Student Name: Sophie Ahmad  
Mentor(s): Annette Sohn, MD, Shannon Fuller, MS  
Title: The impact of COVID-19 on HIV treatment and care delivery for adults in South and Southeast Asia: A Qualitative Study

Background: It remains unclear to what extent COVID-19 and COVID-19-related interventions have changed HIV treatment in South and Southeast Asia, and what the long-term effects of these modifications to routine care may be. We hope to explore the impact of the COVID-19 pandemic on HIV care delivery to gain an understanding of challenges and best practices in maintaining access to HIV care and inform public health practice.

Research Question: How have COVID-19 and COVID-19-related interventions impacted HIV service delivery in South and Southeast Asia from the perspective of HIV care providers and policymakers?

Methods: This was a qualitative study with semi-structured interviews used to explore provider and policymaker perspectives. 33 participants were recruited and 21 interviews were conducted from May to July 2021. Two interview guides were used to conduct interviews, with one guide for providers and one guide for policymakers. To be included in the study, individuals had to be 18 years of age or older, a physician, non-physician provider, or policymaker in the field of HIV, able to consent to a virtual interview, and able to speak English. Template analysis was used to analyze completed interviews following transcription.

Results: Participants included 12 females (57%), 9 males (43%), 13 providers (62%), 5 national policymakers (24%), and 3 regional policymakers (14%). Of the national policymakers and providers, 6 participants were from India, 5 were from Indonesia, and 7 were from Thailand. Four major impacts of the COVID-19 pandemic on HIV-care delivery were identified. These impacts were patient barriers to accessing HIV care, diversion of resources away from HIV-care, delayed progress towards HIV targets in the region, and the implementation of innovative differentiated service delivery (DSD) approaches. Innovations that were expanded include multi-month dispensing (MMD), telehealth services, and community involvement in HIV care delivery. In terms of policy, HIV services lost funding and the implementation of HIV-related policies and advancements was significantly slowed or delayed due to the shift in focus towards COVID-19-related policies.

Conclusion: While analysis is ongoing, preliminary results have uncovered a generally similar perception of the impacts of COVID-19 on HIV-care among participants in India, Indonesia, and Thailand. There was a consensus that although the pandemic introduced detrimental interruptions in HIV-care, the DSD innovations that arose have transformed HIV-care and many believe these services will continue beyond the pandemic. These innovations signal a reform in HIV-care delivery in the South and Southeast Asia region as providers and policymakers alike hope to see scale-up and official implementation of MMD and telehealth services by policymakers through standardized guidelines.
Student Name: Isabella Dohil
Mentor(s): Paul Krezanoski, MD Alison Comfort, PhD
Title: Measuring the Impact of Social Networks on Contraception Use in Madagascar

Background: While women’s health has made tremendous strides in the past 20 years, much of the world is still failing to meet basic sexual and reproductive needs. An estimated 218 million reproductive age women (15-49) living in low- and middle-income countries (LMICs) have an unmet need for modern contraception. In Madagascar, 24% of reproductive age women indicated a desire to limit or to space births, but experienced barriers to doing so. In order to address this continued unmet need, further research must identify and consider the barriers and facilitators to contraception usage among Malagasy women, including the role of social networks.

Research Question: Do male and female family planning networks differentially influence modern contraceptive use among adults in the district of Ambalavao, Madagascar?

Methods:
This secondary data analysis engaged cross-sectional egocentric network data collected via in-person survey between June 2019 – July 2019 in the semi-urban town of Ambalavao. Univariate analyses revealed perceptions toward modern and traditional contraception methods among a cohort of 213 reproductive age women and 208 adult men. We conducted initial bivariate testing to determine associations between social network characteristics and family planning behaviors.

Results:
61% of participants reported current personal use or partner use of a modern method of contraception. Perceptions of efficacy varied by type of contraception method and by gender, with male participants reporting higher levels of efficacy for IUDs, implants, injectables and oral contraceptives compared to female participants. Reasons for not using or for stopping use of contraception varied widely by type. Top reasons included concern of negative health effects, interference with sexual experience, and technical challenges.

Conclusion:
Despite the limitations of cross-sectional data, initial results are suggestive of a social network effect on family planning behaviors. Descriptive statistics revealed gendered differences in perceptions toward modern contraceptives, which may be associated with individual and partner usage. Additional research is underway to explore multivariate relationships.
Student Name: Masih Babagoli
Mentor(s): Dr. David Boettiger, PhD, Dr. Yea-Hung Chen, PhD
Title: Association of Healthcare Access with Hypertension Awareness, Treatment, and Control in Bangladesh

Background: Hypertension is responsible for more deaths globally than any other health risk factor, and its prevalence has been rapidly growing in Bangladesh. Despite this burden, there has been no study analyzing how healthcare access, specifically the spatial distribution of healthcare facilities, impacts the hypertension cascade of care using a nationally representative dataset.

Research Question: How does distance to nearest healthcare facility affect hypertension awareness, treatment, and control among adults in Bangladesh?

Methods: This study was a secondary analysis of data collected as part of the 2017-18 Bangladesh Demographic and Health Survey. Three dichotomous outcome variables – hypertension awareness, treatment, and control – were analyzed, and the variation of each outcome was assessed across socio-demographic factors applying survey weights. The association between distance to nearest healthcare facility (upazila health complex [UHC], private clinic, NGO clinic, or community clinic [CC]) and each of the three outcome variables was analyzed using multivariable logistic regression and adjusting for potential individual, household, and community-level confounders. This relationship was also analyzed separately for each type of healthcare facility.

Results: In Bangladesh, 42.5% [95% CI 40.5%, 44.5%] of those with hypertension were aware, 87.4% [95% CI 85.3%, 89.5%] of those aware were receiving treatment, and 33.8% [95% CI 30.8%, 36.8%] of those receiving treatment had their blood pressure controlled. Overall, only 12.5% of individuals with hypertension had their blood pressure controlled. After adjusting for potential socio-demographic confounders, there was no evidence of robust associations between distance to any nearest healthcare facility and hypertension awareness, treatment, or control. However, individuals in rural communities specifically with no known UHC had lower odds of blood pressure control compared to those living in rural communities within 3km of a UHC (OR 0.303 [95% CI 0.111, 0.822]). Those in rural communities with no known NGO clinic also had lower odds of blood pressure control compared to those living in rural communities within 3km of an NGO clinic (OR 0.491 [95% CI 0.245, 0.985]). Additionally, compared to individuals in urban communities with a CC, those in urban communities 1-3km and greater than 3km from a CC and those in urban communities with no available CC had lower odds of awareness.

Conclusion: A low proportion of individuals with hypertension in Bangladesh have their blood pressure controlled. While distance to any nearest healthcare facility does not appear to be associated with the hypertension awareness, treatment, or control, distance to specific types of healthcare facilities may impact an individual’s progression through the hypertension cascade of care. There needs to be improvements in healthcare facility resources and referral systems for hypertension care.
Student Name: Deandra Lee  
Mentor(s): Jamie Sepulveda MD, DSc, MPH, Alden Blair PhD, MS  
Title: Gender Differences in Mental Health Among Migrants Living at the Border in Tijuana, Mexico, and Contributing Factors to Poor Mental Health: A Quantitative Secondary Analysis

Background: Migration is a stressful life experience for all individuals. However, migrant women, transgender migrants, and individuals with other gender preferences experience differential hardships compared to their male counterparts and each other. This complexity, along with other significant hardships in the context of the COVID-19 pandemic, emphasizes the need to explore the differences in mental health outcomes among migrants by gender.

Research Question: What are the gender differences in the mental health burdens faced by migrants aged 18 and over, living at the border in Tijuana, and what are the potential factors associated with poor mental health outcomes?

Methods: We collected data from a parent study that administered questionnaires among migrants in Tijuana, Mexico from November 2020 to April 2021. Participants were included in this sub-analysis if they identified as male, female, transgender, or other on the questionnaire. All persons who did not have survey data from the parent study were excluded. We used bivariate tests and multivariable logistic regression models to explore the differences in depression, anxiety, and PTSD among genders.

Results: This sub-study included 598 participants. Women showed a higher prevalence in each mental health outcome when compared to men even after adjusting for confounding variables in a multivariate logistic regression model. Women were 2.5 times more likely to have symptoms of depression (97% CI:1.69,3.82), 2.70 times more likely to have anxiety (97% CI:1.77,4.15), and 3.49 times more likely to have PTSD (97% CI:1.93,6.46) compared to their male counterparts. Whereas transgender/other individuals showed no significant difference for any mental health outcome. In both unadjusted models for depression and anxiety, people who inject drugs are protected against depression with an odds ratio of 0.46 (97% CI 0.30,0.71) and anxiety odds ratio of 0.30 (97% CI 0.23,0.59). However, as we adjusted for variables, this was no longer the case as the odds ratio increased to 0.82 (97% CI 0.48,1.39) and 1.01 (97% CI 0.52-1.96) for depression and anxiety, respectfully, and crossed parity. Moreover, individuals who experienced some form of violence (physical or sexual violence, robbed or extorted, and/or kidnapped), faced an increased risk of each poor mental health outcome in both adjusted and unadjusted models.

Conclusion: Our findings suggest the need for mental health interventions tailored towards migrant women who displayed significantly higher mental health burdens compared to their counterparts. Additionally, they suggest that public policy and public health interventions at the state and local levels, in Tijuana, should be aimed towards reducing violence in all forms as they are strong indicators of poor mental health outcomes.
Student Name: Lina Salam  
Mentor(s): Beth Phillips MPH, Lauren Suchman MA, PhD  
Title: Exploring the Perceived Influence of Gender and Family Dynamics on Contraceptive Decision-Making among Ugandan Women: A Qualitative Study

Background: Uganda, like many sub-Saharan African countries, has a considerably high maternal mortality rate of 336 maternal deaths per 100,000 live births, while also experiencing an unmet need for contraceptives. Literature reports that the barriers contributing to contraceptive use for women in Uganda include male partners influence on women’s decision-making for contraceptives or opposition, inadequate access to family planning services and availability of contraceptive methods, lack of knowledge and concern for side effects, and stigma. This study explored the impact of gender and family dynamics on contraceptive decision-making and autonomy among Ugandan women interviewed as part of larger mix-methods study called Innovations for Choice and Autonomy (ICAN), which is a four-year project that aims to optimize approaches to implementing self-injection and understand how to self-injection can enhance women’s autonomy and enable their use of contraceptives.

Research Question: How do gender and family dynamics influence contraceptive decision-making and autonomy for women in Uganda?

Methods: Qualitative methods were used to explore themes of gender and family dynamics, power, gender-based and interpersonal violence, and the perceived facilitators and barriers that impact Ugandan women in their contraceptive decision making. An in-depth interview field guide with questions related to contraceptive decision-making, contraceptive use, and autonomy was used. A secondary analysis was conducted using the in-depth interviews and the themes stated above we coded using a revised codebook. The interviews were audio-recorded, transcribed to English from the local language, and coded for content analysis. Sixteen in-depth interviews were used to collect information about contraceptive decision-making among women in Uganda.

Results: Most women shared awareness of their rights related to contraceptive use as a perceived facilitator to decision making. Others reported partner support in shared decision-making and having support from family and friends as being beneficial to their health, well-being, and providing them with more control in the timing of their pregnancy and childbirth. For other women, however, patriarchal norms, disapproving husbands, marital domestic abuse, lack of family and community support, fear of judgment, societal pressure, and stigma hindered women in their contraceptive decision-making capacity.

Conclusion: The findings of this study highlight the multi-leveled nature of the barriers and facilitators related to contraceptive decision-making for women in Uganda. Eliminating socio-cultural and patriarchal gender norms that prevent women from having contraceptive autonomy and choice is necessary to promote empowered decision-making. More research is needed to further elucidate the complexity of these factors to understand how best to enhance women’s choices and autonomy around contraceptive decision-making.

Keywords: Contraception, Decision-making, Uganda
**Student Name:** Eva Adana  
**Mentor(s):** Doug Arneson  
**Title:** Comparative Rates of Mortality for Pediatric Patients at University of California San Francisco Benioff Children's Hospital, With and Without Genetic Testing for Medulloblastoma

**Background:** Brain cancer is the leading cause of cancer-related death among pediatric patients. The most common form of pediatric brain tumor is medulloblastoma, accounting for 18% to 20% of all pediatric tumors. Within the last decade, four distinct molecular subgroups derived from six genetic markers were discovered in medulloblastoma patients implicating genetic testing as an important tool for diagnosis and multimodal treatment strategies. University of California San Francisco (UCSF) is currently one of the only hospitals in the nation with an advanced clinical genetic test (UCSF500) used for cancer screening that also provides information on genetic testing outcomes located in the EHR, including demographic information, diagnoses, procedures, and mortality rates for patients stored in their electronic health records (EHR) and made available via the UCSF clinical data warehouse (CDW). The real-world data from electronic health records allows for the repositioning of existing data to quantify mortality outcomes for pediatric patients at UCSF that received genetic testing following a medulloblastoma diagnosis.

**Research Question:** Does the UCSF500 genetic test change standard of care and improve mortality outcomes for pediatric patients at University of California San Francisco Benioff Children's Hospital?

**Methods:** The study followed an observational case control format for pediatric medulloblastoma patients that received the UCSF500 following a medulloblastoma diagnosis. A total of 16 participants were analyzed in the intervention group and 160 participants in the control. A 1:10 cohort matching approach using propensity scores based on covariates including demographic and treatment variables. Inclusion criteria included all pediatric patients <18 with a minimum history of 3-months in the EHR. Bivariate and multivariate regressions were conducted to determine if there were differences in demographic characteristics of those who received the genetic tests, changes in treatment outcomes following administration of a UCSF500 test, and mortality outcomes for those that received the intervention.

**Results:** Pediatric medulloblastoma patients who received the genetic test did not have improved mortality outcomes due to the sample size of participants. However, there were significant changes of standard of care post-intervention, as well as a protective hazard ratio for some treatments following medulloblastoma diagnosis. There was no association with socio-economic barriers impacting access to intervention, although there was a protective association with demographic characteristics relating to gender, ethnicity, and English speaking.

**Conclusion:** Our study of how a genetic test influences outcomes in pediatric medulloblastoma is novel as there currently does not exist any research which analyzes the implications of such a test. A future study looking at a larger population size will be necessary to further our understanding of the implications of genetic testing in pediatric medulloblastoma survivorship.
Student Name: Hariclea Vasilopoulos  
Mentor: Ben Oppenheim, PhD  
Title: Trust and Unrest: A quantitative study on post-civil war health care improvements and the relationship between people and state in Aceh, Indonesia

Background: Improved health care services can ameliorate the relationship between people and the government in post-conflict contexts, preventing further intrastate conflict, however the hypothesis that the health sector can act as a bridge towards peace has minimal empirical evidence. Exploring the case of Aceh, an Indonesian province that experienced a violent civil war in 1999 and whose government created post-war health care system changes, can provide more real-life evidence for the aforementioned theory, and help clarify the relationship between health care improvement and trust in the state, which is also impacted by social determinants of health (SDOH).

Research Question: Did government-implemented improvements to Aceh’s health system after their civil war help rebuild trust between citizens and state, and how much did the social determinants of health influence this level of trust?

Methods: Data from a survey of 1,586 Acehnese adults (≥ 18 years old), conducted in 2012 by The Asia Foundation using stratified random sampling, were analyzed. We looked at the participants’ ratings of the health care system and their trust in local and national governments. We used ordinary least square regression models controlled for theoretical confounders with additional subgroup analyses conducted using participant self-identification associated with SDOH.

Results: Changes to the health care system for the better after the signing of the war-ending peace treaty, the Memorandum of Understanding (MoU), was associated with an increase in trust of the national government [adjusted slope (AS): 0.198, 95% confidence interval (CI): 0.134-0.262, p < 0.001]. Higher quality of health care services provided was associated with an increase in the trust of the provincial government [AS: 0.153, CI: 0.110-0.196, p < 0.001]. People who were forced to leave their homes and hometowns during the civil war experienced the strongest trust-building effects of all subgroups [AS: 0.346, CI: 0.141-0.552, p = 0.001]. Women of reproductive age and war victims generally experienced lower trust-building effects compared to the general population.

Conclusion: This study provides clear evidence of the relationship between government-initiated health system improvements and increased trust among the people in Aceh, therefore supporting the hypothesis that the health sector can advance the cause of peace. Governments aiming to lower the risk of future intrastate conflict through increasing the population’s trust in them should invest in their country’s health care system and provide support to all residents.
Student Name: Disha Nangia  
Mentor(s): Shannon Fuller, MS, Wayne Steward, PhD, MPH  
Title: Telehealth and HIV Care Amid the COVID-19 Pandemic: A Qualitative Study in California

Background: The COVID-19 pandemic resulted in the rapid implementation of telehealth among various HIV clinics in California. People living with HIV/AIDS (PLWHA) not only require a continuum of care but are also more likely to be disproportionately impacted by social determinants, which can serve as barriers to accessing care. This created a unique opportunity to study the telehealth experiences of both clinic staff and patients.

Research Question: Among HIV clinics and support service agencies in California, what are the experiences with, and perceived benefits and challenges faced by healthcare team members and patients using telehealth systems for HIV care and management?

Methods: For this qualitative study, 19 semi-structured interviews were conducted with ten key informants and nine clients. The key informants consisted of medical providers, case managers, administrative staff, clinical researchers, and individuals working in policy. The clients included individuals over the age of 18 who were living with HIV or AIDS and had been receiving care in California. The data were analyzed using the framework analysis approach.

Results: Three significant themes emerged from the interviews conducted with key informants and clients. The first theme discovered was utilizing a hybrid model of providing both telehealth and in-person visits as a platform to make HIV care patient-centered. In discussing the need to continue telehealth, both clients and key informants cited telehealth decreased transportation costs and no-show rates. The second theme which emerged was the recommendation of specialized telehealth navigators for successful telehealth implementation. The need for navigators stemmed from the learning curve affiliated with utilizing telehealth platforms. The last theme discovered was the requirement of equitable and accessible resources for the successful implementation of telehealth in marginalized populations. This theme pertained to the digital barriers faced by hard-to-reach populations and the integration of services which is often lost in telehealth platforms.

Conclusion: Our findings suggest that there is no one-size fits all approach for telehealth utilization for HIV care and management. Furthermore, the results of the study support the need for easy-to-use telehealth platforms and for increasing integration of services offered through telehealth.
Student Name: Andrea Correa
Mentor(s): Laura Schmidt
Title: The Impact of Transnational Soda Corporation on Water Supply in Mexico

Water plays an important role in human survival. In Mexico, individuals struggle to find any source of safe quality drinking water. Companies like Coca-Cola, who own the biggest bottling company FEMSA in Mexico, are profiting from families who are not able to access water, meanwhile Coca-Cola extracts large amounts of water daily from Mexican communities. This qualitative study aims to answer how is access to water supplies in Mexican communities affected by Coca-Cola’s corporate actions in water supply governance? This qualitative study utilizes a semi-structured interview with a water advocate and is continuing to gather participants from Coca-Cola FEMSA, policy makers, experts in water laws and regulations, and advocates and civil society representatives. In addition to interviews, a secondary analysis will be conducted from transcripts provided by the parent study focused on public private partnerships in Mexico, as well as a review of gray literature to supplement findings. This study utilizes an analytical framework to detect emerging themes that appear within the data collected. Our research indicated that the lack of water regulations by the National Water Commission (CONAGUA) has had the greatest impact on the water level supplies in Mexico. The lack of regulation and water measurement has allowed for companies such as Coca-Cola FEMSA, along with other beverage companies, to underreport the amount of water being extracted from overexploited aquifers. The lack of water analysis being collected by CONAGUA has left Mexican populations to struggle to obtain access to water, meanwhile corporations extract millions of gallons of water a day. The lack of access to water, especially during the COVID-19 pandemic, has increased hygiene and health problems among Mexican communities. While the Mexican administration has planned new guidelines to better hold beverage corporations accountable of the water being extracted and accurately measure water supply levels, there has been no assurances of when the measure will be implemented.
**Student Name:** Rachel Christensen  
**Mentor(s):** Dr. Matthew Lewin, MD, PhD, Dr. Zuzana Karjala, PhD, Ms. Andrea Nickerson, MS  
**Title:** Reduction of Pharmaceutical Waste Through the Development and Implementation of Ecologically Friendly and Biodegradable Product Packaging

**Background:** The pharmaceutical industry currently produces 3% of the world’s industrial pollution and with a growing mass of pharmaceutical packaging entering the delicate ecosystem, the need to produce biodegradable options for packaging is more urgent than ever. Using biodegradable materials, we seek to develop biodegradable and ecologically friendly packaging formats which will degrade naturally in the environment. As a first step toward the overarching goal, this preliminary degradation trial and analysis shows some processes and rates at which publicly available biodegradable products breakdown over a 30-day period.

**Research Question:** How can pharmaceutical waste be reduced by modifying product packaging of pharmaceutical products to become ecologically friendly and biodegradable?

**Methods:** Six products advertised as biodegradable were each subjected to 30 days of 12 different environmental factors using isolated systems to prevent cross-contamination. Test articles were cut into 5cm x 5cm units and weighed at baseline. Humidity and temperature readings were taken twice daily to ensure the environments did not fall outside the predetermined exposure conditions. Surface area measurements and observations were recorded every other day and final weights were taken at the conclusion of the 30-day trial.

**Results:** All products exhibited some form of physical change ranging from faded ink to extensive fragmentation. Most notable were rice paper, palm fiber, and green food-based ink on the sugar cane. The least physical changes were observed on bamboo, starch, and loofah. Weight changes were varied, but the most consistent were palm fiber which lost weight across all conditions and starch where no changes occurred. The environmental conditions producing the most overall degradation were saltwater and freshwater while soil and sand conditions produced the least.

**Conclusion:** This preliminary analysis showed that product degradation was discordant with advertised claims. Future studies should focus on testing biodegradation over longer timeframes, combining environments, and including wind factors and erosion. Nevertheless, valuable information obtained from this short-term project gave us insight into how commercially available products might be modified for use in pharmaceutical packaging. Rice paper and food-based ink could potentially be used to create ecologically friendly informational packets and replace traditional wood-based paper printed with varnish and resin ink. While this is only one element of pharmaceutical packaging, this is an important first step in adapting current packaging standards and implementing it into manufacturing processes that could be compatible with the latest regulatory requirements. This research can guide useful modifications with the goal of meeting patient needs and an aspirational goal of making a key industry less polluting.
**Student Name:** Maya Ganeshan  
**Mentor(s):** Dr. Jeanne Noble, Director for COVID-19 Response, Parnassus ED, UCSF CARES, Residency Director of Emergency Medicine Simulation, Director of Advanced Procedural Skills Dept of Emergency Medicine, Global Health Affiliate Faculty  
**Title:** Perceptions of Safety and Care in the Emergency Department during the COVID-19 Pandemic  

**Background:** The COVID-19 pandemic has led to overcrowding in emergency departments (ED) and patients with non-emergent health problems were taken care of in hallways and outdoor spaces, which may have influenced their experience. There has been little done to assess the experiences of patients in the ED during the pandemic, as many previous dynamics for patients have been upended.  

**Research Question:** What are the experiences and perceptions of safety and care, among patients at the UCSF Parnassus Emergency Department, during the COVID-19 pandemic?  

**Methods:** This was a cross-sectional quantitative study that assessed experience and perceptions from March 4, 2021, until July 11, 2021, in three locations in the UCSF ED: private rooms, hallways, and outdoor tents. We administered our novel survey tool in person, using a 5-point Likert-scale to assess satisfaction with safety and care. 223 patients were recruited, out of which 200 were eligible. Eligible participants were in one of the three locations, 18 or older, and were willing and able to respond to the survey questions, for any health issue.  

**Results:** Our analysis suggested that there was a significant difference found between satisfaction and dissatisfaction across every metric of safety and care, with most subjects indicating that they were satisfied. Location was associated with perception of care ($X^2=8.13$, $p=.01716$), but was not associated with perception of safety. The odds of being satisfied with safety and care in private rooms was above one across all survey questions. We estimated the odds ratio of being satisfied with care, in hallways compared to private rooms, to be .343 (95% CI: .158-.718) for a question on long wait times.  

**Conclusion:** Patient perceptions of safety and quality of healthcare services received in the ED were not decreased because of fear of COVID-19 transmission or overcrowding due to need for physical distancing. In private rooms, satisfaction with safety and care was more likely compared to hallways and tents, so location did influence perceptions. It appears the UCSF ED kept its patients thoroughly satisfied overall, and ED’s around the country can imitate its short wait times and high standards of care during the pandemic.
Student Name: Wes Stephens  
Mentor(s): Laura A. Schmidt, Ph.D.  
Title: Evaluating the implementation of COVID-19 policy in the Navajo Nation using the Consolidated Framework for Implementation Research (CFIR) model.

Background: In 2020 the COVID pandemic led to a significant death toll around the world. However, no country was hit harder by the disease than the US, which had the largest number of cases and the largest number of COVID related deaths in the world by the time of this research. Within the US, the NN, a Native American population, had the highest number of cases per capita of COVID and the highest death rate from COVID in the country. The NN, being an independent sovereignty within the borders of the US, began to implement their own policy to combat the disease. Their efforts led to a reduction in prevalence and death. Further, the NN experienced only two waves of the disease while the rest of the US experienced three waves, each worse than the previous. The objective of this assessment is to discover the barriers and facilitators of implementing the COVID policy with the NN using the CFIR model.

Research Question: What were the barriers and facilitators of implementing the COVID-19 healthcare policy within the Navajo Nation healthcare system from March first, 2020 to June first, 2021?

Methods: Literature reviews were accomplished with multiple databases using PRISMA search methods. The included literature contained journals, media reports, government documents, interviews, and dissertations. These records were then analyzed using the CFIR model to discover barriers and facilitators of implementation. This was accomplished by first mapping all items to the proper construct defined by the CFIR committee. The constructs were then ranked by adapting the CFIR ranking rules to include a -1 for barriers, 0 for neutral items, and a +1 for facilitators. The barriers and facilitators were then analyzed for successes and failures of policy implementation.

Results: A total of 291 records were included for the analysis: journals (n=127), news articles (n=119), government records (n=32), dissertations (n=8), and interviews (n=5). Within those records a total of 334 CFIR constructs were identified and placed within the proper domain. The majority of constructs were contained within the Inner Setting domain followed by the Intervention Characteristics domain. The top five constructs were Adaptability (n=35), Culture (n=34), Relative Priority (n=26), Complexity (n=24), and Patient Needs & Resources (n=22). The main barriers were Complexity, Cost, Readiness for Implementation, and Patient Needs & Resources. The main facilitators were Relative Priority, Tension for Change, Adaptability, and Leadership Engagement.

Discussion: The success of the NN's policy implementation showed a strong correlation to the recognition from the Navajo people of the severity of the problem, followed by the leadership taking swift action to combat the disease according to the external information given to them. The failures of the policy implementation dealt with cost and complexity of the problem which stemmed from prior known problems the NN had. External power actors recognize these problems, but the policy window for action is closing. It is recommended that the NN use this window to develop permanent relationships with these stakeholders in order to remedy these prior problems.
Student Name: Diana Etwaru  
Mentor(s): Evan Bloch, MD, MS  
Title: Global health and consumption of uncooked seafood: a robust scoping review

Background: Foodborne illnesses cause an estimated 600 million cases of disease worldwide each year. Globally, there is an increase in seafood consumption; we sought to characterize the burden of seafood related illnesses.

Research Question: What is the geological distribution and clinical outcomes associated with uncooked seafood consumption?

Methods: For this robust scoping review, PubMed, Embase, and Web of Science were searched from January 1, 1975 to April 27, 2021. All passive surveillance publications pertaining to seafood related illnesses were included. For this review seafood was broken down into fish, which included fresh- and salt-water finfish, and shellfish, which included crustaceans and mollusks. The exposure of interest was the consumption of uncooked seafood. The outcome of interest was the onset of any seafood related illness due to a bacterial, viral, or parasitic infection, or a marine toxin. This review did not limit by seafood or contaminant type.

Results: A total of 835 publications were identified using the literature search; 101 met criteria for inclusion in this study. The publications represented 25 different countries: 19 from high income countries (76%), three from upper-middle (12%), three from lower-middle (12%) and no publications from low income. The United States were responsible for 37 publications (36.6%). There were no publications from Africa and only one publication from South America. Bacteria accounted for the most publications (n=46), followed by viruses (n=33), parasites (n=20), and toxins (n=2). The most common bacterial, viral, parasitic agents were *Vibrio* (n=37), norovirus (n=13), and *Paragonimus* (n=6) respectively. Ciguatera and saxitoxin were the two toxins. Oysters were the seafood that was implicated in disease in 41 publications (40.6%). Four publications reported deaths due to consumption of seafood (4.0%). In these four studies, all patients had pre-existing conditions, predominantly cirrhosis and a history of regular alcohol use.

Conclusion: This study aimed to determine the type of literature currently published on seafood related illnesses to address gaps in knowledge and provide recommendations for future studies. These findings highlight a need for an improved foodborne illness surveillance system in low- and lower-middle- income countries. With the increase in publications in consumption rates of seafood over time, better implementation of intervention methods and reporting policies are necessary to slow the increasing disease burden of seafood related illnesses. It is becoming more imperative to have surveillance systems and uniform reporting policies in place as the incidence of seafood related illnesses may be exacerbated by the effects of climate change.
Student Name: Cairn Wu
Mentor(s): Dr. Wendy Hartogensis, Phd, MPH, Dr. Anand Dhruva, MD
Title: Six-Month Ayurvedic Intervention for Breast Cancer Survivors—A Clinical Trial

Background: Breast cancer survivors continue to face health challenges well after biomedical treatment. In order to treat ongoing symptoms, including psychosocial elements, an aspect not often addressed in survivorship care, many have turned to the whole-systems approach of Complementary and Integrative Medicine. An Ayurvedic intervention was used to examine feasibility and acceptability, and clinical improvements in quality of life (QoL), as well as other cancer-associated symptoms.

Research Question: Among stage I-III breast cancer survivors living in the San Francisco Bay Area, what is the impact of an Ayurvedic medicine intervention focusing on lifestyle and nutrition practices on symptom management and psychosocial care?

Methods: Bay area women in remission, who had stage I-III breast cancer, underwent chemotherapy and radiation, and/or had surgery were eligible for participation in the study. The trial involved a six-month individualized Ayurvedic intervention, whereby participants worked one-on-one with a trained practitioner, and received counseling on lifestyle, nutrition, yoga and marma (similar to acupressure) during 14 visits, followed by a six-month maintenance phase. QoL was determined by using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ C30, BR23). Symptom measures included General Sleep Disturbance Scale (GSDS), Lee Fatigue Scale (LFS), Center for Epidemiological Studies—Depression Scale (CES-D), and Spielberger State-Trait Anxiety Inventory (STAI-S, STAI-T). All measures were gathered at four timepoints—baseline (month zero), midpoint (month three), at the end of intervention (month 6), and at end of the maintenance phase (month twelve). T-tests and effect sizes (Cohen’s d) were calculated to make comparisons between baseline and end of intervention. Random-intercept mixed effects linear regression models were used for repeated measures analyses.

Results: Participants from the Ayurvedic arm of the study (n=20) had a mean age of 50 years (SD=10.2). 90% of participants completed the full 6 month intervention (n=18), with an 85% retention rate by month 12 (n=17). Comparing baseline to end of intervention, large effect sizes were seen in QLQ-C30 emotional functioning (d=0.97, P<0.005), QLQ-C30 cognitive functioning (d=0.95, P<0.005), insomnia (d=-1.06, P<0.0005), BR23 breast symptoms (d=-1.12, P<0.0005), and GSDS total sleep total (-1.19, p<0.005). Medium effects were seen QLQ-C30 Global Health (d=0.56, P=0.04), QLQ-C30 physical functioning (d=0.50, P=0.034), and GSDS quality of sleep (d=-0.73, p=0.030).

Conclusion: Clinical improvements were seen in QoL and other symptom measures over a course of the six months, resulting in a possible dose effect. The intervention was both feasible and acceptable to participants. Moreover, measures that revealed the largest effect sizes were those related to psychosocial symptoms. The results from this trial warrant further study with a blinded randomized control trial to evaluate the efficacy of Ayurveda for breast cancer survivors.
Student Name: Richard Le  
Mentor(s): Michelle Hermiston, MD, PhD, Anurag Agrawal, MD  
Title: Faculty perspectives on a Vietnamese pediatric hematology-oncology fellowship program: a qualitative assessment

Background: Pediatric cancer is the second leading cause of death due to disease among children globally, behind only unintentional injuries. Providing optimal care requires physicians to be trained specifically to care for children with these diseases. Before November 2019, Vietnam had not established a sub-specialty training program in pediatric hematology oncology. To address this issue, international collaborators worked with the University of Medicine and Pharmacy in Ho Chi Minh City to develop the Vietnamese Pediatric Hematology-Oncology Fellowship Program. The goals of the program are to train competent, compassionate physicians who are experts in the care of children with cancer and blood diseases, as well as to develop leaders who will move the field forward as clinicians, scientists, and child health advocates. This study aimed to explore faculty perceptions of the training program with the goal to identify best practices and areas of improvement.

Research Question: What are the perceptions and challenges faculty members of the Vietnamese Pediatric Hematology Oncology fellowship training program face in delivering an education that cultivates cultural humility and instills an inquiry habit of mind in students during the COVID-19 pandemic?

Methods: Semi-structured interviews with 15 faculty members were conducted. They were recorded, transcribed, and translated by one researcher. Three researchers coded the transcripts independently and one researcher identified key findings using a framework analysis.

Results: Faculty were motivated to join the program for a variety of reasons. Improving current training and clinical outcomes was a key factor in addition to getting the opportunity to think about the field beyond their home institutions. Faculty appreciated the emphasis on case-based teaching and clinical reasoning, as opposed to didactics and rote-memorization. Faculty noted improvements in the fellows’ clinical reasoning, confidence levels, and competency across all aspects of the program. Faculty did note challenges in regard to teaching remotely, language, time constraints, and a lack of program resources.

Conclusion: This study was the first to evaluate the faculty perceptions of the Vietnamese Pediatric Hematology-Oncology Fellowship Program. Our findings suggest that the program is having a positive impact and that this type of training model can be implemented in other parts of Vietnam and throughout Southeast Asia.
Student Name: Mariam Carson
Mentor: Alicia Fernandez, MD
Title: Examining COVID-19 Vaccine Readiness among Latinx Essential Workers in San Francisco: A Qualitative Assessment

Background: Since the SARS-CoV-2 virus first appeared in China in 2019, the coronavirus (COVID-19) pandemic has resulted in over 187 million cases and 4.1 million deaths worldwide—numbers that continue to rise. Data show that the Latinx community in the United States carries a disproportionate burden of disease and death from COVID-19. This is especially true in California, where more than 20% of the essential workforce is Latinx. In San Francisco, these disparities were highlighted as early as April 2020; extensive testing efforts in Latinx neighborhoods demonstrated that the majority of positive cases came from households involved in essential work. As COVID-19 vaccines are made available for emergency use, it is important to identify facilitators and mitigate barriers to vaccine access and uptake for these high-risk groups.

Research Question: What are the barriers and facilitators and the perceived barriers and facilitators towards COVID-19 vaccine uptake for Latinx essential workers in San Francisco?

Methods: A total of 40 participants were interviewed in this study. We conducted three focus group discussions, with one focus group each for day laborers (n = 10), domestic workers (n = 10), and community health workers (n = 6). We also conducted individual interviews with other essential workers that utilized services provided by community-based organizations, including community leaders (n = 5) and unemployed individuals previously engaged in essential work (n = 9). Interviews were conducted over Zoom or over the phone in either English and Spanish, depending on the participant's preference. Eligible participants were 18 years or older, self-identified as Latinx, performed or previously performed essential work in San Francisco, and spoke English and/or Spanish.

Results: Overall, participants expressed a range of perceptions about the COVID-19 vaccines, extending from completely anti-vaccine to full confidence in vaccine safety and efficacy. For those who wanted to get vaccinated, significant barriers to access were cited, including the location of vaccination sites, language barriers, and technology complications. Misinformation and concerns about vaccine safety and efficacy were frequently referenced as barriers for vaccine uptake. Participants reported that these barriers were alleviated with community-based facilitators, such as language-concordant clinic navigators, vaccine outreach campaigns, and information presented by trusted community messengers.

Conclusion: This study exposed the importance of community involvement and the strong need for culturally-concordant patient support during the COVID-19 vaccine rollout. Understanding the barriers to early COVID-19 vaccine uptake, especially in communities of color, can inform strategies to develop more equitable vaccine rollout strategies in the future.
Student Name: Liana Beld  
Mentor(s): Judy Sakanari, PhD and Christina Bulman, BS  
Title: A Laboratory-Based Project: Repurposed Aspartyl Protease Inhibitors as a Possible Treatment for Lymphatic Filariasis

Background: The overall goal is to identify new drug therapies from repurposed compounds to treat lymphatic filariasis (LF), a neglected parasitic disease affecting over 51 million people worldwide. The current treatment for LF, the Triple Therapy, does not effectively kill adult worms allowing the disease to persist in millions of people, thus the discovery of new drugs to treat this chronic and debilitating disease is critical.

Research Question: What effects do repurposed aspartyl protease inhibitors have on the filarial nematode *Brugia malayi* in vitro?

Methods: First, a bioinformatic characterization of the aspartyl proteases in *Brugia malayi* (*B. malayi*) was conducted to gain information on their possible functions, structures, and gene expression in different life cycle stages. Next, aspartyl protease inhibitors (APIs), used for HIV antiretroviral therapy, were screened with adult female *B. malayi* in vitro. The APIs with the best inhibitory activity were further tested to determine their IC$_{50}$ values. Additionally, since *B. malayi* have an endosymbiotic bacterium, *Wolbachia*, adult female worms were tested in vitro with APIs to determine the effects APIs have on *Wolbachia* using qPCR.

Results: Protein sequence alignment of *B. malayi* aspartyl proteases revealed they have a catalytic site similar to the human immunodeficiency virus, HIV-1 protease, which is the target of the APIs. In vitro screening with 30 µM lopinavir, 30 µM nelfinavir, and 50 µM ritonavir showed that adult female worm motility was inhibited by >75% by day six. Lopinavir, nelfinavir, and ritonavir were further tested and the IC$_{50}$ values were 16.9 µM, 7.78 µM, and 14.3 µM, respectively. There was no significant difference in the *Wolbachia* titers of the worms treated with 100 µM lopinavir, 30 µM nelfinavir, and 30 µM ritonavir compared to the DMSO control.

Conclusion: *Brugia malayi*, one of the parasitic nematode species that causes LF, have several aspartyl proteases, two of which appear to be expressed in the adult female life stage, thus these may be targets of the HIV antiretroviral drugs. This study revealed that the APIs lopinavir, nelfinavir, and ritonavir have a direct effect in killing adult *B. malayi* after six days of exposure in vitro and did not affect the endosymbiotic bacterium, *Wolbachia*, that the worms depend on for survival. Future in vitro studies are necessary to validate the effectiveness of the APIs followed by in vivo studies on the safety and pharmacokinetics to determine if these repurposed drugs can move into human clinical trials. This study suggests APIs may serve as new leads for drug discovery and be repurposed to potentially treat lymphatic filariasis.
**Student Name:** Kirstin Kielhold  
**Mentor(s):** Brianna Rader M.S.  
**Title:** Words Matter: A Qualitative Evaluation of a Messaging-Based Program Designed to Promote Communication Regarding Sexual Health and Desires

**Background:** Youth are not exposed to adequate comprehensive sexual health curriculum, this can contribute to experiencing maladaptive outcomes such as an increased likelihood of contracting a sexually transmitted infection, unwanted pregnancy, and developing a distorted perspective of sex. These outcomes compound overtime as individuals develop into adults. Addressing factors such as communication skills and psychoeducation regarding adaptive sexual health practices has the potential to lead to more desirable psychosocial and sexual health outcomes. Slutbot is a technology-based messaging platform aimed to just this as well as build confidence, knowledge, and skills related to sexual health and communication.

**Research Question:** How has the use of Slutbot affected users’ communication about sexual desires and sexual practices during and after use?

**Methods:** Semi structured interviews were conducted with 21 superusers of Slutbot. Participants varied among age, sexuality, gender, and their current relationship status. Framework analysis was used to analyze interview data and draw conclusions about Slutbot’s ability to bridge current gaps in sexual health, education, and communication.

**Results:** Major themes related to the research questions suggested that participants began using Slutbot out of curiosity, for pleasure, and as a learning tool. Users reported experiencing benefits associated with increased confidence and ability to express desires and incorporating ongoing consent in sexual practices. Users also reported the benefit they felt from using Slutbot were carried into other domains of their life.

**Conclusion:** Together, this study demonstrates that technology-based messaging apps can be used as a potential medium for intervention to promote desirable sexual health practices and socioemotional outcomes. Interventionists should consider the potential benefits of incorporating apps like Slutbot in their practice.
**Student Name:** Graham Hinchcliffe  
**Mentor(s):** Wayne Steward, PhD, MPH and Shannon Fuller, MS  
**Title:** Facing the triple threat: The impact of the COVID-19 pandemic on mental health and mental health care of people living with HIV in California. A qualitative study.

**Background:** People living with HIV (PLHIV) in the United States often face pre-existing vulnerability to mental health conditions and utilize mental health services as an essential part of HIV care. What is not known is how the COVID-19 pandemic has impacted their mental health and access to mental health services, particularly during the rapid transition to telehealth-based care.

**Research Question:** What is the impact of the COVID-19 pandemic on the mental health of PLHIV in California, and what are the perceived barriers and facilitators to accessing and utilizing mental health services during the pandemic?

**Methods:** Semi-structured qualitative interviews were conducted with 12 PLHIV who used mental health services and 10 mental health provider key informants. Inclusion criteria for clients were PLHIV aged 18+ who accessed services in California for mild-to-moderate mental health conditions during the COVID-19 pandemic. Provider key informants were clinical and non-clinical staff working in services for PLHIV in California. Data were collected between May and July 2021. Framework analysis was used to explore convergences and divergences in informant perspectives to identify themes and findings.

**Results**  
The COVID-19 pandemic negatively impacted the mental health of most PLHIV, often leading to crises and relapse. There was particular anxiety around the unknown interplay between HIV and SARS-COV-2 co-infection, as well as increased Post Traumatic Stress Disorder (PTSD) and isolation, particularly among older men who have sex with men (MSM). Resilience also emerged among PLHIV, paradoxically among older MSM, who had survived the HIV/AIDS epidemic of the 1980s. The pandemic increased pressure on mental health services, which already faced resource shortages. This led to gaps in care, with some PLHIV experiencing crisis, relapse and disengaging from care altogether. Although PLHIV and providers often recognized the convenient aspects, they reported mostly negative experiences and barriers when transitioning to and using telehealth. These led to some disengagement from care, which was particularly significant among more vulnerable PLHIV who were more susceptible to the digital divide.

**Conclusion**  
The COVID-19 pandemic brought unique challenges for PLHIV who utilize mental health services, further adding to the pre-existing syndemic burdens they often face. Although this is a vulnerable group, it was also resilient in the face of the pandemic. The study recommends that mental health services for PLHIV should be better resourced, and better prepared in the face of future pandemics. Future use of telehealth for mental health care of PLHIV should mitigate access barriers and offer choice, in order for this to be a truly therapeutic long-term care delivery platform for this and other vulnerable groups.
Student Name: Amye Farag  
Mentor(s): James Kahn, MD, MPH and Andrea Tenner, MD, MPH  
Title: Costs of Developing a Dedicated Emergency Department in Sudan: Cost Analysis

Background: Since 2010, a growing number of hospital-based dedicated emergency units have been established in lower-middle income countries (LMICs), intended to consolidate and improve management of urgent critical conditions. However, the costs of doing so remain uncertain.

Research Questions: What costs have been experienced implementing dedicated hospital-based emergency units according to the World Health Organization’s (WHO) Emergency Care Systems Framework (ECSF) in Sudan?  
What operational challenges have been encountered?

Methods: A mixed methods approach was used to obtain both qualitative and quantitative data from three dedicated emergency units in Sudan that are functioning according to WHO’s ECSF. A police hospital, a Ministry of Health Hospital and a private hospital were chosen to evaluate variability amongst units. Pertinent cost data (staff salaries, laboratory tests, and medications) were collected as well as annual patient volumes. Costs were calculated per year for the unit and per patient visit. Results were compared to an existing analytical model that estimates costs to implement a hospital-based emergency unit for a district hospital in sub-Saharan Africa. We conducted informal interviews with emergency unit physicians and a WHO consultant who meets regularly with the Sudanese Ministry of Health to characterize challenges to implementing units specifically related to cost.

Results: Annual costs of units ranged from 168,372 to 615,201 USD, representing a per patient visit cost of 2.97 to 16.83 USD.  
The Ministry of Health, while recognizing the positive health outcomes associated with implementing an emergency unit, is concerned with the cost of staffing dedicated units with trained emergency providers. Operating budgets are often improvised month to month.

Conclusion: Emergency unit costs appear to vary at least 6-fold per patient visit. Barriers to implement emergency care include concerns about new costs, including salaries for trained staff. However, our results add to the growing body of literature that implementing dedicated units may be relatively affordable. Using real-world data from actual implemented units can be used to advocate for continued development of emergency care with pertinent stakeholders.
Student Name: Divya Ganesan  
Mentor(s): James G. Kahn, MD, MPH, Laura Schmidt, PhD, MPH  
Title: Financing Options for a Single Payer Health System in the United States: A Policy Analysis

Background: In the United States (US), people pay almost triple the cost for health insurance compared to those in countries part of the Organization for Economic Co-operation and Development (OECD). Despite this high cost, US health outcomes often lag other OECD countries. Moreover, almost 30 million Americans lack health insurance and almost 60 million cannot utilize it when needed due to its burdensome cost. Single payer, a type of health financing system, has been mentioned as a more effective and cost-effective coverage alternative. However, most single payer proposals have not provided a detailed financing plan due to technical and political complexity.

Research Question: What are the potential funding mechanisms as well as barriers and facilitators of those mechanisms, for implementing a single payer health system in the United States?

Methods: In this policy analysis, we first interviewed stakeholders to determine potential taxes as financing sources. Then, we conducted a grey literature review using government databases to retrieve national tax base data. Using these data, we developed an Excel tool to calculate taxation rates needed to raise $1.3 trillion per year – our estimated tax revenue needed to finance single payer in the US. We then showed stakeholders our initial results, to which they provided feedback. Using this feedback, we refined the financing scenarios and allowed stakeholders to provide additional feedback.

Results: The calculation tool translated tax rates to revenue, permitting specification of tax plans needed to ultimately obtain $1.3 trillion. We designated nine financing scenarios by applying three progressivity schemes and three distributions of tax focus across sources (earned income, capital gains, payroll, and wealth). When the revenue was distributed equally across each tax, the top 1% paid approximately 50% of the tax burden under the progressive scenario, 55% under the highly progressive scenario, and 70% under the extremely progressive scenario. Some barriers in implementing a new financing scheme included the lack of understanding of how much people currently pay versus what they would pay and increasing the tax rates which implied incentives for tax evasion. Facilitators of tax rates apply if tax rate increments are small.

Discussion: Ultimately, the tool was useful for stakeholders when considering potential financing scenarios. When single payer becomes more relevant in Congress, the tool will facilitate exploring financing strategies. This project also assembled national data which has not yet been systematically studied. There were limitations relating to the number of participants and estimates of tax bases. Overall, this study employed a unique study design which featured rapid feedback for each financing strategy to design improved strategies to fund single payer.
Student Name: Sarah Becker
Mentor: Dr. Amy Beck, MD, MPH
Title: The Impact of COVID-19 on the Identification of Speech and Language Delay at the Zuckerberg San Francisco General Hospital (ZSFG) Children’s Health Center

Background: The novel COVID-19 pandemic has increased the incidence of missed primary care appointments, economic instability, telehealth appointments and child care facility closures. Due to these implications having the potential to impact identified speech and language delay, there is a need to research comparisons between prevalence, risk factors, screening rates, and referral rates prior to and during COVID-19.

Research Question: Has the COVID-19 pandemic affected the prevalence of identified speech and language delay seen through ASQ results among children aged 16-32 months presenting at the ZSFG Children’s Health Center?

Methods: The research study was conducted through a serial cross-sectional retrospective medical chart review. Results of the Ages and Stages (ASQ) developmental screening tool was used as a primary indicator for speech and language delay. ASQ communication scores were extracted from 321 medical records of 16-32 month old children who were seen at ZSFG’s Children's Health Center between November 1st 2019- February 28th 2020 (time period I) and November 1st 2020- February 28th 2021 (time period II). Patients who had a previous diagnosis of a genetic or developmental disorder, hearing loss, autism spectrum disorder, or were born prematurely (<37 weeks) were excluded from the study due to conflicting associations with speech and language delay. Through the use of summary statistics, a chi squared analysis, and multivariate logistic regression models, the study analyzed the differences in prevalence of speech and language delay, the role of race/ethnicity and primary home language in speech and language delay, as well as developmental screening rates and referral rates prior to and during COVID-19.

Results: The prevalence of speech and language delay was found to be 29.7% in time period I and 34.2% in time period II, which was not found to be a significant difference. Multiple predictors for speech and language delay were tested in a multivariate logistic regression model and it was found that male sex and race/ethnicity had a significant association. Additionally, developmental screening rates and referral rates were tested through a chi squared analysis and did not show any significant difference between time period I and II in this population.

Conclusion: Despite a slight increase in prevalence between time periods, it was found that time period did not have a statistically significant association with identified speech and language delay in patients at the ZSFG Children’s Health Center. Future studies are recommended to use a larger sample size and wider time range to further analyze the impact of COVID-19 on early childhood language development.
**Student Name:** Forrest DL Barker  
**Mentor(s):** Neelam Sekhri Feachem & Dr. Yea-Hung Chen  
**Title:** Quantitative assessment of the role population characteristics played in the effectiveness of stay-at-home orders issued in the United States in response to COVID-19

**Background:** To slow the spread of COVID-19 and protect medical facilities from overflowing, Stay-At-Home Orders (SAHOs) were issued in the United States during the spring of 2020. These orders had variable levels of effectiveness and profound consequences that continue to manifest long after their termination. This study aims to assess if state and county level population characteristics could explain variability in SAHO effectiveness. Knowledge of factors that influence the efficacy of SAHOs will inform policy makers should such restrictions become necessary in the future.

**Research Question:** In the United States, what factors influenced the extent to which SAHOs issued during spring of 2020 reduced transmission of COVID-19 and what is the relative effect of each identified factor?

**Methods:** SAHOs were determined to be effective if, three weeks after implementation the reproductive rate ($R_t$) of the COVID-19 virus was equal to or less than one. Wilcoxon rank sum tests and logistic regression were used to determine if population characteristics differed between locations with effective and non-effective SAHOs. All 40 States that issued SAHOs were assessed, as was a sample of 329 counties. Population characteristics investigated included: age, income, level of education, political orientation, percentage of frontline workers, percent of non-English speaking people, percent of eligible people vaccinated by July 2021, ethnic composition, racial composition, level of viral transmission, and other Non-Pharmaceutical-Interventions (NPI) enacted before the SAHO. The population characteristics in this analysis were derived from numerous publicly available databases managed by universities and government agencies.

**Results:** At the state level no significant differences were found in population characteristics between states with effective and non-effective SAHOs. Analysis of our sample of 329 counties yielded a significant difference in the cumulative number of days of prior NPI. Counties with more days of NPIs before the SAHO were less likely to have a successful SAHO while counties with fewer cumulative days of NPIs were more likely to have successful SAHOs. All other characteristics considered showed non-significant differences.

**Conclusion:** In the United States the COVID-19 pandemic highlighted the differences between communities. Numerous reports in the media and in scientific literature have pointed to these differences as possible explanations for better or worse outcomes during the COVID-19 pandemic. This analysis shows that SAHO effectiveness may be influenced by prior public health interventions but likely not by any of the other population characteristics considered. This should be considered when assessing how communities have responded to COVID-19 and by policy makers if SAHOs are ever again being considered to limit spread of an infectious respiratory disease.
Student Name: Paola Vera  
Mentor(s): Mara Decker, DrPH, Abigail Gutmann-Gonzalez, MPH, Yea-Hung Chen, PhD, MS  
Title: Exploring Latinx Youth’s Mental Health in Fresno County During Initial COVID-19 Shelter in Place Orders  

Background: The COVID-19 pandemic disrupted and disproportionally affected the Latinx community in the United States. Latinx youth, along with other underrepresented ethnicities, have suffered higher rates of mental health disorders, such as anxiety and depression. The objective of this study was to explore how the COVID-19 pandemic and subsequent shelter-in-place (SIP) orders have impacted the mental health of Latinx youth between the ages of 13 to 21 in Fresno county, California.

Research Question: How has the COVID-19 pandemic and subsequent shelter-in-place orders impacted the mental health of Latinx youth between the ages of 13 to 21 in Fresno county, California?

Methods: This study was a secondary analysis, which consisted of 261 Latinx participants who completed an online survey in June of 2020. Quantitative analysis was conducted using Chi-squared and Fischer’s exact statistical tests to examine the relationship between youth and their feelings of anxiety and depression. Youth’s concerns about catching COVID-19 and feeling worried about family job loss during the pandemic were also assessed. Logistic regression models were used to control for confounding variables. Additionally, a supplemental qualitative analysis was used on one open-ended survey question to examine the negative and positive impact the COVID-19 pandemic had on the youth and their family.

Results: The findings indicate that Latinx youth who identified as female, transgender, queer, or nonbinary had higher rates of worsening depression (p<0.001) and anxiety (p=0.03) during the COVID-19 pandemic than those who identified as male. Participants aged 19-21 had the highest rate of worsening depression (37.8%, p=0.71) and anxiety (48.6%, p=0.23). More than 50% (n=19, p=0.03) of youth currently enrolled in college or technical school had worsening feelings of depression and more than 60% (n=22, p=0.01) had worsening feelings of anxiety. Females reported the highest rate (37.7%, p=0.003) of feeling “very” worried about family job loss due to the COVID-19 pandemic. After adjusting for confounders, youth who lived in a household size of 6 or more were four times more likely to have worsened depression than those living in a household size (OR=0.22, CI=0.08-0.57). The most common themes youth shared regarding positive and negative effects of the pandemic included being able to spend more time with their family and suffering financial consequences.

Conclusion: Latinx youth’s mental health may continue to evolve throughout the different phases of the COVID-19 pandemic. Therefore, future research should evaluate the impact that COVID-19 has and will have on the mental health of vulnerable youth throughout other phases of the pandemic, such as after SIP orders were lifted and after vaccines became accessible.
**Student Name:** Audrey Smith  
**Mentor:** Teresa Kortz, MD, MS, PhD  
**Title:** Risk Factors for Delayed Presentation and its Association with Mortality in Children with Sepsis in a Public Tertiary Care Hospital in Tanzania

**Background:** Outcomes in children with sepsis improve by minimizing the time between symptom onset and treatment, which is a challenge in low-resource settings. We examined the relationship between delayed presentation to the emergency department (ED) of Muhimbili National Hospital (MNH) and mortality, and the impact of socioeconomic status (SES) on presentation to care for a cohort of septic children.

**Research Question:** Is there a relationship between socioeconomic status and delayed presentation to care for pediatric sepsis patients at MNH and what is the association between delayed presentation to care and mortality?

**Methods:** A quantitative analysis was performed on data from 1803 patients (28 days – 14 years old) who presented to the ED at MNH from 7/1/2016 – 6/30/17 with a suspected infection and at least two of the criteria for systemic inflammatory response syndrome, a sepsis severity metric. The association between delayed presentation (> 48 hours between fever onset and presentation to definitive care) and mortality was assessed. SES was tested as an independent risk factor for delayed presentation and was measured by number of ownership variables: in-home electricity, flush/pour toilet, and access to an improved water source. Multivariable logistic regression models tested the two relationships of interest (delayed presentation and mortality, SES and delayed presentation), adjusting for confounders.

**Results:** 11.3% of children with sepsis who presented to MNH died in the hospital (n=203). Delayed presentation to definitive care was more common in non-survivors (44%, n=90), compared to 38% (n=614) of survivors (p<0.05). Multivariable regression revealed that children who had delayed presentation to care, compared to those who did not, had 1.85 times the odds of mortality (95% CI: 1.17- 3.00), after adjusting for confounders. The ownership variable was not significantly associated with delayed presentation after adjusting for confounding.

**Conclusion:** Delayed presentation was a significant risk factor for mortality in this cohort, emphasizing the importance of timely presentation to care for pediatric sepsis patients, which may be challenging for those who originate from distant regions of the country. Potential solutions include more efficient referral networks and emergency transportation systems to MNH. Additional satellite clinics or hospitals with pediatric subspeciality care may reduce pediatric sepsis mortality in Tanzania. SES did not appear to be associated with delayed presentation in this cohort, which could be explained by the usage of ownership variables as a measure of SES, so further studies are needed to elucidate which factors are important in this relationship.
Student Name: Arianna Safi  
Mentor(s): Sujatha Sankaran, MD  

Title: Addressing the Understanding and Practicality of Health Care Providers in Low and Middle-Income Countries for a Novel Quality Improvement Curriculum Project: a Qualitative Study  

Background: The Global Health Quality Program (GHQP), developed by quality improvement (QI) professionals at the University of California, San Francisco, is a novel QI curriculum developed to address the specific needs of health care providers in low and middle-income countries (LMICs). Performing a QI project is an effective way to analyze a challenge and to drive positive change within a health care facility. Currently, there is limited research studying the efficacy and understanding of a QI educational tool that teaches providers how to conduct an effective QI project on a local level. This is a pilot study aimed to understand the concerns of providers in LMICs, and whether this particular QI curriculum addresses these concerns in a meaningful and practical way.  

Research Question: Across under resourced sites in low and middle-income countries, what are health providers’ opinions of and suggestions for the Global Health Quality Program that provides healthcare workers with the tools necessary to carry out QI initiatives on a local level?  

Methods: This qualitative study consisted of semi-structured interviews of approximately forty-five minutes in length. We recruited ten participants in total from a range of LMICs, including Mali, Malawi, Ethiopia, Liberia, India, and the Navajo Nation. The participants consisted of six physicians, two nurses, one public health advisor, and one maternal health coordinator. Eligible participants included direct patient providers in a clinical setting who had a working knowledge of English and adequate access to technology. Both framework and thematic analyses were then performed until thematic saturation was achieved.  

Results: Our main findings suggest that health care providers in LMICs consider both the content of the curriculum and their particular clinical capacity when considering the efficacy of a QI educational tool. When discussing content, participants had mixed impressions regarding the relevance of this content to their facilities, but the majority of participants found the curriculum to be patient-centered and systematic. The biggest concerns with regards to capacity included a lack of support from outside entities, staffing shortages, an overburdened health care system, and a lack of accessibility to all providers.  

Conclusion: These findings provide an initial understanding of how plausible it would be to implement the GHQP curriculum throughout health care facilities in LMICs. While we can conclude that the content of this curriculum is relatively applicable to the majority of low-resourced sites, the largest obstacle to its implementation seems to be a series of overburdened health care systems combined with a lack of available resources. This study will inform future research on how best to overcome these hurdles, and develop the GHQP curriculum to better meet the needs of providers in many low-resourced health care facilities.
Student Name: Winta Haile  
Mentor(s): Kimberly Baltzell, RN, PhD, MS, Alden Blair, PhD, Anna Muller, MS, Richard Malirakwenda, Luseshelo Simwinga  

Title: Exploring the impact of COVID-19 on reported maternal and neonatal complications and access to maternal health care in five government health facilities in Blantyre, Malawi.

Background: Since the emergence of the novel coronavirus, COVID-19, the implemented lockdowns to contain the virus have created disruptions in healthcare systems, transportation, and people's daily life activities. These disruptions can have profound impacts on maternal and neonatal health outcomes. However, there is a dearth of studies assessing these effects, especially in lower- and middle-income countries such as Malawi. Therefore, we aimed to assess the impacts of COVID-19 on reported maternal and neonatal complications as well as potential changes in maternal care access to care among a group of primary care health facilities in Blantyre, Malawi.

Research Question: How has the COVID-19 pandemic affected births, access to maternal care, and reported maternal and neonatal complications in Global Action in Nursing (GAIN) partnering public health facilities in Blantyre, Malawi?

Methods: This quantitative study was a retrospective cohort study with a qualitative supplement, to assess the impacts of COVID-19 associated with maternal and neonatal health outcomes. Five health facilities were selected by the district health office in Blantyre district and chosen based on the reproductive health services offered. Data was drawn from the Malawi District Health Information Software 2 reports to compare outcomes from 15 months before COVID-19 emerged (pre-Covid period = January 2019 – March 2020) with nine months after COVID-19 was declared a global pandemic (post-Covid period = April 2020 – December 2020). Summary reports with select variables chosen by the Ministry of Health were generated monthly and 120 observation periods were evaluated with 21,178 mothers. The inclusion criteria consisted of all the data collected from the health facilities over the study period. However, monthly reports were excluded if they were missing data.

Results: There was a significant decrease in reported use of vacuum extraction, which went from <0.01% in the pre-COVID period to zero percent in the post-COVID period (p=0.01). The proportion of births reporting fetal distress almost tripled from 0.46% to 1.36% (p=0.001) during the post-COVID-19 period. Additionally, reported anticonvulsant use increased from 0.01% to 1.2% (p<0.01), and antibiotic use increased from 0.45% to 1.6% (p=0.01). Asphyxia was the only significant neonatal complication variable reported, which increased from 2.80% to 3.45% (p= 0.01).

Conclusion: Our findings suggest that significant outcomes were mainly due to the indirect effects of COVID-19 rather than the virus itself. Based on our findings and the contextual qualitative interviews with Malawian expert midwives, we concluded that mothers may have been affected more due to understaffing and shortage of skilled personnel in the study health facilities. Therefore, the development of highly skilled health workers may contribute to better outcomes, along with adequate staffing and a streamlined referral process.
Student Name: Anjana Baradwaj
Mentor(s): Matthew Lewin, MD, PhD and Mohsen Malekinejad, MD, MPH, DrPH
Title: Varespladib: Clinical Safety Profile of a secretory Phospholipase A2 (sPLA2) Inhibitor Drug and Implications for Use as a Snakebite Therapeutic: A Systematic Review

Background: Snakebite envenoming is a neglected tropical disease that causes the loss of three million disability-adjusted life years (DALYs) and disproportionally impacting low-income, rural communities. Limitations imposed by traditional antivenoms have led to consideration of varespladib, a secretory phospholipase A2 inhibitor, as a potential alternative therapeutic to treat snakebite patients. Adverse safety outcomes in prior clinical trials caused varespladib to be tabled in 2012, causing a need for a comprehensive safety review to be conducted on the drug to inform its future repurposing for treatment of snakebite envenoming.

Research Question: What is the safety profile of the secretory phospholipase A2 (sPLA2) inhibitor drug varespladib based on health outcomes of participants given the drug in Phase I, II and III clinical trials?

Methods: We conducted a safety outcome systematic review in accordance with PRISMA guidelines. The population of interest was all clinical trial participants administered varespladib sodium or methyl-varespladib in randomized controlled trials. The primary outcome of interest were types and prevalence of adverse events (AEs) reported by study. A total of 14 databases were searched for dates January 1, 1994 through June 1, 2021. Following data extraction, meta-analysis was conducted, and risk of bias measured using the Cochrane Risk of Bias 2 tool.

Results: 10 publications comprising 9 studies and 7,702 patients met the inclusion criteria. We found that varespladib was not associated with many AEs, but did impose greater risk of general (RR=1.27), cardiovascular (CV) AEs (RR=3.39), and abdominal pain (RR=4.36) than placebo in rheumatoid arthritis patients, greater risk of myocardial infarction (MI) in acute coronary syndrome (ACS) patients (RR=1.66), greater risk of dizziness (RR=4.28) and headache (RR=10.41) in coronary heart disease (CHD) patients, lower risk of edema in sepsis patients (RR=0.51), and greater risk of heightened elevation of alanine transaminase and aspartate aminotransferase in ACS (RR=1.93, RR=2.55, RR combined=6.42) and of alanine transaminase in CHD patients (RR=3.81). Meta-analysis performed on ACS patient data supported the increased risk of MI observed, but found no risk of angina, stroke, or death associated with varespladib administration.

Conclusions: Our findings indicate that while potential considerations for may need to be taken for use of varespladib in ACS and RA patients, varespladib was tolerated relatively well in many populations. However, small sample size, high heterogeneity, limited data on short-term use of varespladib for acute conditions, sample populations non-representative of populations most at-risk for snakebite, and overlap in snakebite envenoming symptoms and varespladib AEs are limitations for which future study would be useful in contextualizing safety of this drug for snakebite patients.
Student Name: Tanvi Gurazada  
Mentor(s): Nadia Diamond-Smith  
Title: Impact of shifting household dynamics during COVID-19 on reproductive health care access in Lucknow, India: A qualitative study

Background: Across India, the COVID-19 pandemic and associated measures taken to control its spread (e.g., lockdowns, stay-at-home-orders) continue to directly and indirectly impact access to reproductive health services. Additionally, emerging data in India shows that the pandemic can negatively impact family power dynamics and further increase social isolation of the most marginalized communities. Newly married women in India, an already vulnerable and isolated population, are at severe risk of facing the most extreme of the pandemic’s impacts on both household dynamics and health care access, specifically as they relate to reproductive and family planning services.

Research Question: How have the COVID-19 pandemic and subsequent lockdowns impacted household responsibilities, family relationships and access to prenatal and family planning services among recently married women in Lucknow, India?

Methods: To investigate what, if any, impact the COVID-19 pandemic and associated lockdowns have had on household dynamics (responsibilities within the household, relationships with husband and in-laws, and positional power) and reproductive health care access, a team of researchers at the University of Lucknow conducted 15 semi-structured phone interviews with women in Lucknow, India in June 2021. Interviews explored whether any shifting household power structures resulting from the pandemic impacted women’s ability to access their desire family planning methods or make decisions about their reproductive health (pregnancy timing, pregnancy options, contraceptive use. Interviewed women were all young, recently married (within the last 3 years) and either pregnant, recently postpartum, or seeking family planning services.

Results: Participants reported a general worsening financial situation and rise in household responsibilities since the start of the COVID-19 pandemic in March 2020. Participants who had been pregnant during the pandemic or were currently pregnant (n=14) all reported getting pregnant within 12 months of their wedding. Many participants report opting to continue with an unplanned pregnancy at the urging of their husband and in-laws. Additionally, participants with current or prior contraceptive use (n=12) report that the decision to use a method and method choice were heavily influenced by husband’s wishes.

Conclusion: Women who were already contending with culturally normative restrictions on mobility and autonomous decision-making, are even more reliant on husbands and other family members in light of the COVID-19 pandemic and associated lockdowns. The pandemic has produced a situation in which all information they receive about contraceptive and pregnancy planning options is mediated through their husband and/or in-laws. This study highlights need for targeted public health interventions that seek to re-establish pre-pandemic channels of communication with these women, enabling them to seek information and access health care services on their own.
Student Name: Amity Eliaz
Mentor(s): Michael Reid, MD, MPH, MA, Alden Blair, PhD, MSc
Title: Evaluating the impact of language concordance on contact tracing outcomes among Spanish-speaking adults in San Francisco between June and November 2020

Background: Despite evidence that the coronavirus disease 2019 (COVID-19) pandemic has disproportionately impacted Latinx communities, there remains a lack of research evaluating the impact of Spanish language concordance—clinician or public health worker fluency in a patient’s primary language—on public health efforts in response to the pandemic. In this study, we sought to evaluate the impact of language concordance on COVID-19 contact tracing outcomes among Spanish-speaking adults with limited English proficiency in San Francisco, California.

Research Question: How does language concordance impact COVID-19 contact tracing outcomes among Spanish-speaking adults with limited English proficiency living in San Francisco, California?

Methods: We analyzed surveillance data collected from the City and County of San Francisco’s COVID-19 contact tracing program between June and November 2021, comparing outcomes among Spanish-speaking close contacts reached by language concordant contact tracers and Spanish-speaking close contacts reached by language non-concordant tracers. Individuals were considered eligible if they (1) met the Centers for Disease Control and Prevention (CDC) definition of a close contact of a COVID-19 case, (2) resided in San Francisco, and (3) endorsed low English proficiency and/or preferred to speak Spanish. In total, 2668 Spanish-speaking close contacts were reached during the study period. Using logistic regression, we determined the odds of contact tracing interview completion, COVID-19 testing, and referrals for isolation and quarantine (I&Q) support services among Spanish-speaking adults contacted by language concordant contact tracers compared to language non-concordant contact tracers.

Results: Among the 2668 Spanish-speaking contacts included in the study, 1877 (70.4%) were reached by language concordant contact tracers and 791 (29.6%) were reached by non-concordant tracers during the interview of longest duration. There was a significant association between language concordance and calendar time measured in months, and the proportion of contacts reached by language concordant contact tracers increased over time. Language concordance was not associated with a difference in contact tracing interview completion (Odds Ratio [OR] 1.04, 95% CI: 0.84-1.29, \( p = 0.706 \)). In contrast, language concordance between Spanish-speaking contacts and contact tracers was associated with an increased odds of COVID-19 testing (OR 1.20, 95% CI: 1.02-1.43, \( p = 0.032 \)) and I&Q support service referrals (OR 1.53, 95% CI: 1.29-1.86, \( p < 0.001 \)) compared to non-concordance. For both COVID-19 testing and I&Q support service referrals, the association with language concordance remained significant after adjusting for calendar time.

Conclusions: Language concordant contact tracing was associated with greater likelihood that Spanish-speaking contacts completed COVID-19 testing and received referrals for supportive services. This study highlights language concordance as an important determinant of the effective public health response in San Francisco. The findings underscore the importance of mobilizing a language concordant public health workforce to address the needs of the communities disproportionately impacted by COVID-19 and ensure that Spanish-speaking communities have access to public health services in advance of future pandemic threats.
Student Name: Chelsie Anderson
Mentor(s): Doruk Ozgediz, MD, Wayne Steward, PhD, MS
Title: Global Health Equity in Surgical Care: A Novel Surgical Pipeline Program Curriculum for High School Students in the San Francisco Bay Area

Background: Racial and ethnic minorities in the United States are underrepresented in the practice of medicine and surgery, contributing to healthcare disparities. These disparities in representation are also prevalent in the global health workforce. Surgical career exposure programs are effective at tracking students from backgrounds underrepresented in medicine (URiM) into the field. However, no existing program curriculum allows students to explore the relationships between local and international surgery, the disparities that exist across contexts, or how they could join the field to affect change.

Research Question: Among San Francisco Bay Area high school students from backgrounds underrepresented in medicine (URiM), is a global health equity course in surgical care associated with changes in perceptions of their ability to pursue careers in this area?

Methods: A cohort of 20 URiM San Francisco Bay Area high school students, age 16-18 years enrolled in the UCSF High School Summer Global Surgery Program. The program curriculum was developed using the Kern 6 Step Approach, a model used to create curricula for medical trainees. Delivered online, the curriculum included lectures from both international and domestic surgeons and anesthesiologists, and hands-on activities. Post-program knowledge assessment and the pre/post-program surveys were analyzed with descriptive statistics and Wilcoxon Signed Rank testing. Semi-structured interviews were conducted with half of the student cohort to investigate student perceptions surrounding their ability to pursue a healthcare career. Framework Analysis, a type of Grounded Theory, was used to analyze the data.

Results: We identified a desire to serve family and community as a primary motivator for in the pursuit of a healthcare career for URiM students. Additionally, supportive educational environments facilitated an interest in the field. We identified a lack of racial and ethnic representation in the field, concern of for affording higher education, and navigating the physician career path as barriers. Finally, exposure to minority practitioners and issues of global health equity inspired students to enter the healthcare field. We found a statistically significant increase in reported student knowledge of global health and health equity after participation in the program (p=0.01). Curricular content was best retained from the pediatric surgery day (90% of questions correct), which was also the highest rated session of the program. Content taught through the activities was better retained (92% correct) than either the domestic (76%) or international (74%) lecture content.

Conclusion: Our study suggests that an online global surgery, anesthesia, and health equity course can improve URiM student confidence in their ability to join the healthcare field. More programs of this kind are needed to improve diversity among perioperative care specialists.