The University of Texas at Austin, Public Health Internship Program

Student Reflections

Texas-Mexico Border Health Internships

University of Texas School of Public Health, Brownsville Regional Campus

Summer 2009

Ellen Jones

Integrating My Experiences at UTSPH, Brownsville

Brownsville, Texas, was probably last on mind for places that I wanted to spend my final undergraduate summer. Now that I have the opportunity to look back and reflect on my time there, I am so glad that I took advantage of all this experience had to offer.

When I arrived in Brownsville, I met my mentors, Dr. Jennifer Gay and Dr. Belinda Reininger, who presented me with my project for the summer. Starting in November, they had been directing a research evaluation of the health intervention campaign that the school is operating in the area. It is called Tu Salud ¡Si Cuenta! (Your Health Matters!), and includes several mass media facets (TV, radio, internet) as well as the use of lay community health workers, known as *promotoras* (promoters) and a Farmer's Market. TSSC's main goals are to increase fruit and vegetable intake, portion control, and physical activity for the target audience, which is adult Mexican Americans in Brownsville. In order to test the effectiveness of this campaign, a survey was created to measure fruit and vegetable intake, physical activity, and exposure and attitudes towards the TSSC campaign. Also included in this survey were questions regarding built environment and social support for healthy behaviors in order to discover if any environmental or social factors could be inhibiting the target population from choosing a healthy lifestyle. Now that data from survey administration (completed by the *promotoras*) was coming in, it was ready to be analyzed using statistical software called SAS. Dr. Gay and Dr. Reininger charged me with the task of statistically analyzing this TSSC evaluation data in SAS.

Although this project sounded very interesting to me, I was apprehensive at first about learning SAS in just a few weeks time. After all, proficiency in SAS involved programming command codes and interpreting statistical output, two things I knew nothing about. However, Dr. Gay's talent and patience with teaching me SAS plus my

desire to learn it well facilitated the speed with which I picked up this skill. After starting with simple procedures like means and frequencies, I then refined my analysis using linear and logistic regressions and adding in demographic controls in order to create models for the health behaviors of the target population. All of this work produced pages and pages of analysis from which Dr. Reininger, Dr. Gay and I selected out the more significant results for publishing: my analysis showed that survey participants who interact with the *promotoras* are about ten times more likely to meet nutrition recommendations than those participants who have never done so.

Now that I am about a month out of completing my internship at UTSPH Brownsville, I am writing the "*promotora* paper" and also reflecting on the very fulfilling ten weeks that I spent in the Valley. I look back and am blown away by the skill and knowledge that I gained over the summer: I now have a deep knowledge of statistics and how it is used in analyzing survey data, as well as being very proficient in SAS. In fact, my ability in this area is affirmed by the fact that Dr. Reininger and Dr. Gay offered me a part-time position analyzing data in SAS during the current school year (which I have gratefully accepted). I also learned a lot about the entire research process, from how to create a carefully written and validated survey, to its administration, to its analysis. Experiencing the whole process has uncovered my own interest in continuing this kind of research in my own professional career. In fact, this internship confirmed my desire to complete an MPH while in medical school so that one day I can integrate public health research into my own clinical practice. My most favorite parts of the internship were probably Dr. Gay and Dr. Reininger themselves. It was such a pleasure to work with these very intelligent, professional women who did not hesitate to drop whatever they were doing to help me in SAS or provide guidance in my research. They are the reason that I learned so much and their personal interest in my success has also played a role in why I want to stay very involved in public health for the rest of my life. I am so glad that I chose to spend my

summer and Brownsville, and so thankful for the new opportunities my time there has provided me.

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Emily Webster

The Brownsville Experience

Honestly, I had no idea what was in store for me when I decided to move to Brownsville, Texas this past summer to intern with the University of Texas School of Public Health. Everyone thought I was crazy for spending my last summer in Brownsville, and soon I wondered if I actually was crazy for agreeing to pack up everything and move to a new place where I didn't know anyone and where I didn't even know what I'd be doing for the next ten weeks. However, June 1st rolled around and I found myself making the six hour trek south, not knowing that I was embarking on an awesome adventure.

When I arrived, my mentors, Dr. Belinda Reininger and Lisa Mitchell-Bennett, were ready to hit the ground running with the project they had waiting for me. In 2006, the UTSPH Brownsville Regional Campus, in conjunction with UT- Brownsville and UT- Pan American, created an internship program for high school students in the Rio Grande Valley (RGV). The RGV is notorious for its low education levels combined with high poverty rates, so the Summer Science Internship (SSI) program was created to inspire and encourage disadvantaged high school students in the area to pursue higher education and a career in science. Each year since 2006, interns have been paired with a faculty mentor to work 20 hours a week for 6 weeks out of the summer on various projects and presenting their findings at the end, after which they receive a $500 stipend. In 2008, efforts began to track down the former SSI interns and ask them a few questions in a telephone survey about their current academic and career choices, their experiences with the SSI, and their goals for the future.

My main project this summer was to create a new follow-up survey based on tools used in recent literature and administer this survey to all former interns of the program. For 4 weeks, I called and emailed every former intern trying to get them to participate in our survey, which turned out to be a lot harder than I thought; eventually I ended up completing surveys with 21 out of 34 former interns! I analyzed all of my qualitative and quantitative results and presented my findings in a powerpoint as well as in a scientific report. I also had the opportunity to work on various other projects, such as a teenage pregnancy prevention program, and I had the opportunity to take a class on diabetes in Spanish, visit television stations in Mexico, write for a newsletter, and go out into the community with the *promotoras*.

To discuss everything I learned from this experience would take at least 10 more pages, but in summary, my internship experience taught me more than I could have imagined: I learned about the realm of public health, the pros and cons about working directly with the community, how to write good reports, presentations, newsletter articles, and talking points for TV. I never told anyone at the UTSPH this, but before I started my project, I was absolutely terrified of calling strangers on the phone! It's safe to say that after all of the calling I did, this fear has been completely conquered.

I also learned a lot about life on the border, and especially about how certain populations in wealthy nations such as the United States often get overlooked or forgotten about, and these populations are the ones with the biggest problems and need the most help. I learned a lot about myself this summer, and I learned that even a lowly undergraduate intern has the power to make a positive impact on the community simply by caring enough to put in the time to research the health and well being of its people. I learned a lot about the importance of public health; without institutions such as the UTSPH, many people would remain uninformed about pressing or life-threatening issues

such as diabetes, tuberculosis, and proper diet and exercise, and the people at the UTSPH work very hard to improve the quality of life in the RGV.

Looking back, I can confidently say that getting in the car and driving to Brownsville was one of the best decisions I've made. Nothing can compare to an intense 10 week crash course in community outreach, statistics, Spanish, and life on the border. I would have been crazy to pass up this opportunity!

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Kelly Broussard

Reflections about Novel H1N1 Research

After my summer spent at the UT School of Public Health in Brownsville, not only have I satiated my curiosity about the novel H1N1 flu outbreak, but I have become a walking flu encyclopedia for my classmates, friends, and family. Since the emergence of this new strain of influenza in the spring, the whole world has watched as the outbreak progressed to a pandemic level. Amazingly enough, I transitioned from one of the avid observers of a historic new flu pandemic (though as a microbiology major, I was a bit more avid than most) to an active researcher on the subject. I was able to take part in a groundbreaking, National Institutes of Health (NIH) study diagnosing and characterizing novel H1N1 with the surveillance and response team in Brownsville, Texas.

After meeting my mentor and daily teacher, Diana Gomez, as well Dr. Susan Fisher-Hoch, the head coordinator of the novel H1N1 flu efforts at UTSPH in Brownsville, it became clear that the influenza project moved at a quick pace. The NIH study, more specifically the Rapid Research Response to Influenza or Influenza-like Outbreaks, aimed to collect various samples from people with influenza-like symptoms or confirmed H1N1 along the course of their infection. Blood, fecal, and upper-respiratory specimens were

taken either in the study participants' homes or at the Clinical Research Unit (CRU) and then were brought to us at the lab.

My role at the UTSPH lab involved preparing these specimens for either our own researchers to work with or for shipment to other facilities such as Baylor College of Medicine for H1N1 vaccine research. One of the most time-consuming and delicate specimen processing procedures was that of the isolation of Peripheral Blood Mononuclear Cells (PBMCs) from whole blood; entire days could be devoted to the recovery of these cells. Thankfully, I worked hand-in-hand on the project with another intern, Sami Miller. Our shared interests in infectious diseases, public health, and the new pandemic provided ample enthusiasm to complete the high workload of the study. As a team, we performed Real Time RT-PCR, the only confirmatory diagnostic test for H1N1 flu, as per instructions from the Centers for Disease Control and Prevention (CDC). UTSPH at Brownsville was the first non-State or CDC laboratory able to carry out this crucial confirmatory test, and participating in something this important and contemporary truly struck home with me. My long-time interest in infectious disease research and prevention could not have had a more appropriate manifestation than this study.

I learned first-hand the excitement, richness, and, unfortunately, stress of working in an outbreak environment. Large organizations like the CDC and the NIH have the resources to embark upon incredibly advanced research such as ours, but they also are laden with the bureaucracy required to keep the whole country at the same speed. This summer I have seen that the structure of these organizations can handle the sudden pressure of an outbreak magnificently, as long as everyone follows procedure. My career goals have always centered on the glamorous Biosafety Level-4 disease detective archetype, and I am so grateful for the dose of reality with which this experience has provided me. To meet my goal of working in governmental public health, I have to see the logic and structure behind even the most daring and exciting work.

As we approached the halfway mark of the internship, Sami, Diana, and I became familiar enough with the logic and structure of our daily procedures that we could move into a more specific study of H1N1 influenza. One of the primary goals of the NIH study was to characterize the immunology of the novel H1N1 viral infection using the participants' specimens. We worked very closely with Dr. Fisher-Hoch and Dr. Shaper Mirza to determine the best way to approach the immune response to novel H1N1 infection in our study participants. We chose to study the gene expression levels of a unique panel of cytokines: interferon alpha and beta, interleukin-1 beta, interleukin 6, interleukin 12, and tumor necrosis factor alpha. We discovered a few subtle yet intriguing trends in the immunological response to infection, but more than anything I learned the value of a well planned experiment. Working within the confines of the pre-existing Rapid Research Response study, we devised a workable experimental design. Difficulties arose when our cytokine study design demanded a type of control group not exactly present in our existing samples. Out of this quandary I learned that excellent study design is a very impressive skill, and Diana, Dr. Mirza, and Dr. Fisher-Hoch collaborated admirably to help us construct an interesting research question out of a broad topic.

My time in Brownsville has been extremely rewarding, both in terms of my new laboratory and academic skill sets and my understanding of my future in public health. I love infectious disease study, and I am grateful to find that unchanged—if anything, intensified—by my work this summer. What has changed is my desire to jump directly into a PhD program after finishing my undergraduate degree; I want to apply the same thorough forethought to my future that I did this summer to our H1N1 studies. I can see so many opportunities ahead of me, and my work in Brownsville has sharpened my confidence in my interests and abilities in the world of public health. I am very grateful to have had this unique and enriching experience.

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Samantha Miller

A Summer with HIN1

When I arrived in Brownsville, Texas this summer, I had no idea I would be thrown right into such an important internship as the novel H1N1 project. I had originally wanted to do research involving Tuberculosis, but was pleasantly surprised when I was reassigned to the current novel H1N1 outbreak. The summer passed by so quickly that I did not feel nine weeks had passed when it was time to leave.

This summer I worked with mentors Dr. Susan Fisher-Hoch and Diana Gomez, as well as another student intern, Kelly Broussard, processing samples from suspected novel H1N1 positive participants. We then came up with a project that evaluated the innate immune response to a novel H1N1 infection. Kelly and I spent about 40 hours a week in the lab, and even more hours outside of work doing research. I felt like I was a graduate student at the School of Public Health, and I loved every minute of it. Working with the recent novel H1N1 virus outbreak really made me feel like I was making a difference in the field of Public Health. The work that we were doing down on the border was assisting NIH as well as Baylor College of Medicine in their attempts to become the first groups to create a vaccine for the novel H1N1 virus. We were also lucky (although I am sure that the people on the border would not agree), that we had high numbers of participants who were positive for novel H1N1. Because of this, we had enough samples that we were able to come up with a project for our internship.

Coming up with a project, as well as executing it, was a big undertaking. Reviewing the literature as well as putting in the time and effort in the laboratory became a huge part of our lives this summer. I felt very independent while in the laboratory, and I felt like we really had control over our project while we performed a literature review as well as researched methods to perform our tests. I even had the opportunity to call a Millipore

representative to place an order. The research was grueling, but in the end I was very happy with our results. Not much was known about the novel H1N1 virus at the time of our internship project, so we were on the forefronts of research. By evaluating the innate immune response of participants to the novel H1N1 infection, we were some of the first groups to characterize the previously unknown virus.

What I learned over the 9 weeks I spent in Brownsville, I will keep with me for a lifetime. I was not just down in Brownsville to assist in the laboratory; I learned a lot about myself as well as what it takes to do research fulltime. Since my ultimate goal is to obtain a PhD and do research, I felt that this summer's experience fulfilled any possible expectations that I had. I also had the opportunity to visit with the graduate students at the School of Public Health as well as Dr. Fisher-Hoch in order to find out what it was that I wanted to do with my life. And because of those talks, I feel that I am in a place now where I am happy with my decisions and my plans for the future. I not only gained valuable research experience, but made life long relationships with the people I worked with. I plan to pursue a master's in public health after completing a year long post-bac fellowship. After I obtain a master's in public health, I plan to obtain a PhD and then work in the field of public health. I feel very passionately about the work I do in the lab and I hope that passion continues throughout my lifetime.

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Erica Rubin

Summer Internship Reflection

The research I conducted this past summer in Brownsville provided me with invaluable insight into the field of public health. I worked alongside Dr. Shaper Mirza, a driven, inspiring, and positive mentor, whose impact on my future career goals I cannot even begin to measure.

Dr. Mirza was studying the bacterium, *Streptococcus pneumoniae*, a normal resident bacterial species of the upper respiratory tract. It is a public health concern due to its ability to cause invasive infection, including otitis media, meningitis, and pneumonia, primarily in children and the elderly.

The aims of my specific project were to synthesize the findings of previous research in order to determine whether or not a specific surface protein of *S. pneumoniae* (Pneumococcal choline binding protein A, or PcpA) was responsible for binding to a known ligand (Receptor for Advanced Glycation End Products, or RAGE) for the bacterium on human lung cells. *S. pneumoniae* causes severe infection in individuals with compromised immunity, including those affected by diabetes mellitus. So, this project was epidemiologically relevant in the Valley of Texas due to the disproportionate percentage of the population affected by diabetes. In diabetics, RAGE expression is elevated throughout the body, including on the lung epithelia where *S. pneumoniae* initiates invasive infection. In this way, diabetics are more susceptible to infection since the bacteria have more chances to attach to lung cells. Previous research indicates that *S. pneumoniae* binds to RAGE, but my project proved the candidate protein PcpA to be the definitive receptor that helps the bacteria attach to cells via RAGE.

On a day-to-day basis, I found myself conversing with Dr. Mirza about the specific project for the day, spending many hours in lab, and reading background literature to provide a context for the work I was doing. I learned many new techniques and protocols in molecular biology that I previously had no experience with. For example, I learned how to express a recombinant protein in a bacterial vector, to label this protein with a tag in order to identify it in later experiments, to run SDS-PAGE protein gels, and analyze these gels using the Western blot technique. The most satisfying part of the entire experience was to watch as the purple band I crossed my fingers and hoped to see slowly materialized right where expected on my developing blot. This purple band definitively proved that the protein PcpA of *S. pneumoniae* binds directly to RAGE, just as Dr. Mirza hypothesized.

This project provided me with a glimpse of how experimental bacteriology fits in with epidemiology and public health in general. Although my lab work was extremely focused and at times it was difficult to appreciate the big picture, in the end it was quite gratifying to know I provided the answer for an otherwise unsolved public health question. I learned that the study of microbes like *S. pneumoniae,* the mechanisms of their pathogenesis, and how they affect human populations is central to understanding the trends of public health. I also developed a deep appreciation for the interplay between an infectious disease caused by a microbe and a serious morbidity like diabetes mellitus. I was fascinated by *S. pneumoniae's* exploitation of a human protein that is overabundant in diabetics (as well as in other morbidities, including cystic fibrosis) as a sort of anchor to assist its attachment to our lung cells. The bacterium takes advantage of the effects of a preexisting disorder in order to further its own existence in the human body. This puts individuals with diabetes mellitus at elevated risk of developing a serious infection with *S. pneumoniae*, whereas individuals without increased RAGE expression are less susceptible. This fact could help explain demographic trends of *S. pneumoniae* infection.

Although my research did not directly impact the susceptible community, it did provide a valuable piece of information concerning the pathogenesis of *S. pneumoniae* that could eventually lead to means of countering infection. On a more personal note, my research this summer taught me to troubleshoot effectively and fine-tune my lab work. I learned that the vast majority of time in lab is spent optimizing measurements, timing, and organization. My previous research experiences have been quite frustrating and unproductive, but this summer in Brownsville taught me to be patient and focused with my work. I was privileged to collaborate with a systematic, supportive, and eloquent mentor who led me through every step of the way with utmost patience and good humor. This summer has certainly helped to solidify my interest in the human immune response and bacteriology as it relates to public health. It has also piqued my awareness of the human element and how it may fit into my future career, whether in medical care or immunological research.

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Meagan Sebring

Summer Internship at the UT School of Public Health, Brownsville

This summer I gained experience in both epidemiology and behavioral science, working on several different phases of the research process. My mentor was Dr. Cristina Barroso, a professor whose primary research focus is adolescent health. Much of the work I did for her involved designing materials for her upcoming studies. Another intern and I spent a considerable amount of time creating questionnaires for a newly approved study about Mexican American perceptions of body image. We had to incorporate questions from previously tested and verified surveys and use the Theory of Reasoned Action to amalgamate them. I also helped with a study that aimed to motivate parents to encourage healthy behavior in their children. For that study, I made colorful handouts for each of the six target behaviors. These handouts will be sent to the parents following a motivational interviewing session through the phone.

My experience with epidemiology was mainly in the domain of data collection and entry. Most of the epidemiological groundwork for the studies at the School of Public Health is carried out at the Clinical Research Unit (the CRU). I was able to go with the CRU team as they collected specimens for the diabetes and swine flu studies. Shadowing the CRU team was especially elucidating, because as Dr. Fisher-Hoch pointed out, you can't fully understand your data unless you understand how it was collected. By observing the collection process, I began to understand where the studies might run into problems or where the collection methods might become inefficient. I also entered the data for the swine flu participants into EMMES, the national swine flu database.

In addition, I conducted surveys for Dr. Gowen, an ob/gyn associated with the School of Public Health. She just began a study that seeks to determine if a relationship exists between eating habits during pregnancy and the development of gestational diabetes. The target population was postpartum women, so I spent a good amount of time in the postpartum ward filling out surveys.

Finally, I performed data analysis on SAS for Dr. Barroso. Since I wasn't familiar with SAS before arriving in Brownsville, I had to first learn the program. This task proved to be a bit time consuming, but also relatively enjoyable. Once I understood the basic commands, I analyzed the data from the Cromack Elementary School Physical Activity Intervention Pilot Program. These data included before and after responses from a questionnaire and several hundred entries from the school's exercise log. I created graphs, frequencies, means, ran regressions, and searched for statistically significant changes.

The most important truth about public health that I learned this summer was how all the various health disciplines fit together. I'm interested in infectious disease epidemiology, so before I came to Brownsville, I assumed that was the only type of work I would be doing. I knew there was a behavioral science department as well, but I didn't think I would be associating much with it. The reverse actually happened—the majority of my work was centered around behavioral science, while a small portion was epidemiological. Though I can't say I discovered a love for behavioral science, I definitely understand it's importance now. I never realized how much behavior is intertwined with the spread of infectious diseases. To be truly effective in public health, one must target both areas and resist the temptation to focus on just one.

Another equally important lesson gleaned from this experience is that I actually don't want to become an infectious disease epidemiologist anymore. Gaining an understanding of the nitty-gritty that comes with epidemiological research showed me that

while I may enjoy epidemiology on an intellectual level, I don't connect with it in practice. Personal reflection, combined with my experience at the CRU and several interviews with faculty, revealed that I would be much happier pursuing medicine. So now I'm returning to UT for a fifth year to fulfill my premed requirements, then hopefully I'm off to medical school!

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Katie Hathaway

Reflections on my Public Health Internship in Brownsville, Texas

My summer internship position at the Brownsville campus of the UT School of Public Health gave me a more accurate view of public health than I ever had before. I had few expectations for my internship: I knew I would be working in the behavioral sciences division, but beyond that, I knew little about what I would be doing. I was confident in my decision to pursue medical school and wanted to see if an MD/MPH was something to investigate as well. My internship in Brownsville definitely helped me clarify those future goals.

I spent my nine weeks in Brownsville between two projects. First, for about three weeks, I helped edit a paper on health care utilization along the border, focusing on the factors that influence Mexican-Americans decision to seek medical care either in the US or in Mexico. My job was mainly to read various drafts of the paper, make any obvious necessary changes, and make sure the three co-authors (Dr. Belinda Reninger, Dr. Cristina Barroso, and Lisa Mitchell-Bennett) were reading and editing the paper. Though the topic was very interesting and the co-authors were a joy to work with, the next segment of my summer captivated most of my attention.

For my last six weeks, I worked with Dr. Jennifer Gay and Dr. Joseph McCormick on their study that investigated the relationship between cognitive function and diabetes.

They wanted to investigate the contribution of diabetes to cognitive function among Mexican Americans and evaluate the impact of controlled versus uncontrolled diabetes on cognitive function. I had three main jobs on this paper: conduct a literature review of the topic, analyze the raw data from their 1200 person, Mexican-American cohort (all having taken the Mini-Mental State Examination: their measure of cognitive function), and help outline the final paper.

Analyzing the data was my favorite part of the project. I learned how to use SAS, statistical analysis software, thanks to much instruction and patience from Dr. Gay. She taught me how to define and conduct descriptive analyses of the cohort using mean and frequency commands. After those basic commands, she taught me how to analyze the contribution of diabetic status and glucose control to cognitive function using logistic regression models. Dr. Gay brought me alongside her and Dr. McCormick as they interpreted the results and asked new questions. Through this process, I began to see raw data as more than a large set of numbers: data was actually useful and told us of relationships that can lead to pointed intervention and better health.

Throughout the summer, I was able to see many pieces of putting together a scientific article, though somewhat out of order. I saw the beginnings with the cognitive function/diabetes study. I helped analyze the data and participated in discussions that framed and answered the initial research questions. Then, I began an outline for the paper, based on the literature review I conducted and the results I obtained from the analyses. Finally, the health care utilization paper showed me the final stages of writing and editing a scientific article. I realized this process is extremely collaborative and often involves many people.

Overall, this summer demystified the world of research scientific journals. I realized that I am cognitively able to come up with research questions and pursue their answers. I am sure research, whether clinical or related to public health, will play some role in my

future as a physician. Also, I realized the importance of public health, especially in its role of intervention and prevention. However, I discovered that I do not thrive off the work environment that comes with public health research. I found myself wanting to be in the clinic, talking with patients, more than reading articles or searching for grant money. This summer confirmed my decision to pursue medicine, rather than solely an MPH or PhD in public health. Though I will further consider getting my MPH later in my career as a physician, right now my focus will be on my MD. I am very excited and hopeful to start medical school in August 2011.