

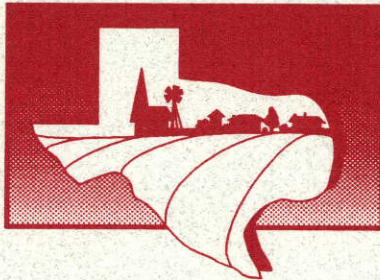
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# Texas Journal of Rural Health

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2002

**TEXAS**   
**JOURNAL**  
OF RURAL HEALTH

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**M I S S I O N   S T A T E M E N T**

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The purpose of this journal is to provide a forum for sharing ideas related to rural health.

*Authors are encouraged to submit relevant and current research studies as well as legislative and/or health care policy papers. Descriptions of innovative strategies in primary health care settings are especially welcome. Manuscripts will be evaluated for pertinence to the issues on a statewide basis. Response to our articles is also encouraged and will be printed under the section "Letters to the Editor."*

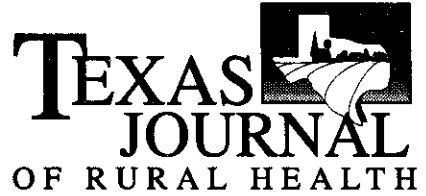
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- **Title Sheet:** Include name of article and abstract or summary of article.
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# **The Editorial Process for the Texas Journal of Rural Health**

## **Step One: Submit Manuscript**

A manuscript should be presented in the form described in “Manuscript Specifications.”

## **Step Two: Blind or Masked Review Process**

The editor and managing editor reserve the right to invite manuscripts for publication. The editor and managing editor also reserve the right to accept or reject manuscripts outright. Before a manuscript is sent for review, it **must** meet APA specifications. Manuscripts sent for review are read by those considered experts on the subject. Thus, a peer review is conducted. The author’s name does not appear anywhere on the manuscript, providing a fair review.

## **Step Three: Recommendations from Reviewers**

After the manuscript is reviewed, it is forwarded to the managing editor who discusses the reviewer’s recommendations and comments with the editor and members of the editorial board. If a manuscript is rejected during the initial review, every effort is made to encourage the author to proceed with the manuscript to make the article publishable. Reviewers’ remarks are included with the return of the manuscript.

## **Step Four: Editorial Board**

The editorial board has quarterly meetings to discuss the manuscripts recommended by the reviewers. Content is the most important feature discussed at this meeting. Recommendations are to either (a) accept the manuscript, (b) accept the manuscript with revisions, (c) revise and resubmit the manuscript, or (d) reject the manuscript. In all cases, authors are encouraged to continue toward publication and every effort is made to facilitate that process.

## **Step Five: Getting the Manuscript Ready for Publication**

Recommendations are sent to the author. The manuscript is scrutinized for content, accuracy in interpretation and application of referenced material, and for topic completeness.

## **Step Six: Return of Manuscript to Managing Editor**

The manuscript is read to make sure all recommended revisions have been satisfactorily completed. Sometimes, a reviewer will request that the revised manuscript be returned for another reading. When that happens, the reviewer may accept the manuscript or request more changes. If the author has not proven diligent in satisfying the reviewer’s or editorial board’s requests for revisions, the manuscript may be rejected.

## **Step Seven: Getting Ready for Publication**

The managing editor performs the job of editing, proofing for grammar, syntax, spelling, and word usage and then puts the manuscript into page layout form.

## **Step Eight: Authors Final Approval**

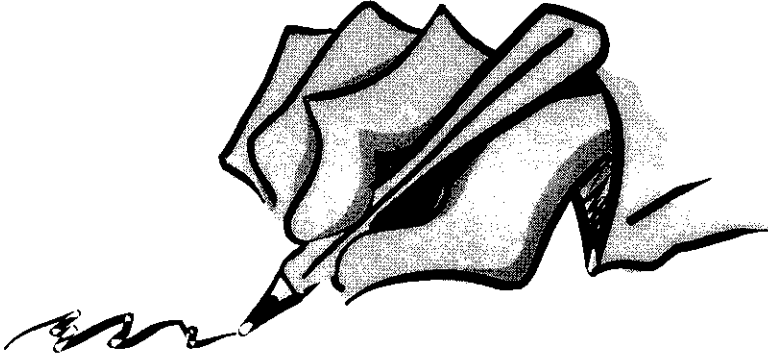
The article will be sent to the author in page-proof (galley) form only if major changes are required within the text. In that event, the author usually signs “approval for printing with/without changes.” Beyond this, no other changes can be made.



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# Call for Papers

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The *Texas Journal of Rural Health* is currently accepting manuscripts for publication on various topics relating to rural health issues. We are looking for articles to go into our new sections:

- **Notes From the Field**
- **Policy and Law**
- **Research**
- **Review Articles**
- **Brief Reports**

Some topic examples are listed below:

- **Nursing Shortages**
- **Community and Migrant Health Centers**
- **Critical Access Hospitals**
- **Rural Health Policy**
- **Primary and Emergency Care in a Rural Setting**
- **Current Legislative Issues**
- **Border Health Issues**

Papers should be submitted to the Managing Editor as outlined in the “Instructions for Authors.” Because of our updated look, we are more than happy to accept manuscripts longer than outlined in the “Instructions.”

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## REVIEW

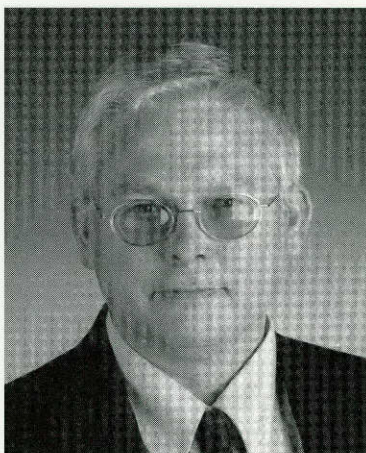
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## BEING PREPARED FOR BIOTERRORISM

Disease surveillance and outbreak investigation are the highest bioterrorism priorities, according to the Centers for Disease Control and Prevention. These are related but distinct activities. Disease surveillance is a continuous activity that involves routine reporting of potential threats, such as single cases of communicable diseases. Through the timely accumulation of data, surveillance permits the early identification of outbreaks that require epidemiological investigation. Epidemiologists will interview persons suffering from the disease in question and their contacts with the goal of determining the source of the disease and its means of transmission.

Unfortunately, local public agencies lack the capacity for real-time surveillance and immediate response to outbreaks caused by terrorists. Our system of reporting diseases that might warn us of emerging epidemics is antiquated and ineffective. Many clinicians do not bother to report diseases even when they are legally obligated to do so. Clinicians are busy and, besides, patient privacy is an issue. Having a public health investigator show up at your patient's door to ask about sexual partners is an example of what can happen when diseases are reported. And, of course, this kind of investigation is indeed necessary. If a quickly spreading disease outbreak is triggered by terrorists, public health officials must be able to track down the source if they are to stop the epidemic. Treating victims after the disease has become a disaster is like locking the barn after the horse is gone. In actual fact, epidemics are



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not stopped by treating the sick, but by preventing exposure.

The best system would involve reporting all cases of infectious disease, even if we do not immediately suspect that bioterrorism is involved. After all, if you are not expecting to see anthrax, you might call it flu. But if there is a sudden outbreak of flu, public health officials might begin to put two and two together right away.

Unfortunately, our system of collecting and analyzing new cases of infectious disease is very slow and cumbersome. Even if all cases were reported, local health officials may not receive the information soon enough to permit mapping and charting and other analytical activities that will reveal the level of danger we might be facing. This is the computer age, but local health agencies are not equipped with the latest machines or

software for this purpose. They also lack the staff — trained epidemiologists — to investigate the outbreaks. Epidemiologists are “disease detectives” who lead a team into the field to search out causes and stop the epidemic before it gets out of control. A nasty epidemic is likely to result in a report being made to the Centers for Disease Control and Prevention in Atlanta, which will then send a team to investigate. This system has worked well enough in the past, but imagine what the result will be if a dozen outbreaks occur at once and are scattered across the country.

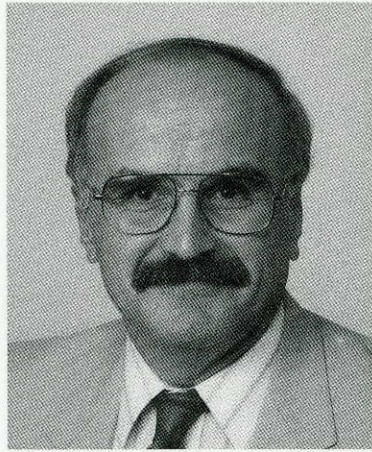
We would not send out to Atlanta for a pizza, because it would take too long. And we sure don't want to send out to Atlanta when people are getting sick all around us. We want to be able to handle epidemics with regional health departments.

Additional epidemiologists must be trained and placed in regional health agencies. New systems for capturing cases and relevant information about those cases must be developed and tested. These systems must be very easy to use, so that busy clinicians won't be burdened. Instantaneous transmission of clinical information to the regional public health agency must occur. Privacy may suffer, but how important, really, is secrecy about our health problems if that secrecy causes an epidemic to get out of control? The terrorists would be delighted if our concern about privacy crippled our public health defenses.

THE NEED FOR A “CULTURALLY-  
CONNECTED” PUBLIC HEALTH  
INFRASTRUCTURE AT THE LOCAL LEVEL

Many epidemiologists and other health care workers fear that dengue fever may become the next major plague of the Western Hemisphere. Dengue fever is often misdiagnosed as “flu” or “viral syndrome.” There is no vaccine to protect against it and infection by more than one of the virus’s four serotypes often leads to very lethal consequences: dengue hemorrhagic fever (DHF)/dengue shock syndrome (DSS). The only “defense” is avoiding exposure to the two mosquito species that vector the virus to humans. This includes education of the human population and denying local breeding and larval habitats to the vectors. Community experience with “anti-dengue” education and sanitary interventions in the Brownsville, Texas area are subjects of an article in this issue of the *Texas Journal of Rural Health* (Winn, Dennis, Paine, Warner, & Hayes, 2002). Dengue is the most common and widespread arthropod-borne viral infection in the world. Before 1970, only nine countries had experienced DHF; that number has increased more than four-fold and continues to rise. The pandemic in 1998, in which 1.2 million cases of dengue fever and DHF were reported from 56 countries (in the Americas, Western Pacific, Southeast Asia, and Eastern Mediterranean), was unprecedented (World Health Organization, 2002).

In mid-January 2002, Cuba began an emergency campaign to contain the worst outbreak of dengue fever since 1981, when 158 Cubans died of the illness. In 1997, an



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outbreak in one municipality (Santiago de Cuba) resulted in 3012 confirmed cases, 205 of which were DHF/DSS and 12 fatalities were officially reported. President Fidel Castro presided over a ceremony on January 11, 2002 and declared “war” on the insect vector, launching fumigation brigades. “I have been hearing about more and more hemorrhaging cases,” a Havana hospital employee said. “If Fidel is getting involved, you know the situation is serious (ProMED Digest, 2002a).” On February 2, 2002 Castro was reported to have said, “By November 28, 2001, 1601 cases had been reported in Havana. After that, the situation became worse. Unfortunately two people have died, but no children (ProMED Digest, 2002b).” Cases had been reported from 95 of Cuba’s 165 municipalities as of

January 1, 2002. This current epidemic in Cuba is due to dengue type-3 virus, which is the type also responsible for a burgeoning epidemic in Brazil.

Public health officials in Rio de Janeiro have been alerting the public as cases of dengue fever steadily increase in 2002. As of February 5, 2002, six deaths from DHF have been reported in Rio. Of nearly 5,880 infected in Rio, 108 had been diagnosed with the hemorrhagic form within the metropolitan area and doctors were investigating more “suspicious” deaths; health authorities had confirmed approximately 12,975 cases of dengue statewide (ProMED Digest, 2002c). In the entire country of Brazil, the number of cases rose from 240,00 in 2000 to 391,000 in 2001, with hemorrhagic cases increasing from 51 to 675 and attributable deaths rising from 3 to 28. Venezuelan health authorities released a report, as of January 19, indicating that 4,733 people had contracted dengue fever in the first days of 2002, 10% being DHF, with no deaths reported. The “under-15” age group was most affected, comprising 54% of the cases (ProMED Digest, 2002d). This is an extension of an epidemic that began in 2001.

Dengue fever is not considered a priority agent for bioterrorism, but if local health authorities were better equipped to routinely deal with outbreaks of this disease and other naturally occurring problems, they would be better able to deal with intentionally-propagated disease outbreaks and disasters.

There is little doubt that additional United States federal monies will flow to state health departments, especially after September 11, 2001, for building and enhancing the public health infrastructure. Dr. Jeffrey P. Koplan, Director of the Centers for Disease Control and Prevention (CDC), recently addressed state health officials to share his views on

being prepared for public health threats and emergencies. Dr. Koplan outlined seven priority areas for “capacity-building (Koplan, 2001).” I will not discuss all seven in this brief space, but I will highlight the ones I feel are most important at the local (city and/or county) level:

1. A well-trained, well-staffed, local public health workforce, which is the basis of any adequate public health system.
2. The workforce needs to be equipped to conduct reliable “grass roots” surveillance and field epidemiology. The ability to rapidly detect health threats is essential.
3. The local public health workforce must also be provided with equipment that facilitates secure, two-way, swift communication in order to provide accurate, timely information to citizens; advice about local public health emergencies to policymakers; and routine preventive medicine messages to their community.
4. Each community needs adequate preparedness and response capabilities to minimize morbidity and mortality until outside assistance, if needed, arrives.

I trust that as increased federal dollars are funneled to the local level, there is not excessive program skimming or subject-matter layering at the state level. Local health departments must have the ability to build and sustain the four areas highlighted above. The state’s primary role should be the provision of adequate regional laboratory capabilities, accessible and secure information systems, and the evaluation tools necessary to ensure that the local community can make the most adequate “first response” that is possible.

Local health department administrators should not assume that all the funds they need will come from state, CDC, or other federal sources. Dr. Koplan provided examples and indicated that “leveraging” is very important in building, sustaining, and enhancing public health programs. In communities such as those Winn et al. studied, local health departments might be able to work with recycling companies, for example, to provide facilities and incentives for citizens to routinely remove plastic, glass, and old tires from their neighborhoods, thus denying breeding/larval habitats for mosquito vectors.

The World Health Organization (WHO) has summarized the conditions most likely related to the resurgence of dengue fever. During the past 50 years, the world’s population has more than doubled, most rapidly in the tropics and subtropics. Rapid and continuing rural-to-urban migration has resulted in more unreliable potable water supplies (residents collect and store water) and poor storm water drainage on urban “fringes,” and there has been a huge increase in solid waste (plastic, glass, and tire casings) from new consumer “habits.” Some of these conditions are also problems in rural areas. When such conditions combine, they favor the transmission of not just the dengue virus, but also St. Louis encephalitis virus and West Nile Virus, which some project will reach Texas in 2002. The magnitude of public health problems will increase unless there are adequate and more-effective local public health measures in-place. The WHO (1999) has highlighted two areas that correspond directly with Dr. Koplan’s comments:

- Epidemiology/surveillance, especially entomological surveillance and monitoring human behaviors (inappropriate

disposal of discarded household items such as plastic, glass, furniture, and appliances); and

- Communication, a culturally appropriate package of guidelines, “tools,” and approaches for the control of vectors and prevention of exposure to their bites at the individual, household, and political (community) level.

It is my fervent hope that both legislative representatives and public health policymakers see the need for, and ensure the adequate funding of, appropriate “culturally-connected” public health infrastructure elements at the local level. Only through such means will we all be empowered to protect ourselves as early, quickly, and thoroughly as possible.

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## INTERVIEW WITH SCOTT PETERS

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### INTERVIEW

Scott Peters is an Assistant Professor in the Department of Education at Cornell University. His teaching and extension work at Cornell focus on civic renewal, community education and development, youth development, and public issues education. His research is devoted to exploring the historical foundations, evolution, and contemporary renewal of cooperative extension's civic mission and public work tradition, and their connection to the democratic promise of the land-grant idea in American higher education. He is currently at work on three books that relate to this theme: a history of the founding and early development of the cooperative extension movement, a Liberty Hyde Bailey Reader, and a set of contemporary case studies that relate to the theory and practice of public scholarship at land-grant colleges and universities.

Dr. Peters is a Consulting Editor for two journals, the *Adult Education Quarterly* and the *Higher Education Exchange* as well as a senior associate with the University of Minnesota's Center for Democracy and Citizenship. He holds a B.S. in Education from the University of Illinois at Urbana-Champaign (1983), an M.A. in Public Affairs from the University of Minnesota's Humphrey Institute of Public Affairs (1995), and a Ph.D. in Educational Policy and Administration, also from the University of Minnesota (1998). From 1984 to 1993 he

*served as Program Director of the University YMCA at the University of Illinois. His book, The Promise of Association, published in 1998, chronicles the history of the civic mission and work of the University YMCA for its 125th anniversary. He plans to continue his research on the YMCA by writing a history of the student YMCA movement as a whole.*

LP: What role does scholarly research play in the development of rural communities?

SP: Scholarly research can and does play a variety of roles. While people often view scholars as technicians who “crunch the numbers” and produce a set of statistics related to demographics or economic trends (which is often an important role), they can also play an important part in helping a community deliberate about what their hopes and problems are and what to do about them. So, on the one hand a scholar might contribute to the development of health care policy in a rural community through survey research that generates local statistics or by bringing national statistics to bear on the local problem. Or on the other hand, a scholar might contribute by helping people to learn how to better understand just what the local problem is that needs to be addressed, how various players in the community understand the problem, and how to bring people together to generate good ideas for acting on it. This kind of research, which is often called “action research,” is about helping people to think more critically

about what they really want, while involving them in creating the knowledge they need to take effective action. It’s not just about meeting an economic bottom line by dealing with isolated parts of a larger whole. Scholars have a responsibility to help people think more broadly about the public interest as well as to focus on specific details such as like demographic statistics. Number crunching is important, of course, but a scholar’s role and responsibility can and should extend beyond the numbers.

LP: When a community collaborates with rural development partners, how important is the democratic process?

SP: The democratic process is key. You can’t get good knowledge or good action regarding any issue, whether it’s health care policy or something else, without it. That’s because everyone always has only a piece of the picture or represents only one or a few of the interests involved in any given problem. So, in order to get a larger picture that takes into account all interests and perspectives, you need some way of working together. We refer to “working together” as the democratic process. It involves negotiation and dialogue. It also involves a kind of learning in which people change their minds or perspective. When policy makers are faced with complicated problems and conflicting scientific data, as they quite often are, they need some way of working through what to do. Various partners in the rural development process might each have a role to play in helping. Research scientists can help by either

providing data or by helping clarify the data's meaning or significance. The cooperative extension service can help organize relationships between and among government agencies, scientists, researchers, and ordinary citizens. They can help people insert meaning and value into the equation, making sure that a policy or development decision is considering more than just one dimension of a problem. It's important here to point out that the work and role of a land grant university in rural development goes way, way beyond just providing the numbers. There is a kind of public scholarship that land grant faculty and extension educators do that is extremely important and valuable, but which is poorly understood and receives little appreciation and respect.

Here's an example of this kind of public scholarship. Dr. Steven Small, a professor with a specialty in adolescent health and development at the University of Wisconsin in Madison, found that he got little attention or respect in communities across rural Wisconsin when he went out to them and told them about adolescent health and behavior indicators drawn from national data bases. Communities told him that his data might be true for adolescents in New York City or Chicago or somewhere else, but they didn't apply to their children in their rural communities. This led Dr. Small to develop the Teen Assessment Program, which is known as TAP for short. TAP is a research tool that enables local communities to generate data about their own youth,

based on their own questions about adolescent health and behaviors. TAP is now widely used by many rural researchers studying adolescents around the country, but it's all grounded in local data with a great deal of local participation in framing, conducting, and interpreting the research. While technicians at universities help by crunching the numbers and compiling the data, they also help the communities learn how to do survey research and how to analyze and interpret data. The research data TAP generates in each community is brought to a public forum that academic researchers also attend. As a team, both the researchers and the community decide together on the meaning of the data and how it could be used to improve the health of their community, making the research meaningful and believable to local communities in a way that "traditional" research can never do.

The more a researcher can work with rural communities in partnership, the more positive relationships are built. Cooperative extension has a valuable role to play in building the partnerships and relationships between researchers and citizens. This kind of work can be understood as educational organizing, although people are scared of that term because it sounds too "political." But educational organizing is, and has always been, the heart and soul of extension work in both urban and rural communities. Of course, it should not be minimized that the technical expertise scholars might have is critically important, but it is also deeply impor-

tant to design a process for developing and interpreting knowledge in a way that a rural community finds meaningful and which actually applies to the specifics of a given place.

LP: Why is this view considered controversial?

SP: There are some places where people don't understand or respect the value of organizing, leadership development, and relationship building in the rural development process, and extension's central role in it. Faculty, they say, are the experts and should run the show. Extension's job is simply to transfer or diffuse the expert "scientific" knowledge and technologies. However, knowledge transfer is not the only purpose of extension. There isn't a single problem of substance in rural communities anywhere in the nation that can be effectively solved by transferring scientific knowledge and new technologies. As difficult as it seems for some people to do, we simply must learn to recognize and respect the relationship building and organizational work that is required for addressing public problems, and stop looking for quick, clean, easy fixes that don't involve confronting larger issues and questions. Our best extension people already know this and they're hard at work every day all across the nation trying to help us.

LP: In your view, what are the two greatest barriers that inhibit the development of rural communities, especially with regard to health care, and what action is

needed to overcome these barriers?

SP: The inability to respect and support the difficult work of building democratic, participatory relationships and partnerships is one barrier. Also, we are bombarded by messages that because of the global economy, or some other sweeping phenomenon, we really have no choices in our rural communities. For example, we hear, "Animal agriculture must become enormously big or it won't be able to compete in the global economy." However, we need to avoid that limited way of thinking and that type of cynicism. It shuts down our imagination, and worse, it prevents us from asking whether or not our interests are or can be served by the only choice we supposedly have. As researchers and members of a community, we must be able to simultaneously understand sobering realities, while also encouraging imagination and creative thinking.

LP: In light of the recent terrorist attacks, do you believe that there will be an influx of people moving to rural areas? If so, how do you think that will impact rural communities?

SP: This is speculation, of course, but I can't really see people moving from the cities to rural communities in large numbers. Maybe if we were to experience a lot more attacks, that might change. However, I don't expect any major demographic shift.

LP: In one word or phrase, how would you describe the future of health care in rural America?

INTERVIEW WITH SCOTT PETERS

SP: On the negative side, there is a real problem related to the reduction of options when hospitals and clinics either close or consolidate. On the positive side, the changes have begun to stir up interest in how to provide quality care that serves the public rather than a narrow corporate interest. This might lead policy makers and entrepreneurs to build a new system of options that could be even better than the old one.

# ROAR (REACH OUT AND READ): IMMUNIZING AGAINST ILLITERACY

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## NOTES FROM THE FIELD

### ABSTRACT

The education of our youth should begin as early as six months of age. Children and their parents must be immunized against the heartbreak of illiteracy. The ROR (Reach Out and Read) program is a functional method for confronting the growing problem of illiteracy within our nation. This article discusses a primary care provider setting's attempt to establish a program to address this identified concern. The article provides some of the challenges and successes encountered during the process. The ideas presented here can be used to help address the unique illiteracy problems confronting every community.

Key words: children, illiteracy, Reach Out and Read, reading, volunteers. (Texas Journal of Rural Health 2002; 20(1): 12-16)

### INTRODUCTION

ILLITERATE. What a profound stigma is placed on the individual who is classified as illiterate by societal standards. Individuals will go to great lengths to cover up their inability to read and understand information.

The National Literacy Act of 1991 defines illiteracy as follows:

1. The lack of ability to read, write, and speak the English language.
2. The inability to solve problems in the employment arena to the level of societal expectations (American Hospital Association, 1972).

The inability to comprehend instructions places this person at the mercy of each and every individual with whom they come in contact during the course of daily activities. As a result of this dependency on others, the illiterate individual develops feelings of incompetence, dread, and low self-confidence (Giorgianni, 1998).

Complicating this situation is the present movement within health care to expect the client to be knowledgeable concerning his or her own health care expectations. Health care recipients are expected to be actively involved in the planning and implementation of the health care treatment plan. The principal method utilized by health care providers for the provision of health information is the written word. When illiteracy is complicating the process, the client or family may be inappropriately labeled as noncompliant. In reality, the problem may be a lack of understanding concerning the treatment plan.

A university school of nursing established a nursing center, which was managed through the use of family nurse practitioners. As this facility began to assess the needs within their designated health care community, the concepts of illiteracy and client compliance became of paramount interest. One aspect identified during the assessment process was the importance of establishing the joy of reading during a child's formative years. If children can be inoculated early with

the thrill of reading, the daunting statistic of 16% to 20% of high school graduates who are incapable of managing everyday situations because of their inadequate reading, writing, and computational skills may be decreased (Giorgianni, 1998). This manuscript discusses the assessment, planning, and implementation of a program to address the issues of illiteracy and client compliance.

### BIRTH OF A PROGRAM

In 1989, a group of pediatricians in the Boston area began a program called Reach Out and Read (ROR) in response to a perceived need in their community for early childhood literacy. The emphasis was on children between the ages of six months to five years of age and their parents. During a well-child examination, pediatricians and/or nurses interacted with the children and their parents using a brand new developmentally appropriate book as a part of the cognitive check-up. The book was then given to the child to take home. Also, the parent was given a "prescription" to read to the child for ten to twenty minutes each day.

The expectations from this group of pediatricians were that the child would begin to be "immunized against illiteracy" along with the other required immunizations which were given during designated appointments prior to them reaching kindergarten age. If this process were continued, each of the children would have received approximately ten books for their own use at home.

ROR came to Texas in 1995 and by 1998 was part of the Texas Tech University Health Sciences Center (TTUHSC) system in Lubbock. Members of the local TTUHSC Advisory Board and the Regional Dean of the School of Nursing in the Permian Basin heard

of this program. As a result of this information, they sought to bring the program to their local area. As the program was envisioned, a mission statement was developed that stated:

The mission of ROR is to make books and reading aloud part of every childhood by incorporating books and early literacy into pediatric health care and into the definition of a healthy childhood (TTUHSC, 1999).

By the fall of 1999, the Permian Basin Nursing Center (PBNC) became approved as a ROR site with a West Odessa WIC clinic as a satellite site under its umbrella. In September 2000, TTUHSC ROR of the Permian Basin began utilizing the original ROR model, which meant:

1. Practitioners prescribed reading assignments.
2. Books were given to the patients.
3. Books were read by volunteers in the clinic waiting areas.

The purpose is to demonstrate reading to the parents, who may not have had anyone to read to them as they were growing up, and to show the children that reading with adults is fun. Over 1,000 books were distributed through the local program in just the initial year. During the fiscal year 2000 to 2001, the program provided new books to patients at the following levels. Children at the age of 6 months were provided approximately 129 books. Children who were one-year-old received 238 books. Children that were two-years-old received 234 books. However, the children who received the most books (400) were three-years-old to five-years-old. In addition to the new books, 294 used books were given to siblings as a result of the visit with the health care provider. In the first

month of the current fiscal year, an additional 138 books were distributed as a result of this program. The data reflects that approximately 115 children were read to during approximately 29 volunteer hours.

### Community Involvement

Presently at each of the clinics, the program has approximately eight volunteers actively reading at least one to two hours on a weekly basis. Volunteer readers, which include college students, ROAR board members, and others are always needed as well as funds for purchasing additional new books. Also, the program accepts "gently used" books for distribution to siblings of the children who are in the program. Within this West Texas area, the program is expected to expand into additional satellite sites such as an additional large WIC clinic in a neighboring city.

If a volunteer perceives a parental literacy need, the volunteers are instructed to inform the staff of this perceived need. Following this notification, the practitioner then refers them to an English as a Second Language (ESL) or literacy training program within the community. Locally, the nurse in the WIC clinic who teaches nutritional classes routinely provides the adults with information concerning ESL and/or literacy programs available in our community.

### The Role of Literacy

According to Quirk (2000), poor reading and comprehension skills are frequently discovered with the economically disadvantaged, immigrants (especially illegal ones), high school dropouts, blacks, Latinos, the unemployed, and Southerners. The estimated rate of illiteracy for the United States adult



populations ranges from 13% to 55% (Glazer, Kirk, & Bosler, 1996). As health care providers interact with clients, the idea of illiteracy becomes increasingly important to ensure that effective preventive care and health promotion information is provided.

The Joint Commission on Accreditation of Health Organizations and the American Hospital Association's Patient Bill of Rights mandate health care providers to consider and address the issue of patient education. As an outcome of these expectations, institutions and providers need to improve their understanding of illiteracy and the methods for documenting and managing the specific educational needs of the client population. When clients, especially parents, are encountering difficulties in comprehending the health materials provided, problems develop with implementations associated amid appointment slips, test instructions, informed consent, prescription labels, and other health educational materials. Frustrations develop on both sides of the setting – the health care provider and the client.

#### SUGGESTIONS FOR IMPLEMENTATION

Multiple recommendations can be targeted as a result of this project. One such recommendation relates to the need for the expansion of this type of project throughout the nation. Programs must be directed toward early intervention to prevent the further development of illiteracy especially in rural areas. Each citizen, regardless of their age, must be given every opportunity to reach their full potential. If a person is unable to read, his or her success in life is thwarted. Therefore, using the ROR model to help someone read better is a step in the right direction.

The ability to acquire appropriate books for use within these projects is critical to the success of the program. Multiple community groups such as women's clubs, the Lion's Club, and the Rotary Club are a few of the types of groups that could be approached to participate in the collection of used books and the acquisition of new books.

A sound and active advisory board is a key element for the successful implementation of this type of program into any community. The members of the advisory board have got to be enthusiastic concerning the importance of this endeavor. Without this absolute commitment to the mission of the project, participation will decrease and success will be compromised.

Another key aspect when considering the implementation of this type of project into a community is the identification of interested health care providers. They, like the board members, must be dedicated to the success of the project. When a community has these two aspects in place, the discovery of volunteers to do the reading will be facilitated.

The acquisition of volunteers is an additional facet, which requires thought and preparation. The policies and expectations for these volunteers should be carefully and thoroughly determined to protect the children and assist the volunteers as they perform their duties. As the board and others work with these volunteers, time and energies need to be directed toward the awarding of positive feedback and acknowledgment of their efforts. Positive accolades are important to the success of volunteer involvement.

#### CONCLUSION

Illiteracy accentuates an individual's vulnerability. As individuals perceive

## REACH OUT AND READ

themselves as unable to function, their health can be adversely affected. By instigating programs that allow children to gain an appreciation for reading, their health care can be positively affected. One of the goals of the TTUHSC ROAR program is for early childhood literacy to become as much a part of a child's health care as their immunizations.

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## THERE'S A NEW AGENCY IN TOWN: THE OFFICE OF RURAL COMMUNITY AFFAIRS

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### ■■■■■■ POLICY AND LAW

Why a new state agency? This is a tough question in a time of tight budget dollars and a focus on leaner government. It is also one that can be responsibly addressed.

The rural hospital in Hale Center, Texas has just closed. Voters in Linden, Texas, rejected the idea of a hospital district in a recent election. The number of rural health clinics has decreased by about 40% in the past three or four years. Many practicing physicians in rural communities are nearing retirement age and have no new physician that wants to take over their practices. Meanwhile, the population in rural Texas continues to age, increasing the need for medical care. These are frightening trends, particularly in light of many federal and state health care initiatives and in spite of numerous programs aimed at "fixing" the problem. Something is evidently not working well enough.

The focus has been on finding health care solutions to health care problems by health care professionals using health care dollars. But it is time to look outside that silo, to look beyond the narrow confines on health care, and look for new solutions and even new partners. The Office of Rural Community Affairs (ORCA) offers the opportunity for a new focus, a broader focus, and partnerships with non-traditional health care partners. The

new agency offers a forum for new discussions and new ideas, for new models, and new thinking outside the box.

The Office of Rural Community Affairs brings together an agency whose sole focus is rural Texas. The legislative intent is simple, clear, and very broad. It says that ORCA should serve as the point agency for the state's health, economic development, and community development programs targeting rural Texas communities. The goal outlined for the new agency states that it should "assure a continuing focus on rural issues, monitor governmental actions affecting rural Texas, research problems, and recommend solutions, and coordinate rural programs among state agencies." The agency is also a timely and innovative solution to a rural situation aggravated by changing demographics, an aging population, an increasingly tighter economy, change in legislative representation, and the challenges of job retention and creation.

In setting up the agency in House Bill 7 (HB 7) that was passed during the latest legislative session, three programs have initially transferred into the agency. These are not new programs or new dollars, but already existing programs with appropriated funds that will continue to be used to address rural issues. Now under the ORCA umbrella, a new approach to administering these programs and services will include the initiation of a broader perspective and the nurturing of new partnerships. The three programs are: a) Community Development Block Grant Program, which administers community-based programs federally funded under the United States Department of Housing and Urban Development's Community Development Block Grant; b) Local Government Services, which routinely administers workshops and

publishes resource guides for government officials; and c) Rural Health, which serves as the primary state resource in planning, coordinating, and advocating statewide efforts to ensure continued access to rural health care services. The rural health program encompasses all the programs and services that had been under the auspices of the Center for Rural Health Initiatives (CRHI).

The beginning point is the innovative idea that rural health programs and services will constructively interact with housing and community development programs as well as programs to help train local government officials. But it will only build from that level. The agency will work with other state agencies and their efforts to provide programs and services to rural communities, focusing on the potential benefit of coordinated efforts. Rural leadership training will be added to the menu of services such that the cadre of local leaders who understand the broader concepts of community development and economic development can help empower their local community to sustain, succeed, and grow. This leadership training will also include training on how rural health can and should be a part of that effort at the community level.

So will rural health benefit from the new agency? It can! Perhaps the best way to look at this is to realize that healthy health care delivery at the community level depends upon a healthy community. Health care needs patients as well as vice-versa. A healthy community retains and attracts residents. Health care providers are not just providers, but also economic generators and employers. As such, community development and economic development leaders at the community level can learn to understand the value of viable health care delivery for a healthy community and, thus, support the local health

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care providers in ways never before fully realized. It also goes beyond health care to include all segments of the economic landscape of a community.

The ORCA agency offers the unique opportunity to stimulate new thinking and new perspectives. New local partnerships and support mechanisms are possible. Perhaps there are sources of funding from non-traditional sources such as funds for capital costs or for job creation. Bringing in a new physician or hiring a new nurse certainly is job creation. In these days of tight budgets, we must all look beyond the dollar to address the barriers that stand between our current state of affairs and our goals.

Yes, we have new ways of thinking, all facilitated by a new agency dedicated to focusing on “rural” as its sole goal. The discussion table will be larger, but so will be the variety of partners, collaborators, supporters, and leaders. Rural health has an opportunity to seek new solutions instead of continuing to focus solely on activities that have failed to produce all the desired results.

The Office of Rural Community Affairs is a reality, but will rely on definition by rural Texans all across the state and by everyone who wants to be part of the process. It is easy to do:

- Mail: P.O. Box 12877  
Austin, TX 78711
- Street: 507 Sabine, Ste. 300  
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- Web: [www.orca.state.tx.us](http://www.orca.state.tx.us)
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# DENGUE FEVER IN THE LOWER RIO GRANDE VALLEY OF TEXAS: MEDICAL ANTHROPOLOGY AND PUBLIC HEALTH

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## RESEARCH

### ABSTRACT

The dengue virus is transmitted by two *Aedes* species of mosquito. Both are present in the United States and Mexico. The presence of these vectors causes concern that the dengue pathogen is spreading into the United States across the Texas/Mexico border. Outbreaks have occurred in South Texas since 1980. Yet, Texas has not experienced a dengue epidemic, although Mexico has. An epidemic in Texas is possible in the near future. This article focuses on an anthropological approach to the viral infection and spread of dengue. It suggests that human behavior, monetary status, culture, and education all appear to contribute to a high risk of exposure to dengue fever virus among the Mexican-American populations in the Brownsville, Texas area.

Key words: dengue fever, infectious disease, medical anthropology, Mexican border, public health, Texas. (*Texas Journal of Rural Health* 2002; 20(1): 20-33)

### INTRODUCTION

The infectious disease known as dengue fever, commonly referred to as "breakbone fever" and "dandy fever" has re-emerged with a vengeance throughout tropical environ-

ments of the world (Rodriguez-Tan & Weir, 1998). The dengue fever virus is now the most common arthropod-borne viral disease in the world, affecting from 30 to 60 million persons each year (Global Health Situation, 1993). The spread of the disease has had a devastating impact on New and Old world countries, and some public health officials fear dengue fever may be the next plague of North America. Since there are four distinguishably different forms (serotypes) of dengue, an infection may result in a mild nonspecific viral syndrome, or a severe and fatal hemorrhagic disease. Dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) are very serious conditions that sometimes result from dengue infections.

A medical anthropological perspective was used to collect these data. The objective was to use personal interview results to help assess how and what behavioral factors contribute to the spread of dengue fever virus along the Mexican border with Texas, and to determine the degree of dengue information that had reached the Brownsville, Texas region through past local education efforts. Overall, this research contributes to understanding the relationship of human behavior to dengue, and may aid in identifying ways to avoid the spread of the dengue fever virus throughout sub-tropical and temperate North America. Since there is no vaccine or cure for dengue fever, modifying human behavior is currently the most important prevention measure.

### The Virus

The dengue fever viruses are single-stranded, enveloped RNA arboviruses (Cardosa, 1998; Rodriguez-Tan & Weir, 1998). They belong to the family *Flaviviridae*, which

includes nearly 70 viruses. Nearly 35 of these viruses have been linked to diseases in humans. Dengue viruses belong to the genus *flavivirus*, and are classified in the *yellow fever* species category (Cardosa, 1998; Fernandes, 1995; Halstead, 1990).

Flaviviruses are associated with three major clinical syndromes: fever with rash, often with myalgia (muscle pain) or arthralgia (joint pain); varying levels of encephalitis (inflammation of the brain); and hemorrhagic fever. Commonly, dengue fever is related to only two of these syndromes, but there have been several reports of dengue encephalitis (Lum, Lam, Choy, George, & Harun, 1996). *Aedes aegypti* (*Ae*) and *Aedes albopictus* mosquitos transmit the dengue virus. Both species are present in the United States and Mexico.

Dengue was misdiagnosed as malaria in the 19th century and continues to be misdiagnosed as yellow fever, murine typhus, leptospirosis, and St. Louis encephalitis. Global distribution of dengue fever is comparable to that of malaria. An estimated 2.5 billion people live in areas at risk for epidemic transmission. Each year, tens of millions of cases of dengue fever occur and, depending on the year, up to hundreds of thousands of cases of DHF. The case-fatality rate of DHF in most countries is about 5%; most fatal cases are among children and young adults (CDC, 2001a).

The onset of dengue fever may result from the infection of any of four serotypes of the dengue virus, dengue-1 (DEN-1), DEN-2, DEN-3, and DEN-4 (Anon, 1986; Fernandes, 1995; Hayes, 1998). Any combination of the four serotypes may cause the potentially fatal form of dengue known as dengue hemorrhagic fever (DHF).

In the classic form of dengue, a self-limiting fever develops within 2 to 15 days of

infection (Beasley, 1994; Simpson, 1996). Chills, headache, eye pain, joint pain, and severe myalgia (the breakbone sensation) and anthralgias often accompany the fever. The first 24 to 48 hours after fever onset, a skin rash may develop, excluding the palms and soles. Adolescents and adults may suffer ocular pain, anorexia, nausea and vomiting, nonspecific respiratory symptoms, taste alteration, marked lassitude, increased skin sensitivity, conjunctival suffusion, diarrhea or constipation, and occasional abdominal pain. A physical examination may disclose bradycardia, swelling of the lymph nodes, and enlargement of the liver. Enlargement of the spleen is infrequent (Hayes & Gubler, 1992). On the third to sixth day the fever subsides after an intensive sweating crisis, and a second rash appears (Anon, 1986). By the fifth day the rash usually subsides and recovery begins. Complete restoration of the patient's health may occur. However, there is a chance that a second febrile phase may develop, an indication of possible DHF (Hayes & Gubler, 1992).

The threat of more victims developing DHF as opposed to dengue fever is considerable. The global spread of all four serotypes increases the risk of sequential infection from different serotypes. Thus, this spread of all serotypes may explain the rise in reported outbreaks of DHF in recent history (Cardosa, 1998).

### Prevention

Currently, there is no vaccine for any dengue serotype (Hayes, 1998; Rodriguez-Tan & Weir, 1998). The complicated pathogenesis of DHF/DSS has made development of a vaccine difficult.

Since there is no vaccine, the only way to avoid infection is to avoid the mosquito

vectors and/or their bite. This involves changes in human behavior and heightened individual awareness and responsibility. The use of personal insect repellent, insect barriers, and protective clothing provide protection. Also, the elimination of peridomestic breeding sites and the use of larvicides can help prevent dengue fever outbreaks by reducing mosquito populations. Quarantine of patients is not required, since the virus cannot be spread directly from human to human. However, the patient should be confined to a mosquito-proof room to prevent infection from other serotypes of the dengue virus, and to avoid transference of the dengue virus to uninfected mosquitoes (Simpson, 1996).

### Spread of Dengue

Central America and Mexico often report hundreds of dengue cases annually. Recently, epidemiologists fear the dengue virus may be spreading into the United States across the Texas/Mexico border (CDC, 1998). There were outbreaks in the United States in 1980, 1986, 1995, and again in 1999. Most of those affected had a travel history that included trips across the Mexico/United States border. However, those few cases that did not have a travel history to Mexico suggest that there were dengue-infected mosquitoes present in Texas.

Continuation of dengue spread into the interior of the United States does not require the migration of infected *Aedes* mosquitoes. Persons infected in Mexico may carry the virus to the uninfected *Aedes* that reside in the United States. Once a local mosquito bites an infected person, it then becomes a vector for the spread of dengue. Due to this possibility, dengue is recognized as a threat on both the state and national level. The



United States Centers for Disease Control and Prevention (CDC) have created an Internet page dedicated to the disease (<http://www.cdc.gov/ncidod/dvbid/dengue/index.htm>).

### The Vector

The *Aedes* mosquitoes that carry dengue are very well adapted to human environments, both urban and rural. They prefer to breed in human-made containers such as tires, birdbaths, flowerpots, and plastic containers that can hold water. Anything that will hold water and maintain a moderate temperature is a potential breeding site. In most communities there are many containers which mosquitoes use for breeding. Only human effort can modify the environment to eliminate the mosquito vector that spreads dengue fever.

The vectors for dengue fever are two widely-dispersed species of mosquito. The principal vector is *Ae aegypti*, which is present in most tropical countries (Hayes, 1998; Rodriguez-Tan & Weir, 1998). The second vector, *Ae albopictus*, was introduced into the United States within the past 15 years from Asia. Both mosquitoes are commonly found in most of the southeastern United States (CDC, 1998; Rawlings et al., 1998). These mosquitoes are arbovirus vectors (Rodriguez-Tan & Weir, 1998).

The *Ae aegypti* is a small black mosquito with a silver-white, lyre-shaped figure on the upper thorax and white bands on the hind tarsi and abdomen (Goddard, 1993). It only exists in the southern United States. Colder temperatures in the north have limited the spread of *Ae aegypti*. However, humidity and rainfall are not a factor; this mosquito prospers in both wet and dry climates via containers near human residences. Human blood is their preferred diet. This species of

mosquito bites during the daytime hours, and the bite is painless. Bites are typically around the ankles or on the back of the neck (Gubler, 1993).

*Aedes aegypti* has adapted very well to the environment in which it finds its favorite prey. The mosquitoes readily enter houses in search of humans. This mosquito is present usually in dark areas such as closets and bathrooms, as well as behind curtains and under beds (Rodriguez-Tan and Weir, 1998). By breeding in discarded containers and flower vases around dwellings, they find an adequate water supply, either through rain or as residents water decorative foliage. Its flight range was presumed to be only 100 meters (Shope, 1991). However, Reiter and Gubler (1997) have demonstrated they can fly up to twice that distance.

The other vector, *Aedes albopictus* is similar to *Ae aegypti*, with a black body and silver-white markings. However *Ae albopictus* has a single, silver-white stripe down the center of the dorsum of the thorax (Goddard, 1993; Rodriguez-Tan & Weir, 1998). Because of these characteristic white markings on its body and legs, it is called the "tiger mosquito." Its aggressive behavior befits this nickname. *Aedes albopictus*, like *Ae aegypti*, is a daytime-biting mosquito that often lands and bites immediately. It has a flight range of approximately 400 meters (Rosen, Shroyer, Tesh, Freier, & Lien, 1983). This mosquito breeds in small, temporary pools of water such as tree holes or puddles in discarded tire casings.

The discovery of *Ae albopictus* in the United States in 1986 generated interest among epidemiologists and entomologists (Hayes, 1998). This species is an exceptionally good vector for dengue viruses because it is not dependent upon a tropical environment. One difference between it and *Ae*

*aegypti* is the recent finding that *Ae albopictus* not only can transmit dengue from human to human, but the infected females also pass the virus to their offspring, thus creating a greater threat of epidemics on a larger scale (Rosen et al., 1983).

## METHODS

Personal interviews were conducted in the homes of volunteer Brownsville, Texas area residents in 1998. The interviews were aimed at determining the cultural/behavioral factors relating to dengue in the Brownsville, Texas area. A questionnaire was developed that included questions regarding basic demographics (age, gender, and household income, etc) and multiple questions concerning personal knowledge of how people acquire and might prevent infection with dengue fever. The three neighborhoods selected for the study consisted almost entirely of Mexican immigrants, so nearly all of the interviews were conducted in Spanish. Adela Rodriguez, a local resident and sociology student, conducted the Spanish interviews and translated the answers. One hundred and eighty interviews were completed.

The three neighborhoods used in the study were selected carefully. Two local health and social service organizations helped us identify neighborhoods with the necessary risk factors to support a mosquito population. Three neighborhoods were selected: two inside the city of Brownsville, Victoria Heights and Las Prietas (officially known as Garden Park), and one just outside the city limits, Cameron Park. A floodplain map was used to verify that all three neighborhoods were close to standing water in times of moderate to heavy rain.

The average income level was determined (City of Brownsville, 1994). Cameron Park's average was less than \$8,000; Victoria Heights and Las Prietas were both approximately \$17,500 (United States Census, 1994; City of Brownsville, 1994). The oldest, Victoria Heights, is divided into 25 feet by 100 feet lots. The houses are narrow and set very close together. Numerous auto repair shops, with large stacks of tire casings outside, surround Victoria Heights. This was one obvious contribution to mosquito breeding. The overgrown vegetation was another. Most of the residents took considerable pride in caring for their yards. Regardless of how small the space, their yards were crowded with foliage. The abundant vegetation required a constant water source. Water was often stored in open plastic buckets, providing a breeding source for mosquitoes, no matter how dry the recent weather had been.

The lots in Las Prietas are twice the size of those in Victoria Heights. Housing varied. Some were brick with solid foundations; others were made of wood and concrete blocks. Some were "pier and beam." Houses in the most common areas of flooding would often stand on concrete blocks more than a foot off the ground. "Pier and beam" construction allows for standing water to remain underneath the houses for several days. The cool shade below the structure serves as a perfect resting place for mosquitoes. Tires and other containers were found in yards for watering plants, or in the street or open lots, waiting for the city to dispose of them. Some child wading pools were also found to contain mosquito larva.

Cameron Park has the largest lots, 60 feet by 120 feet, and is the most recently established neighborhood (30 years old). The size of these lots has left a vast amount of open,

uncared for space. These areas were often overgrown and littered with trash, tires, plastic buckets and other mosquito breeding containers. Homes in Cameron Park show great diversity, from modern brick, solid foundation homes to simple plywood structures. Yards were littered with many containers; flowerpots, water jugs, and child wading pools were common.

This community is just outside the city limits and, therefore, public services are the responsibility of the county. Residents have lived there since 1961, but the county had not paved the streets or regulated sewage disposal. Private donations and grants from outside interests have allowed Cameron Park to pave some streets and build a community center. Both these improvements have contributed to the quality of life. However,

sewage and trash were still being dumped in the natural resaca and in a deep, man-made ravine that almost completely encircles the community.

A total of 60 interviews were conducted in each of these three neighborhoods. After each interview, a quick visual assessment was conducted of each home. Notations were made concerning screens on the doors and windows, air conditioning units, construction of the home itself, visible water-holding containers in the yard or immediate area, and the presence of any standing water.

**Table 1. Community Comparison of Responses to Information Questionnaire**

Question	Cameron Park %	Las Prietas %	Victoria Heights %
	Yes	Yes	Yes
Do you own a TV?	95	98	100
Do you own an AC?	42 *	65	67
Do you use Mexican medical care facilities?	33	32	30
Do you know what dengue is?	80	35 *	76
Do you have knowledge of dengue cases?	33	25	13 *
Do you know how to prevent dengue?	47	38	40
Do you have knowledge of prevention programs in your neighborhood?	28	5 *	28
Do you know of trucks spraying for mosquitoes in your area?	48 *	85	70
Do you leave the windows open during the spraying?	68 *	42	45

\* Based on a 95% CI, this community was significantly different than the other two ( $p \leq 0.05$ ).

RESULTS

*Community Comparisons: Results and Discussion*

The results of the questionnaire data indicate some significant differences among the three neighborhoods. Cameron Park residents reported 23% to 25% fewer [95% confidence interval (CI); 5.6% to 40.4%] residences with air conditioning than the other two communities (see Table 1). Las Prietas and Victoria Heights residents reported 65% and 67%, respectively. This was quite surprising, especially since we reviewed the electricity usage of the homes interviewed, and most of them used about one-third less electricity than the average home in Brownsville. The primary reason for this may have been that most residents in these neighborhoods used the air conditioning sparingly to avoid the cost. Usually they only used it during the evenings, so the heat would not prevent getting a good night's rest.

Approximately one-third of the families in each neighborhood traveled to Mexico for

medical care when they felt a doctor was needed. The combined frequency of all the neighborhoods was 31.7% (see Table 1). Perception of when a doctor was needed was quite interesting. Almost never did a respondent reply that money was or was not a reason to visit a physician. Most stated they had some form of health/medical insurance coverage in the United States for their children and usually for themselves. However, those who had coverage only for their children stated they never went to the doctor for themselves, but only took their children. If they decided they needed a doctor, they went across the border to Mexico because they not only thought Mexican doctors were less expensive, but also thought they were more efficient and effective. Mexican doctors had a reputation for "always giving the patient a shot," whereas United States' doctors were said to only give Tylenol™ and require multiple visits. In effect, it was often considered cheaper and more productive to go to Mexico, because you were treated the first time.

**Table 2. Community Comparison of Information Sources**

Source of Information	Cameron Park %	Las Prietas %	Victoria Heights %
Pamphlet	5	3	0
Radio	11	10	2
Health professional	10	8	3
Church	0	0	0
School	2	0	2
TV	42	47	53
Other	47	40	47

\*Neighborhood totals exceed 100%, because a respondent could indicate more than one source.

The questions concerning the level of knowledge about dengue were also of considerable interest. How much did the residents of the Brownsville area know about dengue and where did they learn what they knew? See Table 2. Such information is necessary to determine if past efforts at educating the public were effective. Most of the people interviewed in Cameron Park and Victoria Heights felt they knew what dengue was (see Table 1). The level of knowledge concerning dengue in Cameron Park seems reasonable because of the intensive educational effort the community cultural center initiated in 1995, and continued to provide whenever the rainy season hit. Also, since the frequency of travel to Mexico by the Cameron Park residents was high, many would have seen the ill effects of dengue or perhaps even have known someone with the disease (see Table 3). Dengue outbreaks have been an annual occurrence in Matamoros, Mexico with hundreds of cases (Hayes, 1998). When cases appear, dengue is widely discussed in the media. Spending time in Matamoros should have greatly increased the likelihood of hearing about dengue. This hypothesis is supported by the data reported in Table 1 and Table 3. Cameron Park respondents answered "yes" to the question "Do you know of dengue cases?" more frequently than those in either of the other neighborhoods. This firsthand experience may explain

why more than 46% of the people from Cameron Park selected the "other" information source (see Table 2). However, this does not explain why Victoria Heights residents chose the "other" category at an equal rate as the Cameron Park respondents, since the Victoria Heights interviewees had the least frequent travel to Mexico and the lowest frequency of knowing someone with the disease. It also does not explain why Las Prietas residents, who travel to Mexico as frequently as the respondents from Cameron Park, knew very little of dengue. Only 35% of Las Prietas residents felt they knew what dengue was (see Table 1). It may be that Cameron Park residents' knowledge of dengue originated more from actually knowing someone with the disease than from learning of it by visiting Mexico. However, the "travel to Mexico" and other interview data support the idea that much of the knowledge of dengue originated from people in Mexico. Thirty-one of the 41 cases known to Brownsville respondents were said to be patients from Mexico.

Table 1 also presents information concerning community efforts to control dengue fever in the area. We discussed various community clean-up programs with the residents. The question was then asked, "Do you know of any efforts or programs for prevention (of dengue) in your neighborhood?" Only 28% of the respondents in Cameron Park and

**Table 3. Community Comparison of Frequency of Cross-Border Travel**

Travel to Mexico	Cameron Park %	Las Prietas %	Victoria Heights %
Once per week	18.3	26.7	13.3
More than once a week	8.3	10.0	13.3
Monthly	26.7	18.3	13.3
Never	46.7	45.0	60.1

Victoria Heights were aware of any such control programs. However, in Las Prietas only 5% were aware of any prevention program in their neighborhood.

One program that was implemented in Cameron County was spraying insecticide from moving trucks. Both the city and county used this method to reduce mosquito populations. Eighty-five percent of the Las Prietas respondents had seen trucks spraying in their neighborhood, as had 70% of the Victoria Heights respondents. But less than half of the Cameron Park respondents had seen trucks in their area (see Table 1). The lack of such sightings in Cameron Park could have been because many people had only recently moved to the area or because the county sprayed less frequently than the city.

Ray Rodri'guez, Chief Sanitarian for the Cameron County Health Department, explained how the insecticide program was employed. The state health department set strict limits on the use of insecticides. First, an investigator had to determine if a risk existed. After a rain they first waited for the water to run off. Then Rodri'guez sent trucks to neighborhoods that he felt most required mosquito control. This was based on perceived knowledge of areas with standing water from past rains. However, during the spring months, the trucks were only sent out when neighborhood residents called to complain about mosquitoes. The insecticide used was only effective on adult, flying mosquitoes. To kill larvae, the driver put a larvacide into the water. However, the only time pools of water were treated was when residents called to specifically complain about mosquitoes apparently originating from that pool.

Since mosquitoes that carry dengue viruses can be inside houses, as well as outside, whether or not doors and windows

are kept open when insecticide-spraying trucks passed by could have had an effect on the success of the insecticide. Only in Cameron Park did a majority of respondents leave their windows open when the trucks passed (see Table 1). Mrs. Moreno, the colonia "mother," said she stressed to residents to keep their houses "open." Since many of the Cameron Park homes did not have air conditioning, they vented their homes by leaving the windows and doors open even during insecticide spraying. Additionally, several of the homes in this area had doors and windows that would not close properly. Many homes were under construction. There were also numerous make-shift dwellings.

Las Prietas and Victoria Heights residents that had seen the trucks often complained of the spray. They would quickly try to close up their homes once the trucks were spotted to prevent inside fumigation. The spray program was probably more effective in Cameron Park, because mosquitoes had fewer "hiding places."

Our data show some definite structural/behavioral/information-source differences between the three neighborhoods of the Brownsville area. They suggest that different educational programs should be applied in specific residential areas in order to convey correct information concerning dengue and how to prevent it. A tailored program for each neighborhood would probably be most beneficial.

#### Combined Neighborhoods: Results and Discussion

The data suggest that basic information concerning dengue had reached the people through local educational programs. However, television was the primary source for

obtaining this information, despite the 1995 campaign that involved the delivery of flyers door-to-door in many neighborhoods. Even so, the obvious profusion of tires and other mosquito-breeding containers, documented in all the neighborhoods, demonstrated that prevention messages had not been incorporated into the local lifestyle. Organized community clean-up had almost ended. Also, the information residents received was not entirely understood. This was reflected in the majority of residents' interpretation of "stagnant water" to be "dirty water." Water that looks clean and is in clean containers can still be "stagnant."

The quality and care of the residential areas in these high-risk areas was also problematic. Neglect of tire disposal was seen mostly in Cameron Park. Several residents told us a county tire pick-up service was supposed to take place at least once a month, but the trucks had not come for several months. So the tires stacked up in yards and ditches all across the community. Trash dumpsters were not provided, so residents burned their trash or dumped it in the surrounding ditch, creating more mosquito-breeding sites. Often, trash was spread through the area by the wind. An insufficient drainage system, the highly polluted resaca, and the man-made ditch created the perfect sub-tropical environment for mosquitoes to breed after every rain. Sixty-one percent of the population felt dengue was a local health problem. Unfortunately, all of these problems were apparently overwhelming, and residents felt they could not cope by themselves. Therefore, if improvement was to be made, the county must assume more responsibility.

Dengue mosquito vectors are most active during the daylight hours. Originally it was hypothesized that there was high exposure to mosquitoes in these Brownsville area neigh-

borhoods, because more people were outside during daylight hours, which was believed to be partially due to a lack of air conditioning in their homes. Therefore, they increased the risk of being bitten by "day" mosquitoes that carry dengue viruses. Residents of Victoria Heights and Cameron Park spent a lot of time outside. The data showed that a majority of those residents had air conditioners, but they could not afford to run them all the time. Therefore, they were used primarily at night to improve sleeping conditions.

Another interesting finding was how frequently these families traveled to Mexico (see Table 3). Las Prietas and Cameron Park residents crossed the border quite frequently when compared to Victoria Heights; however, the differences were not statistically significant. Nineteen percent of all those questioned stated they traveled to Mexico weekly and another 19% traveled there at least once a month (see Table 3). They were also in Mexico primarily between 6:00 a.m. to 6:00 p.m., the peak biting hours of *Aedes* mosquitoes. The low rate of dengue in South Texas is, therefore, difficult to explain on the basis of our interviews. With so much traffic across the border, we might expect dengue to be transported more readily.

The low rate of dengue fever reported from South Texas may be due to misdiagnoses and/or under-reporting. Professionals from Brownsville Community Health Services suggested that it was possible Texas had many cases of unreported dengue.

Dengue is sometimes misdiagnosed as influenza or other pathogens that produce similar signs/symptoms. The only way to verify that a patient has dengue is to obtain both an acute-visit and a convalescent blood specimen about two weeks after the clinical onset of the disease. If people are feeling better, they may not return to the doctor and/

or pay for a second blood specimen. If they actually did have dengue fever, they might be too sick to return to the same physician or perhaps be even dead by then.

The Texas Department of Health (TDH) has addressed these concerns with population-based data during the past two years. In 1980, 23 (36.5%) of 63 dengue cases reported to the TDH acquired their infection in Texas; no travel outside of the state was made in the two weeks prior to the onset of illness. In 1986, 8 (47.1%) of 17 reported cases were apparently acquired in Texas. During both of these outbreaks, Dengue-1 was the only serotype isolated from patients with Texas-acquired infection. In the 1995 Texas outbreak, 7 (24.1%) of 29 dengue cases were "locally" acquired. Both Dengue-2 and Dengue-4 serotypes were isolated from these patients. From 1995 to 1999, locally acquired cases continued to be reported (TDH, 2000).

Another large outbreak of dengue illness occurred in Texas during 1999. Sixteen patients were hospitalized; one died from DDS. Of the total 66 cases reported, 48 (72.7%) had traveled outside the United States within two weeks of illness onset. Twenty-four of these had a history of travel to Mexico. Eighteen (27%) of the patients acquired their illness as a result of traveling to and/or living in Cameron, Hildago, Starr, Webb, and/or Willacy counties in South Texas. Although most dengue cases diagnosed in Texas have been among travelers who were infected outside the state, endemic dengue infection appears to have been established in Texas prior to this study.

In 1999, the TDH conducted a study to determine the extent of unreported and/or undiagnosed dengue cases that had occurred in Laredo. Forty-nine suspected dengue cases were identified from 494 candidate

records. Twenty-four (49%) of these were interviewed, and 22 (91.7%) of the 24 agreed to provide serum samples. Eleven (50%) of these 22 "case-patients" had serologic evidence of recent dengue infection. Nine of these had been diagnosed with "viral syndrome;" two had "flu-like illness." Nine reported travel to Mexico within two weeks of the onset of illness; two had been outside of Texas (TDH, 2001; CDCb, 2001).

## CONCLUSION

Our data suggest that some knowledge of dengue fever, its transmission, and methods of prevention existed among the residents of Brownsville, Texas communities. In addition, there were differences among the neighborhoods concerning specific knowledge about dengue fever. To be more effective, future health educational programs should be tailored specifically to the individual neighborhoods.

Efforts in neighborhood clean up had decreased once the threat of the 1995 dengue outbreak subsided. The continued dengue fever threat had not been advertised to the community as a priority, so upkeep of the area did not continue. In addition, it's important to note that "one man's trash is another man's treasure." People must have an incentive to dispose of items they believe could be useful, especially if those things could pose a health threat.

A re-education program with new methods was needed to keep communities aware of the high risk that dengue poses. This program should focus on medical professionals. Dengue fever is very difficult to diagnose clinically because of its rather common early signs/symptoms. The importance of taking blood samples to verify the diagnosis must be



stressed in clinics. Close medical evaluation, surveillance, and study of possible dengue patients are necessary. To learn actual case numbers and incidence rates in South Texas, we must keep misdiagnosis to a minimum and ensure that actual dengue cases are reported to local and state health departments.

Without accurate prevalence and incidence rates, we cannot demonstrate the true need for educational or environmental health efforts to avoid an outbreak.

An educational program that is beneficial to all the residents of Brownsville and bordering communities, such as Cameron Park, might benefit from our experience. We learned from residents that there was a person informally designated as the "mother" of each neighborhood. The "mother" was the person to whom the residents looked to for advice and who typically could rally the residents for programs she felt would benefit the community. After speaking to the "mothers" of Cameron Park and Las Prietas, we learned considerable information. They told us about past and present conditions and gave an assessment of the overall neighborhood's attitude toward educators coming into the area. Cameron Park residents, for example, were very familiar with researchers walking the streets and knocking on doors. Their "mother" directed a cultural center that kept the residents well informed. The center even sent a van equipped with a bullhorn to each street to inform residents of: programs at the center, the next scheduled tire pick-up, or any threatening situation. The quality of community organization established in Cameron Park was excellent and could be used as a model for others.

The importance of communication with the community "mother" could also be seen

through our experience in Las Prietas. The "mother" of Las Prietas was very helpful in conveying the neighborhood attitudes. Her neighborhood was not particularly friendly to "door knockers." She attributed this to repeated negative dealings with door-to-door solicitors. She also informed us that the Las Prietas residents had never been interested in "bonding" through community programs. This information inspired us to alter our dress and approach in order to be better received.

Demographics and community resources of each area should also be taken into account when designing an educational program. Older individuals were predominant in Victoria Heights. Many in this population would have needed transportation to an informational group meeting or film to have had an effective educational program. Also, neither Victoria Heights nor Las Prietas had a community building for gatherings, as did Cameron Park. Promoters would have to go door-to-door and/or organize community meetings. Television may be the most effective and least costly educational tool. Since 98% of total respondents had working televisions, periodic announcements about dengue would probably be effective. We found that many residents come into the house to watch the daytime Spanish-language soap operas. Information should be presented during afternoon hours on local Spanish-language channels and in the evenings after 6:00 p.m. when the working residents have returned. It would be beneficial to include information on the physical appearance of mosquitoes and what mosquito larvae look like. To be effectively tailored, the content of any television messages should include input from the local "mothers."

Human behavior can, indeed, contribute to

the spread of dengue fever. Dengue viruses appear to be endemic in South Texas, and dengue illness appears to occur in patients who do not travel outside of the state. Anthropological methods and research would be useful in the continual development of community health education programs. Tailoring educational programs to the community level can be one vital key to the control of dengue fever in South Texas communities.

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# HIGH-USE OF MEDICAL CARE AMONG ELDERLY PERSONS WITH HEART DISEASE

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## ABSTRACT

The purpose of this study is to investigate the relationship between rural residence, the presence of co-morbidities, income, and Hispanic ethnicity with the risk of being a high-user of medical visits. Respondents to the National Health Interview Survey (1997) who reported having heart disease and being age 65 or over were selected for analysis. Logistic regression in SUDAAN was used for the multivariate analysis. Rural residence was marginally significant in univariate analysis, but non-significant in multivariate analysis. Being low-income and Hispanic were not associated with being a high-user in this population. Poor health, asthma, cancer, and liver disease increased the odds of being a high-user. The odds ratios were 1.93, 1.42, and 2.15 for asthma, cancer, and liver disease, respectively. Among elderly heart disease patients, the odds of being a high-user are greater if one is in poor health. Social and economic variables proved not to be significant when health status and co-morbid conditions were taken into account.

Key words: elderly patients, heart disease, medical visits, rural health. (Texas Journal of Rural Health 2002; 20(1): 34-43)

## INTRODUCTION

As fiscal pressures intensify, policymakers, providers and consumers are aware of the need to control the cost of medical care. For vulnerable populations such as residents of rural areas, the elderly, the poor, and members of minority groups, among whom out-of-pocket payments may be out of reach, finding ways to effectively manage chronic disease with a moderate number of visits is especially important. Survey data showing which groups are likely to be high-users could help to focus more detailed clinical investigations.

Heart disease is an example of a chronic disease that must be effectively managed. Over 50 million Americans have cardiovascular disease and approximately \$150 billion are spent on cardiovascular disease each year (Seidman, Bass, & Rubin, 1998). Furthermore, the quality of treatment is believed to vary from one provider to another. For example, Ayanian, Guadagnoli, McNeil, and Cleary (1997) found that cardiologists in Texas used drugs, angiography, and angioplasty more effectively than generalists. It must be recognized that most of the heart disease visits in some market areas actually are made to generalist physicians who are providing the follow up care to patients who have heart disease.

Furthermore, access to cardiology is not equal for all Americans. Access to bypass surgery has been shown to vary by race/ethnicity (Hannan et al., 1999). Elderly patients receive less aggressive medical and invasive management of unstable angina (Giugliano et al., 1998). African-Americans are less likely to receive cardiac catheterization (Schechter et al., 1996). In short, there is reason to suspect that vulnerable populations are under-served in cardiology. On the other hand, Leape, Hilborne, Bell, Kamberg, and

Brook (1999) reported no differences by ethnicity in New York City.

Specific aims of this project are:

1. To determine whether the risk of being a high-user of medical visits is the same for rural elderly persons with heart disease as for other elderly persons with heart disease, controlling for the effects of biological, psychological, and social variables.
2. To determine whether the risk of being a high-user of medical visits is the same for low-income elderly persons with heart disease as for other elderly persons with heart disease, controlling for the effects of biological, psychological, and social variables.
3. To determine whether the risk of being a high-user of medical visits is the same for Hispanic elderly persons with heart disease as for non-Hispanic elderly persons with heart disease, controlling for the effects of biological, psychological, and social variables.

## METHODS

### *Data*

The data source for this study was the 1997 National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics (1999). The NHIS is a nationally representative database of health and health care utilization. The data used in this study were compiled from the family and adult core sections of the survey. Merging these two sections yielded 36,116 observations. Data were limited to the sub-population of 1,196 persons over 65 who reported that they had heart disease.

### Independent Variables

Sociodemographic variables included rural/urban residence, gender, race (categorized as white, black, and other), Hispanic ethnicity, education (some college education/college graduate), marital status, whether the individual was born in the United States, and region of residence (Northeast, South, Midwest, or West). Socioeconomic and enabling variables included income level (\$0 to \$20,000; \$20,000 to \$44,999; and \$45,000 and higher), employed/unemployed, Medicare coverage, Medicaid coverage, private health insurance, other government insurance, and having a usual place of care. Numerous health status factors were considered, including overall self-rated health (excellent, very good, good, fair, or poor) and several self-reported diseases and conditions (asthma, cancer, bronchitis, diabetes, emphysema, kidney disease, liver disease, stroke, and ulcer). Finally, psychiatric distress was assessed through a summative measure of six psychiatric functioning items. The six items asked the individual how often in the last 30 days he/she felt sad, nervous, restless, hopeless, and worthless and how often everything was an effort. Responses ranged from 1 (all the time) to 5 (none of the time). Each of these items exhibited a strong correlation with the total (0.64 to 0.72). The Chronbach alpha coefficient was 0.86, suggesting that the summary item has strong internal validity.

### Dependent Variables

Most studies of physician service use examine whether individuals access medical care at all and, if so, the frequency of physician visits. In this study, the focus is on

individuals who are high-users of physician care. The dependent variable was whether the individual had ten or more physician visits in the past year.

### Analysis

The NHIS data were collected through a complex sample design including stratification, clustering, and oversampling of minority groups (National Center for Health Statistics, 1999). Common statistical analysis software packages, such as SAS and SPSS, do not account for these sampling characteristics and, thus, may yield biased variance estimates and test statistics (National Center for Health Statistics, 1999; Levy & Lemeshow, 1991). To assure that the variance estimates and corresponding test statistics were accurate, we employed logistic regression in the SUDAAN software program (Shah, Barnwell, & Bieler, 1997).

Univariate logistic regression analyses were first performed to determine which independent variables should be considered as candidates for inclusion in a multivariate model. Wald statistics were examined to determine which variables were associated with ten or more visits at the 0.25 significance level. All variables which had a p-value of 0.25 or less were retained for inclusion in a multivariate model. Using a lower p-value of 0.05 could result in the exclusion of potentially important risk factors (Hosmer & Lemeshow, 1989).

## RESULTS

In univariate analyses, race, college education, marital status, United States origin, living in the Northeast, income level, other

## HIGH-USE OF MEDICAL CARE

government health insurance, Medicare coverage, and having a usual source of care were not independently associated with high utilization at the 0.25 significance level. These variables were, therefore, not included in the multivariate analysis. Variables that did have univariate odds ratios with p-values of 0.25 or less are displayed in Table 1.

Results from the multivariate analysis are shown in Table 2. As the table indicates, only health status variables were associated with high physician service utilization. Persons who rated their health as excellent, very good, good, or fair were significantly less likely to have ten or more visits than those who rated their health as poor. Persons who had asthma or cancer were significantly more likely to be high-users. Additionally, if a one-tailed test

was used, having liver disease was also associated with having ten or more visits. Because the presence of a co-morbidity would be expected to increase the odds of being a high-user, a one-tailed test is arguably appropriate.

Interestingly, while rural residence and Hispanic ethnicity approached significance in the univariate analysis, they were not significant in the multivariate analysis. Moreover, neither Medicaid nor private health insurance were significant in the multivariate analysis. An obvious interpretation of these results is that the effects of rural residence, Hispanic ethnicity and health insurance coverage are confounded with health status.

**Table 1. Univariate Logistic Regression Analysis of Ten or More Physician Visits**

Independent Variable	Univariate Odds Ratio	p-value	95% Confidence Interval
Psychiatric distress	0.92	0.001	0.87-0.95
Hispanic	1.74	0.06	0.97-3.10
South	0.84	0.25	0.64-1.12
Midwest	1.23	0.20	0.90-1.68
Rural	1.33	0.10	0.95-1.89
Medicaid	1.91	0.001	1.29-2.82
Private insurance	0.75	0.07	0.55-1.02
Excellent health	0.56	0.14	0.26-1.21
Very good health	0.34	0.001	0.23-0.49
Good health	0.69	0.03	0.49-0.95
Fair health	1.43	0.01	1.08-1.91
Asthma	2.15	0.001	1.49-3.11
Cancer	1.58	0.001	1.15-2.15
Bronchitis	1.76	0.01	1.16-2.65
Diabetes	1.72	0.001	1.24-2.38
Emphysema	1.61	0.05	1.01-2.58
Kidney disease	2.05	0.01	1.21-3.46
Liver disease	3.46	0.001	1.56-7.68
Stroke	1.85	0.001	1.29-2.66
Ulcer	1.58	0.01	1.13-2.22

CONCLUSIONS

All studies of medical care utilization by the general population include age as a variable. All studies find that utilization increases with age. Most of this increase is attributable to changes in health status. Studies that focus on elderly respondents also are common. Most use archival data, as does the present study (Himes & Rutrough, 1994; Cox, 1986; Wolinsky & Johnson, 1991; McConnel & Zetzman, 1993; Rosenbach, Acamache, & Khandker, 1995; Blazer, Landerman, Fillenbaum, & Horner, 1995; Counte & Glandon, 1991; Freeborn, Pope, Mullooly, & McFarland, 1990; Burnette & Mui, 1999; Mentnech, Ross, Park, & Benner, 1995; Miller et al., 1997; Schur, Bernstein, & Berk, 1987). Studies analyzing the behavior of subjects who have particular chronic diseases are relatively rare in the utilization literature, even though many of the variations in service use, access, and satisfaction are likely to be disease-related. Only three could be found addressing heart disease patients. Flaker,

McGowan, Boechler, Fortune, and Gage (1999) reported on use of antithrombotic therapy received by urban and rural patients in Missouri. Stafford and Blumenthal (1998) used the National Ambulatory Medical Care Expenditures Survey to study use of preventing services by heart disease patients. And Hannan et al. (1999) used a Rand Corporation survey to study access to bypass surgery. No other studies of medical care use by elderly heart disease patients could be found in the medical literature.

The economic factors that survey researchers have found to be important determinants of medical visits are income and insurance status (Bashshur, Homan, & Smith, 1994; Saver & Peterfreund, 1993). Income usually is found to be positively related to visits. Insurance often is found to be a predictor of visits as well (Saver & Peterfreund, 1993; Mueller, Patil, & Boilesen, 1998). However, medical insurance does not guarantee equal access. A study in the state of Washington found that in terms of ease of access, postponing care, and having a regular

**Table 2. Multivariate Logistic Regression Analysis of Ten or More Visits**

Independent Variable	Odds Ratio	p-value	95% Confidence Interval
Excellent health	0.24	0.001	0.10-0.57
Very good health	0.17	0.001	0.09-0.29
Good health	0.29	0.001	0.17-0.50
Fair health	0.45	0.001	0.29-0.71
<b>Poor health</b>	<b>(reference)</b>		
Asthma	1.95	0.001	1.24-3.06
Cancer	1.42	0.04	1.01-1.99
Liver	2.15	0.07	0.93-4.97

Non-significant, controlled variables included: bronchitis, diabetes, emphysema, Hispanic, kidney disease, Medicaid, Midwest, private insurance, psychiatric distress, rural, South, stroke, and ulcer.



source of care, Medicaid recipients fared worse than respondents with private insurance (Saver & Peterfreund, 1993).

In our study several social and economic factors proved not to be important after the presence of co-morbidities was taken into account. This is a surprising finding. While it is true that the vast majority of elderly persons have Medicare coverage, the need for private supplemental insurance is well-recognized. Yet neither private insurance nor income proved to have an independent effect on being a high-user. We must conclude that the need for care overpowers socio-economic factors in this population; elderly persons with heart disease usually find a way to get care when they believe they need it. Or, perhaps, providers are more responsive to the care needs of elderly persons with heart disease than they are of other patients.

Another variable usually believed to be important is having a usual source of care (Gallagher, Andersen, Koegel, & Gelberg, 1997). Having a usual source of care contributes to continuity and coordination. However, this variable has not gone unchallenged. Hayward, Bernard, Freeman, and Corey (1991) concluded that regular source of care is not an accurate indicator of access to continuity of care. Mainous and Gill (1998) argued that having a regular site of care is not equivalent to having a regular doctor when it comes to achieving continuity. In our data, usual source of care was not significant when the presence of co-morbidities was taken into account. We suspect that since many elderly persons with heart disease have both a regular place and a regular doctor, those variables would not be expected to explain much of the variation in medical visits.

Ethnic and minority group status usually is believed to be important in predicting medical visits (Cox, 1986; Burnette & Mui,

1999; Miller et al., 1997). However, when Mentnech et al. (1995) studied the NHIS from 1984-92, they found race not to be significant in explaining physician visits. The same findings were achieved by Wolinsky and Johnson (1991) in their study of the 1984 NHIS. Rosenbach et al. (1995) found that neither being black nor being Hispanic was associated with physician visits in their study of the Medicare Current Beneficiary Survey. In our study, being black was not associated with being a high-user. Being Hispanic was significant in the univariate comparisons, but not when the presence of co-morbidities was taken into account. This implies that Hispanics who have heart disease use more services because they are more ill than others who have heart disease.

Rural residence usually is regarded as important in use of medical care. In a study of the 1984 NHIS, Himes and Rutrough found that elderly rural residents had fewer medical visits (Himes & Rutrough, 1994). In contrast, McConnel and Zetzman reported that analysis of the 1984 NHIS showed no relationship between rural residence and either frequency of health care use or the probability of service use for elderly persons (McConnel & Zetzman, 1993). Our data, taken from the 1997 NHIS, showed rural residence not to be a significant variable. However, we note that since rural was defined as residing in an area with less than 250,000 population the question remains unresolved.

The usual access-related variables were not significant in this model (e.g., insurance, usual source of care, income, race, ethnicity, rural residence). Instead, the major correlates of being high users of medical care are need-related variables: health status and co-morbidities. The difference between our findings and the usual results could be due to methodology. One obvious difference is that

we included individual diseases as predictor variables, whereas other survey researchers almost universally ignore diagnoses. We regard this innovation as an improvement in methodology. Another methodological difference is that we dichotomized the data into high-users and others. The conventional approach to analyzing physician visits is to use two-stages: first, model the odds of being a non-user and then model the number of visits for those persons who use some care. Studies of high-users are rare, though two were found. Freeborn et al. (1990) studied high-users of medical care among elderly Kaiser subscribers. (They found the number of medical conditions, having a regular doctor, and self-rated health status to be significant.) Lefevre et al. (1999) found a higher prevalence of mental disorders in high-users of primary care. Given the importance of efficiency and effectiveness in today's market, we are forced to conclude that more studies of high-users are needed.

The unimportance of social and economic variables in our results suggests that elderly persons with heart disease do not face significant access barriers to being high-users of medical care. The relationship between health status, co-morbidities, and being a high-user suggests that the clinical needs of the patients drive them into the high-use category. However, there is no reason to assume that high-use is inevitable for these patients. Instead, the possibility of more effective clinical management should be considered. Although patients who identify more than one chronic condition and report poorer health may require more health care services because of the severity of their illness, it may be possible to reduce the frequency and intensity of their service use by implementing more effective clinical management. Not only would this have the

benefit of reducing their health care costs, but their health status and quality of life might also improve. It is particularly important for this group of patients to have a primary health care provider such as a nurse practitioner, physician's assistant, or family practice physician who can act as a care manager in order to coordinate specialty medical services and ancillary nursing, rehabilitative, and supportive care. The provision of a visiting or home health care nurse to monitor medical conditions and to provide ongoing patient and family education could be beneficial for patients with complicated medical conditions. Patients who report more than one chronic disease are likely to have complicated medical regimens and be at risk for errors in medication dosing or adverse medication interactions, particularly if specific components of their disease state are being independently rather than cooperatively managed. Preventive services (such as influenza vaccination) and counseling in regard to behavioral changes (e.g., exercise, nutrition, and abstinence from alcohol and cigarettes) are also important in the subset of patients who are at increased risk of high-frequency service use because of the severity and complexity of their medical condition.

At the same time it should be noted that the above analysis is preliminary and cannot be used to prove that Hispanic and rural elderly patients do not face access barriers. Limitations of the study include the following: the data are cross-sectional rather than prospective, the level of medical care usage is subject to recall bias, and the disease variables are self-reported and, thus, unverified. Therefore, prospective studies are needed.

Since we studied high-users of care, we cannot draw conclusions about the predictors of low levels of service use. Low use, of course, is indicative of impaired access,

whereas high-use is suggestive of system inefficiencies. Furthermore, since we studied a chronically ill population, our findings do not directly pertain to the use of services by persons who primarily need care for acute illnesses.

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## THE 2001 ANTHRAX OUTBREAK: AN OVERVIEW

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### REVIEW

### ABSTRACT

Before the first confirmed case of inhalational anthrax caused by the intentional release of *Bacillus anthracis* on October 4, 2001, the disease had not been of great concern to the American public. However, once the media began in-depth coverage of this act of bioterrorism, the public was immediately thrown into a frenzy of fear and confusion. Hoaxes and misinformation only added to this panic. Public health officials suddenly found themselves under intense scrutiny, and tough questions were asked about disease control and prevention. Sometimes the answers were not what people wanted to hear.

However, the disease control and prevention problems facing public health officials are nothing new, nor are they going to disappear any time soon. They have only been brought to better light because of the recent outbreak. With the media hype rapidly fading, so too has the public attention on these problems. As the biological bogeyman disappears out of the public eye, will anything change as a result of this tragedy or will it be forgotten as quickly as an old nightmare?

This article briefly examines the ramifications of the 2001 anthrax outbreak with regard to disease control and prevention in rural health. In addition, the effect this event has had on the Texas Department of Health will be

discussed. An overview of anthrax and bioterrorism will also be addressed.

Key words: agriculture, anthrax, bioterrorism, disease control & prevention, epidemiology, rural health providers, Texas Department of Health. (Texas Journal of Rural Health 2002; 20(1): 44-56)

## INTRODUCTION

Perhaps there was a dark irony in the words Michael Wermuth, head of a congressional advisory panel on terrorism and a Rand analyst, chose to use during an interview with Time Magazine (Lemonick, 2001), "The idea that someone sends a letter through the mail that you open up, and it says, 'Ha-ha, you've just been exposed to anthrax and are going to die'? Not a chance, just not a chance."

On October 4, 2001, the Centers for Disease Control and Prevention (CDC) reported the first of numerous confirmed cases of anthrax. The source of this outbreak was mail intentionally contaminated with *Bacillus anthracis*; exactly what Wermuth told the American public not to worry about. By December 5, 2001, 22 confirmed cases of anthrax (11 inhalational/ 11 cutaneous) were identified in the United States. Nine of the 11 inhalational cases were confirmed as or likely were the result of direct exposure with contaminated envelopes (CDC, 2002). The impossible had become reality.

A high level of public anxiety quickly followed the first case (a tabloid reporter in Florida), and this was only heightened with each subsequent case and endless media coverage. A deluge of calls suddenly overwhelmed public health agencies; almost all of which were false alarms or hoaxes. With the anthrax scare placed so prominently in the

spotlight, as well as its chronological proximity to the September 11<sup>th</sup> terrorist attack on the World Trade Center, perspective became quickly lost; missing the forest for the tree, as it were. Now months later, the true scope of the outbreak and its effects on rural public health can be assessed with a more objective eye. To do so, one must examine both the biological agent used in October and the history of bioterrorism in America.

## ANTHRAX

Despite its rarity, anthrax is no stranger to rural America. Potentially fatal to most warm-blooded animals, including humans, anthrax is caused by *B. anthracis*. This resilient, spore-forming bacterium can cause illness after a victim is exposed to it in a cutaneous, gastrointestinal, or inhalational manner. Because it is found most commonly in an agricultural setting, through contaminated soil or infected animals, anthrax could be a real concern for rural health providers (CDC, 2002; CDFA, 2001).

Cutaneous anthrax is the most common form of the disease, but even this is a rarity. More than 95% of anthrax cases are cutaneous in nature, typically coming from contact with the carcass or by-products (hides, leather goods, meat, etc) of an infected animal. After an incubation period ranging from 1 to 12 days, the infection progresses from a raised bump into a necrotic ulcer (usually after 1 to 2 days). Fever, headache, and malaise might accompany these symptoms. Even left untreated, the chance for death to result is moderately rare (20%) (CDC, 2002).

The most dangerous form of anthrax is inhalational. Symptoms usually appear seven days after exposure, although some incubation periods can last as long as 60 days.

Symptoms are generally similar to that of a viral respiratory illness; malaise, mild fever, muscle aches, and sore throat (CDC, 2002). Left untreated, death from inhalational anthrax is almost assured, and there is a mortality rate between 75% to 95% should therapy be administered 48 hours after the symptoms appear (Cieslak & Eitzen, 1999; CDC, 2002).

Before the October outbreak, there were only 18 cases of inhalational anthrax in the United States during the 20<sup>th</sup> century, with the last occurring in 1976 (CDC, 2002; Henderson, 2001). Since 1992, there have been two cases of cutaneous anthrax; one in Western Texas in 2001, and the other in North Dakota in 2000 (James, 2001).

Anthrax's main victims are almost always livestock or similar animals (like bison) who ingest the spores while grazing. Scavengers can also fall prey to the disease after feeding on the carcass of an animal that has died from anthrax. Farmers and ranchers typically vaccinate their livestock against the disease, helping to lower the infection rate.

Certain areas of the country are more prone to the existence of anthrax. The most common includes the old cattle trails that ran between Canada and Texas. It can be found even as far north as Wood Buffalo National Park in the Northern Territories of Canada. In Western Texas, anthrax is so prevalent around Del Rio, Rocksprings, and Uvade that the area has been nicknamed the "anthrax triangle" (James, 2001).

Because of its common occurrence in nature, anthrax in a rural setting could cause problems for public health providers in the case of bioterrorism. Julie Rawlings, an infectious disease epidemiologist for the Texas Department of Health's (TDH) Infectious Disease Epidemiology and Surveillance Division, explained, "If we were to hear about an incident of plague or anthrax in a rural area,

say West Texas, we would have to determine whether at least a single case was naturally occurring or whether it was the beginning of that bell curve we would see if a terrorist event had occurred. If people in New York were to get a report of plague or anthrax, I'm sure the first thing they would think of is terrorism (Rawlings, 2001)." The length of this determination period could hinder a criminal investigation of the terrorist act. However, on a health service response level, a rural setting could have an advantage during such an intentional outbreak. Rawlings explains, "It is possible because some of these diseases are those you might find endemic in a rural area, like anthrax or plague, that rural physicians would have kind of a leg up on the urban physicians in that respect (Rawlings, 2001)."

#### WEAPONS-GRADE ANTHRAX

Even though many rural communities exist near areas with high anthrax contamination, the number of inhalational cases remains surprisingly low. This is due in part to the nature of the anthrax spores themselves. While the spores are well suited for aerosolization and are extremely resistant to environmental degradation, they are also prone to "clumping." They have a tendency to bind together with other materials, such as soil particles, thus making the spores too large to adequately penetrate the human lower respiratory mucosa. As the infectious dose for anthrax is also quite high (8,000 to 10,000 spores), an exposure adequate enough to cause illness is unlikely (Cieslak & Eitzen, 1999; Kentucky Department for Public Health, 2001).

However, with proper tools and milling processes, anthrax spores can be transformed



into an effective weapon. Additives help prevent clumping, allowing the spores to easily bypass a human's mucosa and, thus, drastically increase the chance of infection. Anthrax's propensity for aerosolization can allow the weapons-grade spores to spread over a large area and successfully cause mass infections. In a World Health Organization (WHO) report, it was theorized that if an airplane dispersed 50 kg of aerosol anthrax over a population center of 5 million, 250,000 casualties would result with approximately 100,000 untreated civilians dying from the exposure (Inglesby et al., 1999).

In 1979, the effectiveness of anthrax as a bioweapon was tragically demonstrated in Sverdlovsk of the former Soviet Union. An accident at a nearby military research facility caused the release of aerosolized anthrax. This resulted in approximately 79 cases of anthrax infection, 68 of which ended in death. Reports of infected animals were recorded over 31 miles (50 km) away from the release site (Friedlander, 1997; Inglesby et al., 1999).

It is known that the anthrax spores used during the biological attack of October 4, 2001 were genetically similar to those manufactured in Army experiments. It is also known that scientists, such as those at the Dugway Proving Ground in Utah, have recently been producing weapons-grade anthrax in the United States. This suggests that the terrorist could have had access to a lab or could have obtained the anthrax from one; be it a university, veterinary school, or government facility (Lemonick, 2001). The reasons behind this outbreak remain, as yet, unknown.

### BIOTERRORISM

Before October 4, 2001, many experts would not have believed that such an act of

bioterrorism was possible in the United States. Until that time, the number of such attacks remained extremely low, and even fewer were successful. Much like Wermuth, many experts refused to believe that a significant threat existed. This may have stemmed from the lack of solid data on bioterrorist threats because of inaccurate and outdated historical information (Tucker, 1999). Perhaps for this reason, public health officials ignored the growing numbers of experts who believed otherwise.

While rare, bioterrorism has still made an appearance in the United States. Whether they were economically, personally, politically, or religiously motivated, these acts of terrorism have left their mark on the American psyche. Even biological hoaxes have had a dramatic effect on the civilian population, causing widespread panic. Between 1998 and 1999, the use of anthrax in hoaxes or threats initiated by extremists and anti-government groups rose dramatically (Stern, 1999). This may explain the disease's predominant presence in the media.

One of America's best-recognized incidences of bioterrorism occurred in The Dalles, Oregon (population: 11,880) in 1984. After the Wasco-Sherman Public Health Department began receiving reports of several people with gastroenteritis on September 17, 1984, the local and state public health officials began an in-depth investigation. They soon confirmed that the two-wave outbreak of *Salmonella typhimurium* was linked to eating at the salad bars of local restaurants in The Dalles. Seven hundred and fifty-one people, possibly more, were infected; 45 of which were hospitalized. Fortunately, there were no fatalities. Subsequent investigation with the help of the CDC determined that the *S. typhimurium* contamination of at least ten restaurants was intentional in origin. A

criminal investigation later revealed that followers of Bhagwan Shree Rajneesh, the guru of a local religious commune, were directly responsible. The outbreak was part of a test for a planned biological attack later that year. They intended to incapacitate voters in an attempt to manipulate an upcoming election that affected their interests (Török et al., 1997).

Other nationally publicized incidences involving bioterrorism include (Tucker, 1999; Stern, 1999):

**1998:** Larry Wayne Harris, a white supremacist, threatened to attack Las Vegas with weapons-grade anthrax. It was later discovered that the anthrax he and his accomplice possessed was the vaccine strain harmless to human health. He had previously purchased three vials of *Yersin pestis* (bubonic plague) in 1995;

**1991:** Minnesota Patriots Council, an anti-government group, planned to attack targets in the federal government with ricin (a potent protein toxin derived from castor beans); and

**1972:** R.I.S.E., a college-based ecoterrorist group, planned biological attacks with several pathogens, such as meningitis and typhoid fever, to wipe out the global population in order to prevent further environmental damage.

Texas has not been immune to bioterrorism. In 1998, members of a faction of the Republic of Texas (a group that believes Texas is not a part of the United States) were convicted for threatening government officials, including former President Bill Clinton and former Attorney General Janet Reno. They had designed concealable weapons that could fire cactus needles coated

in biological agents such as anthrax or rabies (Baro, 1998; Stern, 1999). In 1996, 12 employees at the St. Paul Medical Center in Dallas were infected with *Shigella dysenteriae* type-2 after they ate deliberately contaminated pastries. An unsigned email had also been left referring the victims to consume the muffins and donuts. An investigation revealed that the perpetrator had intentionally used the medical center's own stock of *S. dysenteriae* to commit the crime (Kolavic et al., 1997).

Although the September 11<sup>th</sup> terrorist attack has created worries about forces outside the United States, it can be seen that a greater danger of bioterrorism exists from a domestic origin rather than a foreign one. For this reason, perhaps it is better to look inward rather than outward. Dissatisfaction with the government, religious and ideological differences, revenge, and political goals will inspire some to acts of terrorism. Biological weapons are just another addition to their arsenals. William Pierce, the leader of the National Alliance (a neo-Nazi organization), may have best put this into perspective when he explained, "People disaffected by the government include not only the kind of people capable of making pipe bombs. Bioweapons are more accessible than are nuclear weapons (Stern, 1999)."

## WHAT DOES IT ALL MEAN?

Considering the rarity of both inhalational anthrax and acts of bioterrorism, it is little wonder that the reaction of public health care officials on and after October 4, 2001 was one of shock and disbelief, followed by confusion and panic. Surgeon General David Satcher admitted that federal health authorities struggled to identify and care for anthrax

victims during the outbreak (“Satcher,” 2001). To the credit of public health officials, however, they recovered from this state of shock quickly and dealt with the growing number of anthrax cases. They also managed to unravel the bureaucratic and logistic knots caused by numerous hoaxes and false alarms. Although holes were discovered in their response planning, things could have been a great deal worse.

But this was an outbreak on a very small scale and with a non-communicable bioweapon. What if it had been on a much larger scale and involved a far more contagious disease such as *Yersinia pestis* (pneumonic plague) or smallpox? The United States’ preparedness for such events has only been tested in hypothetical settings. One such simulation was “TOPOFF” that detailed the intentional release of *Y. pestis* in the Denver Performing Arts Center, which resulted in over 3,000 cases of plague and 800 deaths only five days after the attack. “Dark Winter,” another, and far more grim, simulation detailed the use of smallpox in Oklahoma City on December. This outbreak decimated the United States and caused approximately 1 million deaths worldwide (Pile & Longworth, 2001). As useful as these tests were for public officials, their preparations were not truly tested until October 4, 2001. What they learned from this experience was both positive and negative in nature.

### The Negative

Perhaps one of the greatest problems revealed by the anthrax outbreak is that the United States is not prepared for a large-scale biological attack. During a congressional hearing on the threat of bioterrorism one month before the outbreak, Dr. Donald A. Henderson stated that (Center for Civilian Biodefense Studies, 2001):

“We are today ill-prepared to deal with an epidemic of any sort. There is, as yet, no comprehensive national plan nor an agreed strategy for dealing with the problem of biological weapons. There is little inter-agency coordination at the federal level and nationally funded programs appear to be as often competitive as cooperative. Particularly serious are the vulnerabilities in our medical health care system and our public health infrastructures.”

“A major problem is that there really is no public health ‘system’ for dealing with infectious diseases in this country, but rather a fragmented pattern of activities. The federal system, which for the most part is in the federal CDC, is itself comprised of a number of centers and activities that are themselves independent fiefdoms. State and local health departments reflect a similar pattern and there is a major disconnection between public health and medicine. Doctors rarely communicate with local public health officials and often, when they try to do so, they find no one with needed competence.”

“In most areas, public health is not treated as an emergency service as are police, fire, and utilities. The concept of a 24-hour per day, seven-day per week ‘hotline’ is little known. Yet, public health officials will be the ones who will be obliged to organize a response to an epidemic, to communicate with the public, and to orchestrate a city and state’s response resources.”

These disparities in the public health system were also of concern to the Surgeon General, who said, “If there’s anything these bioterrorism attacks have taught us, it’s that the best defense is a strong public health

infrastructure. The CDC has funded some good initiatives, but we need more than we have (“Satcher,” 2001).”

On February 13, 1999, Dr. John Bartlett, chief of the Division of Infectious Diseases at the Johns Hopkins University School of Medicine, revealed an example of these public health disparities during a test case study. Using an anthrax scenario developed by Dr. Thomas Inglesby (1999), assistant professor in the Division of Infectious Diseases at Johns Hopkins University School of Medicine, Dr. Bartlett went to the Johns Hopkins University Hospital. He found several problems, including that, “The pressures of managed care have resulted in a health care system that has minimal elasticity, so on February 13<sup>th</sup>, there were no beds for an anthrax epidemic (Bartlett, 1999).” During a serious anthrax outbreak, hospitals could expect to see hundreds of patients within days, threatening to overrun available services.

For rural communities, the problem can be even greater. Approximately 54% of Texas counties are experiencing a health professional shortage (Mutranowski, 1999). Hospital closures, lack of health insurance, and poor access to proper medical facilities only increase the disparities in the public health infrastructure. This leaves rural residents extremely vulnerable to all major forms of illness (“Satcher,” 2001). With the speed at which some biological weapons can cause fatality, rural communities could be devastated by an attack.

Rural hospitals might also suffer from the spillover effect of an urban-based biological attack. Refugees might seek the safety of rural communities, some of whom might be unknowingly infected; thus passing on the disease to the rural population. Others might be seeking medical treatment and medications

no longer available in the overtaxed urban centers (Siegrist, 2001).

Another problem is the identification of bioterrorist activity. Public health officials cannot properly respond to an intentional outbreak if they are unaware of the clinical indications. Many are simply not aware of the signs and symptoms shown by the most prominent biological weapons such as anthrax and small pox. Misdiagnosis during the early stages of infection could be disastrous for patients. As many symptoms presented by anthrax and other biological weapons are similar to common maladies (such as the flu), the chance of misdiagnosis only increases. The rarity of these diseases makes proper diagnosis more difficult at the onset. Also, rural communities typically lack the facilities or access to them required to properly identify these types of diseases. Rawlings (2001) explains, “In rural areas there may not be a local health department, which might mean that the region has to come in and assist with an investigation and prevention and control activities.”

Lack of information as well as poor surveillance and communication abilities are also problems public health officials must face. Rawlings (2001) stated that, “We need to educate physicians in general about bioterrorism agents, their treatment, how to collect and submit laboratory specimens, and prevention and control type activities. I imagine that there are many physicians out there that have already educated themselves about these things and will be able to react appropriately when the time comes. But I also think there are other physicians out there that still need training.”

“We need ways to enhance our capabilities in collecting surveillance information about people in Texas, people that have been

to Texas, or people that have moved through Texas. The more we know about potential disease, the sooner we can react and do something in the way of prevention and control measures. That would of course include letting folks in neighboring states know about what is going on. Some of the ways that we've been considering enhancing our surveillance is electronically. And here is where it might be that some of the rural communities come in last, because they don't have some of the lines necessary to transmit data electronically. On the other hand, as we build our HealthAlert network here at the health department, some of the people that are helping us build it actually started building an internet of rural hospitals. So, they might be some of the first that are attached to this internet or we're attaching to them, if you will. However, when that's not the case, when we're talking about areas where that hasn't happened, I think that one of our biggest problems is communication."

The Surgeon General also discussed these problems, suggesting that local and state health providers needed better communication networks and laboratories capable of testing suspected biological agents ("Satcher," 2001).

Even when the public health resources do exist, it does not mean that they can be properly utilized. During his test case, Bartlett attempted to contact the Maryland Department of Health. Forced to leave a message, stating that his inquiry about bioterrorism was important, he was not contacted for three days. While a response mechanism did exist, he could not locate the number in the hospital directory or through 911 listings (Bartlett, 1999).

Proper monitoring is also a concern, especially in the border states. Cross-border

travelers as well as the three to five million migrant and seasonal workers can make health surveillance extremely difficult (McKenzie & Kugel, 2000). Because of its transitory nature and difficulty to monitor, this would be an excellent population target for bioterrorism.

One final problem caused by the 2001 anthrax outbreak was that health departments (such as the TDH) were so focused on it that in some cases routine disease reports did not come in or were given secondary status. As some of these reports could have involved problems far more serious than those caused by the act of bioterrorism, important information may have been overlooked.

### The Positive

Surprisingly, there were a great deal of positive results from the anthrax outbreak, covering the entire spectrum of public health care. Much like a booster-shot, the scare may have actually jump-started the "immune system" of the United States public health services. Rawlings (2001) explains it best as follows:

"I think that the anthrax scare, as busy as it kept all of us, was more a help because it allowed us to, if we had not already, develop relationships with our various partners especially law enforcement, fire, and hazmat. We also needed to strengthen those relationships, because those are the people that we don't traditionally work with in public health, but we would have to work along side them in a bioterrorism event. So, it helped us as a training tool. It helped us test our plan, it showed us where the holes were in our plan, and I think this is all beneficial. I don't think that it mattered if we were talking about urban or rural. In some cases with law enforcement staff, it might have been the only contact we

ever had with them in a rural area. So, it might have been more beneficial there where they might not have local health departments such as they do in the urban areas and where contact had previously been made.”

“I think from my perspective that the differences and changes in attitudes [in governmental and rural health providers] have been good. It is very difficult sometimes to make politicians and other health care providers understand the importance of surveillance and these [disease control] reports. At the end of a very busy day, probably the last thing a health care provider wants to do is read a report about the diseases seen that day or in the previous few days. I think because of the events that have occurred with anthrax that for at least a while people are understanding why it is so important for us to know what is going on, both at the baseline and when unusual occurrences happen, so that we can act in as timely a fashion as possible.”

“I also think that many physicians and health care providers have taken the time now to look at some of the diseases that might or can be caused by or during a bioterrorism event. For example, they might brush up on the signs and symptoms of some of the diseases they might normally see, like anthrax, black plague, small pox, or botulism, and basically keep all that in the back of their minds because now this is a real possibility; it is not something that is just remote and that we crazy people in public health were just trying to talk to them about.”

Rawlings (2001) continues by explaining a public health success story that demonstrates improvement in monitoring and surveillance that came during the anthrax outbreak:

“The United States Postal Service subcontracted some of the cleaning of the eastern post offices. That [subcontracted] company hired some Mexican nationals and a homeless person in Port Arthur, amongst hundreds of other people, to go help with this cleaning process. They sent them to New York, trained them, provided them with protective equipment, and had them clean the [contaminated] post offices. While in New York, several of the Mexican nationals came down with a respiratory illness. They were seen in New York, provided with prophylaxis, and tested. When their work came to an end, they left New York and returned to Texas. Perhaps because they were feeling a little ill, they showed up at the Open Source Health Care Alliance offices in Houston, explained their situation, and were then sent over to a hospital where further testing was done and they were given more prophylaxis. However, they wanted to go on down to Mexico to spend Thanksgiving with their families. What I find amazing is that we were able to keep track of these folks and make sure they were all right for this whole period of time with all that was going on. I think it is amazing sometimes that we are actually able to do this.”

“[Returning to border initiatives], we are trying to set up some sentinel surveillance activities along the border that are bi-national, so that we can track people in exactly the same way. We have the same definition for bringing people into the study and following up and conducting the investigations. We typically use the same laboratory tests and things like that. But I think that this is helping us, albeit slowly, to develop the communications that we need to be able to talk to our counterparts across the border so, that when we do have these bi-national situations, that

tracking, finding, and locating will become easier and easier.”

“We have begun discussing bioterrorism response along the border and would probably do that through the same mechanisms that we’ve already begun developing. Hopefully, this will help in enhancing our relationships and will also help us to begin to work on those types of issues.”

Another improvement has been additional funding. Earlier this year, President Bush signed the “bioterrorism appropriations bill” into law. This will provide each state with a base of \$5 million from the CDC to assist in forming and improving the public health systems required to deal with bioterrorist activities. The Health Resources and Services Administration will later provide further funding for regional response planning. Health and Human Services (HHS) Secretary Tommy G. Thompson explained that, “We’re putting money in the hands of states and local communities so they can start building strong public health systems for responding to a bioterrorism attack. These funds are just the start of our efforts to help states and communities build up their core public health capabilities (HHS Press Office, 2002).”

## CONCLUSION

The ripples of the 2001 anthrax outbreak did not end at the shores of urban centers, but were felt just as strongly in rural communities. Nor would the effects of a similar outbreak remain a “city problem.” Plague and small pox do not differentiate between demographic or political borders. In a severe epidemic, no community would be safe. Also, considering the vulnerability of rural health

providers due to poor public health systems, it is not unlikely for an outbreak to take place in a rural town. The effects of such an outbreak would be tragic.

Rural health providers cannot ignore the threat of anthrax and bioterrorism, despite their rarity. Although, inhalational anthrax has not been heard of for some time, cutaneous anthrax remains a threat for Texas farmers and ranchers. Plague and other naturally occurring diseases may also have a drastic effect on rural communities. A better understanding of their pathology would greatly improve the abilities of rural physicians. As unpleasant as it may seem, a great deal of anti-government and similar violent groups exist in rural areas. These organizations have shown themselves more than willing to utilize biological weapons to fulfill their agendas. Nor are bioterrorist activities solely aimed at the human population. Agriculture and livestock are also significant targets for biowarfare, as decimating a country’s food supply can have an equally devastating effect as a direct attack on the human population.

In the end, the 2001 anthrax outbreak pointed out where the problems and disparities in the current public health system exist. It is now up to the state and rural health providers to fill those holes as best they can. To allow this object lesson to go unanswered only invites further disaster. In these uncertain times, nothing can be taken for granted.

Several troubled areas in public health systems must be addressed to better combat the risk of bioterrorism: Communication, detection and surveillance, diagnosis capabilities, preparedness, prevention, and response. Hopefully, rural health providers will recognize these problems and work toward solving them. The use of disaster scenarios, such as TOPOFF and Dark Winter, could be vital tools

for testing current response plans. Lessons learned during these tests could be implemented without the cost of life a real bioterrorist attack would cause.

What the future holds remains in question. Although public health problems have been tragically demonstrated, how health providers will next respond cannot be adequately predicted. Unfortunately, the next "test" might be far more costly. As the Surgeon General said, "The [bioterrorism] attacks have been different than we anticipated. We hope we're more ready now than we were. But until an attack comes, we can't be fully ready. We're all learning together ("Satcher," 2001)."

#### RESOURCES

Further details on anthrax, bioterrorism, and other possible biological weapons can be found at:

American College of Physicians: <http://aponline.org/bioterr/>

Centers for Disease Control and Prevention Bioterrorism website: <http://bt.cdc.gov>

Johns Hopkins Center for Civilian Biodefense: <http://www.hopkins-biodefense.org/faq.html>

United States Army Medical Research Institute of Infectious Diseases: <http://www.usamriid.army.mil/education/bluebook.html>

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