Studies (CAPS)—will analyze this matter further, including the perspective of immigrant community members and other key informants throughout the Bay Area. Findings from the parent study will be published in Fall 2018.
Student: Resego Bokete  
Mentor: Adam Bennett  
Title: The risk factors of Plasmodium falciparum and Plasmodium vivax malaria in individuals living in Champasak Province, Southern Lao PDR

Background: In 2015, Plasmodium falciparum and Plasmodium vivax malaria reached prevalence levels of about 39% and 61%, respectively, in Lao People’s Democratic Republic (Lao PDR or Laos). These statistics are high even though malaria, though a potentially fatal disease, is completely preventable and treatable. Based on the increasing prevalence of malaria in Laos, the role played by potentially life-threatening plasmodium parasites warrants investigation. This study aimed to describe the risk factors of malaria in four districts in Champasak Province (Mounlapamook, Panthampone, Sanamsaboun and Soukhuma) and to describe the high-risk population (HRP) in these districts.

Research question: What risk factors are associated with Plasmodium falciparum and Plasmodium vivax malaria infection among individuals living in Champasak Province, Southern Lao PDR?

Methods: Two populations were interviewed by MTAT/FTAT teams for this study: the general population (MTAT population) as well as the high-risk population (FTAT population) in multiple Champasak Province districts. In the MTAT population, data was collected at the household and individual level. A total of 1233 households and 4935 individuals in the four districts were surveyed between October 2017 and December 2017. For the FTAT population, 1260 HRP individuals were selected from forest sites to take part in our HRP survey between March 2018 and July 2018. Participants were proactively tested for malaria using RDTs, HS-RDTs and PCR analysis on dry blood-spot samples.

Results: Participants in the MTAT population had a median age of 23 years-old (IQR: 10, 43), while the FTAT population had a median age of 36 years-old (IQR: 26, 46). Most participants in the MTAT population were female with most in FTAT being male. Many participants were aware that malaria was a problem in their community, though there was a lack in malaria knowledge at the household level in the MTAT population. In MTAT, there were cumulatively 154 malaria cases with 140 being attributed to Pv, 10 to Pf and four to a Pf/Pv co-infection. In FTAT, there were cumulatively 53 malaria cases; 41 Pf, 12 Pv and seven Pf/Pv co-infections.

Conclusion: We found that Plasmodium vivax was collectively the most prevalent species (2.84%) as compared to Plasmodium falciparum (0.2%) and of the four districts, Panthampone had the highest prevalence of P. vivax malaria in the MTAT (3.72%) and FTAT (2.5%) populations. Panthampone also had the highest prevalence of Pf infection in both populations (MTAT [0.37%]), (FTAT [6.82%]). The highest occupational risk factor for Pv malaria infection was contributed to rice farming in the MTAT population (OR: 8.71 [95% CI: 4.53, 19.45]). At the household level, we found that there was a lack in malaria knowledge as the heads of the households reported what they believed caused malaria and how to prevent it. These results are cause for community sensitization activities using Information Education Communication and Behavior Change Communication (IEC/BCC) materials, which we are currently implementing.
Student: Sonya Chalaka  
Mentor: Neeta Thakur  
Title: The Association between Adverse Childhood Experiences (ACEs) and Childhood Asthma: A Call to Action for Improved ACE Screening and Prevention  

Background: Adverse Childhood Experiences (ACEs), including child neglect, physical abuse, and exposure to domestic violence, have demonstrated clear associations with a number of physical and mental adult health outcomes. This knowledge has bolstered clinical awareness of ACEs, although uptake of effective screening and prevention practices has been minimal cross-nationally. Additionally, there is limited available research on the relationship between ACE exposure and early life health risks.  

Research Question: To challenge this delay and knowledge gap, we aimed to examine and quantify the association between ACE exposure and physician-diagnosed childhood asthma, a disease that presents a complex, integrated mechanism of onset and manifests in childhood and young adulthood with high global prevalence.  

Methods: A three-database search protocol was developed, with all studies drawn from PubMed, EMBASE, or Google Scholar. 2,545 observational studies were effectively screened for duplication, pre-set exclusion and inclusion criteria; remaining studies were selected accordingly for review. Studies then identified as data complete were further selected for meta-analysis; relevant data were extracted for studies selected for review and meta-analysis. A total of 13 studies were identified for review, of which 9 studies were included for meta-analysis. All 13 studies examined the relationship between ACE exposure and childhood physician diagnosed asthma.  

Results: Analysis suggests that exposure to one or more ACE is associated with an increased risk of asthma onset (OR 1.56; 95% CI: 1.50, 1.61), even following adjustment for age and socioeconomic status (OR 1.23; 95% CI: 1.15, 1.33). Furthermore, subgroup analysis reveals that household dysfunction, a subset of ACEs, may be more strongly associated with early-onset asthma (OR 1.56; 95% CI: 1.51, 1.61), compared with abuse and asthma (OR 1.33; 95% CI: 0.95, 1.87). A sub-analysis with the ACEs category of neglect was not completed.  

Conclusion: The evidence suggests that ACE exposure may contribute to childhood asthma and thus effective clinical screening and prevention is pressing. However, this review also highlights two key knowledge gaps. The association between neglect and asthma remains unclear. Additionally, further studies assessing ACE impact on general disease risk in childhood and young adulthood is vital.
Student: Rachel Chung
Mentors: Dhivya Ramsamy, Neelam Feachem
Title: Effectiveness of Tele-Ophthalmology on Eye Care in Rural Southern India

Background: Tele-ophthalmology has vastly improved patient access to primary eye care services. It has been particularly effective for providing care for patients from rural and/or underserved areas. But while this technology has improved accessibility to primary eye care services, there is still a lack of research evaluating its reliability and accuracy in providing quality care. Currently, the use of tele-ophthalmology has only been evaluated on disease-specific conditions like diabetic retinopathy and glaucoma. Thus, we intend to fill the gap in evidence on the effectiveness of using tele-ophthalmology for providing comprehensive eye care to patients in rural areas.

Research Question: How do comprehensive eye exams via vision technician assessments and tele-ophthalmology consultations at primary care vision centres compare to in-person examinations at Aravind Eye Hospitals with respect to clinical diagnoses?

Methods: New patients presenting for eye exams at Aravind Eye Hospital between June 4 and June 11, 2018, were recruited for this pilot study. Patients underwent two eye exams—one via the Vision Centre (VC) model, which included an assessment by a vision technician and a tele-ophthalmology consultation, and the other via the Base Hospital (BH) model, which was an in-person exam. Clinical diagnoses by both models were recorded for comparison. Additionally, we conducted a retrospective data analysis comparing the clinical diagnoses of all follow-up patients at the base hospital referred from ten vision centres during March 2018. We assessed percent agreement between the models on 25 clinical diagnoses for the right and left eyes. Sensitivity, specificity, PPV, and NPV of the VC model were calculated for each diagnosis.

Results: A total of 13 patients were enrolled in the pilot study, but only 12 completed both exams for a report of 75% agreement between the VC and BH models on the right and left eye diagnoses. Of the total number of diagnoses reported, cataract and refractive error accounted for more than half of the diagnoses. Relatively, refractive error was diagnosed more by the BH model, whereas cataract was diagnosed more by the VC model. Retrospective data analysis on 399 patients showed that the majority of diagnoses made by both models had high agreement (> 90%) with the exception of “Cataract,” “Others,” and “Normal” diagnoses. Overall, specificity and negative predictive value for all diagnoses were fairly high. Sensitivity for detecting cataract diseases was moderately high, but low for pseudophakia, glaucoma, and normal diagnoses for both eyes.

Conclusion: Due to the small sample size, the results of this pilot study were inconclusive and lacked statistical power to detect measurable differences. However, the implementation of this pilot study was sufficient to test its feasibility and for identifying areas of improvement for the main trial. Data analysis on VC referral patients showed that there was generally high percent agreement between the models of care, but in order to further test the effectiveness of tele-ophthalmology on providing quality eye care, this pilot study protocol should be replicated on a larger scale in a future study.
**Student:** Aleksandra Degtyar  
**Mentor:** Andrea Tenner  
**Title:** Sepsis and the Developing World: An Assessment of Barriers and Facilitators to Sepsis Care in Tanzania

**Background:** Sepsis is a leading cause of morbidity and mortality worldwide, with increased rates of mortality in low- and middle-income countries (LMICs). One possible explanation for the discrepancies in sepsis outcomes between LMICs and HICs is delay to timely diagnosis and management of patients. In Tanzania, more than half of adult mortality is attributed to infectious causes.

**Research Question:** What are the barriers and facilitators to timely care, defined as diagnosis within 30 minutes of presentation and initiation of management within 60 minutes of diagnosis, for adults presenting with sepsis at Muhimbili National Hospital in Tanzania, and how do they affect patient outcomes?

**Methods:** This is a mixed methods designed to assess the relationship between time to sepsis care and mortality, the factors contributing to an increased time to care, and patient perception of barriers and facilitators to care at Muhimbili National Hospital in Dar es Salaam, Tanzania. Quantitative data drawn from 818 patients between January and June of 2018 was used to create descriptive statistics. Eligible patients were identified by a set of inclusion and exclusion criteria based on current clinical definitions of sepsis based on international guidelines. Semi-structured in-depth interviews with 20 patients or patient relatives were conducted to provide better insight on these stakeholder perspectives surrounding the issue of timely sepsis care.

**Results:** Many sociodemographic factors were found to be significantly associated with time to care, including age, level of education, household size, and insurance status (\( p < 0.001 \) for all). Pre-hospital factors such as mode of arrival, number of prior facilities, and referral status also showed an association with time to care (\( p < 0.001 \) for all). Time to care was more significantly associated with the distance from a patient’s first facility of care (\( p < 0.001 \)) than with the distance from their referral facility (\( p = 0.001 \)). Time to care was further associated with disposition from the emergency department. However, time to care was not found to have an association with mortality in the emergency department (\( p = 0.173 \)), hospital ward (\( p = 0.745 \)), or on 28-day follow-up (\( p = 0.098 \)). Patient interviews praised the quality of service provided by the emergency department at Muhimbili National Hospital, but often identified payment, insurance, and transportation as major barriers to accessing care at the hospital.

**Conclusion:** Our findings indicate multiple sociodemographic or prehospital factors can act as barriers to care for emergently ill patients in Tanzania. Patients particularly identify financial constraints concerning hospital bills and transport as primary barriers. The findings also suggest that time to care may not affect clinical outcomes to the same degree as seen in the existing literature, which will necessitate further study.
Student: Liam Erickson
Mentor: Matthew Lewin
Title: Attitudes and Perceptions of a Musical Intervention “Iculo Ngenyoka” for Snakebite Awareness in eSwatini: A Qualitative Investigation

Background: Annually, sub-Saharan Africa experiences a significant proportion of the global burden from snakebite with approximately 300,000 envenoming bites and 10% of these bites resulting in death or permanent disability. Because of their small size and incaution, children are at the highest risk of death or injury from snakebite. In eSwatini, rural populations living on the interface with venomous snakes experience the greatest burden of snakebite inflicted injuries and deaths due to expensive and inaccessible anti-snake venom (ASV) treatment. Community engagement programs strive to reduce the burden of snakebite by educating vulnerable communities about snakebite awareness and prevention strategies. This qualitative study explores the current knowledge and attitudes about snakebite, and the perceptions of a musical intervention, titled Iculo Ngenyoka, as an educational tool aimed to raise awareness about snakes in the Lubombo region, eSwatini.

Research Question: What are the attitudes and perceptions of community members in the Lubombo region about the Iculo Ngenyoka musical intervention to raise awareness about snakebite?

Methods: Semi-structured interviews with 56 community members (key informant (n=1), parent/guardian (n=10), and children aged 7-17 years old (n=45)) were conducted between May-June 2018. Participants were selected from four communities within the Lubombo region: Nyetane (n=18), Simunye (n=1), Makhewu (n=23), and Mabuda Farm (n=14). Data were analyzed using a framework analysis approach.

Results: Interviewees perceived snakebite as a significant health burden and a multitude of challenges hindered access to medical treatment including distance and transportation barriers, and ASV shortages. The current sources of snake education evolved from information learned in the homesteads, schools, television programs, and personal experiences. Among interviewees, further education was desired to understand the difference between venomous and non-venomous snakes, and snakebite prevention and first aid treatment strategies. Contrasting views were expressed on preferred learning styles, but the majority of interviewees perceived music as a culturally appropriate and engaging method to learn about snakes. Many expressed the message from the song was not novel information, however, it was perceived as an effective tool to raise awareness about snakes in the community.

Conclusion: This study, to our knowledge, is one of the first demonstrations of the importance of musical interventions in educating vulnerable communities in eSwatini about snakes. Music was perceived as a culturally acceptable, engaging, and memorable method to disseminate a message about snakes. The Iculo Ngenyoka song offers a transportable medium for communicating an important message, affirming value about awareness, potential preventive health habits, and cooperative efforts to potentially reduce the burden of snakebite envenomation in the region. Although it is not proven whether a retained message translates into behavioral change and ultimately preventable snakebite accidents, this study is an important start to understand how innovative health promotion tools can be deployed to mitigate health burdens such as snakebite. The results emphasize the demand for education and the potential use of Iculo Ngenyoka and similar musical tools as vessels to raise awareness about snakebite in eSwatini and other vulnerable communities around the world.
Student: Emily Evans  
Mentor: Priya Shankar  
Title: Boys Health Champions: Developing a health education curriculum for boys in urban slum communities in Mumbai, India

Background: In India, more than one quarter of the population is comprised of adolescents, and though adolescent health is a growing field, many young people still lack access to healthcare and health education. Girls Health Champions (GHC), an organization operating in urban slum communities in Mumbai, seeks to improve access to health education for young girls through a peer-based education model. However, without subsequent health education for boys, GHC recognizes that it cannot make a lasting impact on the rates of intimate partner and sexual violence, sexually transmitted infection and disease, and poor mental health outcomes experienced by adolescents in India. Therefore, GHC seeks also to include a curriculum for boys encompassing five key health domains: nutrition, violence, mental health, tobacco and alcohol, and sexual and reproductive health.

Research Question: Within the five health domains, what are the self-described unique challenges and unmet needs experienced by adolescent boys attending public schools in slum communities in Mumbai?

Methods: This pilot study used purposive sampling to recruit boys whose families had recently visited Niramaya Health Foundation community clinics. Participants were adolescent boys 12-16 years old, entering 8th-10th grade. Three qualitative focus groups were performed in different slum communities in Mumbai in the participants’ preferred language, Hindi or Marathi, with a total of 16 participants. In each focus group, participants were asked to share their observations and general knowledge of the five health domains, as well as their preferred method of health education delivery.

Results: Participants recognized the importance of healthy foods, but lacked information about anemia. They were exposed to violence and eve-teasing in the news and in their communities, including during trips to the village. Participants had little exposure to the term “mental health,” but exhibited healthy coping skills, and most often associated stress with school exams. Tobacco and alcohol were common in all three communities, and participants were familiar with warning labels on cigarette packaging and government advisories that warn against smoking. Energy drinks were also mentioned as a substitute for alcohol. Finally, participants had received very little sexual and reproductive health information in school, but were familiar with condoms from advertisements, and had questions regarding HIV, transgender identity, and abortion. Additional health topics mentioned by participants were pollution and recycling.

Conclusion: Results from this pilot study demonstrate that there is a need for adolescent health education in participants’ communities. Based on focus group discussions, we outlined recommendations for a curriculum to deliver health education in these communities, and determined that further research is needed to continue to advance the knowledge of students’ health education needs and develop a curriculum that is culturally safe and applicable to students.
Student: Jeffery Ezennia  
Mentor: Laura Schmidt  
Title: The Impact of the Park Environment on Beverage Consumption in The San Francisco Bay Area

Background: Adequate consumption of clean water is an essential part of maintaining a healthy lifestyle, yet many do not meet the recommended dietary intake of water. School-based water promotion interventions have shown that improved access to clean drinking water coupled with promotion leads to increases in water consumption and improved health outcomes. No studies have studied the impact of similar strategies on beverage intake and health in parks and public spaces. The goal of this study is to understand how park beverage environments promote or dissuade the consumption of water and recommend ways cities can develop policies to promote consumption of water among residents.

Methods: Observational and survey data was taken over the course of 4 consecutive days at 30 parks located in low-income communities of color in Oakland and San Francisco between May and July 2016. Surveys of 594 park visitors and 120 days of observational data collected information on the presence of drinking water sources and their characteristics, the presence of drinking water promotional materials, sources of SSBs in the park, and presence of SSB advertisements. All statistical analysis was performed in RStudio. T tests and Chi-Squared tests were used to examine bivariate association between park beverage environment characteristics and the proportion of park visitors using the park water source. Multivariate linear regression was done was used to determine the association between the larger park environment and the use of park water source.

Results: There were 73 water sources and two SSB sources in the 30 study parks. There was a statistically significant difference in dirtiness score of parks above and below their city’s poverty level. 76 percent of parks in neighborhoods below the city poverty level had a dirtiness score between zero and two, while 40 percent of parks in neighborhoods above the city poverty level had a dirtiness score between zero and two. A multivariate linear regression between park neighborhood and park water fountain characteristics and proportion of individuals drinking from water fountains or soda in parks suggests dirtiness of the fountain, as well as the presence of an obstruction, are major factors associated with a decrease in water consumption.

Discussion: While the proportion of individuals consuming soda was low, so was the proportion of individuals consuming water while in parks. Only 33 percent of people consuming water while in parks were using park water sources. This suggests that a majority of water users consume water from a source that is not a park source. The disparity in fountain condition by neighborhood poverty level suggests new investments should be made to ameliorate these differences in fountain quality. This study suggests is that there are structural components in the park that cities can alter to promote the consumption of water.

Conclusion: This study suggests that the condition of water sources could impact the utilization of park water sources and promote the consumption of unhealthy alternatives such as soda. There is evidence that conditions of water fountains in parks vary by neighborhood poverty level with dirtier fountains with unsatisfactory flow being concentrated in lower-income neighborhoods.
**Student:** Camila Hurtado  
**Mentor:** Barbara Seaworth  
**Title:** Diabetes, glycemic control, and treatment outcomes in drug-resistant tuberculosis patients enrolled in the Binational Tuberculosis Program: a retrospective chart review

**Background:** The association between diabetes (DM) and tuberculosis (TB) as co-morbidities has long well been established. Previous studies estimated that being diagnosed with DM increases the risk of TB by 3-fold. Because the global prevalence of DM has risen in low- and high-income countries, there has been an elevated interest in glycemic control as a means of improving TB outcomes. A handful of studies have found worse TB outcomes and longer sputum conversion rates for those with poor glucose control; however, the findings are controversial. This study aimed to further assess the associations between glycemic control and sputum culture and smear conversion rates in diabetic, drug-resistant TB patients. All DM-TB patients were enrolled in the Binational Tuberculosis Program, which serves Mexico-residing patients on the Texas-Mexico border.

**Methods:** In a retrospective chart review, this pilot study analyzed 39 diabetic, drug-resistant TB patients. We assessed the associations between sputum smear and culture conversion rates and glycemic control utilizing bivariate analysis. Demographic data, comorbidities, drug resistance, risk factors, and treatment outcomes were also collected and their associations with glycemic control were determined through bivariate analysis.

**Results:** There were no significant findings indicating an association between glycemic control and demographic data, comorbidities, drug resistance, risk factors, treatment outcomes, and sputum conversion rates. Patients from Juárez, Mexico were found to be significantly associated with poor glycemic control. TB treatment regimens ethambutol and cycloserine were also significantly associated with poor glycemic control at the time of treatment initiation.

**Conclusion:** In this pilot study, the lack of significant associations between glycemic control and sputum smear and culture conversion rates implicate that controlling glycemic levels would not be an effective method to improve TB treatment outcomes among diabetic patients.
Student: Sunny Hwang  
Mentor: Lara Miller  
Title: Association of sufficient ANC attendance with preterm birth, preterm birth phenotypic conditions, and small for gestational age in Migori County, Kenya

Background: Kenya is within the top 15 countries with the highest rate of preterm birth (PTB), standing at 12%. Although PTB is a tremendous threat to the health of newborns in Kenya, various interventions to prevent PTB and improve PTB outcomes are not effectively implemented. One of the underutilized interventions is antenatal care (ANC) as only 58% receive four or more ANC visits. In order to promote ANC as a preventative measure for PTB and deepen the current understanding of ANC utilization in Migori County, Kenya, our study sought to explore if ANC could partake in reducing PTB, PTB phenotypic conditions, and small for gestational age (SGA).

Methods: We conducted a secondary data analysis on a dataset that match-merged the Maternity Unit Inpatient charts and the Birth Registry records at the only referral hospital in Migori County, Kenya. We used the WHO’s focused ANC guidelines to categorize women by the level of ANC sufficiency. Descriptive statistics were performed to describe the population characteristics, prevalence of PTB phenotypic conditions, and ANC attendance. We then conducted bivariate and multivariate statistical analyses to test for the association between sufficient ANC attendance and PTB, PTB phenotypic conditions, and SGA.

Results: Of 445 women, 214 had PTB and 260 had sufficient ANC attendance. Sufficient ANC attendance was associated with very PTB (UOR: 3.32, 95%CI: 1.68-6.97), moderate to late PTB (UOR: 2.74, 95%CI: 1.79-4.22), HIV+ mothers being on ARVs (UOR: 3.04, 95%CI: 1.30-8.33), and cesarean section (UOR: 2.10, 95%CI: 1.08-4.34). No statistical significance was found between sufficient ANC attendance and SGA, maternal and perinatal mortality, and sociodemographic factors. After adjustment, sufficient ANC attendance was associated with very PTB (AOR: 3.90, 95%CI: 1.93-8.40), moderate to late PTB (AOR: 2.91, 95%CI: 1.87-4.58), and HIV+ mothers being on ARVs (AOR: 3.30, 95%CI: 1.36-9.27), all of which showed increases over their unadjusted results. The five most prevalent PTB phenotypes were extrauterine infection, fetal distress, antepartum stillbirth, pre-eclampsia, and multiple births—none of which were associated with ANC attendance.

Conclusions: Our findings suggest that sufficient ANC attendance based on the WHO’s focused ANC guidelines may have not been sufficient to avert poor birth outcomes. That women who had sufficient ANC attendance in our study still underwent premature birth may indicate ineffectiveness of the focused ANC guidelines in preventing adverse birth outcomes, confirming the WHO’s new guidelines for a positive pregnancy experience. On the other hand, HIV+ women who were on ARVs were more likely to have sufficient ANC attendance than HIV women, indicating that ANC facilities in Migori County provided expectant mothers with essential HIV care or they tended to have health seeking behaviors. In order to improve maternal and child health through ANC, it is important to educate women in Migori County on the importance of ANC and encourage them to seek ANC early and routinely.
Student: Ann Marie Kelly  
Mentor: Patience Afulani  
Title: Factors that Facilitate Provider Stress and Poor Person-Centered Maternity Care (PCMC) in Migori, Kenya: A Qualitative Study  

Background: Maternal mortality rates are particularly high in rural sections of Kenya; the poor practice of Person-Centered Maternity Care (PCMC) and its more extreme form—disrespect and abuse (D&A) during childbirth—have both been linked to poor maternal outcomes. PCMC refers to high quality maternity care that is respectful and adaptive. In extreme cases, failure to administer PCMC manifests as D&A via the physical, emotional, verbal, or sexual abuse of a woman during labor. We aimed to identify and further understand factors—including stress—that affect health care providers and facilitate poor PCMC in the low-resource facilities of Migori County, Kenya. This study was conducted in an effort to inform interventions that may foster higher quality care and more positive maternal outcomes.  

Research Question: What factors negatively affect the quality of Person-Centered Maternity Care (PCMC) administered by health care providers in Migori County, Kenya?  

Methods: This secondary data analysis involved 15 in-depth interviews with health care providers in Migori that were previously conducted and transcribed by the Perceived Quality of Care during Childbirth (PQCC) Study team. This study included clinical providers only (nurses/midwives and clinical officers). The 15 transcripts involved a total of 12 facilities in Migori: 6 of which may be considered high-volume (with over 70 deliveries/month on average) and 6 of which were low-volume.  

Results: 1) Perceived stress/burnout among providers negatively impact the quality of PCMC administered. 2) Many participants noted that the quality of care given by providers is often compromised by a lack of supplies and/or human resources. These limitations sometimes cause providers to treat their patients disrespectfully. 3) A number of participants feel that they lack adequate training and are incapable of dealing with emergency situations (e.g. pre-term birth complications). 4) Participants cite a lack of patient cooperation as a direct barrier to PCMC. While providers try to practice respectful care during childbirth, many of them admit that a woman’s refusal to “comply” has forced them to sacrifice aspects of high quality care; some even admit to physically and/or verbally abusing their patients. 5) Participants emphasize the importance of introducing themselves to a patient before performing examinations or procedures; however, few participants actually do so. This is reportedly due to the perceived stress associated with workload/ a lack of time, as well as conflicting facility cultures. 6) Coping mechanisms used to deal with stress were identified among participants and largely included time off/rest and social activity/ time with peers.  

Conclusion: Work environment, the level of training amidst providers, and the patient-provider interaction all synergistically impact the quality of maternal care administered by providers; perceived stress/burnout among providers instigates poor PCMC, as well. Well-informed interventions involving stress management, as well as educational PCMC seminars and additional obstetric technical training may collectively foster higher quality care and better maternal outcomes—even amidst chronically resource-deficient and stressful conditions.
Student: Kathy Ko  
Mentors: Stealla Bialous, Naowarut Charoenca  
Title: A Retrospective Policy Analysis on Banning Sweet Flavored Cigarettes in Thailand

Background: There is a growing call by health experts and the World Health Organization for countries to ban the sale of flavored tobacco. It is recognized that such bans would contribute to addressing the 7 million tobacco-caused deaths worldwide. Flavored tobacco, including menthol, is a way for the tobacco industry to entice younger populations to become the next generation of nicotine addicts. Thailand has been a leader in tobacco control by passing robust legislation and policies. This paper aims to examine the Thai tobacco policy which bans the import of sweet and fruity flavored cigarettes, and examines the political environment that led to this policy along with challenges of implementation. It concludes with suggestions on how the country could strengthen their flavor ban to attenuate gaps in the policy, and to include menthol tobacco cigarettes.

Research Question: What were the facilitators and barriers during the policy making process to ban flavored cigarettes in Thailand?

Methods: This policy analysis was conducted in Bangkok, Thailand through a developed partnership with an on-site associate professor at the Mahidol University Faculty of Public Health. Researchers examined the policy content, context, actors and process of policy development by using the Walt and Gilson Framework. After receiving verbal consent from participants, researchers conducted 13 semi-structured interviews with key informants that have worked in the field of tobacco control or had tobacco business experience. Researchers complemented their interviews with knowledge of tobacco control policies currently enforced. During analysis, researchers applied the principles of policy data triangulation. Qualitative research methods were used to collect and analyze data to build a thematic framework from key informant interviews. Interviews were transcribed and thematically coded by the author by using Dedoose software.

Results: It took two years for the Royal Thai Government to approve the first Tobacco Control Products Act in 1992, which was amended recently in 2017. Participants expressed concern over the lackluster attitude emanating from the police department that has allowed flavored cigarettes to seep into black markets and retail shops. The author developed 39 codes to extract data from the KIIs to create seven themes, of which only five were used for this study to determine the four policy elements: content, context, actors, and process.

Conclusion: Thailand has been a world leader in tobacco control, and they have the resources to retain their role of being leaders in the anti-tobacco movement. Regardless, there is a wide margin for improvement and opportunity to strengthen Thailand’s tobacco policy that restricts the sale of sweet flavored cigarettes. The study found significant loopholes in the policy, and observed weakness with the implementation, enforcement, and compliance in the community. They have the power to expand their policy to include a ban of menthol tobacco products by implementing a bottom-up approach to amend their flavor policy.
Student: Victoria Laleau  
Mentor: Beth Phillips  
Title: Barriers and facilitators that influence person-centered maternity care offered by public health facilities in Uttar Pradesh, India

Background: In India, maternal and child health have significant burden, especially in the low resourced and overpopulated states such as Uttar Pradesh. Several efforts have been taken to reduce the rates of maternal and child mortality in the state. The government has helped increase institutional deliveries. However, the maternal and child mortality rates have not decreased at the expected rates. This might be due to a lack of quality of care in the delivery facilities and quality of care is needed to improve maternal and newborn outcomes. Quality of care is defined by clinical care and person-centered care. This study aims to determine how personnel, staffing, and facility characteristics affect person-centered maternity care (PCMC), as well as to explore the facilities’ scores for each domain of the PCMC scale.

Research Question: What are the barriers and facilitators that influence person-centered maternity care offered by public health facilities in Uttar Pradesh, India?

Methods: This cross-sectional study consisted of secondary data analysis of quantitative data collected by the UCSF SPARQ-Q+ (Strengthening People-centered Accessibility, Respect, and Quality) team from August-November 2017. The sample consisted of 40 public-health delivery facilities and 2018 PCMC delivery surveys. Bivariate testing was done to explore the associations between personnel, staffing, and infrastructural characteristics of facilities and facilities’ overall PCMC scores. Lastly, the average score of each domain of the PCMC scale was analyzed in relation to the facilities’ overall PCMC scores.

Results: This study found that there is a significant association between the staffing volume of gynecologists (p=0.015) and other clinical staff (p=0.002) and PCMC. However, it was a negative monotonic association. PCMC was also found to be significantly associated with facility characteristics such as availability of functional toilets (p=0.0065) and table count (0.033) in the facilities’ labor room, facility type (p=0.002) and whether the facilities offered abortion services (p=0.003). Out of the nine PCMC domains, the three with the highest scores were social support (84%), facility environment (79%), and trust (77%). The lowest scoring domains were autonomy (33%), dignity/respect (33%), and predictability & transparency of payments (14%). These findings demonstrate the complexity of PCMC and that physical changes in facilities’ characteristics can be a short-term fix that must go hand in hand with the larger need to train providers in PCMC and assure constructive patient-provider interactions.

Conclusion: Efforts to transform a health-systems’ culture to provide person-centered maternity care requires rigorous, costly, and continuous changes at all levels of the system. Yet, actions and improvements can be done at the facility level to ameliorate and begin the transformation of healthcare systems into providing person-driven care. The need to continue exploring the barriers and facilitators to PCMC is extremely important as PCMC is more than a component to quality of care, it is a human right.
Student: Paola Louzado Feliciano  
Mentor: Holly Martin  
Title: Parent’s Perspective of Pediatric Anemia Prophylaxis and Treatment Interventions in Arequipa, Peru: A Qualitative Study  

Background: Anemia disproportionately affects women, infants, and young children. Each year in Peru, 67.4% of children are diagnosed with anemia during their first year of life. Pediatric anemia can lead to motor and cognitive deficiencies which can affect future productivity as the child becomes an adult. Efforts to decrease the pediatric anemia burden in Peru have revolved around interventions with a focus on malnutrition. By reducing the prevalence of malnutrition, anemia prevalence reduction will follow as the two leading causes of anemia—iron deficiency and micronutrient deficiency—will be tackled. However, rates of pediatric anemia remain persistently elevated. As parents play a pivotal role in the completion of child medical treatments or health preventive measures, we seek to explore their understanding of pediatric anemia.

Research Question: How do parents conceptualize and manage pediatric anemia in Arequipa, Peru?

Methods: For this qualitative study, we recruited 14 parents of children aged less than five years old diagnosed with anemia within the last year in three “Red de Salud” health centers in Arequipa, Peru. We conducted semi-structured in-depth interviews from April 2018-June 2018. Five core inquiry concepts were included: understanding of the medical condition, anemia prophylaxis beliefs and use, anemia treatment beliefs and use, barriers to anemia prevention and treatment, and facilitators to anemia prevention and treatment. Interviews were transcribed verbatim and entered into dedoose.com. We used the framework method to code and organize our data.

Results: All participants interviewed were female; out of the 14 mothers recruited, 13 knew about their child’s anemia diagnosis for at least one month. Interview consensus showed participants had a limited understanding of anemia descriptors such as medical definition, symptoms, and health consequences. Participants conceptualized anemia by cause—malnutrition. Parents identified alimentation as the primary way of preventing or combating anemia. We identified several barriers to effective anemia prevention and treatment interventions—patient-provider communication and lack of systematic protocols within health center practices. We explored recommendations shared by participants to improve the quality of anemia prevention and treatment protocols provided in the “Red de Salud” health centers.

Conclusions: Our findings provide crucial information for the development of future pediatric anemia control interventions implemented in “Red de Salud” health centers as they offer parents’ perspective of anemia prevention practices. Our findings also highlight the importance of patient-provider communication and the need for systematic protocols in “Red de Salud” health centers. We recommend “Red de Salud” health centers to improve the medical information provided to parents’ during a child’s anemia diagnosis.
Student: Sumayya Mohammed  
Mentor: Joe DeRisi  
Title: Whole genomic characterization of unique P. falciparum strains

Background: Plasmodium falciparum parasites, which are responsible for the deadliest form of malaria, have a long history of concurring drug resistance and constantly evolving through natural mutations, which has made eradication difficult. As of late, artemisinin resistant and other multi-drug resistant malaria in Cambodia and the surrounding regions threaten to cause a resurgence of the disease. It is imperative to research unique P. falciparum strains through genetic analysis to understand in what ways drug targets can be refined to kill the parasite. Thus, we aimed to create a comprehensive report on the mutations that occurred in the genome of select strains: CS2, Sb1-A6, 613bf5od, MRA-1236. Each one has a unique property. CS2 is a lab strain that binds to CSA which has implications for placental malaria. Sb1-A6 has shown resistance against electron transport chain inhibitors. 613bf5od is a lab strain made to be resistant to a new parasite killing compound, and lastly MRA-1236 is a Cambodian field strain that is artemisinin resistant.

Research Question: What are the genetic changes found through sequencing analysis that allows the CS2, Sb1-A6, MRA-1236, 613bf5od strains of the malaria parasite to obtain unique features and develop drug resistance?

Methods: For this study four strains of P. falciparum, CS2, SB1-A6, 613bf5od, and MRA-1236 were chosen and underwent the library prep procedure. They were bioanalyzed to check whether they were suited for sequencing. Then, the samples were sequenced using HiSeq 4000 after which the datasets were transferred to the lab server where they could be run through different programs. To begin, the program PriceSeq checked for the quality of the reads and then the Bowtie program aligned the sequences so that MinorityReport can flag mutations, which are the differences between the sample strain and the reference. The data collected from the MinorityReport was further refined by a series of filters to obtain a table that contained all relevant differences. The data was also run through a CNV program to flag the genes that had an altered number of copies.

Results: It was found that the main mutations of the 613bf5od sample lay in its transporter and transcription factor genes. On the other hand, Sb1-A6 displayed a high volume of mutations an unusual amplification of acyl-coA binding proteins. The MRA-1236 strain unexpectedly showed more mutations when compared to an artemisinin susceptible strain originating from the same province than when compared to one from a different Cambodian province. MRA-1236 did, however, have a mutation in the kelch gene, just like other artemisinin resistant strains that have been studied. Unlike the rest of the samples, CS2 did not reveal anything significant.

Conclusion: This study collected preliminary data about the mutations that lead to the unique characteristics exhibited by the selected strains, and it was limited by time. There is no conclusive data and further intensive in-vitro experimentation must be conducted to uncover the intricate mechanism thru which these P.falciparum parasites evade antimalarials.
Student: Katie Morales  
Mentors: Kim Baltzell, Emily Hall, Sergio Bautista  
Title: *Estimating risk and cost, an analysis of patients with risk factors for type 2 diabetes mellitus in rural Jalisco, Mexico*

**Background:** The global age standardized prevalence of type 2 diabetes (T2DM) has doubled (4.7% to 8.5%) over the last three decades and is increasing more rapidly in low and middle-income countries (LMICs). The global economic burden of diabetes affects individuals and health care systems and is estimated to cost $825 billion USD a year. Within Mexico, T2DM is the second leading cause of mortality and the leading cause of morbidity using disability associated life years (DALYs). Early detection and prevention are key factors in managing the disease burden and should be a priority for health care systems. The aim of this project is to provide Tiopa community clinic with a demographic and cost overview of patients at risk of developing diabetes, to provide recommendations for diabetes prevention program planning.

**Research Question:** What is the prevalence of risk factors for diabetes in a rural non-profit clinic and what is the cost of caring for those patients compared to patients with no risk factors from a health care system perspective?

**Methods:** We conducted a retrospective chart review (n=264) collecting data on diabetic risk factors including: overweight (BMI ≥ 25), obesity (BMI ≥ 30), family history of diabetes, age ≥ 45, and personal history of hypertension (BP ≥140/90) or dyslipidemia. Patients were then stratified by number of risk factors per patient. For the cost analysis portion of this study, we used a health care system perspective to analyze the cost of providing care to the general population and to patients at risk of diabetes.

**Results:** Of 264 charts reviewed, 218 (83%) had one or more diabetic risk factor and 46 (17%) had no risk factors for diabetes. The percentage of those with one risk factor was 36%, two risk factors 27%, three risk factors 17% and four risk factors 3%. The majority of males and females fall under the one risk factor category. Those with one risk factor have a median age of 36 (IQR 27-46), median BMI of 28 and 46% demonstrated an elevated blood pressure on their most recent visit. The estimated per patient per visit cost from a health care systems perspective is $130.4 MP (Mexican Peso, 2018). Those with T2DM cost on average $36.8 MP more per visit (p<.001). As the number of risk factors increases for an individual patient, the mean cost of their care to the system increases as well.

**Conclusion:** Those with at least one risk factor comprise the majority in both males and females with a median age of 36 and median BMI of 28. Those in the one risk factor group also have the highest percentage of elevated blood pressure (46%), while they were not diagnosed with hypertension they were found to be borderline hypertensive at their most recent appointment. This data demonstrates an opportunity to intervene in a group of young adults (ages 27-46) with a cluster of high risk borderline risk factors and preventing them from developing obesity, hypertension and diabetes later in life.
Student: Kezia Mostak  
Mentor: Mohsen Malekinejad  
Title: Effects of Nutrient Supplementation During Pregnancy on Maternal Complications. An Umbrella Review

Background: In 2008, the WHO/UNICEF Maternal and Child Undernutrition Study Group estimated that inadequate nutrition, including maternal and childhood micronutrient deficiencies and sub-optimal breastfeeding practices were attributable to 35% of deaths in children under five and 11% of the world’s disease burden. Although, current estimates indicate that the prevalence of undernourishment in developing countries is 12%, a steady decline from 35% over the last 40 years, the global population of those undernourished, currently 815 million, has been increasing since 2014.

Understanding interventions that can improve maternal nutrition during pregnancy can lead to better pregnancy outcomes for both mothers and children worldwide. Current WHO guidelines encourage supplementation of Iron and Folic Acid for women during pregnancy to reduce anemia and associated morbidities. Although many studies have investigated possible risk reduction of adverse pregnancy outcomes with an array of micronutrient supplementation interventions, a comprehensive study of the associated effects of maternal supplementation data does not exist and is critical to inform future policy and guidelines.

Research Question: What is the landscape of currently published literature on maternal nutrition interventions administered during pregnancy and their impact on maternal outcomes?

Methods: Using Cochrane guidelines, a systematic database search was conducted on May 8, 2018 in the Cochrane library, EMBASE, PubMed, ISI Web of Science and the WHO Library. The inclusion criteria of systematic reviews, RCTs of supplementation interventions administered to pregnant women to assess maternal morbidity/mortality outcomes was applied for study selection. Observational studies and quasi-RCTs were excluded. The AMSTAR criteria was applied to assess methodological quality of reviews and GRADE assessment informed evidence quality and certainty.

Results: In total, 2383 peer reviewed abstract records were assessed for inclusion, 107 records were selected for full text assessment, from which 23 systematic reviews were selected, encompassing 162 RCTs addressing 13 different supplementation interventions (antioxidants, calcium, calcium + vitamin D, fish oil, food based interventions, Iron and Folic Acid, Magnesium, multiple micronutrient concentrations, vitamin C + E, and Vitamin D) and 5 maternal outcomes (morbidity, maternal hospitalizations, gestational hypertension, gestational diabetes, and Anemia). Overall, study quality for systematic reviews of maternal supplementation is weak with 49% of studies scoring very low on the GRADE scale for evidence quality. Gestational hypertension outcomes were the most prominent in the literature contributing 52% of included study outcomes. Calcium and Antioxidants interventions were among the most published interventions. Among the highest quality evidence there was a significant reduction in gestational hypertension risk by 78-82% in high risk populations supplemented with Calcium and 72% reduced risk with Antioxidant supplementation.

Conclusion: More high-quality evidence is needed to assess the effects of maternal nutrient supplementation interventions on maternal pregnancy outcomes especially relating to gestational diabetes and other potentially nutrient deficient populations.
Student: Vahid Namdarizandi  
Mentor: Mohsen Malekinejad  
Title: Association between adverse childhood experiences (ACEs) and initiation of illicit drug use during childhood and young adulthood: systematic review of global evidence

Background: The association between adverse childhood experiences (ACEs) (e.g., physical abuse and sexual abuse) and several high-burden health conditions such as cardiovascular diseases in adulthood is well documented. To date, there is no systematic review assessing the association between ACEs and early onset of illicit drug use in young ages. We address this gap in knowledge.

Research question: Does exposure to ACEs increase the risk of drug use initiation during young ages (<25)?

Methods: We conducted a systematic review of the observational studies by searching four databases (PubMed, Embase, Web of Science, and PsycINFO) from 1998 up to May 10, 2018 without language and geographical restrictions. We included peer-reviewed papers quantifying the association between at least one of the ten most commonly cited ACEs (exposure) and the initiation or injection of hard illicit drugs such as opioids (as outcomes) in populations < 25 years of age. We used random-effects model to combine data reported as odds ratio (OR) and mean difference (MD) and used GRADE tools to assess studies’ risk of bias and the overall quality of evidence.

Results: From the 11,071 citations retrieved from database searches, 35 studies met our eligibility criteria. Nearly half of studies were conducted in the United States and 77% of them were cross-sectional design. The most commonly reported ACEs were sexual abuse (30%) and physical abuse (22%). Participants with the history of ACEs had a higher risk of early initiation of drug use: physical abuse (Number of studies = 2, pooled OR = 2.0, 95% confidence interval:1.5, 2.6) and sexual abuse (n= 2, OR 2.68, 95%CI: 2.1, 3.4), parental divorce (n= 2, OR 1.91, 95%CI: 1.0, 3.5), and overall ACEs (n= 2, OR 2.68, 95%CI: 2.1, 3.4). On average, participants with the history of physical abuse and sexual abuse initiated using drugs earlier in life (year MD: -1.35, 95%CI: -2.4, -0.3) and (year MD: -1.82, 95%CI: -3.3, -0.3), respectively. Participants who reported injection drug use were more likely to be physically abused (n=3, OR 2.53, 95%CI:1.7, 3.7) or sexually abused (n=3, OR1.66, 95%CI: 1.3, 2.1). Being exposed to mixed ACEs was significantly associated with illicit drug use (n= 8, OR 1.93, 95%CI: 1.2, 3.1), but not for neglect (n= 4, OR 1.70, 95%CI: 0.9, 3.1) or “substance use by family member” (n=2, OR 3.15, 95%CI: 0.7, 15.3). Pooled data had a wide range of heterogeneity (I^2: 0 – 94%, majority > 60%). Fifty-seven percent of studies had high risk of bias for two or more bias domains. The overall quality of evidence was low due to methodological issues and heterogeneity.

Conclusion: The existing evidence, although mix in quality, suggests that populations with the history of certain ACEs (compared to those without them) are more likely to initiate using drugs at a younger age and therefore are at increased risk of its adverse health consequences for longer time. Drug use prevention and treatment programs may consider incorporating and evaluating the effect of screening for and addressing ACEs, a potentially key component missing from existing interventions.
Student: Andrea Nickerson  
Mentors: Matthew Lewin, María Herrera  
Title: Exploring Perceptions and Issues of Snakebite Envenomation in Livestock: A Mixed Methods Study Among Community and Industry Stakeholders in Costa Rica

Background: Snakebite envenomation (SBE) is a neglected human and animal health problem. Rural and agricultural populations across the globe are disproportionately affected by this disease. These populations often do not have adequate access to care for SBE, which results in severe morbidities and death. Livestock animals are also at high risk of SBE due to the overlap of livestock pasture and snake habitat. The loss of productive livestock has the potential to negatively impact farmer livelihoods through loss of agricultural productivity and food security. However, studies on SBE as an animal health issue are largely absent from the literature. To better understand if and how farmer livelihoods are affected by SBE in livestock, this study aims to explore farmers’ experiences with envenomed livestock in Costa Rica.

Research Question: What is the burden on farmer livelihoods caused by snakebite envenomation among livestock in Costa Rica?

Methods: This mixed method study used qualitative interviews and a quantitative survey for data collection. A total of 12 farmers and 6 employees from the Instituto Clodomiro Picado (ICP) were purposively selected for participation in semi-structured interviews. Employees from the ICP were interviewed to gain perspective on any national or global level challenges facing antivenom production, distribution, or SBE prevention. Additionally, a phone survey was conducted with 15 randomly selected former and current clients of the ICP, who owned a total of 3173 livestock animals, to better understand the incidence of SBE in livestock.

Results: Four main themes were identified from the farmer interviews: 1) Role of livestock in farmer’s lives, 2) Management of SBE in livestock, 3) Access to appropriate treatment, and 4) Impacts of SBE related treatment and death. Subjects reported frequent loss of animals that were their primary source of income due to difficulties in accessing appropriate treatment. The three primary barriers to treatment were lack of access to veterinarians, antivenom, and skills needed to apply treatment. The ICP employees highlighted balancing human and veterinary antivenom production, lack of distributor regulation, and human animal conflict as primary challenges for managing SBE in livestock. Of the 15 survey participants, 80% reported a snakebite in their animals in the past year. Among the 3173 livestock that they owned, 2.1% (n = 67) had been bitten in the past year. Of those animals that were bitten, farmers reported that 25.4% (n = 17) died. The snake reported most often by interview and survey participants as being responsible for the bites was Bothrops asper, a venomous pit viper in Costa Rica.

Conclusion: These results suggest that the issue of SBE in livestock in Costa Rica is unrecognized and has a large impact. SBE in livestock has significant negative economic and emotional effects on farmers. The reported barriers in accessing treatment for livestock are similar to the barriers reported in human studies, but is likely exacerbated due to the prioritization of antivenom for human use. Further research is recommended to fully understand the burden caused by SBE in livestock and the benefits of treating this animal health issue.
Student: Akasha Palou  
Mentor: Anne Boekelheide  
Title: Infant Breastfeeding Promotion Practices Among Organizations Who Target Cleft Palate Correction Surgeries: Potential Barriers and Facilitators in Low-resource Settings

Background: Breastfeeding is not possible for a child who has a cleft palate with or without cleft lip (CLP). Infants with CLP tend to starve in low-resource settings where formula and specialized bottles/nipples are extremely expensive and unavailable. With a breastfeeding appliance in the making, the best intervention for infants with CLP to aid in overall nutrition and development is reconstructive surgery. Many of these surgeries are done by non-governmental organizations (NGOs). These NGOs are vital to the country’s CLP community where doctors, hospitals, and resources fall short. However, the long-term methods used to promote breastfeeding in order to improve nutrition and development prior to surgery are unexplored. This qualitative study explores potential barriers and facilitators of breastfeeding promotion and assess the breastfeeding appliance’s feasibility, accessibility, and necessity within cleft mission trips.

Research Question: What are the barriers and facilitators to implementing infant breastfeeding promotion practices among organizations who perform cleft palate with or without cleft lip (CLP) surgeries, in low-resource settings?

Methods: We conducted nine in-depth, semi-structured qualitative phone interviews with doctors, speech pathologist, nurse practitioners, and administrators who work/volunteer with NGO’s that perform CLP correction surgery worldwide. Data collection occurred between May and June of 2018. All interviews were transcribed, coded, and analyzed using a priori and emergent codes. A framework analysis was used to organize findings and identify main themes throughout the data.

Results: Of the nine participants, four were administrators, two were nurse practitioners, two were speech pathologists, and one was a doctor. Among interviewees, there was a consensus to promote breastfeeding practices for children with CLP. Although, findings show that malnutrition is a condition only specific sites suffer. In those cases, the use of breastmilk, through spoon, cup, or bottle, is the preferred method to aid in nutrition and development of CLP infants. Overall, the breastfeeding was not an interest or focus of the organizations, as most organizations are surgically orientated. Opinions over device development and implementation were fragmented among participants.

Interpretation: Our finding suggest support and education around breastfeeding disseminated by healthcare professionals and organizations is lacking on surgical missions and requires improvement for mothers who have infants with CLP. Additionally, CLP surgical mission trips could be a site of device implementation. However, the timing, focus, and expert used to disseminate education around breastfeeding and device use needs to be assessed and discussed by each NGO individually; as they all have different models.
Student: Sabahat Rahman  
Mentors: Arlan Fuller, Satchit Balsari  
Title: The Perspective of the Rohingya Residing in Cox’s Bazar, Bangladesh on Resettlement and Livelihood

Background: Over 700,000 Rohingya have fled to Bangladesh to escape brutalities in Myanmar, leading to great resource strain and rising tensions within the host community. These factors, along with international pressure, have expedited resettlement negotiations. Previously, we completed a quantitative assessment highlighting concerns surrounding education, disease burden, access to healthcare, quality of shelters, and fears for the future. Now, we are following up with a qualitative wing to dive deeper into the nuances of the Rohingya perception of their current conditions in the camps, aspects of livelihood, and fears and aspirations for their future.

Research Question: What are the perspectives of newly arrived Rohingya residing in Bangladeshi makeshift camps regarding resettlement and livelihood?

Methods: 11 focus group discussions consisting of male household heads, female household heads, social leaders, majhis, businessmen, and volunteers were completed, recruiting from 6 camps in the Ukhia and Teknaf regions of Cox’s Bazar, Bangladesh that qualified as informal shelters for arrivals post-August 2017. Convenience sampling followed by snowball sampling was utilized for each group until reaching 7-10 members. The phenomenological approach guided the topics discussed and the lens for analysis.

Results: Emergent themes fell under four categories: current conditions, host community relationship, future resettlement prospects, and the voice of this population. Inadequate food supply, desire for work for adults and education for children, and pervasive apprehension about shelter and sanitation infrastructure threatened by upcoming monsoon storms were of greatest concern for their current conditions. Most expressed gratitude for neighboring communities, despite mixed experiences. Desire to return to Myanmar varied between sub-communities. However, demands for if repatriation was to be enforced were common. Most had little knowledge of other resettlement prospects. Lastly, many reported having weak representation of their voice in the current leadership scheme within the communities.

Conclusion: The relief distributed has not adequately accounted for logistical barriers in usage, demonstrating the need to reassess resource allocation. Furthermore, prioritized concerns of job opportunity and education have not been properly addressed. While expressing consistent gratitude for the host community, much emphasis was also placed on envisioning a better future. Thus, this study shows the value of more community-based research to aptly prepare for both short- and long-term future plans within the camps and regarding resettlement.
**Student:** Hailey Reeves  
**Mentor:** Elizabeth Fair  
**Title:** Health Education Videos for Tuberculosis in Androrangavola, Madagascar

**Background:** Tuberculosis (TB) is the leading cause of death due to infectious disease worldwide. Though we possess the tools to cure the disease, the global burden of TB remains remarkably high due to issues with prevention, diagnosis and treatment. A crucial step to TB control is targeting remote regions of the world where populations lack knowledge of the disease and have limited access to treatment. Effective methods for educating remote populations about TB are needed to promote prevention among vulnerable communities and to encourage treatment for infected individuals. The Drones Observed Therapy System (DrOTS) implemented a video training curriculum to address the lack of access to TB information in remote areas of Madagascar. This research study assessed the impact of these educational videos on patient, community health worker (CHW), and community member knowledge of TB in Androrangavola, Madagascar.

**Research Question:** Are health education videos focused on TB care and control effective in improving TB knowledge among patients, community members, and CHWs in remote Madagascar?

**Methods:** This study used a pre-post-test design to evaluate the effectiveness of a video training curriculum in improving participants’ knowledge of TB. Videos were short, culturally appropriate live-action or animated films covering TB prevention, diagnosis, treatment and stigma. The target population for this research study were individuals over the age of 15 living in villages in Androrangavola, Madagascar. Populations in these areas are poor, underserved, and live in very remote settings – isolated villages that are accessible only by foot, have poor sanitation, and lack access to clean water and health care. From May 2nd to June 8th, 2018, 146 participants were recruited from 25 different villages in the region to participate in this study. Participants completed the pre-test to assess baseline levels of knowledge, viewed the video training curriculum, and then completed a post-test to measure knowledge acquisition.

**Results:** There was a statistically significant difference (p < 0.001) between the pre- and post-test scores wherein scores increased by a median of 10% (IQR: 0.00% – 20.0%) after viewing the video training curriculum. The median score on the pre-test was 87.5% (IQR: 70.4% – 90.0%) and the median score on the post-test was 100% (IQR: 88.9% – 100%). There was also a statistically significant difference (p < 0.001) between the number of correct answers on the pre-test and the number of correct answers on the post-test. Of the total 146 participants, 86 (59%) improved their score on the post-test, 50 (34%) obtained the same score, and 10 (7%) received a worse score.

**Conclusion:** TB educational videos were found to significantly improve levels of TB knowledge among a low-literacy, remote population in Madagascar. Future research is warranted to determine if educational videos could be used as a tool to improve knowledge of TB globally.
Student: Sayaka Ri  
Mentor: Jess Ghannam  
Title: The Psychological Impact Associated with Frequent Tear Gas Exposure Among Palestinian Refugees in Aida Refugee Camp, West Bank

Background: The use of tear gas has been subject to comprehensive prohibition under international humanitarian law. Despite regulations, there have been frequent reports of deliberate tear gas use by Israeli Security Forces (ISF) in the Occupied Palestinian Territory (oPt) over the past three years. Aida camp has experienced the highest number of tear gas attacks within the oPt averaging at three to four times per week. The indiscriminate nature of tear gas use by the ISF raises concerns about the mental health consequences associated with frequent tear gas exposure.

Research Question: What are the psychological impacts associated with frequent tear gas exposure among Palestinian refugees residing in Aida camp?

Methods: A purposively selected sample (n=235) of residents was screened using the Arabic version of the 12-item General Health Questionnaire (GHQ-12). Participants self-reported their monthly and yearly tear gas exposure, and the average duration of each tear gas attack. Bivariate analyses of weighted GHQ-scores were compared between genders, age groups and occupations. To test reliability, the internal consistency of the GHQ-12 was assessed by calculating Cronbach’s alpha coefficient.

Results: Using the bimodal GHQ scoring method, the median GHQ score is six out of 12 (SD = 2.1). With a screening threshold score of three out of 12, 66.0% of the participants qualified as cases of minor psychiatric distress. Gender and occupation are not found to be significantly associated with minor psychiatric distress. Age is the only demographic variable significantly associated with minor psychiatric distress. Compared to those aged 66 years and older, participants aged 18 to 24 have 7.9 times the odds of being diagnosed with minor psychiatric distress. Among the three self-reported tear gas exposure categories, the average duration of each tear gas exposure event is significantly associated with minor psychiatric distress diagnosis. The Cronbach’s alpha coefficient of the GHQ-12 is less than satisfactory at 0.365.

Conclusion: Young adults exposed to tear gas in Aida camp are highly vulnerable in being diagnosed for minor psychiatric distress. Although psychosocial programs in the oPt are targeted for children and the youth, programs aimed at young adults should be sponsored by UNRWA. The average duration of each tear gas event has a high association with minor psychiatric distress diagnosis, which highlights the danger of increased potency of tear gas being used. Future research is encouraged to understand the long-term physical and mental health effects of tear gas exposure in the oPt and of refugee populations more generally.
Student: Jacqueline Shieh  
Mentors: Anna Leddy, Sheri Weiser  
Title: Exploring the neighborhood-level factors of food insecurity among aging women living with or at risk for HIV in the United States: a qualitative study

Background: Among the 49 million individuals affected by food insecurity in the United States, aging populations and people living with HIV (PLHIV) are disproportionately affected. Additionally, women living with HIV may experience food insecurity more than men living with HIV. While evidence suggests that food insecurity, HIV, and aging can create a vicious cycle resulting in continued morbidity, disability, and mortality among those affected, few studies have explored these relationships. Furthermore, although understanding the effects of neighborhood-level factors on food insecurity is critical to intervening on this vicious cycle, these factors remain relatively understudied.

Research Question: How do neighborhood-level factors influence experiences with food insecurity among aging women with or at risk for HIV in two major urban settings in the United States?

Methods: In the parent study, semi-structured in-depth interviews were conducted with 38 food-insecure, aging women living with or at risk for HIV in San Francisco Bay Area, California; Atlanta, Georgia; and Chapel Hill, North Carolina. Interviews explored participants’ perspectives of their financial situations, food insecurity, aging experiences, and neighborhood and community characteristics. In this analysis, an inductive-deductive approach was used to thematically analyze the data from San Francisco Bay Area and Atlanta.

Results: Several themes emerged regarding participants’ lived experiences of food insecurity, food environment, and social environment. Participants described how financial insecurity facilitated many aspects of their lived experiences of food insecurity. Many women reported prioritizing other basic needs over food and being unable to afford a healthy diet. Participants also discussed how harsh food environments in their neighborhoods, in which food stores were difficult to access, not affordable, and had poor quality food, limited their ability to obtain affordable, nutritious, and fresh foods. Women explained how, even when transportation was accessible, they were unable to access food stores due to their inability to carry groceries home. Additionally, many participants noted having to purchase poor-quality, processed foods at corner stores because of the inaccessibility of grocery stores. Compared to participants living in Atlanta, participants living in San Francisco reported having and using more institutional food support. Between San Francisco and Atlanta, differences in social environments facilitated the varying types of food support used. While women in San Francisco reported having distrusting relationships with neighbors and using formal support to access food, women in Atlanta described having reciprocal relationships with neighbors and using informal support to access food.

Conclusion: Our findings suggest that, coupled with financial insecurity, living in a harsh food environment can exacerbate experiences of food insecurity. Our findings also provide a qualitative perspective on the protective effects of social cohesion and social capital in harsh food environments, and how different social environments can foster varying means of leveraging social capital to access food or resources for food. Policies and interventions targeting the availability, affordability, and quality of healthy foods in grocery stores can have profound impacts on women’s lived experiences of financial and food insecurity. Furthermore, given their higher levels of cohesiveness and social capital, communities in Atlanta may be conducive to mobilization toward advocacy of such policies.
Student: Vikram Sridharan  
Mentor: Hugh Sturrock  
Title: Evaluate Operational Productivity Improvements to Indoor Residual Spraying Activity using Travel Route Optimizations

Background: Indoor Residual Spraying (IRS), a technique by which the inside walls of residential structures are treated with insecticide to kill mosquitoes, is commonly used in countries trying to eliminate malaria. IRS is a resource intensive and costly effort involving trained personnel travelling to dwellings to perform treatments. Decision support applications like Disease Surveillance and Risk Monitoring (DiSARM) help automate prediction of malaria spread to aid countries with on the ground operational decision making. DiSARM directs targeted application of IRS activity in the predicted high-risk malaria regions. To bring down costs associated with IRS activity, there is an opportunity to develop solutions that could be used by applications like DiSARM to reduce the large distances travelled.

Research Question: Our study evaluates ways to minimize the total distance that personnel must travel between residences during insecticide application. As compared to the current travel routing strategy employed by the malaria program in Swaziland, we evaluate the use of an optimal route to provide operational efficiencies for personnel using DiSARM. In this study the following three aims were investigated: determining savings in distance travelled when servicing many structures using an optimized route as compared to current practice, identifying natural clusters along the optimized route and evaluating the degradation in savings when the current unoptimized travel strategy is used inside each cluster, and quantifying the impact of optimized approaches on the cost-effectiveness of IRS campaigns.

Methods: The parent study built and deployed DiSARM for use as an automated surveillance and decision support platform for malaria elimination. This study was conducted to explore enhancements to DiSARM. We assessed the use of geographic information system data and mathematical algorithms to create optimized IRS personnel travel routes. Our analysis used 50,000 geo-located residential structures throughout Swaziland. For our analysis, we sampled sets of 1,000 structures from the larger data set of 50,000 structures.

Results: The median kilometers travelled was 38% lower in the optimized route compared to the current routing strategy. The time spent to service all structures was comparable between both travel approaches. The analysis clustered structures along the optimized route to facilitate user adoption and convenience. We found a 6% degradation in median performance when the user traced the optimized clustered route but chose to employ their current travel strategies to service the structures inside each cluster. Finally, the optimized route resulted in a median of 15% lower kilometers driven as compared to the current strategy and the median savings from reduced driving distance per group of 1,000 structures was between $16 and $36.

Discussion: Much like other disease elimination programs, malaria faces a significant funding gap. Efficiency improvements to existing elimination and vector control processes helps stretch available resources. Our study has evaluated ways to optimize personnel travel distances between residences during insecticide application to reduce travel costs. The results of the study provide favorable evidence to support a pilot field implementation to assess the real-world operational feasibility of using travel route optimizations used in conjunction with DiSARM.
Student: Ana Starcevich
Mentor: Craig Steinmaus
Title: The Effects of Diet on Arsenic Metabolism in Populations in Northern Chile

Background: Inorganic arsenic is a naturally occurring element that is present in high levels throughout the world. It is severely toxic and a known carcinogen that can cause bladder, lung, and skin cancer, and other chronic conditions. Contaminated drinking water is the largest source of inorganic arsenic exposure and affects millions of people globally. When inorganic arsenic (InAs) is ingested, it is incompletely metabolized to monomethylarsonic acid (MMA) and dimethylarsinate (DMA) before being excreted through the urine. MMA is the most acutely toxic form of arsenic and higher proportions of urinary MMA are associated with increased risk of disease. Although large interindividual variation exists, the factors that influence arsenic metabolism are largely unknown.

Research Question: What are the associations between diet and arsenic metabolism among the population in Northern Chile?

Methods: A secondary data analysis was conducted as part of a larger parent study performed by Dr. Craig Steinmaus. In this study, we analyzed data from 599 participants from Northern Chile. Using bivariate testing, and multivariate linear regression, we assessed the association between intake of selenium, folate, protein, fat, and methionine and arsenic metabolism, as measured by urinary MMA, DMA, and InAs.

Results: To evaluate the association between nutritional intake and the proportion of urinary arsenic metabolites, we performed multivariate linear regression with %MMA, %DMA, and %InAs as the dependent variables and selenium, methionine, protein, folate, and total fat as the independent variables. The models of best fit were chosen by simultaneous forward and backwards stepwise regression with an AIC as the defining factor. Statistically significant associations were found for all five dietary nutrients. Increases in selenium, folate, and methionine intake were associated with decreases in percent MMA and increases in percent DMA. Increases in protein and total fat intake were associated with increases in percent MMA and decreases in percent DMA.

Conclusion: The results of this study suggest that selenium, methionine, folate, protein, and fat may influence arsenic methylation and metabolism in populations in Northern Chile. These results are consistent with other studies and suggest that dietary deficiencies may increase disease susceptibility in arsenic exposed populations.
Student: Ginny Svigals  
Mentor: Deborah Dean  
Title: Estimating the prevalence and risk of Chlamydia trachomatis sexually transmitted infections among females in Suva, Fiji

Background. Sexually transmitted infections (STIs) are a silent epidemic. Chlamydia trachomatis (Ct) is the most sexually transmitted bacterial infection in the world with the greatest concentrations reported in the Western Pacific Region. Given the lack of screening for STIs, except for HIV, the prevalence of Ct and high-risk behaviors associated with Ct infection among the female population of Fiji is currently unknown.

Research Question: This study aims to estimate the prevalence of Ct infection and the risk factors associated amongst females in Suva, Fiji.

Methods. We performed a prevalence study of Ct and associated risk factors by consecutively enrolling 255 sexually active females, aged 18-59 years, using convenience sampling from four outpatient clinic sites in Suva, Fiji. Women were administered a Behavioral Surveillance Survey (BSS) to assess high-risk indicators for infection. Clinicians recorded information on symptoms and signs along with collecting vaginal swabs using standard techniques. Clinical samples were tested for Ct and Neisseria gonorrhoea (NG) infection using the Cepheid GeneXpert-1 CT/NG NAAT. All analyses were conducted using R-Studio. Odds ratios (OR) were estimated by bivariate analysis and adjusted ORs were determined by multivariate testing using Multiple Logistic Regression modeling.

Results. Ct infection prevalence was 20% among the 255 females screened; the highest rate was 38.3% (23 of 60) among women aged 18 to 24 years. CT infection prevalence (OR [95% confidence interval]) was significantly associated with women aged 18-24 years (7.28 [1.03 - 8.15]); two (4.46 [1.59 - 13.31]), three to five (3.17 [1.03 - 9.94]), six to 10 (4.8 [1.15 - 1.96]) and over 10 (4.43 [1.15 - 19.64]) lifetime sex partners; and coinfection with NG (6.29 [1.48 - 33.89]).

Conclusions. There is a disproportionately high burden of Ct infection among young females in Suva, Fiji, regardless of the number of lifetime partners. The asymptomatic nature of Ct creates additional barriers to seeking medical attention. Interventions to increase STI screening in all sexually active women, reassessing the validity of Syndromic Management, and the development of educational programs is recommended.
Student: Ekaterina A. Tangog  
Mentor: Fe Esperanza Espino, Pauline Joy M. Lorenzo  
Title: Community Perceptions of Schistosomiasis and “Bulate” (Intestinal Worms) in the Sorsogon Province, the Republic of the Philippines

Background: Intestinal infections, such as Schistosomiasis (SCH) and “Bulate” (Soil-Transmitted Helminths, STH, in the native language of Tagalog) have become a public health concern in the Philippines. Currently, there are 12 million people that are at-risk for intestinal infection across 28 endemic provinces. To address this issue, the Philippines’s Departments of Health (DOH) and Education (DepEd) have adopted the WHO’s recommendation of administering mass drug administration (MDA) to control and reduce disease prevalence for SCH and STH. Despite MDA occurring across the country, prevalence rates remain high, especially in endemic regions. The second highest prevalence for SCH (4%) and STH (89.5%) can be found in the Sorsogon Province. Therefore, the study aimed to investigate what barriers or factors affect MDA adherence in this province and to provide recommendations to improve MDA execution in the Philippines.

Research Question: How do community perceptions of intestinal parasitism (Schistosomiasis and Soil Transmitted Helminths) affect participation in MDA?

Methods: Prior to data collection, a document review of the DOH’s recommended MDA protocol was conducted in order to familiarize the research team with how MDA is supposed to executed on the ground. Five elementary schools that participated in MDA in the municipalities of Irosin and Juban in the Sorsogon Province were randomly selected as the main study sites for data collection. We conducted key informant interviews (n=8) with elementary school principals, health coordinators, and district nurses; Ten focus group discussions (FGDS) were also conducted—five with only school-aged children (grades IV – VI) and the remaining five with mothers of enrolled elementary school students (n=78). A thematic framework analysis was done to identify themes from the data.

Results: Based on the data obtained, we were able to assess community perceptions of SCH and STH in the municipalities of Irosin and Juban. KII participants were questioned about the MDA process and the challenges they faced. FGD participants were questioned about the causes, symptoms, and what preventive practices could be done for both SCH and STH. Four main factors/barriers were identified that directly affected MDA compliance—adverse side effects, fear, gaps in knowledge, and logistics.

Discussion/Conclusion: The findings from this study reveal that there are notable barriers/factors that need to be addressed in order to increase MDA participation rates. Therefore, our findings can have implications on how to improve the MDA program for SCH and STH in the Philippines. The proposed recommendations are based on addressing the four barriers that participants have identified as having a direct impact on MDA compliance.
Student: Alekya Tummala
Mentors: Maxim Ritzenberg, Mohini Venkatesh
Title: Cost Analysis of Waliku - A Mobile Application and Database System that Digitizes Student Attendance, Absenteeism, and Child Sickness Data

Background: In Sumba Barat, Indonesia, school attendance is lower than the national average, and found to be as low as 80-85% in some schools. To improve student attendance rates in such communities, the district government, together with Save the Children and its partners, are piloting Waliku, a technology that digitizes attendance, absenteeism, and child sickness data. Waliku allows teachers to communicate with caregivers about absent children to determine the reason for the absence. The data generated through the application can enhance understanding of the leading causes of absenteeism in the community. Consequently, government and school officials can address health and social issues in a more targeted way. A cost analysis was conducted to understand the financial feasibility of implementing and scaling up Waliku.

Research Question: What is the per-student cost of implementing Waliku, a technology that monitors student absenteeism and the causes of absence, in five pilot schools in Wanokaka sub-district of Sumba Barat, Indonesia and in all the district schools in Sumba Barat, Indonesia?

Methods: We evaluated the per-student costs of Waliku using standard micro-costing methods under two scenarios: 1) as Waliku implemented by Save the Children in five pilot schools; and 2) as Waliku scaled up by the district government across all schools in the six sub-districts of Sumba Barat. Pilot cost data was collected using the top-down approach via Save the Children's budget records. Per-student costs for scaling up Waliku implementation were estimated using the bottom-up approach by omitting one-time, pilot study costs and proportionally scaling up recurring costs. All cost inputs were varied from 50 to 150% of their original values to estimate the impact of uncertainty on the outputs from both scenarios. The pilot and district per-student costs of Waliku were then compared to the pilot and district per-student expenditures of the government. The latter data was mainly acquired via the pilot schools’ School Operational Grants (BOS) expenditure records and website, respectively. All costs were evaluated from the implementer’s perspective over a one-year time horizon. The costs are financial costs reported in 2017 U.S. Dollars.

Results: The per-student cost of implementing Waliku in the pilot schools in the first year was $53.71. The costs of scaling up Waliku to all district schools in subsequent years was $9.51. The pilot study and district per-student costs of Waliku were most affected by uncertainty in the number of students in the pilot schools. The results also showed that the larger the cost of an input, the more effect it had on per-student Waliku costs at the pilot and district levels. Finally, the analysis showed that government budget and expenditure on a per-student basis was $59.28 at the pilot and district levels.

Conclusion: When Waliku is scaled up from pilot to district schools, the per-student costs decrease. In fact, less government funds will be needed to scale up Waliku to the district than to implement it in the pilot schools. Future studies can explore the real costs and benefits of scaling up Waliku across the district, province, and nation.
Student: Janelli Vallin  
Mentor: Beth Phillips  
Title: *Providing person-centered maternity care along the road to referral? Provider perspectives from high volume facilities in Uttar Pradesh, India*

**Background:** The maternal health burden in India is recognized as a global issue with high rates of maternal deaths. While there has been an increase in institutional births from the establishment of the JSY program, pregnant women still experience a lack of person-centered maternity care (PCMC). A smooth functioning referral system operates within a health facility environment and providers ability to deliver PCMC is an important element of a patient’s experience during the referral process. This study aims to highlight clinical and nonclinical provider perceptions of PCMC within the referral system.

**Research Question:** How does the referral system enable or diminish provider’s ability to deliver person-centered care in highly resource constrained maternity hospitals in Uttar Pradesh, India?

**Methods:** The project is embedded within a larger research study titled ‘Strengthening People-centered Accessibility, Respect, and Quality’ (SPARQ). Roughly 50 in-depth interviews were conducted with facility staff, managers, and providers about the perceived facilitators and barriers to providing high quality person-centered care. Interviews were translated and transcribed from Hindi to English. Excerpts were coded using Dedoose™. The emergent themes were discussed and analyzed through a framework analysis approach and charted based on a priori categories.

**Results:** We identified 3 domains, 6 themes and 14 associated sub themes. The 3 domains include common practices of person centered maternity care, enablers of PCMC within referrals and challenges of delivering PCMC within referrals. These domains illustrated themes such as patient provider interactions, referral management, and ambulance related services. All of the providers interviewed, whether they were considered clinical or non-clinical staff, reported having communication issues with their patients during the referral process. Almost all providers described knowing when to refer patients and identifying the male of the family as the decision maker. This study also demonstrates that in addition to doctors and nurses acting as the primary decision makers, ASHA’s and ambulance services also play a key role in the smooth functioning of a referral system.

**Conclusion:** The varying levels of interactions with different health professionals demonstrates the complexity of delivering person-centered maternity care in high volume low-resource maternity facilities. As a result, there are three recommendations that could be adopted. The first is to provide doctors with knowledge of the best PCMC practices by incorporating them into the medical or training curriculum. The second is to create a set of referral protocols and guidelines that reflect good PCMC. Better policies that incorporate PCMC can help place women at the center of care. This includes incorporating a technology-based feedback mechanism between health facilities in order to monitor referrals and the quality of PCMC. The third is to incorporate ASHA’s perspectives during referrals into these policies. Providers’ perspectives need to be integrated with patient’s perspectives to improve women’s experiences throughout the referral process.
**Student:** Brianna Vargas  
**Mentor:** Holly Martin  
**Title:** Lost Voices: An Exploration of Patient-Provider Dynamics and Childbirth Experiences in Rural and Urban Perú

**Background:** Skilled Birth Attendants (SBA) are trained and accredited health professionals with the skills to manage childbirth and refer complications. They are frequently used to mitigate maternal and neonatal mortality and morbidity. Previous data suggest that SBA are less utilized in rural versus urban settings. Currently in Perú, neonatal intrapartum related deaths account for approximately 36.2% of total deaths in children under the age of five and maternal deaths account for approximately 8.3% of total deaths in women of reproductive age. This continued burden in Perú and discrepancies and gaps in SBA utilization data are driving the need for exploration into childbirth experiences and SBA in the region.

**Research Question:** How do attitudes and beliefs regarding labor and delivery inform decision-making with regard to skilled birth attendance and influence childbirth experiences among women and skilled birth attendants in rural and urban southern Perú?

**Methods:** This qualitative study aimed to explore the patient-provider dynamic and factors involved in SBA utilization and childbirth experiences in rural Colca Canyon and urban Arequipa, Perú. Ten women and five SBA were recruited from throughout the Colca Canyon valley and ten women and five SBA were recruited from throughout Arequipa City over a two-month period. Women were between the ages of 19 and 41 and experienced childbirth within the last two years. SBA were predominantly female, between the ages of 37 and 62, and had at least eight years of experience. We conducted semi-structured elicitation interviews with patients and SBA; all interviews were audio-recorded and transcribed. We coded individual transcripts using clearly defined codes and sub-codes and used framework analysis for final theme and sub-theme identification of patient and provider interviews.

**Results:** Women revealed factors that led to positive versus negative birth experiences. Six main themes emerged upon exploring experiences, community, and future health-seeking behavior: patient advocacy, respectful maternity care, norms within childbirth care among network of mothers, patient blame, behaviors and emotions, and plans for future safe childbirth. For SBA interviews, four themes emerged: collective facilitators and barriers to provision of care, perceived difficulties with patients, and justification of mistreatment during childbirth.

**Conclusion:** Findings suggest that the absence of respectful maternity care (RMC) and patient advocacy or companionship is commonplace across both Arequipa City and Colca Canyon. This typically exacerbated women’s feelings of helplessness and frustration. Yet, regardless of experiences, attitudes, and community beliefs, safe childbirth seems to be the main driver of SBA utilization and facility-based births. This study shed light on the nuances of patient-provider relationships and childbirth experiences and aimed to give women the space to tell their stories and voice their needs.
Student: Abhinav Veerina  
Mentor: Rachel Kaplan  
Title: “Outness”: What it Means and How it is Associated with Experiences of Transphobia and Resilience Among Transgender Women in Beirut, Lebanon

Background: Transgender women are a diverse population of individuals worldwide who are assigned male sex at birth and identify as female, transcending many traditional societal constructions of gender. Trans women face a disproportionately high risk of HIV/AIDS, abuse and violence, mental illness, and discrimination individually and structurally. In Lebanon, there is very little knowledge on the health disparities existing among trans women. This study aims to fill this gap by exploring the construct of “outness”, visibility or gender expression of trans women as it relates to their social environment and how this interaction influences health.

Research Question: What associations relate “outness” of transgender feminine individuals in Lebanon to experiences of transphobia and to indicators of resilience?

Methods: 20 semi-structured in-depth interviews were conducted with trans women prior to a trans-specific pilot intervention for HIV, and 16 surveys were completed by trans women during the pilot intervention. This data was collected previously in a larger, existing longitudinal study, and was used in this study to assess relationships between “outness” and experiences of transphobia and indicators of resilience via mix-methods analysis.

Results: Quantitative findings indicated significant associations between ‘Visibility as Trans’ and two indicators of resilience, ‘Social Cohesion’ (p=0.0071) and ‘Community Connectedness’ (p=0.0380); individuals ‘Visible’ as trans scored 50.0% and 26.67% lower on ‘Social Cohesion’ and ‘Community Connectedness’ scales, respectively, compared to individuals ‘Not Visible’ as trans. Qualitative findings identified three themes, ‘Isolation’, ‘Affirmation of Gender Identity’, and ‘Resilience’. Participants indicated trans visibility subjected individuals to increased risk of transphobic encounters including discrimination and violence from family, society, and law enforcement causing trans women to isolate themselves to avoid transphobia. However, validation of gender identity internally or externally (via physical appearance, gender affirmation surgery or hormone replacement therapy) was very important to participants. Participants also found resilience through the social support of personal relationships with loved ones, especially significant others.

Conclusion: While quantitative analysis may not have shown statistically significant associations between “outness” and experiences of transphobia and “outness” and resilience, qualitative analysis did suggest that experiences of transphobia were more likely to occur when visible as trans. Those ‘Visible’ as trans having lower scores of ‘Social Cohesion’ and ‘Community Connectedness’ showed a relationship between “outness” and resilience. Qualitative results showed that social support and strong relationships with loved ones were most important to trans women. This exploratory study into how trans visibility and “outness” influences health demonstrates the need for further research to explore and evaluate this construct as well as the serious health disparities that trans women in Beirut experience.
Name: Pamela Williams
Mentor: Hana Azman Firdaus
Title: Factors Associated with Postpartum Family Planning Uptake: A Mixed Methods Analysis

Background: Family planning is one of the most effective methods to improve reproductive, maternal, newborn, and child health (RMNCH) outcomes. Globally, there is a large unmet need for family planning in the postpartum period, defined as the first six weeks after childbirth as a mother’s body returns to a non-pregnant state. Numerous infrastructure and health workforce developments have provided a foundation to facilitate postpartum family planning (PPFP) uptake in Rwanda. Approximately 62% of Rwandan women have unmet family planning needs in their first year postpartum. Thus, a key priority action to continue and accelerate progress in RMNCH for Rwandans includes strengthened efforts in the area of PPFP.

Methods: This mixed-methods secondary data analysis explored both system-level factors, such as health facility type (government or faith-based) and individual level factors, such as respectful maternity care, locus of control, mental health (perceived stress scale and Edinburgh postnatal depression scale) and current attitudes of men, women and community health workers towards PPFP. Data was derived from the Preterm Birth Initiative (PTBi) Rwanda parent study. A total of 68 participants completed the required baseline and follow-up survey; an additional 55 participants lost to follow-up were included. Non-parametric and parametric testing were applied for all categorical and numeric variables where appropriate. An idiographic approach by secondary data analysis of parent study focus group interviews was used for the qualitative component.

Results: A significant difference is seen between the completed and lost to follow-up groups demographic measures in occupation (p=0.02), cooking methods (p=0.05), and openness in partner discussions (p=0.05). The majority of women (87%) did not want a pregnancy within the next year, however, only half (53%) utilized a family planning method postpartum. Health facility type was not significantly correlated with PPFP uptake. Respectful care and locus of control showed a significant difference between answers recorded at the baseline and follow-up time points (p=0.03, p=0.04); mental health measures did not. Respectful care was not significantly correlated with PPFP uptake. Locus of control and PPFP uptake was correlated if the partner or man was reported as the individual making healthcare decisions (p=0.04). Mental health measures of were not significantly correlated with PPFP uptake. Attitudes of men, women, and community health workers towards PPFP were summarized in four themes: 1) information about family planning could be disseminated more effectively, 2) the wait time for postnatal care (PNC) discourages attendance, 3) the purpose of family planning specifically in the postpartum period is not clear, and 4) men want to participate in PPFP decision making.

Conclusion: The Rwanda MOH wants to increase rates of PPFP uptake to improve the health outcomes of the mother and baby, and thus the continued growth of a healthy nation. These results illustrate that a gap exists in the utilization of PPFP services. Multiple factors can be considered influential elements of PPFP uptake of which the most significant correlates are socioeconomic status and locus of control. Thus, attendance to PNC services, improved quality of PNC services, and partner (male) involvement can improve PPFP approaches.