

Undergraduate Research Symposium May 18, 2012 Mary Gates Hall

Online Proceedings

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MODELS, MAPS AND THE MAKING OF GLOBAL HEALTH

Session Moderator: Matthew Sparke, Geography

Mary Gates Hall 242

3:30 PM to 5:00 PM

* Note: Titles in order of presentation.

Modeling the Human Ecosystem

Mollie Holmberg, Junior, Biology (Ecology, Evolution & Conservation), Mathematics

Mentor: Luke Bergmann, Department of Geography

The magnitude of trade in food within an increasingly globalized world has contributed to a situation where the populations that produce food often do not receive the ultimate benefits of their labor. For example, food production in one place might primarily support the production of manufactured goods and services that benefit people in distant places. The degree to which agriculture in a certain region supports economic activities abroad varies enormously across the globe. This study aims to understand how food production supports flows within the global economic system and contributes to unequal relationships between different regions of the world. To do this, global economic flows are modeled by entering production and consumption data into an interregional Social Accounting Model and analyzed within a geographic information system. From this, we have been able to identify the most important globalized croplands and categorize regions by the “function” they serve in global webs of production and consumption similar to an ecological trophic level analysis. These results suggest that uneven flows of embodied food production between regions may be related to global patterns of poverty and health, as well as to the prospects for a more sustainable human ecosystem.

Mathematical Modeling of Home-Based Counseling and Testing for HIV in KwaZulu-Natal, South Africa

Roger Ying, Senior, Bioengineering

Mary Gates Scholar

Mentor: Ruanne Barnabas, Global Health

South Africa’s KwaZulu-Natal province currently has the highest HIV prevalence in the world at approximately 30%. The University of Washington’s International Clinical Research Center is currently conducting a pilot program for a new HIV testing method, Home-Based Counseling and Test-

ing for HIV (HBCT), to address the HIV epidemic. A mathematical model of heterosexual HIV transmission in KwaZulu-Natal was created to evaluate the long-term consequences of HBCT on HIV prevalence. This model simulates a population of susceptible and infected individuals with varying sexual activity levels and therefore, risk. The model also divides the population among twelve age cohorts and the infected individuals are further divided into three HIV stages and a final AIDS stage, as defined by the World Health Organization. The model was created in MATLAB and validated with HIV prevalence data for KwaZulu-Natal from the Joint United Nations Programme on HIV/AIDS. Preliminary results from the model indicate that HBCT will diagnose more cases of HIV than other testing methods and, with successful linkage to care, will decrease HIV prevalence in the future. While the possibility of HIV elimination by HBCT is yet to be determined, preliminary results indicate that HBCT is effective at linking infected individuals with care, including antiretroviral therapy. This work has the potential to guide health policy in South Africa, and given the newfound effectiveness of pre-exposure prophylaxis and treatment as prevention, HBCT provides a promising future for controlling the HIV epidemic.

Giving Circles: Creating Greater Awareness of Obstetric Fistula

Asha Mohamud Farah, Senior, Nursing

Mentor: Barbara Plovie, Family & Child Nursing

Obstetric Fistula is a childbearing injury that occurs as a result of neglected labor. Obstetric Fistulas occur in 5% of live births and accounts for 8% of all maternal deaths. It is one of the four major causes of maternal mortality and morbidity. Worldwide about 50,000 to 100,000 women are affected by obstetric fistula each year (World Health Organization, 2011). The purpose of this project was to: 1) Create greater awareness of obstetrical fistula in the community, 2) Assess if giving circles and my presentation accomplished this goal. Giving circles is a strategy used to inform and educate small

groups of people about obstetric fistula. I conducted a series of giving circles, starting with family, then to a group of friends, followed by students in the UW School of Nursing Programs, and hope to set up another for UW faculty. I used PowerPoint slides and showed a clip of the 2009 Emmy award winning documentary "A Walk to Beautiful". I asked the attendees to fill out a written evaluation at the end of each presentation as a means to evaluate the presentation itself and the impact it had on the attendees. The evaluation consisted of eight direct questions about the information and delivery of the presentation and allowed the attendees to comment and/or grade content. In total I had a response rate of about 50%. I identified major themes across all responses and sub-themes in each of the individual questions. One major theme identified was the need to spend more time explaining the anatomy of an Obstetric Fistula and the research around the social implications of having the fistula. As a result I concluded that there is a general interest in the community about Obstetric Fistula and giving circles are an effective method of raising awareness.

intestinal parasites, and head fungus.

The Tropical Diseases of Malaria, Parasites, and Head Fungus in Correlation with the Living Conditions of a Maasai Tribe near Moshi, Tanzania

Christine Marie Scullywest, Junior, Biology (General)

Mentor: Linda Martin-Morris, Biology

Within the previous year, over half of a million people died from malaria and ninety one percent of these deaths occurred in Africa. My research studies the living conditions of the Maasai tribe in correlation to the prevalence of malaria, intestinal parasites, and head fungus. During field research in Tanzania these were the three most widespread diseases among the three hundred patients treated. The life cycles and causes of each disease were studied individually to distinguish how specific environmental and household factors contributed to the transmission of the diseases. Relevant factors of the living conditions were identified. I hypothesized that the incidence of disease would be reflected in the prevalence of the elements relating to the transmission of disease. I collected data on the living conditions in Tanzania by visiting Maasai households and evaluating the following criteria: the presence of a fire inside the house, the presence of feces and/or garbage in the household, the number and size of the windows in each household, the number of people living there, the number of people who were sick living there, the presence of uncontained animals in the compound, the presence of mosquito nets, the type of material used to make the house, the presence of a toilet, and the presence of a cover on the toilet; if applicable. Analysis of the results suggests that for each disease, the relevant factors of living conditions matched expectations in all three diseases. These results suggest that by making certain improvements to the living conditions of the people in the Maasai village, it would be possible to reduce the prevalence of the tropical diseases of malaria,