Liu’s Thesis on Hygiene
Empowering African women reduces childhood diseases

Clean water was something that Jessie Liu (HB ’09) took for granted growing up in the United States—until she volunteered in poverty-stricken Guatemala and witnessed firsthand the suffering caused by water-borne illnesses. This experience inspired her to investigate the links between hygiene and health in her honors thesis, “Maternal Beliefs and Behaviors in the Prevention of Childhood Diarrhea in Dar es Salaam, Tanzania.” In 2009 she received the “Sandy Dornbusch Award for Excellence in Research Related to Families and Children” for this project.

Working through Stanford’s Human Biology Honors Program, Liu joined the “Poop Group,” a research team looking for solutions to the problem of childhood diarrhea. This group’s “Queen of Clean” is

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Liu’s Thesis, cont’d

**Jenna Davis, Ph.D.** Assistant Professor in Civil and Environmental Engineering, a Woods Institute Fellow specializing in sustainable sanitation solutions. During the summer of 2008, her crew traveled to Dar es Salaam, Tanzania’s largest city, a place where diarrhea causes one-quarter of the deaths of children under five.

One of the challenges that Liu faced with this project was defining study objectives in a country that she’d never visited. After reading a number of journal articles about Tanzania’s health issues, she worked with **Paul Wise, M.D., Ph.D.**, Professor of Medicine (Pediatrics), to formulate overarching research questions. Davis guided her on study methodology. And the Haas Center’s Public Service Scholars Program served as an unofficial advisory board and communicated her findings to field organizations.

Through the thesis research process, Liu learned that implementing Western-style sanitation projects in Sub-Saharan Africa often fails when there isn’t a good understanding of a country’s social structures. Because of this, Liu decided to focus her study on maternal behavioral aspects of hygiene.

“I felt that women were treated as second-class citizens and wondered how and if perceptions of empowerment, motivation, and self-efficacy could change their health behaviors,” she said.

For the data collection phase of the project, the *Poop Group* hired Tanzanian locals to conduct surveys and interact directly with households. These “enumerators” visited each household four times, interviewing female heads of households for behavioral information, and testing the cleanliness of stored water and family members’ hands.

Liu’s part of the research was to analyze the relative influences of socio-demographic factors, beliefs, and behaviors with regards to hand hygiene, sanitation (cleanliness of latrine), water treatment (boiling or chlorination), and use of oral hydrating salts during bouts of diarrhea.

In the end, she found that the relationships between maternal beliefs and preventive behaviors were more complex than previously thought. The most surprising finding was that simply educating maternal caregivers about the risk factors for childhood diarrhea wasn’t enough to improve a family’s hygiene; it was most important to instill the caregivers with a feeling of self-efficacy. In other words, a mother may know that chlorinating drinking water will prevent her children from getting sick, but if she isn’t given spending money to buy bleach, she can’t act on that knowledge. This self-efficacy seems to be enhanced by providing the women with education and skills that enable them to earn money and build confidence.

Results from the group’s research are showing that a multifaceted approach that involves policymakers, public health educators, and community leaders is necessary to promote behaviors that prevent childhood diarrhea.

Since Liu’s graduation, she’s been working as a medical services coordinator for a nonprofit group in Ecuador, applying what she learned in Africa. Besides ensuring that the clinic is well stocked with medical supplies, she teaches sex education and health classes, encouraging secondary school girls to learn skills that they can turn into a profession. She hopes to attend medical school next year.

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**Darwin’s Bad* Rap**

Science rapper and HumBio Course Associate **Tom McFadden** has added yet another title to his playlist, called “3.5* ‘til Infinity.” It was inspired by a Bing Overseas Sophomore Seminar that retraces Darwin’s evolutionary journey to the Galapagos.

McFadden’s other rap songs include “I’m Going Going Back Back to Plasma Membrane,” about cellular membranes; “Regulatin’ Genes,” about HOX genes; and “It’s Too Late to Apoptize,” about the tragic relationship between cancer cell proliferation and programmed cell death. Last year John Tierney of the *New York Times* honored these nerdly works in his blog entry “Rappin’ for Science.”

*Definition of “bad” from the Urban Dictionary: “What Michael Jackson told us he was all along.”*