

Z
π 300.6
T312J
2002/2nd

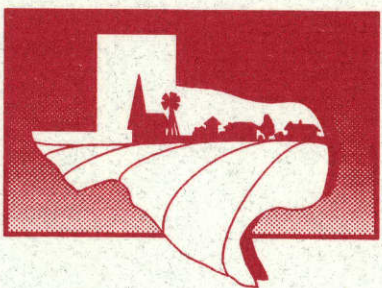
Texas Journal of Rural Health



Government Publications
Texas State Documents

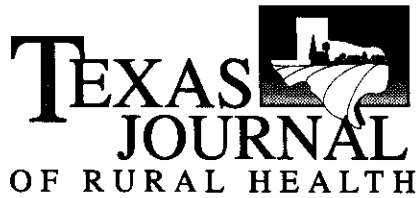
OCT 10 2002

Depository
Dallas Public Library



VOLUME XX, NUMBER 2
2002

VOLUME XX, NUMBER 2
2002



MISSION STATEMENT

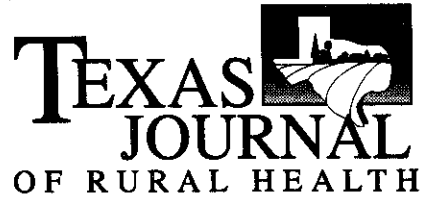
The purpose of this journal is to provide a forum for sharing ideas related to rural health.

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."

The Texas Journal of Rural Health (ISSN 1049-0211) is published by Texas Tech University Health Sciences Center, Preston Smith Library, 3601 4th Street – Suite 244, Lubbock, Texas, 79430, (806) 743-1338. Copyright © 2002 by Texas Tech University Health Sciences Center. For subscription information please contact the office at the address above. No part of this periodical may be reproduced without the written consent of the Texas Tech University Health Sciences Center.

James E. Rohrer, Ph.D.

Editor
Professor and Chair
Department of Health Services
Research & Management
Texas Tech University Health Sciences Center



Lee Ann Paradise

Managing Editor
Texas Tech University Health Sciences Center

Jason Robert Fryer

Editorial Assistant
Texas Tech University Health Sciences Center

THE EDITORIAL BOARD

Paul P. Brooke Jr., Ph.D., F.A.C.H.E.

Dean and Professor
School of Allied Health
Texas Tech University Health Sciences Center
Lubbock, Texas

Ceretha S. Cartwright, Dr.PH.

Assistant Professor
Special Projects
Office of the Regional Dean
Texas Tech University Health Sciences Center
Odessa, Texas

Richard Hoeth, F.A.C.H.E., C.A.E.

Vice President
Rural Health/Membership
Texas Hospital Association
Austin, Texas

Andrew James, Dr.PH., J.D., L.L.M.

Assistant Director
Health & Human Services
City of Houston
Houston, Texas

Patti J. Patterson, M.D., M.P.H.

Vice President for Rural & Community Health
The Marie Hall Chair in Rural Health
Medical Director
Center for TeleMedicine/TeleHealth
Texas Tech University Health Sciences Center
Lubbock, Texas

Susan Pollock, R.N., Ph.D., F.A.A.N.

Professor
School of Nursing
Texas Tech University Health Sciences Center
Lubbock, Texas

Steve Shelton, M.B.A., PA-C

Executive Director
East Texas Health Education Center (AHEC)
Galveston, Texas

Ted Sparling, Dr.PH.

Associate Professor
Department of Health Care Administration
Trinity University
San Antonio, Texas

THE EDITORIAL BOARD

Robt. J. "Sam" Tessen, M.S.

Executive Director
Office of Rural Community Affairs
Austin, Texas

Leonel Vela, M.D., M.P.H.

Dean of the Regional Academic Health Center
Division of the School of Medicine
University of Texas Health Sciences Center
San Antonio, Texas

Mary Walker, R.N., Ph.D., F.A.A.N.

President/CEO
Texas Healthcare Trustees
Austin, Texas

Darryl Williams, M.D., M.P.H.

Director
Office of Border Health
Project Director
Hispanic Center of Excellence
Texas Tech University Health Sciences Center
El Paso, Texas



Authors interested in submitting articles for publication should send them to:

Lee Ann Paradise

Managing Editor: Texas Journal of Rural Health

Texas Tech University Health Sciences Center

Preston Smith Library

3601 4th Street – Suite 244

Lubbock, Texas 79430

(806) 743-1338

MANUSCRIPT SPECIFICATIONS

- **Blind Review:** Prepare manuscript for blind review—authors names on cover sheet only and title sheet without names.
- **Manuscript:** Submit one original manuscript plus three additional copies on clean 8 1/2 x 11 inch paper. Include a disk version if possible. See “save” formats below.
- **Length:** Average article length is 10 double-spaced typewritten pages excluding references. Lengthy manuscripts may be considered at the discretion of the managing editor.
- **Cover Sheet:** The cover sheet of the manuscript should include: (a) the title of the article, (b) the complete name(s) of all the authors, degrees, and certifications, (c) a brief biographical sketch (one or two sentences) about each author with present employment position and location, (d) addresses and phone numbers of all authors, and (e) one fax number.
- **Title Sheet:** Include name of article and abstract or summary of article.
- **Body of Text:** Double spaced, no running heads. Include page numbers such as “1 of 10,” etc.
- **Abstract:** Include an abstract of 25 to 75 words if the article calls for an abstract. If no abstract is required, please write a summary of the contents for the editor’s quick reference.
- **References:** Please cite all references with complete information. The form is that of the American Psychological Association, fourth edition—author/date in text and alphabetical listing in reference section.
- **Copyright Materials:** Authors must supply copyright “permission to print” with manuscripts including quoted copy, derivatives, graphs, and/or photos from original publisher or author/creator.
- **Graphics and Illustrations:** Graphics and illustrations are reproduced by the managing editor so that style and form are consistent from issue to issue.
- **Charts and Tables:** Charts and tables must meet American Psychological Association (APA) guidelines.
- **Photos:** Black and white photos may be submitted if relevant to the article.

“Save” formats for text conversion:

- Microsoft Word for DOS versions 3.0-5.0
- Microsoft Word for Windows version 2.0-6.0
- PageMaker 5.0-6.0 Stories
- WordPerfect for Windows 5.0-6.0

Graphics can be converted from:

- GIF files
- JPEG files
- PICT files

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.

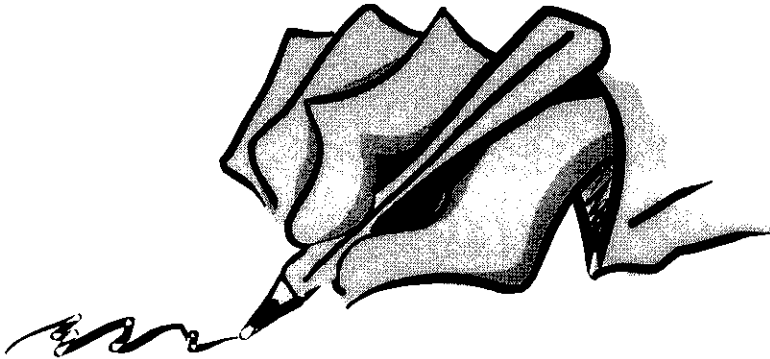
Step Seven: Getting Ready for Publication

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.

Call for Papers



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

- **Notes From the Field**
- **Policy and Law**
- **Research**

Topics of special interest:

- **Rural Development and Community Health**
- **Nursing Shortages**
- **Rural Health Policy**

Papers should be submitted to the Managing Editor as outlined in the "Instructions for Authors."

TABLE OF CONTENTS

EDITOR'S COMMENTS

<i>James E. Rohrer, Ph.D.</i>	1
-------------------------------------	---

INTERVIEW WITH SAM TESSEN

<i>Lee Ann Paradise</i>	3
-------------------------------	---

NOTES FROM THE FIELD

Nursing Students in the Rural Setting

<i>Paula S. Faulk, M.S.N., R.N.</i>	9
---	---

Nursing Home Access in Texas: A Focus on County Demographics and Facility Availability

<i>Jason S. Ulsperger, M.S., Kristen Kloss Ulsperger, M.S.</i>	13
--	----

Australian Rural and Remote Area Nursing Summit

<i>David Lindsay</i>	20
----------------------------	----

RESEARCH

Medical Resources and Mortality in the Panhandle

<i>James E. Rohrer, Ph.D.</i>	23
-------------------------------------	----

A Commentary on Medical Resources and Mortality in the Panhandle

<i>Steven R. Shelton, M.B.A., PA-C</i>	31
--	----

Ethnicity, Health Care & Socio-economic Status: The Continuing Disparity Among Minority Children in Texas

<i>Lonnie C. Roy, Ph.D., Susan Brown Eve, Ph.D., Diana Torrez, Ph.D.</i>	33
--	----

REVIEW

The "Epidemiological Paradox" of Health Indicators and the Texas-Mexico Border

<i>Darryl M. Williams, M.D., M.P.H.</i>	42
---	----

RURAL HEALTH UPDATES

Pregnancy Risk Assessment Monitoring System (PRAMS)	61
---	----

A New Health Deduction Has Been Approved by the IRS	66
---	----

The Impact of Rural Educational Experience on Students	68
--	----

Prevalence of Tobacco Use by Rural High School Students	70
---	----

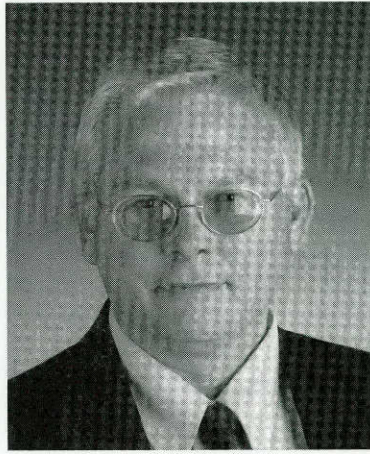
THE MEANING OF AN EXPLODING MAILBOX

As I write this the Federal Bureau of Investigation is investigating an outbreak of what they call “domestic terrorism.” Someone put pipe bombs in mailboxes in several states in the heartland of America. Innocent people were injured so that the perpetrator could draw attention to his anti-government letters.

We now know that this was the work of a single individual. However, it is possible that these actions have the sympathies of some of our friends and neighbors in rural areas. After all, the Oklahoma City bombing was the work of people who saw themselves as patriots. Many Americans distrust the federal government so deeply that they regard it as their enemy. The strength of paranoid conspiracy theories, of course, is that they can never be disproven: supposedly the conspirators are hiding evidence, controlling the media, even spying on us via the internet. If we can’t prove it false, the conspiracy could be accepted as true, by the cynical, the gullible, and the culpable.

Who hasn’t criticized the government? I certainly have. Speaking as a government employee, I can assure the reader that incompetence, laziness, and nastiness are found just as often in the government as they are in private business or in your home town. That is no reason to put a bomb in my neighbor’s mailbox. In fact, if I can’t trust the government, there is even more reason to rely on and respect my neighbor. Otherwise, we are very much alone.

The heart of the issue is this: people who



James E. Rohrer, Ph.D.
Professor and Chair
Department of Health Services
Research and Management
Texas Tech University Health Sciences Center
Lubbock, Texas

will bomb mailboxes may engage in other forms of domestic terrorism in rural areas. We tend to assume that population centers are the natural targets of bioterrorism because of the potential for contagion. However, water reservoirs, herds of cattle, fields of grain – all are vulnerable to contamination. Is poison really any more difficult to use than a pipe bomb?

Our inept and annoying government is on a fast track to build up the capacity of state, regional, and local public health agencies to detect bioterrorism and to quickly respond to it. This is a new role for people who have spent their careers dealing with food poisoning, sexually transmitted diseases, and health education. Public health has always been important, but the causes of diseases in the United States have not been deliberate.

Investigators could rely with some confidence on the belief that people would not deliberately spread contamination or poison each other.

Now it is a new ball game. Public health workers now must face the possible existence of opponents who would deliberately use disease for political purposes. And some of these terrorists might be our neighbors.

Public health workers are going to need all the help they can get. Suspicious outbreaks of diseases among humans, animals, or even crops should be reported. If a health department representative visits a rural community as part of an investigation, we can be cooperative.

Can't we?

INTERVIEW WITH SAM TESSEN

Lee Ann Paradise
Managing Editor
Texas Journal of Rural Health
Texas Tech University
Health Sciences Center
Lubbock, Texas

INTERVIEW

Robert J. "Sam" Tessen, M.S., is the Executive Director of the new state agency, the Office of Rural Community Affairs. Previously he served as Executive Director of the state of Texas' Telecommunications Infrastructure Fund and as the Executive Director of the Center for Rural Health Initiatives (the Texas State Office of Rural Health). His extensive background with rural communities includes work in rural health care frontline arenas such as community mental health, long-term care, and primary health care. Past experience includes service in a faculty associate position with the University of Texas Medical Branch in Galveston, Texas where he founded and developed a unique professional recruitment program called the Texas PRAIRIE DOC Program. He has gained extensive experience in rural telecommunications issues, including telemedicine applications and community networks. His experience also includes development of both federal and state policy and implementation of telemedicine applications.

Mr. Tessen has been published in numerous journals, including Texas Medicine, the Archives of Family Medicine, and the Texas Journal of Rural Health. The National Rural Health Association recognized his contributions to rural health by awarding him the

President's Award in 1998 as did the Texas Academy of Family Physicians with their Patient Advocacy Award in 2000. Mr. Tessen was named a Fellow of the Texas A&M University's Center for Distance Learning Research in 2002 and has also been selected as a Fellow of the Council of State Governments Henry Toll Fellowship in 2002. He has made numerous state and national presentations on a wide variety of health care, telecommunication, and policy matters.

Mr. Tessen is a licensed professional counselor with a master's degree in Psychology.

LP: What are the two most pressing rural health policy issues in Texas right now?

ST: First, access to the entire spectrum of health care for the broad cross-section of citizens in rural areas. Access to care is being affected by the absence of health care providers in rural areas including physicians, nurses, pharmacists, dentists, radiologic technicians, psychiatrists, psychologists, and social workers. Access to care is also being affected by transportation issues, or more accurately, the lack of transportation, particularly for vulnerable populations like the elderly and the poor. Other impacts on health care access include: the aging of many rural providers without reasonable chance of replacement and the aging of many health care facilities in rural areas. In addition, the fact that many rural communities are losing population makes it more difficult to attract health care providers. The maldistribution of existing providers is also a problem.

Second, access to the financial resources necessary to sustain health care services in rural areas is sometimes limited. Reimbursement rates for health care services are failing to pay for the cost of the delivery of the services. The cost of medical liability coverage is rising dramatically to a point where many physicians can no longer afford to provide higher risk procedures. Other problems include: the lack of capital funds to pay for building improvements, new equipment, and the expansion of facilities; the lack of financial resources to educate and train new providers, such as nurses, to meet the needs of rural areas; the lack of funds to allow providers to keep up with the technological improvements and developments in the field of health care.

LP: From a national perspective, how are these issues different?

ST: From a national perspective, there are differences in geographic areas of our country. Western states seem to experience more difficulties in recruiting and replacing providers. The common denominator appears to be that of greater geographic distances, the wide open spaces. Frontier areas (areas with a population density of less than seven people per square mile) experience the greatest difficulty in retaining even reasonable access to health care services.

Areas experiencing even moderate growth in population find it easier to find financial resources for maintenance of health care services and even expansion of those services. The

availability of financial resources is tied to population statistics.

Population density relative to geographic distance to related resources also varies by state. In some states, rural communities may have sparse population, but may be located only a handful of miles from a larger health care delivery outlet. In Texas, where 30 miles or more can be a standard between communities, as in West Texas, 5 to 15 miles may be the case in some eastern and southern states. It makes a difference for people having reasonable access to health care.

LP: Do we need to develop new frameworks to assess the needs of rural communities?

ST: Most definitely. We are using assessment and outcome measures based upon an access and delivery model that goes back 30 or 40 or even more years, particularly prior to the advent of the concept of managed care. In rural communities, we continue to think in terms of the times when each community or county had a rural hospital and doctors were the prime and only health care providers. General hospitals provided almost all of the necessary inpatient care. Physicians came from and went back to rural communities. Communities tended to be homogeneous in population.

What a difference a generation makes. Managed care has changed the landscape. We have a broader range of providers, including physician assistants and nurse practitioners. We understand the spectrum of health care

and its interdependence, including behavioral health care, pharmacy, dentistry, physical/speech/occupational therapists, long-term care, and other segments of health care. Rural hospitals struggle to stay open due, in large part, to continuing less than break-even reimbursement in the Medicare and Medicaid programs.

The definition of reasonable access to care is changing, though I am not sure we know to what extent yet. That definition is increasingly defined by where providers are rather than where the recipients live. Demographics have changed. Ethnic differences, cultural differences, and language differences abound in rural communities, requiring different approaches to assessing how people access health care and utilize it. Rural communities typically have higher proportions of senior citizens, whose health care needs and demands vary from other population groups. Increasingly, finances drive the definition of access, be it reimbursement for services, availability of insurance for recipients, or tough state budgets for Medicaid.

Yes, we need new measuring sticks, though what those ought to be may be the potential for much discussion.

LP: What areas of rural health could be benefited by additional research?

ST: There are many, some of which I have already alluded to. How do rural communities deliver access to health care when aging populations need different services than do healthy adults or children? How does health

care get delivered in an environment of limited providers but expanding cultural and language differences in populations? What is going to be the result of the increase of Spanish-speaking citizens in many rural communities?

Can health care be delivered more effectively or more efficiently through regionalization or through building delivery systems across care types, e.g., primary care, EMS, long-term care, pharmacy, and home health care? As the Medicare program focused on outpatient care, what does that portend for rural inpatient care providers? How do we facilitate the exploration of new models within systems that are driven by reimbursement methodologies? Are there new definitions of rural hospitals or of integrated delivery systems? Should the definition of access be in terms of the provider or the recipient? What are truly practical and financially viable applications for technology and telecommunications, which involves fields beyond health care? Yes, research, including applied research, can help significantly.

LP: How can we hasten positive changes in rural community development through research?

ST: How long do we tinker around the edges of a system that may, in fact, no longer fit the delivery of health care services in rural areas of our country? Or, do we start looking for new models that are designed to specifically fit rural communities? Do we keep trying to change the delivery of health care services to match rural communities that

themselves are not static? What could it mean if the two change processes do not match in time or in direction?

We can hasten the development of positive changes if we recognize that we must focus on the interdependence of many factors, including those outside of health care itself. We must also recognize that health care services within a community do not exist in a vacuum. The success of the local health care system is also inextricably tied to the health of the community itself. Focusing on the future of health care services without focusing on the future of the local community will lead to less than comprehensive change in rural community development.

Research can also help delineate all the breadth of connections between health care and the larger community, including water and air quality, water treatment and housing, transportation, public education and higher education, telecommunications, and public safety.

Health care is not only a purveyor of health care services but is also an economic generator, an employer, and a factor in a community's ability to recruit businesses and jobs. How do the economic development leaders in a community learn of the value of health care? Research can help identify and delineate those economic and broader implications. The future of both rural health care services and the rural communities they serve may be in the balance.

LP: What role can rural health surveys play in the policy making process?

ST: Rural health surveys can play an integral part in the policy making process. Do health care professionals understand the key economic roles they play in rural communities? Do rural health professionals understand the policy making process itself? When specific health professionals have focused on specific policy issues and brought all efforts to bear, successful results have occurred. Knowledge and understanding of the process does work.

Do citizens of rural communities understand even the basics of the intricacies of the rural health care delivery system? We can think that if they did understand it, support for the system as well as the implications for their communities would increase and solidify. Surveys can help us learn the level of awareness, the degree of support, and the level of utilization of the local health care services. Understanding these data could help in efforts to understand the connection or in some cases the lack of connection, between local citizens and their health care systems.

There have been many studies about the incidences of various illnesses and diseases in rural areas. But do we understand if local folks sense and understand the connection between their conditions and the availability of local health care services to meet their needs. Frequently, studies measure the direct utilization of local services and

outcomes of those services. Sometimes the measure is why local folks do or do not utilize local health care services. But there is more to it; it is about attitudes, understanding, beliefs, cultural competency, and other aspects of our thinking that determines our subsequent actions. We need to understand beyond utilization and down to the heart of understanding that many local folks vote with their feet against local health care services. Is the health care grass always greener in the next community?

LP: What are the key obstacles that rural health advocates face today?

ST: Some of the key obstacles facing rural health advocates today include the fact that in times of a shrinking health care pot of money, policies often can and do pit one type of provider against another. Rural providers are subsequently left with fighting over a shrinking piece of the pie. Rather, rural health advocates should get beyond turf and collaborate to advocate for a larger piece of the pie.

One frequent argument is that health care costs less to provide in rural areas. This myth keeps rearing its ugly head; yet rural health advocates sometimes fail to fight this line of thinking. So it continues to be used to justify lower reimbursement rates for rural providers. Advocacy should address this issue.

Reimbursement is a critical piece to not only the survival of health care, but also to the maintenance of quality care, availability of modern equipment, and a professional staff. But sometimes

health care advocates inadvertently come across with the idea that increased reimbursement is the answer to all rural health problems. The fact is that the delivery of health care is much more complicated. Access to other resources, good management and business practices, and reasonable availability of access to capital are also very critical. Attention to the other aspects of the day-to-day segments of community economic life is equally critical to success and survival.

Rural health advocates can also find themselves in their respective silos – focused on their own area or needs. Silo thinking leads to a lack of communication and even inadvertent competition. Rural health advocates can increase effective advocacy by getting out of those silos and establishing new partnerships. More collaboration, more voices, more effectiveness.

LP: What mechanisms does your organization have in place to help overcome these obstacles?

ST: The new Office of Rural Community Affairs (ORCA) was established specifically to advocate for rural community issues. Rural health is a major constituency of the agency. The agency offers a new opportunity for rural Texans to focus on rural community issues, including rural health. The agency brings together the former Center for Rural Health Initiatives and all of its grant programs and services for rural health constituents with other programs not typically associated with health care. The Community Develop-

ment Block Grant program, a federal Housing and Urban Development grant program, and leadership training for local government officials also became part of the new agency. The combination of the three programs offers a unique opportunity for rural health to learn some of those broader aspects of rural community life. It also offers an opportunity for learning new collaborative relationships and partnerships at the local community level.

The formation of the new agency involved numerous legislative members and policy makers. These leaders have made an investment in the future of our rural communities and citizens. The new agency is a new idea, a state agency focused entirely on rural issues. It was given responsibility to report regularly to the legislature on the status of rural communities across the state. It is also designed to serve as a liaison with other state agencies that also have programs and services for rural areas and communities.

ORCA brings to the table a combination of new opportunities and mechanisms to address the obstacles. It will require us all to learn some new ways of thinking and collaborating. We can make it work.

LP: What one word or phrase best describes rural health today?

ST: Quality care in a changing and unstable environment.

NURSING STUDENTS IN THE RURAL SETTING

Paula S. Faulk, M.S.N., R.N.
Nursing Faculty
Learning Resource Coordinator
Department of Nursing
Tarleton State University
Stephenville, Texas

NOTES FROM THE FIELD

ABSTRACT

Developing an educationally sound clinical experience in a rural setting can be a challenging undertaking for both instructors and students. Course objectives that allow for the development and application of the art and science of nursing requires creative thinking on the part of rural nurse educators. Transformation of experience is mandatory as the face of the Tarleton nursing student changes from non-traditional to traditional and he or she strives for a BSN in a rural setting. Learning about and caring for specific targeted rural groups demand dedication and ingenuity on the part of nursing students and their instructors.

Key words: educators, nursing, rural Texas. (Texas Journal of Rural Health 2002; 20(2): 9-12)

THE PROGRAM

Preparing nursing students for health care delivery in a rural setting can be a challenge. As the Tarleton nursing program has evolved from an associate degree program to a baccalaureate program, the student demographic has changed. In the 1980s, the

students were more prone to be non-traditional in that they had families, work experience, and felt the need to achieve their goal of Registered Nurse quickly in order to provide a better standard of living for themselves and their loved ones. The majority of them came from a rural background to Tarleton and would return to areas of familiarity when they graduated. Some were LVNs who wished to further their own knowledge and return to the practice setting in supervisory capacities. From 1976 through the early 1990s, the majority of the graduates established themselves firmly in an 11-county area surrounding the main Tarleton campus in Stephenville, Texas. Any Tarleton State University (TSU) clinical instructor could walk into small hospitals in their community and see the faces of several of those nurses they had helped to prepare for their careers. Some of the graduates stayed in their communities of origin, others worked for periods of time in urban settings and then returned to the rural area to start or continue their families in what seemed a more idealistic setting based on their own values. All had an impact on the rural communities in which they practiced.

With the advent of a BSN program by 1996 and the subsequent decision to end the ADN portion of the Tarleton program, the face of the nursing student gradually changed. Currently the students are more likely to be fresh out of high school, have fewer educational and work experiences, still be accountable to their parents rather than having families of their own, and be motivated by their parents values and desire to see them be professionals. In many instances, they continue to be the first of their family to strive for a college education. Their own self-motivation sometimes is under-developed because they are struggling with the questions "Who am I?" and "Do I really want to

be a nurse?" The nursing curriculum is tough, failure to achieve can be devastating, study skills have to be developed quickly, and the role models they see in the clinical setting are frequently much older in age and outlook, so they do not relate to them as well as they do their peers.

Developing a meaningful, workable, and educationally sound clinical experience in a rural setting is very different in many ways than doing so in an urban setting. In urban settings, students might have most of or all of their experiences in conjunction with one hospital and community system. The choice of patient demographics and diagnosis can be endless and plentiful. Travel time to and from clinical sites on a daily basis is minimal as well as manageable. The roads are paved, and while the traffic may be heavy, it is predictable and public transportation can be arranged.

In rural settings, patients tend to be older, sicker before seeking health care, and less able to pay for the care they receive. Funding for reimbursement of care from governmental sources is not as plentiful for rural patients as for those in urban settings. This inequity of reimbursement impacts the way in which care can be delivered in rural health care settings. Clinical instructors as well as students must learn early to work with what they have in the way of equipment, supplies, team members, and experiences available whether the setting be a rural hospital, home health care, extended care, or community based experience. Humility now forces the question of clinical instructors "Did we do our best for this practicing graduate who will now mentor other students in the rural health care setting?" Experience demonstrates that the rural nurses in practice are capable, caring, and willing to share their daily activities with students.

Tarleton nursing students learn quickly that their rural clinical experiences are not

going to be in one hospital or one community. They begin to understand the term “flexibility” early in their clinical rotation. The prudent clinical instructor helps develop more than one preceptor at a remote site if possible. When a student has traveled more than a hundred miles one way to get to a clinical site for the day, they expect a meaningful clinical experience. The student can be deflected from the learning experience if they find that the preceptor with whom they were expecting to work has been called out for an emergency for the previous ten hours and will be unavailable to precept them. An alternate plan has to be available. When developing plans for a clinical experience, the instructor must make not one plan of action, but two or more. The student has to be made aware of his or her need to develop a certain amount of autonomy in the rural setting. The experiences themselves often reflect the need of the rural community members, either in direct care settings or community experiences.

The Tarleton nursing students often approach this experience with a certain degree of trepidation. Their reluctance soon changes to incredulity when they perceive the possibilities. The Senior Center in Eastland, Texas (Location: Eastland County Population; 4000 +) is in the throes of change. While the county itself has a population with 20.7% of the citizens over the age of 65, services for the elderly of the community have not yet been fully developed. The reasons for this are not clear cut and need to be studied to determine ways to fill the perceived gaps in service for senior citizens. The TSU nursing students are being afforded the opportunity in the Center to interact with their elders in studying cause and effect in an aged, but mostly well population. Students are afforded the opportunity to refine assessment skills, apply knowledge learned in earlier community health and

management courses, develop political acumen in securing needed resources, and apply research on the elderly to an area of need.

At least one day a week, a group of students arrive at the Center by 9 a.m. They open the doors, check needed supplies for the day, and make sure the area in and around the Center is neat, clean, and inviting. A large pot of coffee and snacks are readied for the arrival of an eclectic group of feisty, but elderly citizens from the surrounding community. Activities available at the Center are aimed at social and physical engagement for the elderly. A specially-designed physical workout aimed at maintaining joint flexibility is guided by students with the seniors participating at their individual level of ability. The students have frequently been surprised by their own lack of stamina in comparison with the other participants. Hilarity often intrudes as students discover that they are being left in the dust when it comes to enthusiastic participation. Students are asked to do frequent blood pressure checks and then record them for each individual to show their doctor on a next visit. Students have been asked to teach individuals about the medications prescribed by their physicians. Students can find this a daunting, but rewarding chore. While not all older people take numerous medications, some do have multiple numbers in their possession. Researching and teaching the participants about the drug action and interaction can be a learning experience on both sides.

Frequently students find that medications have been “self discontinued,” because the person for whom it was prescribed could not afford to buy the drug. Students are empowered with the individual’s permission to seek help in securing medications from companies willing to help or by working with their

NURSING STUDENTS IN THE RURAL SETTING

physician to see if a change in medication that is less costly can be achieved for the patient's benefit.

One thing students do become aware of early on each semester is how dedicated rural physicians are to their patients and how willing they are to encourage any healthful activity in the community. Being approachable is one quality any successful rural physician has incorporated into their medical practice and the students enjoy being able to talk directly with the physician for the benefit of a patient.

One ongoing project in the Center is teaching anyone wishing to learn about the use of computers. Most of the time this never extends beyond the use of email, but that in and of itself helps the seniors remain mentally stimulated and involved. For some, the ability to "connect" with their children and grandchildren in this fashion opens new avenues of discussion and engagement. Each semester, students arrive at the experience in the Center with some reservations, but have been known to cry at leaving the group at the end of the semester. The seniors, themselves, eagerly await the next group of students to resume interaction with them for a new season.

A capstone course in a nursing program should allow students to apply all that they have learned during their semesters in nursing school. In this rural health care course, students are allowed to stretch their imaginations as well as their wings in providing care in multiple settings. They are assigned in settings that include acute hospital care as well as community-based care and are encouraged to reach the limits of their capability while remaining under the guidance of others with experience. Rural communities need qualified and enthusiastic health care providers. If a course such as this encourages a portion of new graduates to remain in

or seek practice in a rural setting, it will be meaningful for both the nurse and the community.

NURSING HOME ACCESS IN TEXAS: A FOCUS ON COUNTY DEMOGRAPHICS AND FACILITY AVAILABILITY

Jason S. Ulsperger, M.S.

Instructor

Department of Sociology

Oklahoma State University

Stillwater, Oklahoma

Kristen Kloss Ulsperger, M.S.

Research Coordinator

Research Department

Oklahoma State University Foundation

Stillwater, Oklahoma

ABSTRACT

The intent of this study was to explore nursing home access in all Texas counties for people over the age of 65. Using the United States Census Bureau and Health Care Financing Administration data, it sought to identify areas with low and high nursing home availability in order to determine adequate access to long-term health care. Recommendations for access improvement in rural areas center on small facility growth and long-term health care service integration.

Key words: census, elderly, nursing homes, rural health, Texas. (Texas Journal of Rural Health 2002; 20(2): 13-19)

INTRODUCTION

The population of the United States has changed dramatically over the past two centuries. In 1776, a person could expect to live 35 years. One century later, life expectancy reached 40, while the median age was 21 (Dychtwald & Flower, 1990). Two factors kept America a young country in terms of population: high mortality rates and high fertility rates. However, advancements in technology have decreased death rates and increased the number of elderly (Riekse & Holstege, 1996). Consider the last century. In 1900, the elderly population was 3,080. In the year 2000, it was

34,991,753 (United States Census Bureau, 2001a). Americans can now expect to live until they are 77, and in the year 2025, life expectancy will reach 81 (United States Census Bureau, 2001b).

For a majority of the elderly, friends and family provide long-term health care. However, certain people 65+ require intensive supervision due to cognitive impairment and severe health problems. Family members are likely to place these individuals in nursing homes. Nursing homes provide 24-hour nursing care to sick or disabled people that cannot use services such as home health care (Sahyoun, Pratt, Lentzner, Dey, & Robinson, 2001).

Only 5% of Americans 65 and older live in nursing homes, but this percentage increases considerably with age. Nearly 25% of the people 85+ reside in nursing homes (Morgan & Kunkel, 1998). It is estimated that 70 million Americans will be 65 years of age and older in 2030. The 85+ population is expected to reach 8.5 million that same year. As such, nursing homes will remain an essential component of the United States health care system (Sahyoun et al., 2001). The intent of this study was to explore nursing home access in all Texas counties for people over the age of 65. Using United States Census Bureau and Health Care Financing Administration data, it sought to identify areas with low and high nursing home availability in order to determine adequate access to long-term health care.

METHOD

Unit of Analysis

This report reviewed Health Care Financing Administration (HCFA) data relating to

nursing homes in all of Texas' 254 counties. The counties examined came from two different regions identified by HCFA. The first region included 104 counties from East and South Texas with 590 facilities. The second region included 150 counties in West and North Texas with 591 facilities. Overall, HCFA identifies 1,181 nursing homes in Texas. Counties with nursing homes listed under HCFA's list of facilities certified by Medicare and/or Medicaid in the state of Texas (N = 231) were the focus of this study. Twenty-three counties did not have any certified facilities listed. There are 2,072,532 people over the age of 65 in Texas. For every nursing home in Texas, there are 1,755 people 65+ (United States Census Bureau, 2000; HCFA, 2001).

Instrumentation

The United States Census Bureau surveys the American public every 10 years. They focus on characteristics such as age, race, sex, marital status, and income. They also collect information on households, counties, and states. The Census Bureau uses mailing techniques to contact dwelling units or households in urban areas. Different procedures take place for rural areas. A Census Bureau worker visits the household in order to obtain an accurate address. This technique is necessary because household addresses are not the same as postal addresses in rural areas. Once the worker delivers the questionnaire, they instruct a person in the house to complete the questionnaire and return it by mail. To ensure accuracy in rural areas, the Census Bureau sometimes requests that recipients hold their questionnaire until a worker can collect the survey in person (Daugherty & Kammeyer, 1995). Updated census informa-

tion can be located on the United States Census Bureau web site (United States Census Bureau, 2001c).

In addition to Census Bureau data, this study used data from the Health Care Financing Administration Nursing Home Compare system. HCFA maintains an Internet system that provides consumers information on all certified nursing homes. The system also provides information on all facilities in specific cities, counties, or states. HCFA updates the system on a monthly basis (HCFA, 2001).

Procedures

In the year 2000, Texas' population was 20,851,820. The elderly population was 2,072,532. This indicates that approximately 10% of Texas' population is 65 years of age or older. Based on this percentage, this study used a list of Texas counties provided by the United States Census Bureau to categorize counties into two groups. One group included counties where the elderly population was less than 10%. The other group included counties with an elderly population more than 10% (United States Census Bureau, 2000). This study considered counties with an elderly population above 10% to have a high percentage of the aged. It considered counties with an elderly population below 10% to have a low percentage of the aged.

To measure access, this study categorized these counties based on nursing home availability. It divided the number of elderly individuals in Texas by the number of nursing homes listed under HCFA guidelines. This indicated that one nursing home exists for every 1,755 people 65+ in the state of Texas. The study used this measure as a standard in determining low and high availability in each county. It considered counties with more

than 1,755 people 65+ per nursing home to have low availability. It considered counties with less than 1,755 people per facility to have high availability. Chi-square analysis assessed the difference between counties with low and high nursing home availability using a 0.01 probability level to assess statistical significance. The project excluded the 23 counties without certified facilities from the statistical analysis portion of this study.

RESULTS

Percentages of the Aged

As mentioned earlier, 10% of the Texas population is 65 years of age and older. Only 21 of the 231 counties in the sample had a 65+ population below 10%. Two hundred and ten were at or above 10%. This translates into 9% of the sample having a below average or low percentage of elderly, while 91% had a high percentage of elderly. Collin County (5.3%), Coryell County (5.7%), Fort Bend County (5.7%), and Travis County (6.7%) had relatively low percentages of the elderly. Gillespie County (25.5%), Haskell County (25.5%), Kent County (25.5%), and Llano County (30.7%) had comparatively high percentages of elderly people (United States Census Bureau 2000; HCFA 2001).

Nursing Home Availability

Of the 231 counties in the sample, 47 had more than 1,755 people for every nursing home, which implied low access. Counties with extremely low ratios of the elderly per nursing home included El Paso, Maverick, Randall, and Starr. Of the 231 counties in the sample, 184 had high access. Counties in this category included Denton, Kenedy, Kent, and

Sterling (United States Census Bureau, 2000; HCFA, 2001).

Population and Availability

Four outcomes existed in this study. First, a county could have a low percentage of elderly people and low nursing home availability. Second, a county could have a low percentage of elderly people and high availability. Third, a county could have a high percentage of elderly people and low facility availability. Finally, a county could have a high percentage of elderly people and high availability.

Table 1 indicates a statistically significant difference between counties with low and high availability ($\chi^2 = 10.62, p < 0.01$). Of the 21 counties with low elderly populations, 11 had low nursing home availability. Counties in this category included Collin, Dallas, Harris, and Tarrant. Ten counties with low elderly populations had high nursing home availability. Counties in this category included Bell, Chambers, Denton, and Rockwall.

Of the 210 counties with a high percentage of elderly, 37 had low nursing home availabil-

ity. Counties in this category included Bandera, Bexar, Lubbock, and El Paso. One hundred and seventy three counties with a high percentage of the elderly had high availability. Counties in this category included Bowie, Gregg, Jefferson, and McLennan. Most importantly, the study indicated that all counties without certified nursing facilities had a high percentage of elderly people (United States Census Bureau, 2000; HCFA, 2001).

LIMITATIONS

This study has two major limitations. First, the sample was limited to nursing homes under the supervision of the Health Care Financing Administration. As previously mentioned, HCFA data only includes information on facilities that receive government funding. A more accurate analysis of nursing home availability would include facilities that operate without government funds. Second, the study's unit of analysis involved the number of nursing homes in each county. Future analyses might consider using nursing

Table 1. Texas Counties: Population and Nursing Home Availability

Demographic	Availability	Number	Percentage
Low percentage of aged	Low	11	52
	High	10	48
	Total	21	100
High percentage of aged	Low	37	18
	High	173	82
	Total	210	100

Source: United States Census Bureau (2000); HCFA (2001).

home bed access to measure availability. Consider that a county may have just one nursing home and a high percentage of the aged, but the available facility may have numerous beds to accurately meet long-term care needs.

DISCUSSION

Though rapid increases in the elderly population have occurred in the past few decades, Texas' level of nursing home access for the elderly is keeping pace. Findings from this study indicated that a high number of Texas counties have an above average number of people 65+. However, a majority of these counties also have high levels of nursing home availability.

In terms of nursing home demand, areas with a low percentage of the aged and a low percentage of availability are of little concern. In counties such as Tarrant, Dallas, and Harris

with large metropolitan areas such as Ft. Worth, Dallas, and Houston, access to facilities may be less than average, but a low percentage of the aged indicates intensive long-term health care may not be as critical. In addition, counties such as Bell, Denton, and Walker with smaller cities such as Belton, Denton, and Huntsville appear to have an ideal situation relating to nursing home access. These areas have low percentages of the aged and high facility availability.

Counties such as Jefferson, McLennan, Reagan, and Wichita with cities such as Beaumont, Waco, Amarillo, and Wichita Falls do have a high percentage of the elderly population. However, they meet this situation with a high percentage of facilities. Table 2 indicates areas of concern relating to nursing home access. These areas include Bexar, Lubbock, and El Paso County with cities such as San Antonio, Lubbock, and El Paso. These locations have a high percentage of the aged

Table 2. Texas Counties: High Percentage of Aged and Low Nursing Home Availability

Aransas	Ector	Ken	Pecos
Bandera	Edwards*	King*	Polk
Bexar	El Paso	Kinney*	Presidio*
Borden*	Galveston	La Salle*	Randall
Burleson	Grimes	Liberty	Roberts*
Burnet	Guadalupe	Loving*	San Jacinto
Briscoe*	Hansford*	Lubbock	Smith
Calhoun	Harrison	Maverick	Sutton*
Cameron	Henderson	McMullen*	Terrell*
Clay	Hidalgo	Midland	Tom Green
Cochran*	Hood	Motley*	Uvalde
Cornal	Hudspeth*	Newton	Wharton
Culberson*	Hutchinson	Nueces	Willacy
Dallam*	Irion*	Oldham*	Zavala*
Duval'	Jeff Davis*	Parker	

* Counties without certified nursing homes with a 65+ population at or above 10%.

and low nursing home availability. Table 2 also indicates counties of concern that do not have certified intensive long-term health care available. Specifically, concern exists with counties void of access such as Presidio and Zavala. Though these counties are in rural areas without sizable populations, they do have over 1,000 people 65+ without certified nursing home care.

IMPLICATIONS

This analysis provided insight into nursing home access in Texas. A majority of counties present few problems in terms of providing intensive long-term health care. However, areas do exist in Texas with a less than average amount of certified nursing homes. The results of this study can be useful in the design and implementation of programs to counter low access. Policymakers and long-term health care practitioners can use them to better serve the aged. Based on the findings presented, the following recommendations are suggested:

1. Policymakers from counties that this study identified as having low nursing home availability and a high elderly population should work to secure funding to promote intense assessments of long-term care access. Working with the Department of Health and Human Services, the assessment would need to address specific issues concerning access to facilities not certified under HCFA regulations and variables such as the number of long-term care beds in the county. These types of intense assessments would help to determine whether areas of concern presented in this study truly warrant increased levels of long-term care.
2. Policymakers and practitioners in areas with low availability should promote outreach programs to aid the elderly. In this case, it might be possible that several rural counties combine forces to address long-term care needs on a regional basis. As such, a regional task force comprised of long-term care service providers could meet on a monthly basis and integrate knowledge related to the aged in their specific areas. Staff members from nursing homes, home health care agencies, hospice organizations, the Texas Department of Human Services, Ombudsman programs, and action groups such as the Texas Advocates for Nursing Home Residents should all be involved. Outreach provided could involve home health services, transportation, meal services, and/or medical treatment. "Starter Grants" provided under President Bush's New Freedom Initiative could be used to help develop such outreach programs. HCFA recently began providing these grants in order to increase access to quality long-term care in communities (HCFA, 2002).
3. For rural counties without any certified long-term health care facilities and a sizeable elderly population, policymakers should consider opening at least one nursing home to meet the needs of the aged population. It is possible the counties could access funds from aforementioned grants supplied through HCFA. Securing available monies would be a crucial step in providing some form of long-term care in areas that are lacking. Once funds are secured, it would then be possible to work with various state

agencies to plan the construction of facilities.

Though a small percentage of the aged actually live in nursing homes, larger numbers of the aged in the population will require higher levels of intensive long-term health care. As previously mentioned, nearly 25% of people 85+ reside in nursing homes. The importance of intensive long-term health care is obvious when one considers that people 85+ belong to the fastest growing segment of the American population (Morgan & Kunkel, 1998; Sahyoun et al., 2001). Regardless of technological advances, we can predict circulatory disease and cognitive impairment will continue to plague the elderly. This will require a continued focus on long-term health care access for the aged.

REFERENCES

- Daugherty, H. & Kammeyer, K. (1995). *Introduction to population* (2nd ed). New York, NY: The Guilford Press.
- Dychtwald, K. & Flower, J. (1990). *Age wave*. New York, NY: Bantam Books.
- Health Care Financing Administration (2001). Nursing home compare [Online]. Available: <http://www.medicare.gov/NHCompare/home.asp>.
- Health Care Financing Administration (2002). Real choice systems change grants [Online]. Available: <http://www.hcfa.gov/medicaide/realchoice/default.htm>.
- Morgan, L. & Kunkel, S. (1998). *Aging: The social context*. Thousand Oaks, CA: Pine Forge Press.
- Riekse, R. & Holstege, H. (1996). *Growing older in America*. New York, NY: McGraw-Hill.
- Sahyoun, N., Pratt, L., Lentzner, H., Dey, A., & Robinson, K. (2001). The changing profile of nursing home residents. *Aging Trends No. 4*. Hyattsville, MD: National Center for Health Statistics.
- United States Census Bureau (2000). *Census 2000 summary file 1, matrices P13 and PCT12*. Washington, DC: United States Government Printing Office.
- United States Census Bureau (2001a). *Profile of general demographic characteristics – 2000*. Washington, DC: United States Government Printing Office.
- United States Census Bureau (2001b). IDB summary demographic data for United States [Online]. Available: <http://www.census.gov/cgi-bin/ipc/idbsum?cty=US>.
- United States Census Bureau (2001c). United States Census Bureau home page [Online]. Available: <http://www.census.gov>.

AUSTRALIAN RURAL AND REMOTE AREA NURSING SUMMIT

David Lindsay
Senior Lecturer
Coordinator of Undergraduate Studies
School of Nursing Sciences
James Cook University
Townsville, Queensland
AUSTRALIA

ABSTRACT

Australian rural and remote area nurses will have an opportunity to explore solutions to some of the current challenges facing the nursing workforce in rural and remote areas at the Rural and Remote Area Nursing Summit in July 2002. Delegates at the 6th National Rural Health Conference held in Canberra in March 2001 gave strong support for a national nursing summit. Its main aim will be to identify rural and remote nursing workforce issues and develop a national framework for action. For information about the National Rural Health Alliance, readers may wish to explore their website at <http://www.ruralhealth.org.au/>.

Key words: AARN, Australia, nursing, rural health. (Texas Journal of Rural Health 2002; 20(2): 20-22)

INTRODUCTION

The Rural and Remote Area Nursing Summit and its related activities will provide:

- An opportunity for rural and remote nurses and their national organizations to respond in a collaborative way to the findings of the National Review of Nursing Education, the 2001 Senate inquiry into nursing, and the directions

set for nursing by the new Minister for Health in the federal government;

- A forum for debate and agreement about the solutions to some of the current challenges facing the nursing workforce in rural and remote areas;
- Recommendations to the employers and managers, funders, educators and trainers, and researchers of nurses and nursing services on the ground in rural and remote Australia;
- An agreed set of initiatives to be proposed to various levels of government, employers, education and training bodies, and to nursing bodies themselves; and
- Feedback to consumers, students, and other health care professionals.

The Rural and Remote Area Nursing Summit and its related activities will result in:

- A set of recommendations to governments, employers, education and training bodies, and nursing bodies;
- Confirmation of agreed principles and policies or the suggestion of new principles and policies that relate to the nursing practice and the education, training, and support of nurses in rural and remote Australia;
- One or more publications on these subjects;
- Increased media attention to issues affecting rural and remote nurses; and
- A strengthened network among rural and remote nurses, their national bodies, and other nursing organizations.

SUMMIT ORGANIZING COMMITTEE

As mentioned, the Summit is being organized by the three nursing bodies of the National Rural Health Alliance. Membership of the Summit Organizing Committee (SOC) also includes representatives from the following national nursing organizations:

- The Australian Council of Deans of Nursing (ACDN);
- The Australian Nursing Council Inc. (ANCI);
- The Congress of Aboriginal and Torres Strait Islander Nurses (CATSIN);
- The Chief Nursing Officers; and
- The Royal College of Nursing Australia (RCNA).

The SOC is chaired by Mr. David Lindsay, Immediate Past President of the Association for Australian Rural Nurses, Inc.

PLANNING AND ATTENDANCE

Planning for the Rural and Remote Area Nursing Summit began in October 2001 and is being undertaken largely by teleconference; however, two face-to-face meetings have been held. The first was with the SOC and the two facilitators that have been employed to coordinate the day. The second was with the SOC regarding essential Summit documents.

As part of the ongoing planning activity on rural and remote nursing, and to inform the Summit itself, four "working parties" have been established. The topics for these are as follows:

- The national nursing infrastructure;
- Best practice in recruitment and retention;
- Education and training; and
- Roles and service models.

nursing in Australia. Readers wishing to contact me regarding their rural nursing experiences are welcome to do so.

These “working parties” will be a key part of the planning process for the Summit and all of the collaborating bodies will be invited to have representation on panels that are of particular interest to them. Time will also be set aside on the day after the Summit for the “working parties” to discuss any necessary follow-up plans.

Attendance at the Summit will be by invitation, to ensure that those present are representative of the breadth of key stakeholder groups, and possess the capacity to make decisions on behalf of those groups.

CONCLUSION

In summary, this Summit is an exciting and challenging event for rural and remote area nurses in Australia. To date, the planning process has been characterised by a strong spirit of collaboration across the many nursing groups, and a willingness to move forward on the important issues for these nurses and the broader profession in Australia. I am conscious of the global community of nurses who work in rural and remote areas, and I trust that this brief article has provided readers with a snapshot of this event, and some insights into some of the issues confronting rural and remote area nurses. There may be lessons that we can learn from similar processes that have been undertaken in Texas, or the United States. Alternatively, we may be able to share more of our experiences throughout this process, or other aspects related to rural and remote area

MEDICAL RESOURCES AND MORTALITY IN THE PANHANDLE

James E. Rohrer, Ph.D.
Professor and Chair
Department of Health Services
Research and Management
Texas Tech University
Health Sciences Center
Lubbock, TX

RESEARCH

ABSTRACT

Rural counties in Texas were studied to investigate the relationship between the supply of medical resources in rural areas and mortality. None of the medical care resources variables were independently associated with the age-adjusted mortality or years of potential life lost. The limitations of mortality measures as indicators of population health are discussed.

Key words: medical resources, mortality, rural health, Texas. (*Texas Journal of Rural Health* 2002; 20(2): 23-30)

INTRODUCTION

Rural health researchers, advocates for rural health, and policymakers frequently are concerned about the availability of medical resources in rural areas. Physicians per capita, hospitals, the shortage of nurses, and the absence of certified emergency personnel all are chronic problems. When residents of rural areas are sick or injured, the need for medical resources is obvious. However, the impact of such resources on the health of the population is less clear. Medications may alleviate suffering without extending life. Rushing to the scene of an accident may not

noticeably affect overall death rates. Local hospitals are convenient but, once again, their presence may not improve the health of people who live nearby. As a competing hypothesis regarding the determinants of population health, many analysts would argue that economic conditions are more important than medical care (Tarlov & St. Peter, 2000; Singe, 2000). After all, poverty induces stress (Kawachi, 2000; Shively, 2000). In addition, low income is associated with low educational levels, crime rates, substandard housing, and unhealthy lifestyles (Adrian & Wilkinson, 2000).

The purpose of the study reported here was to investigate the relationship between the supply of medical resources in rural areas and one aspect of population health: mortality. The results shed light on the meaning of population health, its measurement, and the appropriate justification for investment in medical resources.

METHODS

The data used were obtained from the Texas Department of Health (TDH). Mortality rates are for 1998 and the other data were contained in a 1999 public-use file. Years of potential life lost were obtained for each county from the Epigram system. Cases were limited to rural counties, as defined by the TDH indicator included in the public-use data file.

Two measures of mortality were used. The first was the age-adjusted mortality rate, which was expressed as deaths per 100,000 standardized to the 1940 population. The second mortality indicator was the age-adjusted years of potential life lost for all causes. Age 75 was used as the expected life span. This means that deaths occurring to

persons older than age 75 did not increase the YPLL score. On the other hand, the death of a child greatly increases the YPLL for that county. The YPLL may be superior to the age-adjusted death rate as an indicator of population health because the latter assumes that maximization of life span is an appropriate goal, even though the increase in morbidity found in the very old may detract from life quality. The YPLL can be thought of as the number of years of life lost due to premature death.

Five measures of medical resources were used in the analysis. These were the number of general and family physicians per 100,000, the number of registered nurses per 100,000, the number of certified emergency medical services personnel per 1000, the number of licensed hospital beds per 1000, and the percentage of the population not having health insurance.

Other county characteristics examined as possible determinants of county death rates were per capita income, the percentage of the population living below the poverty line, the unemployment rate, the population per square mile, the percentage of the Hispanic population, and the percentage of the Black population.

Descriptive statistics were examined to detect out of range values and establish the normality of the distributions. Bivariate relationships between predictor variables and mortality measures were measured using simple linear regression. Multiple linear regression analysis was used to establish independent relationships between variables. A p value of 0.10 was used to determine significance, because the hypothesized relationships were directional. One county was omitted from the multivariate analyses because there were no deaths in that county in 1999.

RESULTS

The counties included in this analysis had an average population of 15,736 persons (see Table 1). Population density, on average, was 18.2 persons per square mile. The mean unemployment was over 5% and the rate of uninsurance was over 22%. On average, 20% of the county population was living in poverty and per capita income was about \$19,000.

The typical county had about 3 licensed hospital beds per 1000 people. Health care personnel averaged 3107 primary care MDs per 100,000, 419 RNs per 100,000, and 4.2 certified EMS personnel per 1000.

The mean age adjusted death rate for all

causes was 531 per 100,000. The age-adjusted number of life-years lost, assuming an expected life of 75 years, was 8382 in the average county.

Univariate linear regression analysis revealed that several variables were unrelated to the adjusted death rate (see Table 2). These were per capita income, PCPs per 100,000, and the unemployment rate. Population density, the percentage of Hispanics, the lack of health insurance, the supply of RNs, and the supply of EMS providers were associated with lower death rates. The percentage of Blacks and the hospital bed supply were associated with higher death rates.

Age-adjusted YPLL was associated with

Table 1. Descriptive Statistics, Rural Counties in Texas, 1999 (N=196)

Variable	Mean	Minimum	Maximum	SD
Total population	15,736.7	92.0	78,512.0	13,992.96
Population per square mile	18.2	0.10	97.9	17.09
Unemployment rate	5.67	1.100	27.80	3.80
Per capita income	18,936.9	8,225.0	38,754.0	4,276.1
Uninsured percent	22.57	14.7	35.0	0.278
Poverty percent	20.36	6.9	46.7	6.82
Hispanic percent	27.79	1.30	97.70	23.72
Black percent	6.46	0	35.3	7.86
Licensed hospital beds per 1000	2.977	0	17.24	3.00
Primary care MDs per 100,000	3107.4	0	14717.0	2375.4
Certified EMS per 1000	4.198	0	18.18	3.04
RNs per 100,000	419.72	0	3,838.0	449.96
Adjusted death rate	531.34	0	808.9	118.56
Adjusted YPLL	8,381.69	0	19,458.0	3,116.67

Source: Texas Department of Health, 2001.

population density, the EMS supply, the percent uninsured, the percent Black, and the percent Hispanic. Once again, the percent uninsured was associated with lower mortality, as was the percent Hispanic. The other variables were not associated with YPLL, though hospital bed supply approached significance ($p=0.109$). However, the relationship was again positive, indicating that if beds are related to YPLL then they are associated with greater mortality rather than less.

Further examination of the percent uninsured revealed it to be a linear function of other county characteristics. In other words, it is not an independent variable that measures something different from what the demographic variables provide. Accordingly, the percent of uninsured was dropped from

the analysis.

Licensed hospital beds per 1000 was omitted from the multiple regression analysis to follow, since the purpose of the analysis was to identify possible causes of lower death rates. Hospital beds were associated with higher rather than lower mortality rates in the simple regression analysis and, thus, could not be considered a possible cause of lower death rates.

The results of multiple regression analysis are shown in Table 3. The RN supply was revealed to be associated with lower death rates. This relationship is significant if a one-tailed test is used ($p=0.076$), but the effect is small ($b=-0.031$). No other medical resource variables were significant. Poverty and percent Black were predictive of higher mortality rates and

Table 2. Correlations (R-square) between Death Rates, Years of Potential Life Lost, and County Characteristics

	Adjusted Death Rate (p)	Adjusted YPLL (p)
R-square	0.20	0.15
Health Care Resources		
EMS per 1000	-0.02 (0.060)	-0.02 (0.045)
RNs per 100,000	-0.02 (0.067)	-0.01 (0.174)
Licensed hospital beds per 1000	0.04 (0.005)	0.01 (0.109)
Other Characteristics		
Uninsurance rate	-0.02 (0.035)	-0.02 (0.044)
Population per square mile	0.05 (0.002)	0.02 (0.050)
Percent Hispanic	-0.08 (0.000)	-0.05 (0.002)
Percent Black	0.15 (0.000)	0.12 (0.000)

Nonsignificant variables not included: per capita income, poverty percent, primary care MDs per 100,000, and unemployment rate.

percent Hispanic predicted lower mortality.

YPLL was predicted less well than mortality rates (R-square 0.15 versus 0.20). Only two variables were significant: percent poverty (b=95.4, p=0.07) and percent Hispanic (b=-0.27.5, p=0.096). Percent Black approached significance, with a p value of 0.1087. None of the medical care resource variables were independently associated with YPLL.

DISCUSSION

Planning for health system changes that lead to improvements in community health requires employment of strategies that are locally-acceptable (Rohrer, 1999). Rural communities often choose investment in the local hospital as their preferred approach to improved health status. However, investing in medical resources in rural counties does not appear to reduce mortality rates in those counties. Instead, reducing poverty rates may be a more effective strategy. This finding raises questions about the appropriate goals of the medical care system, the appropriate concerns of the public health system, and how the two are related. We will begin by

addressing the latter.

The purpose of public health agencies and their collaborators, of course, is to work toward complete physical, mental, and social well-being for everyone. This obviously is an ambitious goal that can never be fully achieved. Instead, it is necessary to develop indicators of health and to measure progress in terms of improvements in those indicators. In this study, age-adjusted mortality rates and years of potential life lost were used as two such indicators. Infant mortality rates, infectious disease rates, chronic disease rates, and quality of life also could have been used. However, no data are routinely collected on the latter two. We also know that healthy lifestyles are directly related to quality of life, but county-level data are not available on these indicators either. Given these limitations, we are forced to assume that if mortality declines, then the period of healthy life must have increased. Each reader must decide whether this assumption is reasonable. If so, then reducing mortality is a reasonable goal of the public health system.

According to national organizations, the public health system is responsible for evaluating the accessibility and quality of population and personal health services. This

Table 3. OLS Regression Analysis of Death Rate and Years of Potential Life Lost (Rural Counties in Texas, N=195)

	Adjusted Death Rate (p)	Adjusted YPLL (p)
RNs per 100,000	-0.031 (0.076)	NS
Poverty percent	4.248 (0.030)	95.401 (0.072)
Percent Black	3.339 (0.018)	97.721 (0.011)
Percent Hispanic	-1.529 (0.013)	-27.546 (0.096)

Nonsignificant variables not shown: primary care MDs per 100,000, EMS per 1000, unemployment rate, per capita income, population per square mile.

statement, unfortunately, fails to clarify the reason why public health agencies should be concerned about personal health services, including medical care. We might conclude that, since public health success is being measured with mortality rates, the value of local medical care in rural areas should be measured in the same fashion. However, an alternative view posits that if local medical care contributes to physical, mental and/or social well-being in other ways, then it is an important public health concern. The alleviation of pain or other symptoms so that people can resume their normal activities is an example of how medical care contributes to public health. The question that remains unanswered is whether medical care must be available locally in rural counties to achieve this benefit, or whether travel to urban centers when ill is sufficiently feasible so that residents of rural areas do not need local access. In fact, recent research has shown that many rural persons travel to urban centers for medical care, even when it is available locally (Borders, Rohrer, Hilsenrath, & Ward, 2000).

Advocates for rural health frequently justify investment in local medical care in terms of economic growth rather than improved health. In our data, we showed that more licensed hospital beds were associated with higher mortality rates. We assumed that rural hospitals do not actually cause mortality rates to increase, but instead areas with higher mortality rates are more likely to attract hospitals. As an interesting side issue, however, we investigated the relationship between bed supply and economic health. In this data set, increasing the number of licensed hospital beds by one bed per 1000 is associated with an increase in per capita income of \$253. It is not associated with the poverty rate or the unemployment rate. And,

of course, we cannot determine from these data whether investing in hospital beds increases per capita income or whether wealthier communities have more hospital beds.

One should not jump to conclusions from this superficial examination of the economic development issue. After all, economic development may improve health regardless of the level of investment in local hospitals, if that development reduces poverty rates. The author is well-aware that some readers may perceive a faint odor of radicalism in this repeated emphasis on reduction in poverty rates. Since endorsement of local values is essential to effective health planning, and since local values are conservative in rural areas, we might conclude that reduction in poverty levels as a strategy is off limits. However, from another perspective, rural communities often can be characterized as more populist than conservative. Rural populists supported a tax revolt in the seventies and eighties, but that tax revolt was strongly against regressive property taxes rather than progressive income taxes. In fact, rural populists are equally suspicious of big business as they are of big government (Lasch, 1991). Policies such as start-up assistance and tax breaks for small business, a living wage, and job training might be well-received in some rural communities.

Public health agencies obviously do not have the authority, or the expertise, to redesign society so as to eliminate poverty. They are limited to sanitation, promotion of healthy lifestyles, and some direct delivery of health services to the disadvantaged. Accordingly, we must recognize that poor population health in rural areas is not due to inept public health agencies, but is largely a result of an issue outside of their control—rural poverty.

CONCLUSIONS

Mortality in rural Texas does not appear to be reduced by investing in medical resources at the local level. Some policy makers may conclude that the state has no responsibility to assure convenient access to medical care if population health is not enhanced by having medical care available locally. However, population rates such as PCPs per 100,000 may indicate a need for investment in medical resources, on humanitarian grounds. Impact on mortality rates, or other health indicators, is not a fair test of the value of having medical resources located in the county. Instead, reduction in symptoms and improved quality of life are more appropriate measures of the value of medical care. The question that should be addressed next is this: is quality of life greater in rural counties where medical care is more available? In order to address this issue, it will be necessary to routinely collect information at the county level about quality of life. One approach to measuring quality of life is captured by the notion of "interference with usual activities" (Donabedian, 1973). Questions about limitations in usual activities due to impaired health have been included in the National Health Interview Survey for two generations. Gradually, these questions have come to be seen as a "healthy days" approach to measuring health related quality of life (CDC, 2000). The Behavioral Risk Factor Surveillance System (BRFSS) is conducted annually and contains questions about healthy days that are intended to measure health-related quality of life. Samples are not sufficiently large so as to permit drawing conclusions about health in individual rural counties, however. Additional work is needed to discern more accurately how much progress we really are making in the improvement of

health in rural counties and the degree to which medical care contributes toward these improvements.

This study has several limitations that may have influenced its findings. First, licensed beds may not be the best measure of hospital bed capacity. However, no single measure of hospital capacity has come into widespread use. Second, this study did not use 2000 census data. Therefore, replication with more current information could change the conclusions. Third, the definition of rural used by TDH to classify these counties may have captured counties that are too well-populated. This may have created an apples and oranges comparison. Fourth, since the data are cross-sectional rather than longitudinal causal relationships could not be established. Fifth, since the number of deaths is small in several counties, the rates computed from them may be either too high or too low and, thus, could have contributed to measurement error and reduced the amount of explained variance. And finally, the low r-squares reveal that most of the causes of variation in mortality in rural areas in Texas were not included in the analysis.

REFERENCES

- Adrian, M. & Wilkinson, A. (2000). The social context of smoking, nutrition, and sedentary health behavior in Kansas. In Tarlov, A. R. & St. Peter, R. F. (Eds.), *The Society and Population Health Reader, Volume II: A State and Community Perspective* (pp. 161-177). New York, NY: The New Press.
- Borders, T. F., Rohrer, J. E., Hilsenrath, P. E., & Ward, M. A. (2000). Why rural residents migrate for family physician care. *Journal of Rural Health*, 16(4), 337-348.

- Centers for Disease Control and Prevention. (2000). *Measuring healthy days*. Atlanta, GA: Centers for Disease Control and Prevention.
- Donabedian, A. (1973) *Aspects of medical care administration*. Cambridge, MA: Harvard University Press.
- Kawachi I. (2000). Social cohesion and health. In Tarlov, A. R. & St. Peter, R. F. (Eds.), *The society and population health reader, volume II: A state and community perspective* (pp. 57-74). New York, NY: The New Press.
- Lasch, C. (1991). *The True and Only Heaven*. New York, NY: W.W. Norton.
- Rohrer, J. E. (1999). *Planning for community-oriented health systems*. Washington, DC: American Public Health Association.
- Shively, C. A. (2000). Social status, stress, and health in female monkeys. In Tarlov, A.R. & St. Peter, R. F. (Eds.), *The society and population health reader, volume II: A state and community perspective* (pp. 278-292). New York, NY: The New Press.
- Singe, G. K. (2000). Socioeconomic and behavioral differences in health, morbidity, and mortality in Kansas: Empirical data, models, and analyses. In Tarlov, A.R. & St. Peter, R. F. (Eds.), *The society and population health reader, volume II: A state and community perspective* (pp. 15-56). New York, NY: The New Press.
- Tarlov, A. R. & St. Peter, R.F. (2000). Introduction. In Tarlov, A.R. & St. Peter, R. F. (Eds.), *The society and population health reader, volume II: A state and community perspective* (pp. ix-xxv). New York, NY: The New Press.
- Texas Department of Health (2001). *Selected demographic and public health measures: Rankings for Texas counties 1997-1999* (TDH Publication No. 25-11019). Austin, TX: Author.

A COMMENTARY ON MEDICAL RESOURCES AND MORTALITY IN THE PANHANDLE

Steven R. Shelton, M.B.A., PA-C
Executive Director
East Texas Health Education Center
Galveston, Texas

COMMENTARY

This article provides a hypothesis, background, and analysis that is thought-provoking in an area of inquiry that has not been thoroughly studied in Texas in recent years.

The author uses a number of variables in his analysis to identify their relationship and predictive value for two key measures. Use of mortality is a clear, unequivocal outcome measure. There can be no confusion by its definition or interpretation. The direct casual factors are also usually very clearly defined. Use of years of productive life lost (YPLL) is also an intriguing measure. The YPLL infers a relative economic and socio-cultural value that may be very different for each reader as well as study subject. The YPLL also requires acceptance of a standard statistical life expectancy, a necessary obligation when using data. This does not honor the mitigating personal, local, and regional factors which can significantly alter life expectancy positively or negatively in a state as diverse as Texas.

This reader found the descriptive statistics of rural counties to provide interesting insight on the "average" rural county. The measures also point out a major dilemma when trying to profile rural health. Adjusting workforce data to a "per 100,000" basis takes the statistic to an unrealistic comparative realm for rural health systems. The data

suggest that there are seven times more rural physicians than registered nurses. Further explanation on these two reported measures would help the reader understand how to more effectively interpret the actual health professional workforce in place in rural communities. Analysis of data to identify casual relationship is more difficult to truly understand than to simply say "hospital beds were associated with higher rather than lower mortality rates." Further discussion might reveal higher morbidity, end-stage illness, and other explanatory factors that broaden understanding of the hospital bed/mortality relationship.

While economic development at the community level must consider the local health care system as a fundamental element to sustain communities, the limited discussion presented in this article tends to distract this reader from the basic premise of the article. Hopefully, the relationship between local economic health and local/regional health systems can be explored further by research that will help describe this aspect in Texas more thoroughly.

The casual reader, especially those with a limited background in statistics or rural health issues, might resolve from this article that there is not a physician shortage, that hospitals are unhealthy for patients, and that economic factors are independent of health issues. Other assumptions that are not accurate may be created as well.

The policy implications from this article alone may be significant. Readers in policy decision-making positions are encouraged to further explore the intricacies of the information presented.

This article provides new information for consideration. Its analysis, while taking a broad brush-stroke, provokes further thought. The questions raised directly by the author

are important. The questions raised by each reader, upon reflection, also merit further investigation. Researchers in the Texas health sector will find fuel for several new studies stimulated by this work. Each reader interested in rural health issues, whether a resident of a rural area, a service provider, advocate, or champion of a cause, must take responsibility for expressing a viewpoint, responding to questions, or challenging a way of thinking. Through such interaction, the interests of rural health will be furthered.

ETHNICITY, HEALTH CARE & SOCIO-ECONOMIC STATUS: THE CONTINUING DISPARITY AMONG MINORITY CHILDREN IN TEXAS

Lonnie C. Roy, Ph.D.
*Health Services Research Manager
Department of Planning
Children's Medical Center of Dallas
Dallas, Texas*

Susan Brown Eve, Ph.D.
*Professor & Track Director
MPH Health Services Research
Department of Applied Gerontology
University of North Texas
Denton, Texas*

Diana Torrez, Ph.D.
*Associate Researcher
Department of Sociology
University of North Texas
Colorado Springs, Colorado*

ABSTRACT

This research investigated economic, health, and medical insurance disparities among children in three ethnic groups in the Dallas, Texas metropolitan area (N = 1511). Minority children were significantly less likely to have medical insurance and medical homes than White children. Furthermore, Hispanic children were more economically at risk and more likely to lack medical insurance than either African-American or White children. Policy efforts to maximize children's access to medical care must focus on income barriers, lack of insurance, and access to medical homes.

Key words: children, ethnicity, health care.
(Texas Journal of Rural Health 2002; 20(2): 33-41)

INTRODUCTION

It is evident from the research on health care use that having insurance and the type of insurance greatly influence children's use of physician and emergency room services. Uninsured children have been found to be the most at risk for unmet health care needs, while managed care and fee-for-service Medicaid insured children have been found to fare better (Dubay & Kenny, 2001; Lillie-Blanton,

Martinez, Lyons, & Rowland, 1999; Rosenbach, Irvin, & Coulam, 1999; Hall, 1999; Rowland, Feder, & Keenan, 1998; Aday, 1993). Uninsured children have fewer physician visits and are less likely to have a routine source of care than insured children (Hughes, Johnson, & Rowenbaum, 1999; Weissman & Epstein, 1993; Wood, Hayward, Corey, Freeman, & Shapiro, 1990).

Income has been associated with both having medical insurance and use of health care services. Children from households with higher income levels are more likely to receive illness and preventative care, while uninsured children are less likely to have ambulatory and preventative care (Wood et al., 1990; Cunningham & Hahn, 1994). Lower rates of medical care use and being uninsured are apparent among minorities, immigrant children, and lower income families. Hispanic children make up 29% of the nation's uninsured children (Carrillo, Trevino, Betancourt, & Coustasse, 2001). Minorities and immigrant children have been found to have fewer physician visits than White children (Dubay & Kenney, 2001; Aday, 1993; Ku & Matani, 2001; Lillie-Blanton, 1999).

Even as certain areas of Texas generally prosper, poverty in the state is no less prevalent than in the nation as a whole, and disproportionately higher among Texas minorities, especially Hispanics. In 1997, about 17% of Texans were at or below the poverty level. Hispanic and African-Americans composed a disproportionate share of this number. Nearly one-third of the Hispanics in Texas are in poverty. This is also true for 26% of the African-Americans in Texas. Moreover, children are the most likely group in Texas to be living in poverty, accounting for half of all Texans living in poverty. This high poverty rate has translated into equally high percentages of children without health

care insurance in Texas. As of 1998, Texas had the highest rate of uninsured in the nation, with 25% of the total state population lacking health care insurance. Thirty-one percent of those uninsured were children (1.4 million), while the national average was 14.8% (Texas Health and Human Services Commission, 1999).

Nationally, Hispanics are the largest minority group in the United States (Falcon, Aguirre-Molina, & Molina, 2001). They are the most likely to lack health care insurance. This makes Hispanic children particularly at risk for lacking access to health care and childhood morbidity. Recent studies indicate that Mexican-American children have higher rates of being overweight than both White and African-American children (Carter, Pokras, & Zambrana, 2001). Other data support the vulnerability of Hispanic children. For example, some studies have found that Hispanic children, overall, are less likely to get immunizations and have lower rates of use and access to preventive dentistry than White or African-American children (Flores & Zambrana, 2001).

This research briefly examines ethnic variation in socio-economic status, medical insurance status, and medical home status among three ethnic groups of children in the Dallas, Texas metropolitan area. Given the differential medical needs of children and the growing number of uninsured minority children in Texas, it is relevant to re-examine the disparities in access to medical care previously delineated. We find that even in this era of health care reform and general economic prosperity in North Texas, significant disparity remains among children by ethnic group.

METHODOLOGY

Random digit dialing was used to survey a sample of 1606 caregivers to children under 15 years of age. Data were gathered between April and May 1999. Caregivers were defined as respondents who had or shared the health care responsibility for the children in their home. Caregivers were asked about a variety of health service use behaviors, social-psychological issues related to health service use, and their demographic characteristics. Interviews were conducted in either Spanish or English according to the respondent's language preference.

The sample was composed of 1606 guardians of children under 15 years of age. The sample was pre-stratified by both income level and urban/suburban residency to insure adequate numbers of uninsured and Medicaid insured children for statistical analysis and, then, statistically weighted to reflect correct proportions based on the 1999 United States census data. The overall sample margin of error was +/- 2.4%. Three income levels were used for stratification: 1) less than \$20,000; 2) at least \$20,000, but less than \$35,000; and 3) \$35,000 or more. These categories were selected for stratification because they would maximize the likelihood of locating households that included children without medical insurance and those with Medicaid. The federal poverty guidelines were used to construct an income stratification variable so that the lowest level included families that were predominantly at or below 100% of poverty; the intermediate category would include families that were predominantly between 100% and 200% of poverty, and the highest category would include predominantly families with incomes above poverty. (Covering Kids, 1999).

After the screening criteria were met (adult respondent, children under 15 in the home, responsibility for children's health care), respondents were asked the ages of the children under 15 in their homes. Since respondents with more than one child could have answered the survey for several children, they were asked to answer the questions using a "target" child that was randomly selected by the interviewing software from among the children under age 15 in their home. Because of the large Spanish speaking population in the Dallas area, the instrument was translated into Spanish. Interviews were conducted in either Spanish or English depending on the respondent's language preference.

VARIABLE MEASURES

A broad array of demographic, economic, social, and children's health status variables were used. Ethnicity was self-reported by the respondent and used as a cultural variable. Ethnicity was collapsed to White, Black, and Hispanic because of insufficient frequencies of other ethnic groups in the sample (adjusted N=1511). Other demographic variables included urban/suburban residency, caregiver's educational level, yearly household income, age, marital status, race, number of adult caregivers in the home, and number of children under 15 in the home. Type of insurance was measured as commercial managed care (respondents identified their child's insurance plan as an HMO, PPO, or POS type plan), fee-for-service Medicaid, uninsured, other, and don't know/undeterminable. [The "other" category included commercial indemnity insurance as well as other types of insurance that could not be identified as a managed care plan.]

A medical home is defined as the place where patients receive both well and sick care at one location—one place where the patient can return overtime for medical care. A medical home can provide the continuity of care necessary to improve patients' quality of life through early detection of disease, prevention of illness, and case management. Caregivers were asked where their child usually received sick and well care. Children who received sick and well care at a physician's office were coded as having a medical home with a private physician. Children who received their sick and well care at a community health center were coded as having a medical home at a community health center. Any other combinations of these two variables were coded as "no" medical home, since that would involve either using a hospital emergency room for sick and well care or some type of mismatch between using a private physician, emergency room, or community health center for sick and well care. A child's health status was measured by the caregiver's perception of the child's overall health and the number of physician visits during the six months preceding the survey.

RESULTS

Table 1 presents the characteristics of the sample by ethnicity with appropriate tests of significance. Significant ethnic differences were observed for almost every variable. Minorities had significantly lower levels of education, income, were younger, less likely to be married, and averaged more children under 15 years of age in the home than White people. With regard to health care issues, minorities were significantly more likely to say their children's usual source of sick and well

care were either a community health center or hospital emergency room. In addition, their children were less likely to have medical homes, and caregivers were significantly more likely to rate their children's overall health as only "good" or worse.

Looking specifically within ethnic groups, numerous differences were observed between Hispanics, African-Americans, and White children. Hispanic children appear to be the most at risk for poverty and to lack adequate health care insurance. Hispanic caregivers, by large margins, had lower educational levels and lower incomes. Hispanics also had larger household sizes (averaged more children and adults in the home) and Hispanic caregivers were more likely to be young. Sixty-seven percent of the Hispanic caregivers interviewed were under age 34 and nearly 19% were 18 to 24 years old, while 9% of African-Americans and 5.7% of Whites were less than 24 years of age.

Children of Hispanic caregivers are acutely at risk to lack health care insurance. Children of Hispanic caregivers were more than twice as likely to be uninsured as African-American children and three times more likely to be uninsured than those of White caregivers. Furthermore, Hispanic children were substantially less likely to have Medicaid or commercial insurance than children of either African-American or White caregivers. African-American and Hispanic children were three times more likely not to have a medical home than White children. Finally, children of Hispanic caregivers were substantially more likely to rely on community health centers for sick and well care.

Table 1a. Characteristics by Ethnicity (N = 1511)*

Variable	Hispanic		African-American		White		Sig
	Count	Percent	Count	Percent	Count	Percent	
Area							
Urban	146	45.1%	125	43.3%	92	10.2%	
Suburban	178	54.9%	164	56.7%	806	89.8%	
Total	324	100.0%	289	100.0%	898	100.0%	(P < 0.001) †
Education							
<High school	126	39.0%	13	4.5%	26	2.9%	
HS or GED	80	24.8%	72	25.0%	139	15.5%	
Trade/vocational	17	5.3%	27	9.4%	33	3.7%	
Some college	35	10.8%	73	25.3%	205	22.8%	
AA	16	5.0%	33	11.5%	56	6.2%	
BA	39	12.1%	55	19.1%	267	29.7%	
Graduate	10	3.1%	15	5.2%	173	19.2%	
Total	323	100.0%	288	100.0%	899	100.0%	(P < 0.001) †
Income							
<\$10,000	37	11.4%	38	13.1%	15	1.7%	
\$10-19,999	95	29.3%	46	15.9%	44	4.9%	
\$20-34,999	82	25.3%	87	30.0%	103	11.5%	
\$35-49,999	56	17.3%	56	19.3%	173	19.3%	
\$50-74,999	29	9.0%	31	10.7%	196	21.8%	
\$75,000+	25	7.7%	32	11.0%	367	40.9%	
Total	324	100.0%	290	100.0%	898	100.0%	(P < 0.001) †
Marital Status							
Married	253	78.1%	138	48.1%	751	83.6%	
Not married	71	21.9%	149	51.9%	147	16.4%	
Total	324	100.0%	287	100.0%	898	100.0%	(P < 0.001) †
Caregiver's Age							
18-24	62	19.1%	26	9.0%	51	5.7%	
25-34	156	48.1%	129	44.6%	281	31.3%	
35-44	89	27.5%	98	33.9%	421	46.9%	
45-54	16	4.9%	27	9.3%	118	13.1%	
55+	1	0.3%	9	3.1%	27	3.0%	
Total	324	100.0%	289	100.0%	898	100.0%	(P < 0.001) †
Medical Insurance							
Yes	197	60.8%	244	84.4%	805	89.6%	
No	127	39.2%	45	15.6%	93	10.4%	
Total	324	100.0%	289	100.0%	898	100.0%	(P < 0.001) †

*Total N's vary because of incomplete responses. † Chi-square analysis. ‡ One-way analysis of variance.

Table 1b. Characteristics by Ethnicity (N = 1511)*

Variable	Hispanic		African-American		White		Sig
	Count	Percent	Count	Percent	Count	Percent	
Type of Insurance							
Managed care	104	32.05	127	43.9%	553	61.6%	
Medicaid	44	13.5%	67	23.2%	31	3.5%	
Uninsured	127	39.1%	45	15.6%	93	10.4%	
Other	20	6.2%	29	10.0%	134	14.9%	
Don't know	23	7.1%	14	4.8%	50	5.6%	
Undeterminable	6	2.2%	7	2.4%	37	4.1%	
Total	324	100.0%	289	100.0%	898	100.0%	(P < 0.001) †
Usual Source of Sick Care							
Physician's office	188	58.4%	181	62.8%	821	91.5%	
Hospital ER	18	5.6%	45	15.6%	21	2.3%	
Hospital CHC	116	36.0%	62	21.5%	55	6.1%	
Total	322	100.0%	288	100.0%	897	100.0%	(P < 0.001) †
Usual Source of Well Care							
Physician's office	168	52.5%	191	67.3%	827	92.3%	
Hospital ER/CHC	152	47.5%	93	32.7%	69	7.7%	
Total	320	100.0%	284	100.0%	896	100.0%	(P < 0.001) †
Medical Home							
Physician's office	154	48.4%	166	58.2%	796	88.8%	
CHC	103	32.4%	46	16.1%	36	4.0%	
None	61	19.2%	73	25.6%	64	7.1%	
Total	318	100.0%	285	100.0%	896	100.0%	(P < 0.001) †
Perceived Health Status							
Poor/fair	27	8.3%	17	5.9%	11	1.2%	
Good	62	19.1%	43	15.0%	85	9.5%	
Very good	107	33.0%	110	38.3%	265	29.5%	
Excellent	128	39.5%	117	40.8%	536	59.8%	
Total	324	100.0%	287	100.0%	897	100.0%	(P < 0.001) †
		Mean		Mean		Mean	
Mean number physician visits		1.45		1.24		1.67	(P < 0.01) ‡
Mean N adults in the home		1.86		1.47		1.69	(P < 0.001) ‡
Mean N children <15 in household		2.00		1.82		1.73	(P < 0.001) ‡

CHC= Community health center.

*Total N's vary because of incomplete responses. † Chi-square analysis. ‡ One-way analysis of variance.

DISCUSSION

Access to health care has been and continues to be stratified by ethnicity and socio-economic conditions, even under the Medicaid reforms of the 1980s. [SCHIP wasn't initiated in Texas until 2000, after these data were collected.] This research indicates that Hispanic children in Dallas, Texas are more likely to live in low income, poorly educated families than either African-American or White children. Furthermore, medical insurance remains problematic for minority children and, again, is exacerbated among Hispanic children. Minority children overall are less likely to have medical homes (the same place for sick and well care) than White children.

Within the two minority groups studied, Hispanic children are more likely to use community health centers for both sick and well care than African-American children, possibly improving continuity of care for these children. African-American children are more likely to access several different types of health care providers for sick and well care with a larger proportion reporting the use of hospital emergency rooms for sick care than Hispanics. This may indicate improved continuity of medical care for some Hispanic children compared to African-American children in the area; however, the sharp contrast with White children for having *any* type of medical home punctuates the continuity of care disparity among minority children.

Children's use of physician services is a direct function of their parent's ability to obtain employment with medical benefits, to enroll children in Medicaid if eligible, or to fend for themselves "out-of-pocket." Given the high cost of medical care, and our study's findings that Hispanic children in Dallas are disproportionately more likely to be unin-

sured, more likely to live in families with low incomes, and more likely to have guardians with very low educational levels, many Hispanic children are particularly at risk. Further, given the expanding Hispanic population in Texas (United States Census Bureau, 2000), the number of Hispanic children at risk of poverty and inadequate health care is growing. We found Hispanic children to be at the greatest risk of living in poor families and to lack medical insurance in an economically prosperous, large metropolitan area of Texas with large numbers of health care providers and facilities. These socio-economic and health care access inequalities are substantially exacerbated among cities along the Texas/Mexico border, rural agricultural areas, and among Hispanic *colonias*—rural unincorporated residential developments along the Texas/Mexico border that lack public services such as electricity, water, and sewage (Williams, 2001).

Children's health care is an important part of the broad array of care necessary to rearing children in a modern industrial society. Children represent the future economic security of any nation, as a part of the workforce and as productive members of society. The well-being of children should, therefore, be a focus of major concern in the public policy arena of the nation (Bergman, 1996; Wilson, 1999). Compared to other industrialized countries on measures such as neonatal mortality, post-neonatal mortality, infant mortality, low birth weight, and life expectancy, the United States does a relatively poor job of protecting the health of its children (Starfield, 1999; Starfield, 1998).

The state of health care delivery and financing in the United States at the beginning of the twenty-first century is highly volatile with changes taking place in access to care and financing mechanisms in both

private and publicly funded insurance plans. Meanwhile, the number of uninsured children is disproportionately greater among minority children, especially Hispanics (Mills, 2001). Addressing the effects of poverty among children in Texas, including lack of insurance and access to adequate health care, will require state and national debates that focus on our ideology of individualism maintaining that people should stand on their own feet and that government assistance only undermines that independence (Kawachi, Kennedy, & Wilkinson, 1999; Bergman, 1996; Schor & Menaghan, 1995). Policy efforts to maximize children's access to medical care must continue to focus on overcoming income barriers, lack of insurance, and access to medical homes, all which are exacerbated among Texas' minority children.

REFERENCES

- Aday, L. (1993). *At risk in America*. San Francisco, CA: Jossey-Bass Publishers.
- Bergman, B. R. (1996). *Saving our children from poverty: What the United States can learn from France*. New York, NY: Russell Sage Foundation.
- Carrillo, J., Trevino, F., Betancourt, J., & Coustasse, A. (2001). Latino access to health care. In Aguirre-Molina, A., Molina, C. W., & Zambrana, R. E. (Eds.), *Health Issues in the Latino community* (pp. 55-73). San Francisco, CA: Jossey-Bass.
- Carter-Pokras, O., & Zambrana, R.E. (2001). Latino health status. In Aguirre-Molina, A., Molina, C. W., & Zambrana, R. E. (Eds.), *Health issues in the Latino community* (pp. 23-54). San Francisco, CA: Jossey-Bass.
- Covering Kids (1999). Facts on uninsured kids [On-line]. Available: <http://www.coveringkids.org/facts.htm>.
- Cunningham, P. J. & Hahn, B. A. (1994). The changing American family: Implications for children's health insurance coverage and the use of ambulatory care services. *The Future of Children: Critical Health Issues for Children and Youth*, 4(3), 24-42.
- Dubay, L. & Kenney G. (2001). Health care access and use among low-income children: Who fares best? *Health Affairs*, 20, 112-121.
- Falcon, A., Aguirre-Molina, M., & Molina, C. (2001). Latino health policy. In Aguirre-Molina, A., Molina, C. W., & Zambrana, R. E. (Eds.), *Health issues in the Latino community* (pp. 3-22). San Francisco, CA: Jossey-Bass.
- Flores, G. & Zambrana, R. E. (2001). The early years: The health of children and youth. In Aguirre-Molina, A., Molina, C. W., & Zambrana, R. E. (Eds.), *Health issues in the Latino community* (pp. 77-106). San Francisco, CA: Jossey-Bass.
- Hall, A. G. (1999). Medicaid's impact on access to and utilization of health care services among racial and ethnic minority children. *Journal of Urban Health*, 75(4), 677-92.
- Hughes, D., Johnson, K. A., & Rowenbaum, S. (1999). Children's access to health care. In Lillie-Blanton, M., Martinez, R.M., Lyons, B., & Rowland, D. (Eds.), *Access to health care: Promises and prospects for low-income Americans* (pp. 41-60). Washington, DC: The Kaiser Commission on Medicaid and the Uninsured.
- Kawachi, I., Kennedy, B. P., & Wilkinson, R. G. (1999). *The society and population*

- reader: *Income inequality and health*. New York, NY: The New Press.
- Ku, L., & Matani, S. (2001). Left out: Immigrants' access to health care and insurance. *Health Affairs*, 20, 247-255.
- Lillie-Blanton, M., Martinez, R. M., Lyons, B., & Rowland, D. (1999). Introduction. In Lillie-Blanton, M., Martinez, R. M., Lyons, B., & Rowland, D. (Eds.), *Access to health care: Promises and prospects for low-income Americans* (pp. 11-18). Washington, DC: The Kaiser Commission on Medicaid and the Uninsured.
- Lillie-Blanton, M. (1999). A review of the nation's progress in achieving access to health care for low income Americans. In Lillie-Blanton, M., Martinez, R. M., Lyons, B., & Rowland, D. (Eds.), *Access to health care: Promises and prospects for low-income Americans* (pp. 19-37). Washington, DC: The Kaiser Commission on Medicaid and the Uninsured.
- Mills, R. J. (2001). Current population reports: Health insurance coverage—2000 [On-line]. Available: <http://www.census.gov/prod/2001pubs/p60-215.pdf>.
- Rosenbach, M. L., Irvin, C., & Coulam, R. F. (1999). Access for low-income children: Is health insurance enough? *Pediatrics* 103, 1167-1174.
- Rowland, D., Feder, J., & Keenan, P. S. (1998). Uninsured in America: The causes and consequences. In Altman, S. H., Reinhardt, U. E., & Shields, A. E. (Eds.). *The future of the U.S. healthcare system: Who will care for the poor and uninsured* (pp. 25-44) Chicago, IL: Health Administration Press.
- Schor, E. L. & Menaghan, E. G. (1995). Family pathways to child health. In Amick, B.C., Levine, S., Tarlov, A.R., & Walsh (Eds.), *Family pathways to child health* (pp. 18-45). Washington, DC: New York Oxford University Press.
- Starfield, B. (1999). State of the science: [Presentation summary] improving children's health through health services research [On-line]. Available: <http://www.arhq.gov/research/statsci.htm>.
- Starfield, B. (1998). *Primary care: Balancing health care needs, services, and technology*. New York, NY: Oxford Unveristy Press.
- Texas Health and Human Services Commission (1999). *Texas medicaid in perspective* (3rd ed). Austin, TX: Texas Health and Human Services Commission, State Medicaid Division.
- United States Census Bureau (2000). Population division, administrative records and methodology research [On-line]. Available: <http://www.census.gov/population/estimates/state/rank/hisp.txt>.
- Weissman, J. S., & Epstein, A. M. (1993). The insurance gap: Does it make a difference. *Annual Review of Public Health*, 14, 243-70.
- Williams, D. (2001). La promotora. *Health Affairs*, 20, 212-218.
- Wilson, P. D. (1999). Overview of congressional interest in children's health services research: [Presentation summary] improving children's health through health services research [On-line]. Available: <http://www.arhq.gov/research/congint.htm>.
- Wood, D. L., Hayward, R. A., Corey, C. R., Freeman, H. E., & Shapiro, M. F. (1990). Access to medial care for children and adolescents in the United States. *Pediatrics*, 86(5), 666-673.

THE "EPIDEMIOLOGICAL PARADOX" OF HEALTH INDICATORS AND THE TEXAS-MEXICO BORDER

Darryl M. Williams, M.D., M.P.H.
Professor of Internal Medicine
Director, Office of Border Health
Texas Tech University
Health Sciences Center
El Paso, Texas

REVIEW

ABSTRACT

The epidemiological paradox of poor socioeconomic status and favorable health indicators among United States/Mexico Border and Hispanic populations has been recognized for 30 years. Infant mortality and crude death rates among these populations are more favorable than among the general population. This study of recent census data from border counties in Texas confirms these observations. A review of the literature considers the factors that have been proposed to account for this phenomenon including under-reporting, the healthy migrant effect, favorable diet and lifestyles, genetic factors, acculturation, transitional epidemiology, and the "salmon bias." Not one of these proposed theories individually explains the phenomenon in a satisfactory way. Some factors such as acculturation and the healthy migrant effect appear to be more important. More specific and satisfactory explanations for the phenomenon should be sought through well-designed prospective studies. At the same time, the rates of costly chronic health problems are increasing more rapidly in this population, and living conditions include poor sanitation, inadequate access to health care services, and exposure to infectious diseases. Thus, it is important not to use the paradox as an argument against allocation of

resources to improve health care access and disease prevention activities among affected populations.

Key words: death rates, epidemiology, Hispanic populations, infant mortality, rural health, Texas-Mexico border, United States census (Texas Journal of Rural Health 2002; 20(2): 42-60)

INTRODUCTION

The United States/Mexico Border represents a unique region linking two very different countries and societies. As Mexico moves rapidly to industrialize, the northern tier of Mexican states has realized economic growth and dramatic increases in population. Coupled with emigration pressures into the United States, these changes have also produced dramatic population growth on the Texas side of the border. This growth has resulted in rising poverty on the United States side as increasing numbers of unskilled workers immigrate, and communities find it impossible to keep up with the needs for an expanded infrastructure. Lack of access to health care is well-documented, and United States census data clearly demonstrate that the region is among the poorest in the country. Certain infectious diseases have been shown to be endemic in the region, especially in the undeveloped *colonias*. These observations have caused many to assume that the health of the region is poor, but many of the indicators that are used to assess the health status of large populations do not bear this out. This apparent contradiction, the so-called "Epidemiological Paradox of the Border," may have its basis in a more generalized observation that in the Hispanic populations in the United States many health indicators are better than would be anti-

pated by socioeconomic factors. On the other hand, it may be as some have suggested, that these indicators may be inadequate as markers of the health of a population and that there are factors acting independently of the Hispanic makeup of the border population that contribute to the differences in mortality rates for neonates as well as the general populations in the border counties compared with the state of Texas as a whole. In any event, it is an important issue because of its implications for public health initiatives along the United States/Mexico Border and among the Hispanic population. Some policy makers suggest that the favorable health indicators argue against allocation of resources to the border and to Hispanic populations. This in spite of the reduced socioeconomic status and health care access of the population along with increasing rates of chronic health problems in this population and a demonstrated deficiency in other health indicators including population growth, sanitation, immunization status, and increased exposure to infectious diseases (Barnes, Morrison, & Richards, 1997; Davidhizar & Bechtel, 1999). The purposes of this review are to describe socioeconomic indicators and health indicators among the populations of key border counties within Texas and to compare them with large urban centers within Texas and the state as a whole. These observations may be used to explore the nature of the paradox, to examine proposed explanations for the phenomenon, to relate it to health care resources, and to suggest possible areas of further study.

METHODS

Population information, demographic characteristics, socioeconomic and accultura-

tion indicators, and health measures including mortality rates for various diseases and conditions were obtained for the state of Texas and eight of its counties. This information was obtained from data published by the United States Census and the Texas Department of Health on their respective Internet websites: www.census.gov and <http://www.tdh.state.tx.us/dpa>. Most demographic data were drawn from 2000 census information, but in some instances, the only available information was from the previous 1990 census. Health indicators were obtained from 1999 determinations of the Texas Department of Health. Border counties were selected to reflect the five most populous regions of the Texas-Mexico Border. These included El Paso, Cameron, Hidalgo, Val Verde, and Webb Counties. These counties were compared with two large metropolitan counties, one with a large Hispanic population (Bexar County) and one with a population that is more similar to the state population as a whole (Harris County).

RESULTS

Demographic Characteristics

In 2000, nearly one-third of the Texas population was Hispanic. This was similar to the Hispanic representation in Harris County (Houston) while the border counties were from two-thirds to nearly 95% Hispanic. Bexar County (San Antonio) was intermediate with a Hispanic population of 54.3%. The border population was slightly younger with more children of dependent age than either the state as a whole or the larger metropolitan counties. Family income in the border counties was between 58% and 75% of that of the state as a whole while the larger metropoli-

tan areas were above or only slightly below the statewide average. The percentage of individuals living in poverty was from 166% to 225% greater in the five border counties than in the state as a whole while the larger metropolitan areas were similar to the statewide average. Unemployment was markedly greater in Hidalgo, Webb, and Val Verde Counties than the state average. Larger numbers of the population in the five border counties had achieved less than a ninth grade education. Population growth between the census studies of 1990 and 2000 varied from a low of 14.9% in El Paso County to 48.5% in Hidalgo County. These values compared with 22.8%, 17.5%, and 20.7% in the state as a whole, Bexar County, and Harris County, respectively. Thus, the socioeconomic indicators are generally lower for border counties than for the state as a whole or for the larger metropolitan counties.

Acculturation Characteristics

Table 1 shows values obtained during the 1990 census, and reflect the percentage of families who speak a foreign language within the home, the percentage of individuals who are foreign born, and the percentage of individuals who resided in a foreign country five years previous to the survey. Previous studies have shown that acculturation is reflected by the predominant language spoken in the household as well as by patterns of immigration and the duration of residency (Cuellar, Harris, & Jasso, 1980). It is more common in the border counties for a language other than English to be used in the home. Substantially more citizens are foreign born in the border counties and more border citizens resided in a foreign country as recently as 5 years before the census survey. These indicators suggest that the populations

of the border counties are less acculturated than either of the large urban counties as well as the state as a whole.

Indicators of Maternal and Infant Health

Statistics related to live births and infant mortality are shown in Table 2. It can be seen that the fertility rate for the five border counties is greater than that of the two large urban centers as well as the state as a whole. However, the percentage of low birth weight infants is less, as is infant mortality rate. This is observed in spite of the observation that the number of mothers receiving late or no prenatal care is greater in all of the border counties except for Webb County (Laredo). Fetal mortality rates vary from county to county, but these rates are consistently less in the border counties than in the state as a whole. El Paso and Bexar Counties reflect similar fetal mortality rates.

Death Rates

Comparisons of the overall death rate and the death rate from selected diseases, obtained from Texas Department of Public

Health data for 1999, are shown in Table 3. Mortality data were calculated using guidelines of the National Center for Health Statistics and the 2000 Standard Population. In some instances, death rates were not calculated because the low number of cases obviated reliable statistical evaluation. The crude mortality of all of the border counties is well below the state average except for the most rural county, Val Verde. Bexar County is slightly above the state average while Harris County is slightly below the state average. Cameron County has the lowest crude death rate of all of the counties studied.

The rate of death due to heart disease is lower in the border counties except for Val Verde County than the state at large, while similar or higher in the large metropolitan counties. Considering stroke, the border counties show substantially lower rates. In those counties with sufficient data for comparisons, death rates for lung cancer and chronic obstructive pulmonary disease (COPD) are substantially lower in the border counties. Breast cancer shows a variable comparison among the counties when compared with state and metropolitan statistics. Death from diabetes mellitus is

Table 1. Acculturation Characteristics of Texas

	Texas	Selected Texas Counties						
		El Paso	Cameron	Hidalgo	Val Verde	Webb	Bexar	Harris
Family language percent	25.4	67.3	78.1	81.5	67.6	92.0	42.3	25.7
Foreign born percent	9.0	23.9	22.1	24.7	25.0	20.3	8.4	14.3
Foreign prior residence	2.3	6.4	3.9	4.7	4.2	5.9	2.5	3.2

Source: United States Bureau of the Census (1990).

substantially higher in the border counties as well as in Bexar County (San Antonio). Although the relatively small population of Val Verde County precludes reliable calculation of death rates for the various diseases, in general the available data suggest an increased death rate in that county which is different from the other border counties.

DISCUSSION

In this study, the socioeconomic status of the five border counties is lower than that of the state of Texas as a whole as well as those of a heavily Hispanic urban center and a large

urban center with a Hispanic population that mirrors the state. At the same time, the risk of low birth-weight infants, infant mortality, crude death rate, and death rates from common fatal illnesses including heart disease, stroke, and cancer are lower in the border populations. These observations confirm the “epidemiologic paradox of the border” and demonstrate the lack of linkage of a number of indicators of socioeconomic status with positive health outcomes. They further suggest that some of the apparent health advantage of border populations may be lost in more urban populations somewhat removed from the border. No explanation for these observations is possible from the

Table 2. Live Births, Fertility Rates, Rate of Low Birth Weight, Prenatal Care and Infant and Fetal Mortality Rates in Texas

	Texas		Selected Texas Counties					
	El Paso	Cameron	Hidalgo	Val Verde	Webb	Bexar	Harris	
Live births	349,157	13,960	8,021	14,087	970	5,448	23,597	61,067
Fertility rate ¹	77.3	89.8	113.0	117.3	105.2	121.4	74.0	83.8
Low birth weight percent ²	7.4	7.1	6.1	5.9	6.8	6.3	7.6	7.5
Late or no prenatal care ³	20.7	37.4	36.3	39.3	22.7	27.2	15.2	17.9
Infant mortality rate ⁴	6.2	5.2	4.2	3.8	(<1.0)	5.7	6.7	6.1
Fetal mortality rate ⁵	6.4	6.0	4.9	4.0	(<1.0)	4.6	6.0	7.6

¹Per 1,000 women ages 15-44.

²Less than 2500 grams at birth.

³Late prenatal care occurred after the first trimester.

⁴Per 1,000 live births.

⁵Occurring after 20 weeks gestation and before birth, per 1,000 live births.

Source: Texas Department of Health (1999). Texas Health Facts [Online]. Available: <http://www.tdh.state.tx.us/dpa>.

available data, but review of the current favored explanations seems in order.

Socioeconomic Status and Health

There is a general consensus that socio-economic status (SES) is directly related to health, and this appears to be true for individuals as well as nations. Presumably, individuals of lower SES are more likely to have poorer nutrition and sanitation and are also more likely to be exposed to environmental hazards. Further, they have less access to health care services. All of these factors are thought to contribute to a poorer overall health status. Indeed, there are numerous studies that demonstrate the linkage of SES with health, using a number of health indicators. The World Health Organization (WHO) has identified a chain of indicators that are

linked to poverty. These include population density, rate of population growth, dependent population, and rate of urbanization. All of these factors play a role in impacting infant mortality and life expectancy (Briggs, 1999). Furthermore, income level, both relative and absolute, and educational attainment appear to be independent determinants of health status. In a wide-ranging study of populations in Western Europe and the United States, income, occupation, and maternal health were all shown to affect both infant and neonatal mortality, but educational attainment of the parents was the strongest predictor of infant mortality (Antonovsky & Bernstein, 1977). Related factors that are thought to contribute to increased infant mortality include high fertility rate, large family size, and high incidence of infectious diseases (Selby, Lee, Tuttle, & Loe, 1984).

Table 3. Crude Death Rate³ and Selected Disease-Specific Death Rates in Texas

	Selected Texas Counties							
	Texas	El Paso	Cameron	Hidalgo	Val Verde	Webb	Bexar	Harris
Death rate	897.7	773.6	659.2	681.0	898.8	728.2	910.4	873.5
Heart	272.7	203.5	187.8	202.1	356.9	204.3	284.8	267.1
Stroke	66.3	50.4	47.1	45.7	***	55.7	63.6	70.7
Cancer	199.7	164.3	159.6	142.9	220.2	142.7	193.8	200.3
Lung	56.3	34.1	33.3	33.8	***	29.3	46.2	56.3
Breast	25.8	25.5	22.5	20.4	***	***	25.8	28.1
COPD	47.4	43.6	23.8	32.2	***	22.0	39.5	36.8
Diabetes	30.3	50.5	34.2	42.6	***	47.5	40.1	24.7
Accidents	38.2	30.9	28.4	34.2	***	22.5	30.1	33.4
Homicide	6.4	***	***	***	***	***	8.6	9.6
Suicide	10.5	5.4	***	***	***	***	10.8	10.1

*** Infrequency prevents reliable calculation.

Source: Texas Department of Health (1999). Texas Health Facts [Online]. Available: <http://www.tdh.state.tx.us/dpa>.

Infant Mortality Rate

The infant mortality rate has been used as an indicator of living and sanitary conditions (Stockwell, 1962). Rapid declines in the infant mortality rate have been observed in countries undergoing economic development. Many risk factors are associated with this indicator including age of the mother at conception, number and interval of pregnancies, nutrition, smoking, and prenatal care. The importance of prenatal care on reduced neonatal and infant mortality has long been accepted. Recent data raise questions about this relationship. It has been argued that mothers who seek out prenatal care are more likely to have other favorable risk factors independent of the prenatal care while some mothers who receive "extra" prenatal care may actually be at greater risk for neonatal mortality (Scribner, 1996).

DESCRIPTION OF THE "BORDER PARADOX"

Studies in the 1960s first demonstrated a lower utilization of mental health services by Mexican-Americans in the Southwest, which was interpreted as an indicator of reduced needs and greater mental health among the Mexican-American population rather than as a measure of access (Karno & Edgerton, 1969). This advantage was observed in spite of socioeconomic disadvantage and it was thought to be an "epidemiological paradox" due to such factors as strong family support. No systematic studies were conducted to explain the observations.

Studies of infant mortality in Texas during the years 1970-1972 demonstrated that the lowest death rates were observed in the state economic areas (SEAs) along the Mexican border (Teller & Clyburn, 1974). This was

surprising since earlier studies had demonstrated high infant mortality rates for Mexican-Americans (Ellis, 1959; Forbes & Frisbie, 1991). One explanation was that United States births were over-estimated because of Mexican mothers coming to the United States for delivery to assure United States citizenship for the infant while United States infant deaths were under-estimated because of Mexican mothers returning to Mexico where subsequent infant deaths went unreported to United States authorities. This explanation was brought into question with the observation that the apparent advantage persisted in Hispanic populations outside of the border region (Gee, Lee, & Forthofer, 1976; Hedderson & Daustidel, 1982; Markides & Hazuda, 1980).

Among older populations in Houston and San Antonio, a lower life expectancy was seen in Mexican-Americans than in Anglos (Ellis, 1959; Ellis, 1962). Recent mortality rates among Texas Hispanics have been shown to be similar to those of Anglos (Bradshaw & Frisbie, 1992). Death rates may be even lower in other Hispanic populations (Markides & Coreil, 1986). In 1986, Markides and Coreil reviewed a number of reports concerning the health status of southwestern Hispanics living in California, Arizona, New Mexico, Texas, and Colorado. Their study anticipated use of data from the then-recently completed Hispanic Health and Nutrition Examination Survey (HHANES) conducted specifically because earlier studies had failed to collect sufficient information about the health of the Hispanic population (Markides & Coreil, 1986).

Taken together, these studies demonstrated an unexpected survival advantage for Hispanic individuals living along the United States/Mexico Border, thus raising the question of whether this was a geographic or

ethnic phenomenon. Studies of diverse Hispanic populations have been used in an effort to sort this out.

DESCRIPTION OF THE "HISPANIC EPIDEMIOLOGICAL PARADOX"

Definitions of the Hispanic Population

The term, "Hispanic," has in the past referred to individuals with Spanish surnames, often inferring that these individuals are recent immigrants to the United States. It is now clear that the Hispanic population is a heterogeneous group with origins in many countries and often descendants of families who have lived in the United States over several generations. Most of these individuals are of Mexican origin and live in the western states near the United States/Mexico Border. Recently, Mexican-Americans have become more geographically diverse with large population concentrations in the Midwest and along the East Coast. Puerto Ricans, who reside primarily in New York and along the East Coast, make up the second largest Hispanic group. The third largest group is from Central and South America, and the fourth largest group is made up of Cubans who reside in Florida (Council on Scientific Affairs, 1990). These demographic groups differ with respect to many variables including income, educational status, and acculturation. Moreover, these groups are in themselves heterogeneous, and with increasing inter-group marriage in this country, this heterogeneity will only increase. Thus, although it is often customary and convenient to consider this Hispanic population as an integral demographic unit, it is clear that epidemiologic studies must make efforts to examine each ethnic group independently.

These ambiguities have led to contradictions within the literature, diminished precision in population calculations, and difficulties in isolating the variables that contribute to the observation of the apparent paradox. In spite of these ambiguities, we will use the terminology of the United States Bureau of the Census and of the United States Public Health Service who provide much of the population-based data used by investigators.

Infant Mortality

As described above, studies in large Texas cities in the decades before 1970 demonstrated increased infant mortality among the Spanish-surnamed population (Forbes & Frisbie, 1991). By 1974, this had changed so that infant mortality was similar among "Anglos" and Spanish-surnamed individuals. In the same communities, neonatal mortality was less among the Spanish-surnamed infants compared with Anglo infants (Forbes & Frisbie, 1991; Teller & Clyburn, 1974). When legitimacy status, mother's age, birth order, and birth weight were examined as factors contributing to neonatal mortality in ethnic groups in Houston, risk of mortality in Spanish-surnamed neonates was less than the average but higher than non-Spanish Whites (Gee et al., 1976).

One contemporary study in counties of the southwestern United States demonstrated a higher infant mortality rate correlated with the proportion of Mexican-American population. This differential was eliminated when controlled for SES (Eberstein & Pol, 1982). Other studies demonstrated unusually low mortality rates among the border counties of Texas and were presumed to be due to poor quality of data so that border data were excluded. In spite of this exclusion, low infant mortality rates persisted in the Spanish

surnamed population (Markides & Hazuda, 1980). These observations were confirmed in a number of subsequent studies that also documented disadvantages among the Spanish-surnamed population including lower SES, higher parity, less adequate medical care, a larger proportion of teenage births, and a somewhat higher proportion of low-birth-weight infants (Powell-Griner & Streck, 1982). These discrepancies were ascribed to reliability of data, including coding errors of race on birth and death records, errors of reporting infant deaths as fetal deaths, inflation of births and under-reporting of deaths because of mobility of Mexican national mothers, and under-representation of deaths due to home burials (Powell-Griner & Streck, 1982).

Another explanation for the low mortality rate in Texas border counties was under-reporting of neonatal deaths among the Spanish-surname population due to reliance on non-professional birth attendants, the identification of Mexican nationals as Texas residents, and the intrinsic value of a Texas birth certificate (Powell-Griner & Streck, 1982). These explanations were not supported by a study of births recorded in El Paso where under-registration could not be demonstrated in a community with a uniquely high indigenous Spanish surname population. Furthermore, higher birth weight was observed, suggesting survival advantage (Hedderson & Daustidel, 1982). This suggestion was affirmed by a study of pregnant Spanish-surnamed women in California who were found to have children of birth weight comparable to United States-born whites but greater than United States-born blacks (Williams, Binkin, & Clingman, 1986).

Recent efforts have tried to define more precisely the ethnic parameters of the apparent Hispanic advantage. Using linked

infant birth and death data sets from 1983 and 1984, the Centers for Disease Control and Prevention (CDC) examined infant mortality risks among the predominant Hispanic populations: Mexican-Americans, Cuban-Americans, Puerto Ricans, and others. The rate of low birth weight (LBW) (LBW <2500 g) was slightly higher among Hispanics than non-Hispanic Whites (5.5% vs. 4.7%). LBW was highest among Puerto Ricans (8.3%), intermediate among Mexican-Americans (4.9%), and lowest among Cuban-Americans (4.8%). Compared with the non-Hispanic White population, the relative risks (RR) for neonatal mortality were: all Hispanics (RR=1.08), Mexicans (RR=1.00), mainland Puerto Ricans (RR=1.52), Cubans (RR=0.96), and Puerto Rican islanders (RR=2.28). Similar comparisons for infant mortality were: all Hispanics (RR=1.05), Mexicans (RR=1.00), mainland Puerto Ricans (RR=1.40), Cubans (RR=0.84), and Puerto Rican islanders (RR=1.80) (Becerra, Hogue, Atrash, & Pérez, 1991). At the same time, all Hispanic groups demonstrated higher levels of poverty and lower levels of educational attainment (Mendoza et al., 1991).

The relatively low risk of LBW in Mexican-Americans has also been shown in a study of several Hispanic populations in Chicago where, again, Puerto Ricans are more likely to have LBW infants (Collins & Shay, 1994). In very low-income neighborhoods, United States-born Mexican-American mothers are twice as likely to have a LBW infant as the Mexico-born mothers. This has been taken as evidence of the negative effect of acculturation on the risk of LBW. Other workers, using a number of measures for acculturation, have concluded that the risk of LBW (and by inference increased infant mortality) increases as acculturation progresses (Cobas, Balcazar, Benin, Keith, & Chong, 1996; Scribner &

Dwyer, 1989).

Taken together, these studies reaffirm that an apparent socioeconomic paradox for infant mortality exists in Mexican-American and Cuban-American populations. A similar advantage is not seen in other Hispanic populations.

OVERALL MORTALITY

Early studies of mortality rates examined Spanish surname populations in large Texas cities. Health department data from Houston and San Antonio during the years 1949-1951 showed that life expectancy among Spanish surnamed individuals was shorter than among other Whites. Spanish surnamed women seemed to be at particular risk of early death, not apparently related to low SES (Ellis, 1959; Ellis, 1962). These early studies suggested that Spanish surnamed individuals might be at a greater risk of death due to other than socioeconomic factors, but later studies began to suggest that there may be survival and other advantages for Mexican-American populations including better mental health, less use of psychiatric facilities, and reduced death rates from heart disease and cancer (Karno & Edgerton, 1969; Schoen & Nelson, 1981).

In Chicago, a city with a large and diverse Hispanic population, comparative mortality studies were conducted using the 1980 census. Mexican-born and Puerto Rican-born individuals were compared with Whites, using the additional variables of age and gender. In both males and females, age-specific mortality rates for Puerto Ricans was similar to the White controls while rates for Mexicans was lower for most age groups and for both genders (Shai & Rosenwaive, 1987). Death from homicide was increased in both the

Mexican and Puerto Rican populations, but death from heart disease, cerebrovascular events, cancer, suicide, and cirrhosis was decreased in the Mexican population. Puerto Rican males enjoyed a slight survival advantage over Whites for heart disease, cancer, and cerebrovascular events. Possible explanations included under-diagnosis, under-reporting, the "healthy migrant" effect, and the return to native lands of ill individuals.

The National Longitudinal Mortality Study (NLMS) is a prospective study of mortality among a cohort of 700,000 individuals including 40,000 Hispanics based upon Current Population Surveys (CPS) conducted over an interval of 12 years. Deaths in the survey populations were recorded, and the causes and underlying causes of death were identified. From this information and adjusting for age, Hispanics were found to have lower mortality from all causes. When these data were further corrected for family income, mortality rates for Hispanics, compared with non-Hispanics were even lower. When the data were categorized according to specific causes of death, Hispanics had a lower risk of death from cancer and cardiovascular disease. Hispanics had a higher risk of death from diabetes and homicide (Sorlie, Backlund, Johnson, & Rogot, 1993). These observations are consistent with other, more focused studies that demonstrate a survival advantage for Hispanic individuals for a variety of illnesses including heart disease and stroke (Becker, Wiggins, Key, & Samet, 1988; Mitchell, Hazuda, Haffner, Patterson, & Stern, 1991; Rosenwaive, 1987; Stern et al., 1987).

Using the National Health Interview Survey (NHIS) from 1986 through 1990, and identifying deaths from the National Death Index through 1991, others identified reduced mortality rates for Hispanics in older age groups. Hispanic men aged 18 through 44 had

a higher mortality rate than the White controls (Liao et al., 1998). Younger Hispanic men were at slightly greater risk of death from causes other than cardiovascular disease and cancer.

More recently, efforts have been made to examine mortality differentials across the various subgroups of the Hispanic population (Hummer, Rogers, Amir, Forbes, & Frisbie, 2000). Using the NHIS-Multiple Cause of Death linked data sets for 1986 through 1995, these authors compared mortality risks for Anglos with Mexican-Americans, Puerto Ricans, Cuban-Americans, Central/South Americans, and other Hispanics. Higher risk of death was observed in young adult Hispanics, and lower risk of death due to cardiovascular disease and cancer. However, distinct differences among the subpopulations were noted: Puerto Ricans were at higher risk, Central/South Americans at lower risk, and Mexican-Americans and Cuban-Americans at similar risk to the Anglo control population. Other than age, important factors that contributed to differentials in survival were socioeconomic factors and nativity (country of birth). When socioeconomic factors were controlled, the Puerto Rican disadvantage disappeared, and Mexican-Americans achieved a survival advantage compared with Anglos. Being foreign born was a survival advantage for all groups, but most marked in Central/South Americans and Puerto Ricans.

These studies, taken together, demonstrate an apparent survival advantage for Hispanic populations, especially Mexican-American populations, that is in contrast to the socioeconomic condition of the study population. Nativity influences this advantage, lending support to explanations for the observation that incorporate the "healthy immigrant" effect and the role of acculturation. However, definitive explanations for the

phenomenon remain to be advanced.

POSSIBLE EXPLANATIONS FOR THE OBSERVATION

Under-reporting

Perhaps the most long-standing explanation for the apparent paradox has been the assertion that birth and death statistics for Hispanic populations have been consistently under-reported. Thus, in the case of infant mortality, it has been suggested that births by mothers coming from Mexico have been erroneously reported as United States births and that infant deaths have been under-reported as a result of a return to Mexico and home burials. It has also been suggested that inadequate records of home births and other culturally unique activities also result in inaccurate data. None of these hypotheses has been documented.

Transitional Epidemiology

This explanation is based on evidence that in a Mexican-American population, orientation toward Mexican culture results in better health indicators such as birth weight (Scribner & Dwyer, 1989). However, it is extended to suggest that group behaviors may have an effect on individual health, especially chronic disease that cannot then be explained by examining individual outcomes (Scribner, 1994; Scribner, 1996). Advocates of this theory hold that making causal inferences from group data to individual behaviors may result in an "ecological fallacy" (Schwartz, 1994). Some authors suggest that by using group data to infer individual outcomes, three fallacious conclusions may result: individual-level models are more precise than ecological-

level models, ecological correlations can always be used as a surrogate for individual correlations, and group-level variables do not cause disease (Schwartz, 1994; Scribner, 1996). This has been termed "transitional epidemiology." The concept recognizes the importance of acculturation and suggests that the health of populations - in this case the Hispanic, or Mexican-American, or border populations - declines as the population becomes more "Americanized." It also makes a case for the importance of the group to maintain practices of the individual that contribute to better health. However, it is problematic in failing to provide a quantitative basis for the explanation.

Diet and Risky Behavior

Another prevailing explanation for the paradox has been the notion that recent immigrants have better health habits and fewer risky behaviors than do longer-term residents. As individuals move into the mainstream of the United States population, they abandon these healthy behaviors, resulting in health outcomes that more closely reflect the outcomes of the larger population. This has been termed the effect of acculturation, and it includes such behaviors as diet and nutrition, smoking and tobacco use, drug abuse, and suicide.

Several studies have suggested that immigrant groups, especially Mexican-Americans change their diet with acculturation (Council on Scientific Affairs, 1990; Marks, Garcia, & Solis, 1990). These observations are borne out in a study of data obtained from the 1982-1984 Hispanic Health and Nutrition Examination Survey (HHANES) and from the 1976-1980 National Health and Nutrition Examination Survey (NHANES II) (Guendelman & Abrams, 1995). First

generation Mexican-American women were found to be of lower SES (least educated, poorest, least likely to be employed, most likely to be married, and least likely to rate their health as excellent or very good) when compared with second generation Mexican-American women or White, non-Hispanic women. At the same time, their dietary intake of protein, calcium, folic acid, and vitamins A and C was greater than that of the other two groups. Overall nutritional adequacy was greatest for the first generation Mexican-Americans and lowest for the second generation Mexican-Americans, which more closely resembled that of the White non-Hispanic women. Thus, this study supports the assertion that dietary adequacy declines with acculturation, and with that, presumably a decline in health and survival advantage.

In the past, studies have shown that Hispanic populations appear to smoke less than the rest of the United States population. More recent data from HHANES has shown that smoking may be more common among Hispanics than among Whites or Blacks. (Haynes, Harvey, Montes, Nickens, & Cohen, 1990). However, smoking habits may be influenced by acculturation even though some studies have failed to demonstrate such an effect (Markides, Coreil, & Ray, 1987). Smoking is more common in men than women, regardless of level of acculturation, and Cuban-Americans are more likely to be heavy smokers (Marks et al., 1990). Mexican-Americans have the lowest rate of smoking of any of the Hispanic sub-populations (Haynes et al., 1990; Marks et al., 1990). A telephone survey of Hispanics in San Francisco demonstrated that among men, acculturation (measured by a five-item scale) was associated with reduced levels of smoking. In women, acculturation was associated with increased levels of smoking (Marin, Perez-

Stable, & Vanos Marin, 1989). The data are conflicting, and there is no information about temporal changes in smoking activity. Thus, if Hispanics have increased their smoking habits in recent years, it would not yet be reflected in mortality rates associated with lung cancer or COPD. Thus, it is unlikely that smoking patterns are associated with the paradox.

Alcohol consumption in pregnant women is tied to fetal alcohol syndrome and other risks in the newborn. Alcohol consumption is also tied to a number of chronic illnesses including hepatic cirrhosis. Thus, it is important to know whether differences in alcohol consumption might account for the differences observed between Hispanics and the general population in infant mortality and in death rates.

There is some reason to believe that alcoholism may be more prevalent among Hispanics than the general population. The risk of alcoholism is especially great among Mexican-American men. One autopsy study between 1918 and 1970 showed that 52% of all deaths of Mexican-American men aged 30 to 60 years were due to alcohol-related diseases compared with 24% in White non-Hispanic men (Council on Scientific Affairs, 1990). There are no recent comparable studies available, and so it is difficult to evaluate this information with respect to the epidemiological paradox.

In a study designed to examine specifically the effect of acculturation on alcohol consumption, Markides et al. (1990) used data from HHANES. These data included an index of acculturation based on the Cuellar scale. The authors found that more frequent and heavier drinking was more common in younger and middle aged men. These men did not drink as frequently as men in the general population, but they tended to drink very

heavily when they drank. Acculturation was highest among both men and women in the 20 to 39 years age group. Acculturation was associated with increased drinking in both volume and frequency among women of this age group, but was not related to drinking among men. Acculturation was not associated with drinking among older men, but it was associated with an increased probability of being a drinker among older women. These findings were in contrast to earlier studies that showed that middle-aged men who were more acculturated used less alcohol (Markides, Krause, & Mendes de Leon, 1988). Thus, these studies failed to demonstrate a consistent effect of acculturation on the use of alcohol, but they did demonstrate that acculturation may have different influences at different stages in the life cycle.

Illicit substance use appears to be linked with acculturation. This is supported by a study of the HHANES 1982-1984 data (Amaro, Whitaker, Coffman, & Heeren, 1990). Applying English language use as an indicator of acculturation, the study showed that illicit drug use was increased across all Hispanic groups. Even when socioeconomic factors were controlled, the use of both marijuana and cocaine was associated with use of English by Mexican-Americans and Puerto Ricans. In all circumstances, men were more likely to use these drugs than were women.

Genetic Factors

It has been suggested that there may be some genetic factors that are protective for Hispanic populations and that provide the explanation for the epidemiological paradox. However, there is no substantive evidence to support this hypothesis. Indeed, there is some evidence to suggest that there may be a genetic basis for some diseases that are more

common in Hispanic populations, most notably type 2 diabetes mellitus.

Birth Weight

Favorable birth weight has been cited as one possible explanation for the apparent advantage in infant mortality for Mexican-Americans. Using statistical methods to identify the contribution of birth weight to improving infant mortality over a period of 30 years, Frisbie identified it as an important factor in Anglos but not in Mexican-Americans (Frisbie, 1994). That is, in both Anglos and Mexican-Americans, infant mortality declined over an interval of 30 years, during which time the mortality rate among Mexican-Americans declined more rapidly to achieve parity and eliminate the sharp differences that were noted before 1953. The mortality reductions in Mexican-Americans could not be explained by birth weight distribution. Thus, birth weight could not be used to explain the paradox even though it was seen to be the most important indicator of neonatal mortality.

Favorable birth weight is an important factor contributing to favorable neonatal and infant survival, but it is not clear why it is favorable in a population that has socioeconomic indicators that would predict poor outcomes. It may be related to factors associated with acculturation (Cobas, Balcazar, Benin, Keith, & Chong, 1996; Frisbie, 1994; Scribner & Dwyer, 1989; Singh & Yu, 1996).

Acculturation

Acculturation is perhaps the most widely accepted explanation for the paradox. According to this suggestion, individuals who have not adopted behaviors of the general

population pursue healthier habits such as diet, smoking, alcohol use, and other unidentified factors. As individuals become acculturated, they lose their healthy behaviors and develop a health profile similar to the greater population. Some have suggested two acculturation models: "the acculturative stress model" and the "acculturation model" (Markides et al., 1990). In the former, the stresses of rapid acculturation lead to adoption of unhealthy behaviors such as alcohol consumption and tobacco abuse. With the latter, patterns of behavior simply reflect the extent to which individuals have adopted the practices of the larger society. However, acculturation is difficult to measure. The most widely used assessments are usually modifications of the measures developed by Cuellar, Harris, and Jasso (1980). These assessments are based primarily on the use of language, even though there are clearly many poorly defined elements of acculturation. In an effort to deal with this issue, Cobas et al. used a structural equation model that incorporated a number of variables, showing that the variables exerted different weights on the final index of acculturation as well as different interactions on one another (Cobas et al., 1996). Using this refined technique, increasing numbers of low birth weight infants were found to relate directly to changes in acculturation. However, the study also demonstrated the need to develop better, more broadly based measures for acculturation.

Healthy Migrant Effect

Epidemiologic studies from the United Kingdom have identified factors that influence socioeconomic status as well as mortality. Among these factors, the role of migration from several countries into England and

Wales was evaluated. Mortality was lower in male immigrants than in non-immigrants from the same countries of origin (Marmot, Adelstein, & Bulusu, 1984). This suggested a selection effect in which migrants were healthier than compatriots who did not migrate. This was called the "healthy migrant" effect and compared to the well-described "healthy worker" effect in which bias can be introduced because workers tend to be healthier than the population from which they are drawn. The authors also noted that if the two effects are comparable, the effect of migration should disappear with time while if the migrants are selected on social rather than health grounds, the effect might persist. Infant mortality was high in this migrant population, and social class could not account for mortality differences.

These findings have implications for similar studies carried out in immigrant populations from Mexico in which mortality rates for immigrants was intermediate between those of Mexico and the United States population (Bradshaw & Frisbie, 1992). Some authors reject this explanation for the paradox (Abraído-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). They point out that there is a survival advantage for United States-born Hispanics compared with United States-born Whites as well as for foreign-born Hispanics compared with foreign-born Whites.

Fatally-ill Emigration (The Salmon Bias)

According to this theory, mortality rates for Hispanics are artificially low, because they return to their native country with dead or dying infants or when they themselves become seriously ill. Thus, the fate of these individuals is unknown to organizations that gather birth, death, and health statistics. In particular, this explanation was advanced as

an explanation for favorable neonatal and infant mortality rates in Texas cities and counties. However, studies using matched birth and death statistics and other careful analytic methods have not supported this hypothesis (Becerra et al., 1991; Frisbie, 1994; Frisbie, Forbes, & Hummer, 1998; Frisbie, Forbes, & Pullum, 1996; Frisbie, Forbes, & Rogers, 1992). Further, this hypothesis becomes more difficult to support when considering the distances and political circumstances that make it difficult or impossible for Puerto Ricans and Cuban-Americans to return to their home country. A recent study has cast doubts on the validity of the "salmon hypothesis" (Abraído-Lanza et al., 1999).

SUMMARY AND CONCLUSIONS

The epidemiological paradox is well-documented. Numerous studies demonstrate favorable statistics for infant mortality and overall mortality for populations along the United States/Mexico Border as well as for Hispanics including Mexican-Americans, Cuban-Americans, and in some cases Puerto Ricans. Explanations have been advanced to account for this advantage in the face of poor socioeconomic indicators. Among the most popular explanations, the "healthy migrant" effect and the role of acculturation have received the most support. Other explanations have also had their advocates, and yet none of these explanations is sufficient. None addresses the observations that infant mortality and overall mortality among Mexican-American populations was considerably worse than among non-Hispanic Whites in the decades before and immediately after World War II. Nor do they explain why there was an apparent improvement in these

indicators in the decades that followed.

It seems clear that no single explanation suffices to explain totally the phenomenon. It is possible that the "healthy migrant" effect may be used to account for the generally better health in a migrant population than that seen in the home country, and that this should be coupled with the acculturation effect accounting for decline in health measures.

It also seems clear that current approaches may not be sufficient to examine the phenomenon fully. Several authors have argued that group statistics cannot adequately serve to describe individual results and that individual assessments may be required to fully explain the differences that have been seen (Abraído-Lanza et al., 1999; Frisbie et al., 1998; Markides et al., 1990). It is also likely that unrecognized confounding variables in retrospective studies have clouded some analyses. Thus, it seems reasonable to propose that future studies should be directed to a more systematic comparison of Hispanic (border) populations and the general population. Appropriately designed prospective studies in which acculturation and socioeconomic variables are controlled may provide a more definitive explanation for the very interesting and important epidemiological paradox.

REFERENCES

- Abraído-Lanza, A. F., Dohrenwend, B. P., Ng-Mak, D. S., & Turner, J. B. (1999). The Latino mortality paradox: A test of the "salmon bias" and healthy migrant hypotheses. *American Journal of Public Health, 89*(10), 1543-1548.
- Amaro, H., Whitaker, R., Coffman, G., & Heeren, T. (1990). IX. Acculturation and marijuana and cocaine use: Findings from HHANES 1982-84. *American Journal of Public Health, 80*(Supplement), 54-60.
- Antonovsky, A., & Bernstein, J. (1977). Social class and infant mortality. *Social Science and Medicine, 11*, 453-470.
- Barnes, M. D., Morrison, C. H., Jr., & Richards, K. (1997). Our border environment: Public health, practice and policy perspectives. In J. G. Bruhn & J. E. Brandon (Eds.), *Border Health: Challenges for the United States and Mexico*. New York: Gardland Publishing, Inc.
- Becerra, J. E., Hogue, C. J. R., Atrash, H. K., & Pérez, N. (1991). Infant mortality among Hispanics: A portrait of heterogeneity. *Journal of the American Medical Association, 265*(2), 217-221.
- Becker, T. M., Wiggins, C., Key, C. R., & Samet, J. M. (1988). Ischemic heart disease mortality in Hispanics, American Indians, and non-Hispanic whites in New Mexico, 1958-1982. *Circulation, 78*, 302-309.
- Bradshaw, B. S., & Frisbie, W. P. (1992). Mortality of Mexican-Americans and Mexican-Americans: Comparisons with Mexico. In J. R. Weeks & R. Ham-Chande (Eds.), *Demographic Dynamics of the United States-Mexico Border* (pp. 125-150). El Paso: Texas Western Press.
- Briggs, D. (1999). *Environmental health indicators: Framework and methodologies* (WHO/SDE/OEH/99.10). Geneva: World Health Organization.
- Cobas, J. A., Balcazar, H., Benin, M. B., Keith, V. M., & Chong, Y. (1996). Acculturation and low-birthweight infants among Latino women: A reanalysis of HHANES data with structural equation

- models. *American Journal of Public Health*, 86(3), 394-396.
- Collins, J. W., Jr., & Shay, D. K. (1994). Prevalence of low birth weight among Hispanic infants with United States-born and foreign-born mothers: The effect of urban poverty. *American Journal of Epidemiology*, 139(2), 184-192.
- Council on Scientific Affairs. (1990). A permanent United States-Mexico border environmental health commission. *Journal of the American Medical Association*, 263(24), 3319-3321.
- Cuellar, I., Harris, L., & Jasso, R. (1980). An acculturation scale for Mexican-American normal and clinical populations. *Hispanic Journal of Behavioral Sciences*, 2, 199-217.
- Davidhizar, R., & Bechtel, G. A. (1999). Health and quality of life within colonias settlements along the United States and Mexico border. *Public Health Nursing*, 16(4), 301-306.
- Eberstein, I. W., & Pol, L. G. (1982). Mexican-American ethnicity, socioeconomic status, and infant mortality: A county-level analysis. *Social Science Journal*, 19(2), 61-71.
- Ellis, J. M. (1959). Mortality differentials for a Spanish surname population group. *South West Social Science Journal*, 39, 314-321.
- Ellis, J. M. (1962). Spanish surname mortality differences in San Antonio, TX. *Health and Human Behavior*, 3, 125-127.
- Forbes, D., & Frisbie, W. P. (1991). Spanish surname and Anglo infant mortality: Differentials over a half-century. *Demography*, 28(4), 639-660.
- Frisbie, W. P. (1994). Birth weight and infant mortality in the Mexican origin and Anglo populations. *Social Science Quarterly*, 75(4), 881-895.
- Frisbie, W. P., Forbes, D., & Hummer, R. A. (1998). Hispanic pregnancy outcomes: Additional evidence. *Social Science Quarterly*, 79(1), 149-169.
- Frisbie, W. P., Forbes, D., & Pullum, S. G. (1996). Compromised birth outcomes and infant mortality among racial and ethnic groups. *Demography*, 33(4), 469-481.
- Frisbie, W. P., Forbes, D., & Rogers, R. G. (1992). Neonatal and postnatal mortality as proxies for cause of death: Evidence from ethnic and longitudinal comparisons. *Social Science Quarterly*, 73(3), 535-549.
- Gee, S. C., Lee, E. S., & Forthofer, R. N. (1976). Ethnic differentials in neonatal and postnatal mortality: A birth cohort analysis by a binary variable multiple regression method. *Social Biology*, 23, 317-325.
- Guendelman, S., & Abrams, B. (1995). Dietary intake among Mexican-American Women: Generational differences and a comparison with White Non-Hispanic women. *American Journal of Public Health*, 85(1), 20-25.
- Haynes, S. G., Harvey, C., Montes, H., Nickens, H., & Cohen, B. H. (1990). VIII. Patterns of cigarette smoking among Hispanics in the United States: Results from HHANES 19982-1984. *American Journal of Public Health*, 80(Supplement), 47-54.
- Hedderson, J., & Daustidel, H. C. (1982). Infant mortality of the Spanish surname population. *Social Science Journal*, 19, 67-78.
- Hummer, R. A., Rogers, R. G., Amir, S. H., Forbes, D., & Frisbie, W. P. (2000). Adult mortality differentials among Hispanic subgroups and non-Hispanic

- whites. *Social Science Quarterly*, 81(1), 459-476.
- Karno, M., & Edgerton, R. B. (1969). Perception of mental illness in a Mexican-American community. *Archives of General Psychiatry*, 20, 233-238.
- Liao, Y., Cooper, R. S., Cao, G., Durazo-Arvizu, R., Kaufman, J. S., Luke, A., & McGee, D. L. (1998). Mortality patterns among adult Hispanics: Findings from the NHIS, 1986 to 1990. *American Journal of Public Health*, 88(2), 227-232.
- Marin, G., Perez-Stable, E. J., & Vanos Marin, B. (1989). Cigarette smoking among San Francisco Hispanics: The role of acculturation and gender. *American Journal of Public Health*, 79(2), 196-199.
- Markides, K. S., & Coreil, J. (1986). The Health of Hispanics in the Southwestern United States: an Epidemiologic Paradox. *Public Health Reports*, 101(3), 253-265.
- Markides, K. S., Coreil, J., & Ray, L. A. (1987). Smoking among Mexican-Americans: A three-generation study. *American Journal of Public Health*, 77, 708-711.
- Markides, K. S., & Hazuda, H. P. (1980). Ethnicity and infant mortality in Texas counties. *Social Biology*, 27, 261-271.
- Markides, K. S., Krause, N., & Mendes de Leon, C. F. (1988). Acculturation and alcohol consumption among Mexican Americans. *American Journal of Public Health*, 78, 1178-1181.
- Markides, K. S., Ray, L. A., Stroup-Benham, C. A., & Treviño, F. (1990). VII. Acculturation and alcohol consumption in the Mexican-American population of the southwestern United States: Findings from HHANES 1982-84. *American Journal of Public Health*, 80(Supplement), 42-46.
- Marks, G., Garcia, M., & Solis, J. M. (1990). III. Health risk behaviors of Hispanics in the United States: Findings from HHANES, 1982-84. *American Journal of Public Health*, 80(Supplement), 20-26.
- Marmot, M. G., Adelstein, A. M., & Bulusu, L. (1984). Lessons from the Study of Immigrant Mortality. *Lancet*, 1, 1455-1457.
- Mendoza, F. S., Ventura, S. J., Valdez, R. B., Castillo, R. O., Saldivar, L. E., Baisden, K., & Martorell, R. (1991). Selected measures of health status for Mexican-American, mainland Puerto Rican, and Cuban-American children. *Journal of the American Medical Association*, 265(2), 227-232.
- Mitchell, B. D., Hazuda, H. P., Haffner, S. M., Patterson, J. K., & Stern, M. P. (1991). Myocardial infarction in Mexican-Americans and non-Hispanic whites. *Circulation*, 83(1), 45-51.
- Powell-Griner, E., & Streck, D. (1982). A closer examination of neonatal mortality rates among the Texas Spanish surname population. *American Journal of Public Health*, 72(9), 993-999.
- Rosenwaive, I. (1987). Mortality differentials among persons born in Cuba, Mexico, and Puerto Rico residing in the United States, 1979-1981. *American Journal of Public Health*, 77, 603-606.
- Schoen, R., & Nelson, V. (1981). Mortality by cause among Spanish surnamed Californians, 1969-1971. *Social Science Quarterly*, 62, 259-274.
- Schwartz, S. (1994). The fallacy of the ecological fallacy: The potential misuse of a concept and the consequences. *American Journal of Public Health*, 84(5), 819-824.
- Scribner, R. (1994). Mortality among Hispanics (letter). *Journal of the American*

- Medical Association*, 271(16), 1238.
- Scribner, R. (1996). Editorial: Paradox as Paradigm - The Health Outcomes of Mexican Americans. *American Journal of Public Health*, 86(3), 303-305.
- Scribner, R., & Dwyer, J. H. (1989). Acculturation and Low Birthweight among Latinos in the Hispanic HANES. *American Journal of Public Health*, 79(9), 1263-1267.
- Selby, M. L., Lee, E. S., Tuttle, D. M., & Loe, H. D., Jr. (1984). Validity of the Spanish surname infant mortality rate as a health status indicator for the Mexican American population. *American Journal of Public Health*, 74(9), 998-1002.
- Shai, D., & Rosenwaike, I. (1987). Mortality among Hispanics in metropolitan Chicago: An examination based on vital statistics data. *Journal of Chronic Diseases*, 40(5), 445-451.
- Singh, G. K., & Yu, S. M. (1996). Adverse pregnancy outcomes: Differences between United States- and foreign-born women in major United States racial and ethnic groups. *American Journal of Public Health*, 86(6), 837-843.
- Sorlie, P. D., Backlund, E., Johnson, N. J., & Rogot, E. (1993). Mortality by Hispanic status in the United States. *Journal of the American Medical Association*, 270(20), 2464-2468.
- Stern, M. P., Bradshaw, B. S., Eifler, C. W., Fong, D. S., Hazuda, H. P., & Rosenthal, M. (1987). Secular decline in death rates due to ischemic heart disease in Mexican Americans and non-Hispanic whites in Texas, 1970-1980. *Circulation*, 76, 1245-1250.
- Stockwell, E. G. (1962). Infant mortality and socio-economic status: A changing relationship. *Milbank Memorial Fund Quarterly*, 40, 101-111.
- Teller, C. H., & Clyburn, S. (1974). Trends in infant mortality. *Texas Business Review*, 48, 240-246.
- Williams, R. L., Binkin, N. J., & Clingman, E. J. (1986). Pregnancy outcomes among Spanish-surname women in California. *American Journal of Public Health*, 76(4), 387-391.

PREGNANCY RISK ASSESSMENT MONITORING SYSTEM (PRAMS)

■ RURAL HEALTH UPDATE

The charts shown below were adapted from the Pregnancy Risk Assessment Monitoring System (PRAMS) 1998 surveillance report (Lipscomb et al., 2000). The PRAMS is collected via mail survey. Response rates are over 70%. The PRAMS report is available on the website maintained by the Centers for Disease Control and Prevention at http://www.cdc.gov/nccdphp/drh/prams/pdf/98prams/prams_98.pdf. Data are presented here for the states of New Mexico and Oklahoma because of their predominantly rural character. The state of Texas did not participate in PRAMS.

Three items from the PRAMS were chosen for presentation here. The prevalence of breast-feeding initiation is important because breast-feeding is associated with better infant health. The Healthy People 2010 objective for this indicator is 75%.

The prevalence of late entry into prenatal care also is important, because prenatal care improves birth outcomes. The Healthy People 2010 objective is that 90% of mothers start prenatal care in the first trimester, so the rate of late entry to prenatal care should be less than 10%.

Women who have unintended births are likely to not initiate prenatal care and are more

prone to unhealthy behaviors. The Healthy People 2010 objective for intended pregnancies is 70%, which means that rates of unintended pregnancies should be below 30%.

The following differences can be seen in the charts:

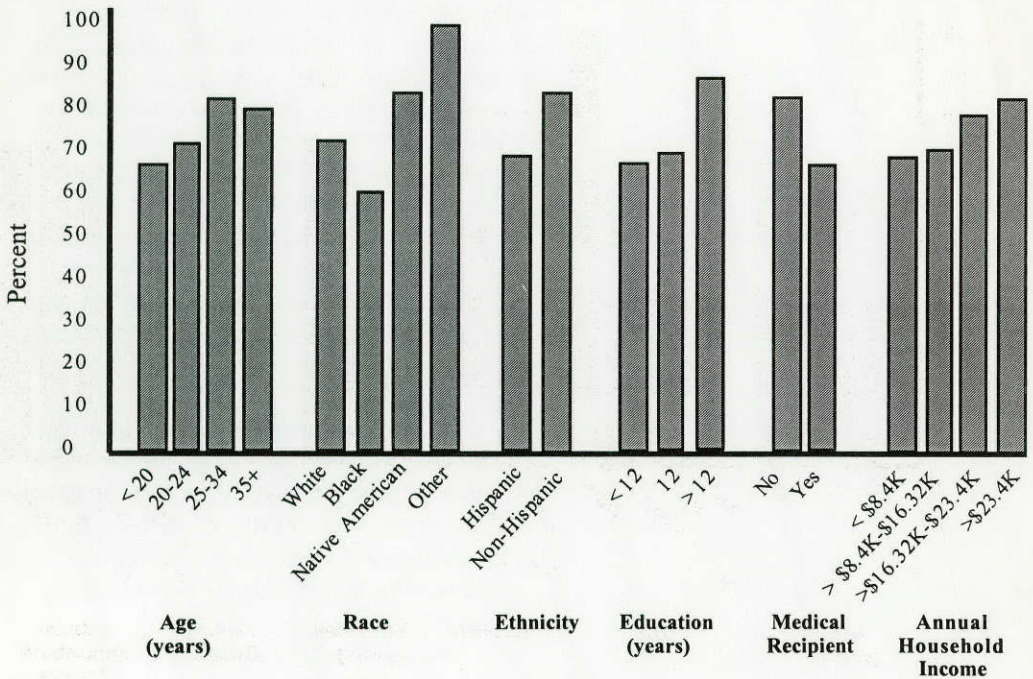
- In both states, the prevalence of breast-feeding was lowest among mothers who were younger, Black, Hispanic,

less educated, on Medicaid, and of low income.

- The prevalence of late-entry into prenatal care was highest among mothers who were younger, Black, Hispanic, less educated, on Medicaid, and of low income. This was true in both states.
- The prevalence of unintended pregnancy was highest among mothers who were younger, Black, less educated, on Medicaid, and of low income.

Figure 1a. Prevalence of Breast-Feeding Initiation, 1997-1998

NEWMEXICO



Hispanic and non-Hispanic mothers did not differ dramatically in risk for unintended pregnancy in either state.

REFERENCE

Lipscomb, L. E., Johnson, C. H., Morrow, B., Colley, G. B., Ahluwalia, I. B., Beck, L. F., Gaffield, M. E., Rogers, M., & Whitehead, N. (2000). *PRAMS 1998 surveillance report*. Atlanta, GA: Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

ACKNOWLEDGMENT

All the figures that appear in this update were adapted from the PRAMS 1998 surveillance report (Lipscomb et al., 2000).

Figure 1b. Prevalence of Breast-Feeding Initiation, 1997-1998

OKLAHOMA

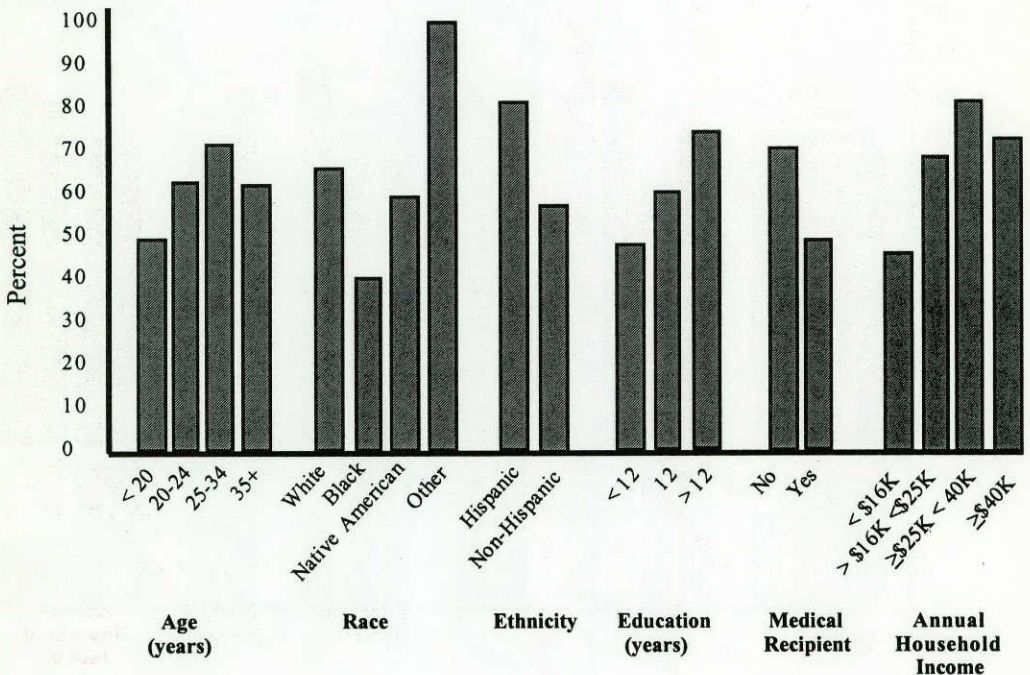
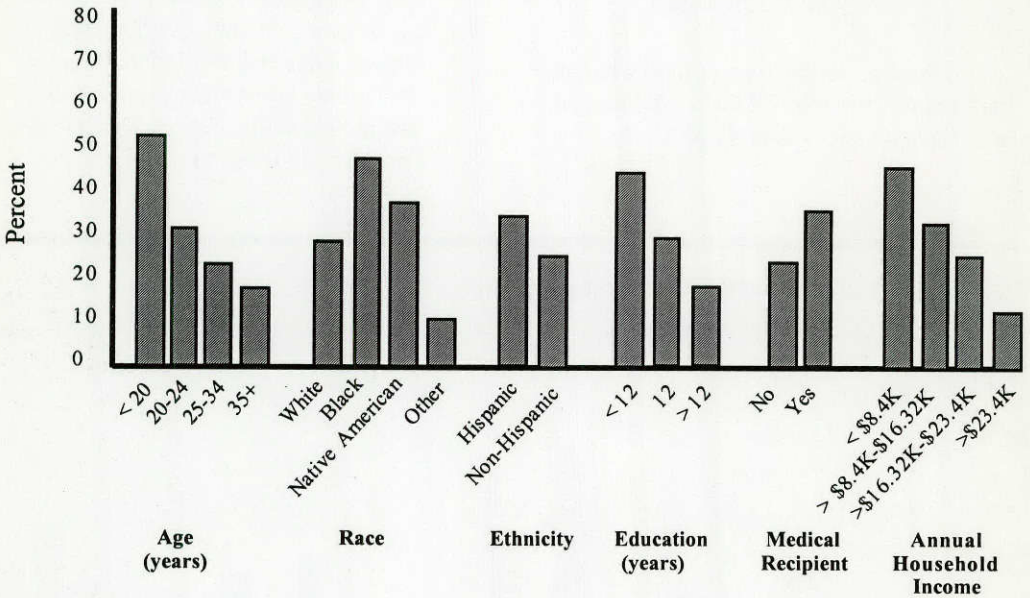


Figure 2. Prevalence of Late Entry Into Prenatal Care (After First Trimester)

NEWMEXICO



OKLAHOMA

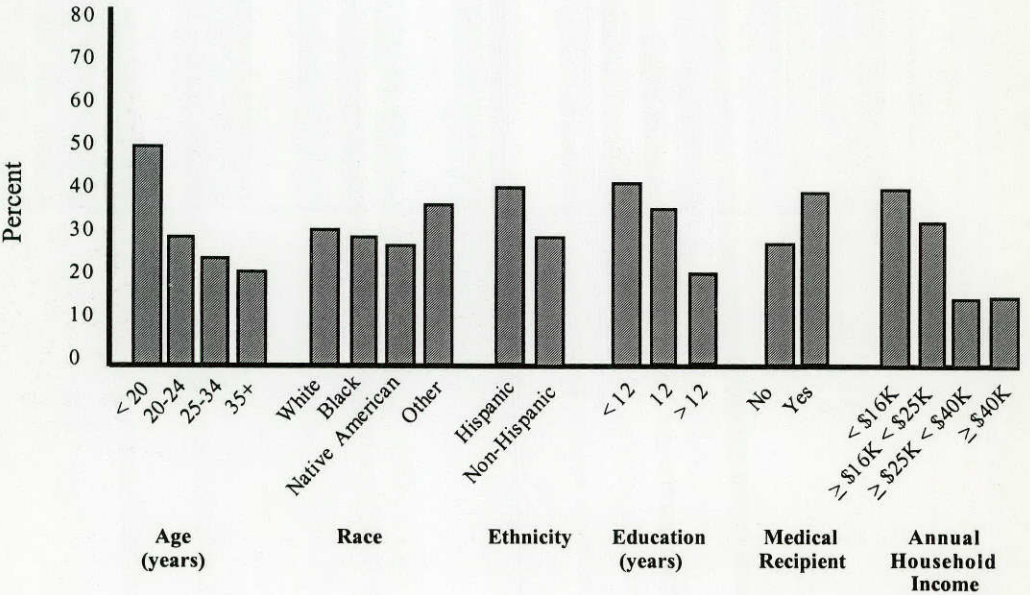
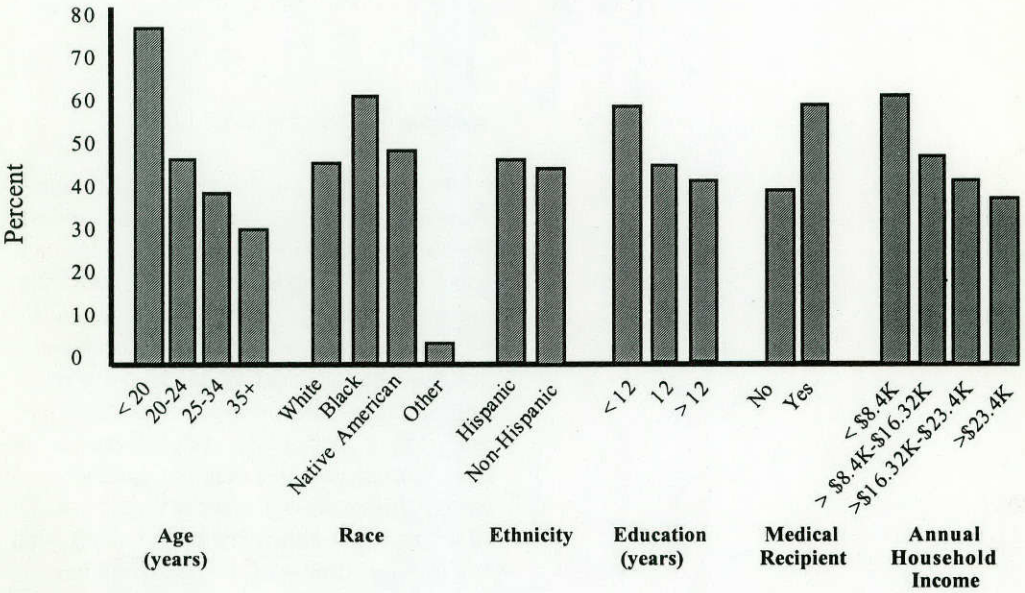
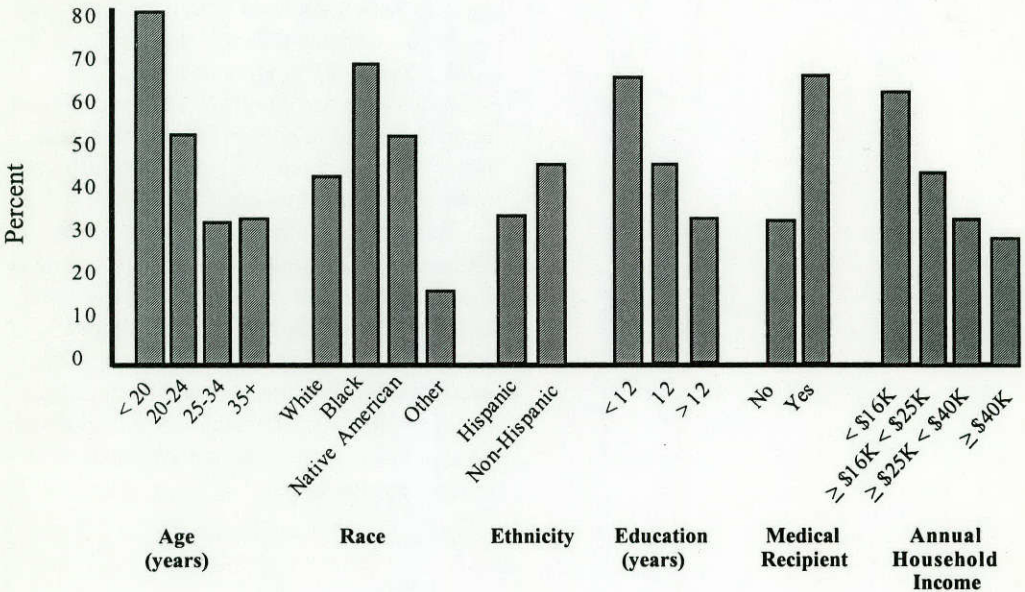


Figure 3. Prevalence of Unintended Pregnancy Among Women Having a Live Birth

NEW MEXICO



OKLAHOMA



A NEW HEALTH DEDUCTION HAS BEEN APPROVED BY THE IRS

■ RURAL HEALTH UPDATE

Under certain conditions, the IRS is now allowing you to take expenses associated with weight-loss programs as a medical deduction when you are filing an itemized tax return. In order to qualify for the deduction, you must be under a doctor's supervision. Therefore, you must be participating in a weight-loss program for medically valid reason, such as you need to control your weight because you have heart disease, for example. In other words, this deduction is not intended for someone who wants to maintain overall good health. The purpose of the deduction is to encourage obese patients with medical conditions to lose weight and to help offset the expenses associated with the effort.

In an Associated Press article by Curt Anderson (2002), Linda Webb Carilli, a spokeswoman for Weight Watchers International Inc., had this to say about the deduction: "It really opens the gate for everybody to be at a healthier weight."

But what about people living in a rural community that want to lose weight and need the encouragement of a support group to be successful? Getting to a Weight Watcher's meeting, for example, may be difficult when one considers that the nearest meeting place may be more than 30 miles away. Consult with your physician regarding the available options in your own town.

NEW HEALTH DEDUCTION

Because many insurance companies don't reimburse expenses associated with weight-loss, this deduction is a blessing for some people who are struggling financially. So what's the catch? Your medical expenses will need to exceed 7.5 percent of your adjusted gross income. Any food expenses that you may incur cannot be part of the deduction. The reason the IRS gives for that limitation is logical; people have to eat whether they are on a diet or not (Anderson, 2002).

Even though this deduction is "new" (the ruling was announced this year during tax season), you can file an amended return as far back as 1998. For example, if you were under a physician's care in 1999 and had a lot of expenses that were related to a weight-loss program, you may want to file an amended tax return. If you have any questions, talk to your CPA. And by the way, it is advisable, especially if you are filing an amended return, to have a verification letter from your doctor.

REFERENCE

Anderson, C. (2002). IRS recognizes obesity as a disease. [Online]. Available: <http://www.obesity.org/subs/pressroom/apstory.shtml>.

THE IMPACT OF RURAL EDUCATIONAL EXPERIENCE ON STUDENTS

■ RURAL HEALTH UPDATE

A recent study conducted at the University of Calgary (UC) in Alberta, Canada found that students were more likely to take part in a rural locum if they were provided rural educational experience. This finding is vitally important as it may provide a possible solution to rural physician shortages.

In the final year of a three-year course, students of the family medicine clerkship program at UC undergo a mandatory four-week rotation in a rural practice. These practices are located in different communities throughout Alberta, each with varying populations and facilities. Funding from the Government of Alberta's Rural Physician Action Plan helps to almost completely cover students' travel and accommodation expenses. Thus, this program encourages the students to remain in the rural community throughout their four-week experience and immerse themselves in the rural lifestyle. During their stay, students are exposed to the numerous experiences associated with rural health practices.

Wayne Woloschuk, Program/Curriculum Evaluator at the UC Medical School, and Michael Tarrant, Family Medicine Clerkship Director at the UC Medical School, collected pre-rotation and post-rotation data from the classes of 1996 to 2000. The pre-rotation questionnaire provided demographic information as well as two opinion questions on the

student's likelihood of doing a rural locum and/or rural practice. The post-rotation questionnaire revisited these opinion questions and gave the students an opportunity to evaluate their rural practice experience.

From the collected data, Woloschuk and Tarrant (2002) noted three key points:

- 1) Changes in students' perceptions of rural practices could be feasibly monitored;
- 2) Students with an urban background that underwent the rural educational experience reported an increased likelihood of undertaking rural locums; and
- 3) Students with rural backgrounds were more likely to consider both rural locums and rural practices as compared to those students who were raised in urban settings, regardless of the rural educational experience.

The study showed that a student's perspective regarding rural practice issues could be changed by a positive educational experience in a rural practice, even if the students were not raised in a rural community. It also indicated that students with rural backgrounds were more likely to utilize their training in a rural environment. These students could greatly help answer rural physician shortages. However, the number of medical students with rural backgrounds is low, as are current medical school applications from this population.

The author's concluded that increasing the number of rural-raised medical students could greatly benefit rural health practices. Providing incentives, such as preferential admission, to this student population would assist in increasing their presence in medical programs.

Similarly, rural health education can help to motivate medical students raised in urban environments to practice in rural areas. Rural experience and incentive programs, such as the Rural Physician Action Plan, can increase the likelihood these students will serve in a rural locum.

ADDITIONAL RESOURCES

Alberta Rural Physician Action Plan: <http://www.ruralnet.ab.ca/rpap/>

RuralNet: <http://www.ruralnet.ab.ca/>

Society of Rural Physicians of Canada: <http://www.srpc.ca/>

University of Calgary Family Medicine
Rural Teaching Sites: <http://www.ruralnet.ab.ca/teachsites/>

REFERENCE

Woloschuk, W. & Tarrant, M. (2002). Does a rural educational experience influence students' likelihood of rural practice? Impact of student background and gender. *Medical Education*, 36, 241-247.

PREVALENCE OF TOBACCO USE BY RURAL HIGH SCHOOL STUDENTS

■ RURAL HEALTH UPDATE

The United States' leading cause of death is tobacco use (McGinnis & Forge, 1993). This fact only makes the national trends of tobacco use among rural high school students all the more disturbing.

Between 1991 to 1997, the Centers for Disease Control and Prevention's (CDC) Youth Risk Behavior Surveillance System conducted four cross-sectional Youth Risk Behavior Surveys (YRBS). The surveys recorded changes in tobacco use among high school students on a national level, along with other health risk behaviors. Nine specific behaviors regarding tobacco use were examined:

- Current cigar use;
- Current cigarette use;
- Current smokeless tobacco use;
- Daily smoking;
- Frequent cigarette smoking;
- Lifetime cigarette smoking (ever smoked cigarettes, even one or two puffs);
- Smoked cigarette on school property;
- Smoked entire cigarette before age 13; and
- Used smokeless tobacco on school property.

Using the YRBS data, Everett and Warren (2001) were able to analyze changes in high

school student tobacco use. For rural students, the changes were typically significant as compared to urban and suburban counterparts.

From 1993 to 1997, the percentage of rural high school students who reported current cigarette smoking (smoked one or more of the 30 days before the survey) jumped from 27.9% to 42.2%. In 1997, the percentage of rural high school students who reported current use of smokeless tobacco was 14.1%, which was nearly double that of urban adolescents (7.5%). In 1997, with the exception of current cigar use, rural adolescents had the highest percentage of all the specific behaviors studied (Everett & Warren, 2001).

Disturbing trends among rural adolescents are the percentage of high school students who smoke at least once every day increasing from 19.1% in 1993 to 29.6% in 1997, and the percentage of high school students who smoked their first cigarette before age 13 increasing from 25.0% in 1993 to 30.7% in 1997. In both categories, the rural students are nearly 10% more likely to engage in the discussed behaviors than urban students.

National anti-smoking and tobacco awareness campaigns seem to have done very little to prevent the continuing rise of tobacco use for rural high school students. Further work must be conducted to prevent this negative trend from continuing. For additional information, please go to the *Smoking and Tobacco Control Monologues* located at <http://cancercontrol.cancer.gov/tcrb/monographs/>.

United States. In National Cancer Institute (Eds.), *Changing adolescent smoking prevalence*. Rockville, MD: Author.

McGinnis, J. M. & Foege, W. H. (1993). Actual causes of death in the United States. *Journal of the American Medical Association*, 270(18), 2207-2212.

REFERENCES

Everett, S. A. & Warren, C. W. (2001). Trends and subgroup difference in tobacco use among high school students in the

**Texas Tech University
Health Sciences Center
Texas Journal of Rural Health
Preston Smith Library
3601 4th Street – Suite 244
Lubbock, Texas 79430**

**Non Profit Orgn.
U.S. Postage
PAID
Texas Tech Univ.
Lubbock, Texas**