

Tanner Dean Summer Research Grant 2017  
Meera Kattapuram

Proposal Abstract:

Malnutrition and acute febrile illnesses have both been significant health issues in coastal Ecuador. This summer, I hope to conduct research at Hospital De Niños in Guayaquil, Ecuador that tackles these relevant issues. This project is part of an ongoing collaboration between Cornell University, Escuela Superior Politécnica del Litoral (ESPOL), and Hospital de Niños. The main research project of the summer will consist of conducting a comprehensive clinical chart review of n=200 participants who were expected to have dengue. We will be analyzing the clinical, immunological, and nutritional factors associated with dengue fever and its progression. Other acute febrile illnesses may also be considered. This data analysis will be the subject of a research manuscript, to be submitted for publication at the end of the summer. Additionally, I plan on using the data obtained from this summer as the foundation for my honors thesis.

Biographical Sketch

Meera Kattapuram is a junior, majoring in Biological Sciences with a concentration in Human Nutrition. Meera grew up in Bethesda, Maryland.

Since her sophomore year of college, Meera has worked at the Finkelstein laboratory in the Department of Nutritional Sciences. She is currently working on a systematic literature review on Vitamin B12, pregnancy, and diabetes related outcomes.

During her time at Cornell University, Meera has been involved with a number of organizations on campus. She has been involved with Cornell Health International, a student run global health organization, since her freshman year. She served as the Finance Director, and then the Co-Executive Director for the club, working together with the rest of the executive board to plan the annual global health benefit dinner, conference, and multiple fundraisers/awareness events on campus. She is also involved with Food Recovery Network and is a member of Phi Delta Epsilon, the international medical fraternity on campus. In the past, she has also volunteered as a Patient Care Advocate at Cayuga Medical Center and worked as a teaching assistant for the Cornell Prefreshman Summer Program. She is excited to continue engaging with her peers and the local community in the remainder of her time at Cornell.

Tanner Dean's Scholar Program Summer 2017  
Meera Kattapuram, Biological Sciences, 2018  
Micronutrients and Acute Febrile Illnesses in Coastal Ecuador

Statement of purpose (3-5 pages). Please describe your project in detail: explain the significance of your research and your reasons for wishing to engage in it, and tell us where you will carry out this research and what resources you will use. Discuss briefly how your project relates to existing research in your field on the same subject. Be sure to include a bibliography.

In high school, I had the opportunity to intern at the National Institutes of Health with Dr. Joan Han, a pediatric endocrinologist studying genetic disorders and obesity in children. This experience allowed me to observe how I could combine my interest in nutrition with the theory of science learned in the classroom. Due to my love of travel, I looked for an opportunity involving international health and development, upon coming to Cornell University. I was lucky enough to find a lab that was aligned with my interests in that it was carrying out efforts to elucidate more about maternal and child health, nutrition, and infectious diseases abroad. My first project, upon joining the Finkelstein laboratory, was assisting on a systematic literature review on micronutrient supplementation in HIV-exposed children. Afterwards, I moved on to conducting my own systematic literature review on Vitamin B12, pregnancy, and diabetes related outcomes. The purpose of these reviews is to summarize what is known in the field currently and delineate gaps in the knowledge that would be useful points of focus for future studies. This summer, I hope to be able to travel to the lab field site, contextualize the research I have been working on so far, and contribute to the current body of scientific literature.

Dengue virus (DENV), a mosquito borne virus, has been reported in over 100 countries (Ahmed, Finkelstein et al. 2014). The virus has multiple clinical manifestations, including dengue fever(DF), dengue hemorrhagic fever(DHF), and dengue shock syndrome(DSS), with a range of symptoms (Ahmed, Finkelstein et al. 2014). It is estimated that there are 390 million dengue infections per year and the Americas and Asia represent high risk zones (Bhatt, Gething et al. 2013). As there is no treatment or vaccine for dengue virus at this time, it is important to

consider other interventions that can reduce the burden of the disease (Ahmed, Finkelstein et al. 2014).

In determining how to reduce the burden of dengue virus, nutrition is an important consideration. Macrophage function has been shown to be affected by micronutrients (Erikson, Medina et al. 2000). Deficiencies can have effects on many aspects of innate immunity, including natural killer cells (Erikson, Medina et al. 2000). There is still much to be learned about the association between nutrition and dengue virus. In a study comparing nutritional status, Z scores for weight-for-age, height-for-age, and body mass index for age among healthy children, children with dengue fever, and children with dengue hemorrhagic fever, there were no significant differences in weight for age or BMI for age Z scores (Maron, Clara, et al. 2010). This study did not find that normal or excess nutrition were risk factors for dengue nor that malnutrition was less common in severe dengue patients (Maron, Clara et al. 2010). In a case control study in Thailand, researchers found a direction correlation between being overweight and severity of dengue hemorrhagic fever (Pichainarong, Mongkalangoon et al. 2006). Since there is a lot of knowledge yet to be learned about nutrition and dengue, this research being conducted this summer is timely and novel.

I plan to be in Ecuador for about 10 weeks this summer. For the first two weeks, I will be participating in a language and cultural immersion program in Cuenca, Ecuador. This program will enable me to improve my Spanish and acclimate to the local culture. Improving my Spanish will help me not only communicate more effectively this summer, but will also allow me to serve a more diverse patient population in the future. For the remainder of time in country, I will be working in Hospital De Niños in Guayaquil, Ecuador. In the hospital, I will be extracting data from the charts of patients expected to have dengue. Relevant data will include

sociodemographic, clinical, laboratory, nutrition laboratory, and nutrition anthropometry information. Other tasks will include data analysis and working towards the research manuscript summarizing associations between aspects of nutrition and the progression of dengue. Other tasks include patient interviews and anthropometric measurements.

This research opportunity is possible due to the partnership of Cornell University, Escuela Superior Politécnica del Litoral (ESPOL), and Hospital de Niños. This partnership has supported Cornell students in the past and is well equipped to ensure that students have a productive and impactful summer. The results from this summer will serve as the basis for a research manuscript, to be submitted for publication later, and for my honors thesis.

This work is relevant to my career goals as I hope to pursue a career in medicine. The clinical exposure and work in clinical research will help me develop my skills in communication, critical thinking, and allow me to learn more about the role of a physician, in a novel context.

Additionally, this work will inform future health interventions in coastal Ecuador and areas with similar conditions. Field guides and partnerships forged from this summer will also facilitate the continued collaboration between these institutions and learning opportunities for future students in the lab. I hope that the Tanner Dean research grant will enable me to partake in this experiential learning opportunity in order to benefit the community in Ecuador and learn more about global health.

#### References:

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Maron, G.M., A.W. Clara, J.W. Diddle, E.B. PLeites, L. Miller, G. Macdonald and E.E. Adderson (2010). "Association between nutritional status and severity of dengue infection in children in El Salvador." AM J Trop Med Hyg 82(2): 324-329.

Pichainarong, N., N. Mongkalangoon, S. Kalayanarooj and W. Chaveepojnkamjorn(2006)."Relationship between body size and severity of dengue hemorrhagic fever among childred aged 0-14 year." Southeast Asian J Trop Med Public Health 37(2): 283-288.

IV. IRB approval/waiver will be submitted with the letter of support by Dr. Julia Finkelstein.

V. Please see budget chart in document.

VI. Yes, I have applied for funding from other sources. I have applied to the Engaged Learning and Research grant and the Biology Summer Internship Program through the Office of Undergraduate Biology at Cornell University.

