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The purpose of this journal is to provide a forum for sharing ideas related to rural health. Authors are encouraged to submit relevant and current research studies as well as legislative and/or health care policy papers. Descriptions of innovative strategies in primary health care settings are especially welcome. Manuscripts will be evaluated for pertinence to the issues of solving problems in rural health care settings and their applications to these issues on a statewide basis. Response to our articles is also encouraged and will be printed under the section "Letters to the Editor".
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2nd Annual Rural Health Conference

Community Oriented Care:
Community Survival in the New Environment

Holiday Inn Civic Center
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The article is sent to the author in page-proof (galley) form. Minor changes and corrections may be made at this time. The author usually signs "approval for printing with/without changes." Beyond this, no other changes can be made.
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*The journal accepts articles throughout the year, and the deadlines stated here are flexible. If you wish to submit a manuscript but are experiencing difficulty meeting a deadline, call Gay Lynn Smith, managing editor, at (915) 335-5119.
"While health is not in itself the flower of life, it is the soil from which the finest flowers grow."

Willgoose, 1962

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Dr. Boyd Mattison served as vice-chair of the "Special Task Force on Rural Health Delivery in Texas" in 1988. In 1991, she was president of the Texas Rural Health Association. She created working "senior/rural-help" partnerships with the National Rural Health Network, the Texas Rural Health Association, AARP, and the Texas Department of Agriculture. She is a delegate board member for the National Council on Rural Aging of the NCA, also serving on the Health Advocacy Services Constituency advising on rural aging issues. Dr. Boyd earned her MBA and EdD at Texas Tech University.

ABSTRACT

Older women are poorer than their male counterparts. They live longer and therefore suffer more from the chronic illness that comes with long life. A survey of 268 women in Central and West Texas was conducted in order to learn what they identified as their primary health and wellness concerns, what health resources they employ to address these concerns, the barriers that prevent their use of resources, and the enhancers that promote their use of resources. Although there were demographic differences across socioeconomic lines, these had little effect on women's responses. Heart disease, cancer, osteoporosis, nutrition, and long-term care were the top five concerns. Lack of knowledge, information, and availability were key barriers preventing them from using health resource services and programs. Helping women better help themselves and others achieve greater total well-being in efficient, cost-effective ways must become a priority goal locally, statewide, and on the national level.

INTRODUCTION

For the 32.8 million Americans age 65 or older, 19.5 million of whom are women, the issue of protecting and providing for one's long-term health and wellness is of primary concern. Today's older women can expect to live longer than ever before, but what will the quality of that life be? This discussion examines the broader issues as they relate to, and are reflected in, a recent survey of Texas women.
Older women, as a class, make higher use of medical care. They are consistently more likely than older men to use primary care outpatient services. Older women are also more likely than older men to require prescription drugs and long-term care for chronic health conditions that occur with increased longevity.

For example:

- One out of every eight women can expect to be diagnosed with breast cancer in her lifetime, and
- Women suffer 75 to 80 percent of the 250,000 hip fractures that occur annually in the U.S. due to osteoporosis (Collin, Rowland, Salganicoff, & Chait, 1994).

Poverty exacerbates issues of health care access. Advocating for older women’s total well-being, the American Association of Retired People (AARP, 1992) notes the financial insecurity of aging women:

- Nearly three of four older people living in poverty today are women;
- Ten million women aged 50 or older are in the work force, yet they earn less than two-thirds of the wages of men in the same age groups;
- Three of four caregivers for older or disabled family members are women who often risk job and financial security to provide this care; and
- A woman at age 65 is almost twice as likely to be living in poverty (15.4%) as a man of that age (7.6%). Poverty rates are especially high among black, native American, and Hispanic women.

Medicare and Medicaid are the primary sources of health care funds for aging Americans. Medicare covers 99 percent of Americans age 65 and older, but it does not cover prescription drugs and long-term care. Of greater concern, currently both the House and the Senate are considering major programmatic changes and reductions in funding of Medicare and Medicaid to help rein in the escalating costs of health care and reduce the federal deficit. The resulting legislation is likely to produce significant medical and economic consequences for older women.

**Curing Sickness v. Abetting Wellness**

Faced with a growing aging population at a time of declining resources, providers and policy makers are looking to research for viable solutions. Dr. Robert Butler, Editor-in-Chief of *Geriatrics* and the often acclaimed “father” of geriatric medicine, is encouraged by the increased attention and study that mid-life and older women’s health care status are receiving from policy makers (NIH) and medical educators. However, he, along with others in the field of geriatrics, contends that a large gap still remains between the acute-care orientation medical students receive during clinical rotations and the provision of primary care diagnosis, treatment, and community services needed by older women afflicted with multiple and overlapping chronic health problems (Butler, Collin, Meir, Muller, & Pinn 1995).

In similar fashion, many social scientists note that understanding the disease process of illnesses associated with aging has been the primary focus of health professionals and researchers for too long. One must, they argue, begin to define the processes for promoting health and wellness associated with age-related changes.

**Promoting Health Promotion**

One way professionals can maximize resources for health enhancement is by working in concert with their older women clients to help them to better comprehend the “science of health.” Nurse educators postulate that knowledge about self-perceived health correlates adds measurably to understanding the meaning of health in old age. These correlates can be broadly classified to include demographic variables, social participation,
fiscal/physical/cultural resources, personal attitudes, and subjective self-assessments related to total well-being (Gelein, 1983).

Researchers at Duke University and NIMH (National Institute of Mental Health) have produced two studies that examine the reciprocal nature of personal needs and environmental resources in the acquisition of health assessments. Using a variety of measures, multidisciplinary researchers in each setting collected data on normal elderly people over a period of time. What emerged was Lawton's concept of health-protective behaviors, a formula that proposes that competent behavior and positive affect in old age are a function of the interface of person and environment (Lawton 1980). In sum, people are not just consumers of health services, but are also producers of behaviors that can enhance their overall well-being as they age.

A Comparative Study of Texas Women

Aside from the studies noted above, little research has been designed to examine the characteristics or structure of health in older females. With census numbers projecting a 5 to 2 ratio of women to men over the age of 75 by the year 2000, it is critical both from a cost perspective and a human perspective that policy-driven delivery models, as well as professional and consumer practices, focus on improving health protection outcomes for tomorrow’s older women.

These views are reinforced by a recent study by the authors. That study was undertaken to provide Women in Government, a national professional association of women state legislators, with a feel for:
- what aging women in Texas identify as their health and wellness concerns,
- the health resources they use to address these concerns,
- the barriers that prevent them from using these resources, and
- the changes that would improve their use of resources.

**METHODOLOGY**

The target population was women over age 50 who participated in lunch programs at area senior activity centers in West Texas and in Central Texas. A self-administered survey instrument was employed. A letter of introduction from the authors was sent to the director of each of the senior activity centers. The director was asked to have up to twelve center participants complete the survey and return it to the authors. Survey instruments and a return envelope were included with the letter. The 268 respondents reflect a convenience sample of program participants.

The survey instrument was initially developed by a hospital in Ohio as a market research tool for a Women’s Health Center. The survey asked women about their health concerns, health resources employed, and barriers to and enablers of health resource utilization. For the current study, the authors added additional demographic questions and categories.

The number of respondents was divided equally between West Texas and Central Texas. The majority of West Texas respondents lived in Lubbock, a small urban city. The majority of Central Texas respondents lived in rural counties. For the purposes of this study, the West Texas group will serve as a surrogate for urban concerns, the Central Texas group as a surrogate for rural concerns. Group comparisons were examined employing the chi-square statistic to assess whether respondents differed along demographic variables that are believed to be related to both health concerns and health resources employed.

**Texas Women: The Findings**

Demographics: Approximately 89.5 percent of all respondents were over the age of 60; 27 percent were over age 70. Thirty-eight percent were married, 53 percent widowed, and 9 percent single. Eighty-two percent of respondents described themselves as Anglo. (The number of non-Anglo respondents was too small to do separate analyses.)
Although there were differences between the West Texas and Central Texas respondents on each of these variables, these differences did not reach statistical significance and are not detailed here (see Table 1). However, the between-group differences on most indicators of socioeconomic status did reach statistical significance.

Taken as a whole, respondents were just about evenly divided between those with incomes in excess of $20,000 per year (50.5%) and those with incomes below $20,000 (49.5%) (see Table 1). However, more West Texas respondents fell in the over $20,000 categories than the Central Texas respondents (65% versus 36%). Just about one quarter of all respondents did not complete high school; 73 percent of those were Central Texans (see Table 2). Sixty-two percent of respondents who reported having some higher education were West Texans. Sixty-six percent of respondents were retired, 14.4 percent described themselves as homemakers, and 19 percent were employed at least part-time see (Table 3). The West Texas respondents were more likely to be homemakers (21% versus 8%), and respondents from Central Texas were more likely to be employed part-time (17% versus 7%).

Health Status: Fifty-three percent of all respondents rated their health as better than average or excellent (Table 4). Only 4.6 percent rated their health as worse than average. Although the differences did not reach significance, Central Texans rated their health as better than average to excellent.
less often than their West Texas neighbors (48% versus 58%), and more often as worse than average (7% versus 2%). Central Texans reported suffering from a chronic health problem more often than West Texans (35% versus 27%), which may explain the difference in health status (see Table 5).

Table 5

<table>
<thead>
<tr>
<th>Chronic Illness</th>
<th>West</th>
<th>Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27.42%</td>
<td>34.96%</td>
</tr>
<tr>
<td>No</td>
<td>72.58%</td>
<td>65.04%</td>
</tr>
</tbody>
</table>

p < .201 n.s.

In summary, although all of the differences did not reach statistical significance, Central Texans reported more chronic illness, poorer health status, were more often unmarried, had fewer years of education, and had lower incomes, factors that are characteristic of rural America. Health status is significantly related to chronic illness (those experiencing a chronic illness report poorer health status), income, and education (see Table 6). Are these demographic differences related to differences in an aging woman’s health and wellness concerns or to the nature of resources they employ? Yes and no.

Health and Wellness Concerns

The differences in socioeconomic status did not translate into differences in the major health concerns, those mentioned most frequently by respondents, or in the health resources employed. The major health concerns of all respondents were cardiovascular disease, osteoporosis, cancer, nutrition, and long-term care. There were, however, differences in the percentages of respondents listing each concern (see Table 7). (The concern about cardiovascular disease and cancer among Central Texans may be related to their greater experience with chronic illness.)

Table 6

<table>
<thead>
<tr>
<th>Correlates* of Health Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Illness</td>
</tr>
<tr>
<td>r = -.32</td>
</tr>
<tr>
<td>p &lt; .001</td>
</tr>
<tr>
<td>n = 243</td>
</tr>
</tbody>
</table>

*Pearson Correlation Coefficients

Health Resources: The major health resources utilized by respondents were similar for both groups:
1. physician (general),
2. pharmacist,
3. clergy/church, family,
4. books/magazines/newspapers, and
5. friends.

As their primary resource, both groups listed their physician as number 1 and books/magazines/newspapers as number 2.

However, tied for second place among West Texans was use of the local pharmacist, whereas Central Texans listed family in second place. Friends, as a resource, came in third for both groups (Table 8).

Barriers to Use: The major barriers to use of health resources were also the same for both groups:
1. lack of interest,
2. lack of service availability,
3. lack of knowledge about which resources are useful,
4. need for more information on what services are available, and
5. the need for assistance to determine what services are most needed.

The major barrier to use of health resources by Central Texans was lack of service availability.
followed by lack of knowledge about which resources are useful. West Texas respondents listed lack of knowledge first, followed by lack of availability. Resource affordability was not noted among the major barriers by either group (see Table 9).

Enhancers of Use: Six enhancers were mentioned most frequently by respondents. There was agreement on four:
1. having a specific problem/need,
2. being told to use a service by their physician,
3. having services available during the day, and
4. the affordability of service.

Location of a service close to home/work was the fifth issue for Central Texans; the availability of experts the fifth for West Texans (see Table 10).

West Texas respondents most often listed having a specific problem as an enhancer of resource utilization. This was followed by the affordability of the service, being directed to use a resource by their physician, service hours, and service offered by experts. Central Texans first listed being directed by their physician, followed by service location close to work/home, having a specific problem/need, service hours, and affordability.

Implications

Due to the nature of the sample, no generalizations about older women in Texas or older women who participate in senior activity centers can be drawn from this data. Nevertheless, the survey data produced suggestive findings to assist both providers and policy makers in their thinking and planning for how to best manage and promote health status enhancers for this growing population segment.

As participants in this study noted, lack of knowledge, information, and availability were key barriers preventing them from using health re-
Table 8

Top Five Health Resources

<table>
<thead>
<tr>
<th>Health Resource</th>
<th>Percentage Responding</th>
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<tbody>
<tr>
<td>Physician</td>
<td>80</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>70</td>
</tr>
<tr>
<td>Clergy</td>
<td>60</td>
</tr>
<tr>
<td>Family</td>
<td>40</td>
</tr>
<tr>
<td>Books, etc.</td>
<td>20</td>
</tr>
<tr>
<td>Friends</td>
<td>0</td>
</tr>
</tbody>
</table>

HEALTH RESOURCES USED

- **West Texas**
- **Central Texas**

Table 9

Top Five Barriers

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Percentage Responding</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Interest</td>
<td>80</td>
</tr>
<tr>
<td>Availability</td>
<td>70</td>
</tr>
<tr>
<td>Usefulness</td>
<td>60</td>
</tr>
<tr>
<td>Information</td>
<td>40</td>
</tr>
<tr>
<td>Guidance</td>
<td>20</td>
</tr>
</tbody>
</table>

BARRIERS TO USE

- **West Texas**
- **Central Texas**
source services and programs. Hence, more effective dissemination of health protection information needs to be effected by integrated community teams charged with health education initiatives. Heidrich and Ruff (1992) identified the value to both researchers and older women of giving this target population group the opportunity to reflect on and respond to issues which affect their day-to-day total health concerns and behaviors. Knowing the facts about older women heightens understanding of their needs and their vulnerabilities in these turbulent times.

The fact that affordability of resources was not a significant barrier to health resource use suggests that Medicare and Medicaid have been providing aging women with some measure of health security. The availability of services, however, is currently a problem for all of these women, particularly for the poorer Central Texas group. Major funding cuts and programmatic redesigns currently being discussed for these entitlement programs could once again make affordability an issue and exacerbate service availability if providers refuse to accept Medicare and Medicaid clients. In addition, the shift of Medicare away from fee-for-service and toward managed care might further limit availability of services in small and rural communities. Both situations could lead to greater illness and disability outcomes for young and old alike.

GATEKEEPERS

Finally, many older women remain the family gatekeeper, managing decisions relating not only to their own well-being but also that of their spouses, disabled relatives/friends, and grandchildren. National and statewide trends toward scal-
TAKING THE PULSE OF OLDER WOMEN: "WHOLE-PERSON WELLNESS" IN RURAL TEXAS

ing-back or eliminating health resources place even more caregiving responsibilities on the shoulders of volunteers and family members who are, more often than not, women.

Helping women better help themselves and others achieve greater total well-being in efficient, cost-effective ways must become a priority goal of community partnerships which include health professionals, civic leaders, volunteers, politicians, family members, retirees, and cross-generations of women. It is imperative that cooperative agreements and partnerships which protect the general well-being of older women be emphasized and promoted locally, statewide, and on the national level.

Today's older women include the generation Stephen E. Ambrose (1995) describes in his book D-Day: June 6, 1944:

Women who not only helped win the war due to their diligent work force efforts at home and abroad, but also provided the support which held their families and communities together. Wartime work demands and experiences created new opportunities for these women as they assumed expanded workplace responsibilities, employment benefits, and positions of leadership in their communities. The same resourcefulness women demonstrated in the 1940s must now be called forth again as a vital resource for addressing and resolving unmet needs of today's older women as well as to better prepare younger women for the aging process.

To conclude, everyone benefits when older women are practicing and sharing health-protecting behaviors. Gail Sheehy (1995) writes about lessons she learned from a recent study of older women.

Wisdom, or the collective practical knowledge of the culture that we call common sense, has been associated from the time of premodern female healers with older women. Those of us eager to become wise women in training have scarcely begun to tap the wisdom of those old enough to understand life backward.

Today's "Wisewomen" are represented by our mothers and grandmothers. Tomorrow's Wisewomen will be our sisters, daughters, wives, granddaughters, and, hopefully, ourselves. We must begin to tap the wisdom of America's older women. To promote their health and well-being is to promote our own!

REFERENCES


ABSTRACT

Four open-ended questions assessed parents’ concerns about their children’s exposure to injury and poisoning hazards while performing farm work. Half of the 110 responses were related to use of farm machinery; other concerns dealt with animals and chemicals. Within these broad categories, responses reflected the hazards associated with commodities and farming practices specific to each farm’s region or county. Open-ended questions can be useful to prevention programmers for developing region-specific intervention strategies. The questions can be used without modification in other states with large and diverse farm and ranch populations.

INTRODUCTION

In rural America, children and adolescents have historically provided farm labor (Pollack, Rubenstein, & Landrigan, 1992). The use of their labor continues today, primarily as unpaid workers on family farms. In the US, about 1.2 million youths under age 14 live in farmer-operated households. Because they are actively involved in farm labor, children and adolescents on farms are at a high risk for both fatal and nonfatal injury (Rivara, 1985; Stallones, 1989; Purschwitz, 1990). The environmental hazards associated with these injuries and fatalities include tractors and other machinery, bodies of water, farm animals, agricultural chemicals, electricity, and elevated structures such as barns and silos (Wilk, 1993). An estimated 300 children and adolescents in the US are killed each
year from farm injuries of all types, and at least another 23,500 suffer nonfatal injuries (Rivara, 1985). Agricultural machinery is the leading hazard associated with farm fatalities among children and adolescents 19 and under, with farm tractors involved in about half of the machinery deaths. In the four states having the largest numbers of farms (Texas, Missouri, Iowa, and Kentucky), 192 children aged 19 and under died from farm machinery accidents between 1979 and 1988 (See Table 1).

The prevention of agricultural injury to farm youth is one of the most complex and challenging areas of injury prevention in rural locations (Hawk, Donham, & Gay, 1994). Farm parents are in a unique position when it comes to making decisions that affect a child’s work-related injury risk. They must decide rules for children’s work safety, set developmentally appropriate work tasks, and determine the level of on-the-job supervision given their children. Parents faced with these decisions are not likely to be influenced by occupational health and safety regulations, since these regulations do not usually apply to children working on family farms (Wilk, 1993; Aherin, Murphy, & Westaby, 1992).

A better understanding of parents’ perceptions of their children’s risk is needed before crafting the messages in prevention programs (Fischhoff, Bostrom, & Quadrel, 1993). However, little is known about how farm parents perceive the risk of work-related injury for youth, how parents make decisions regarding tasks for farm children, and how farm parents protect children from injury (Lee & Gunderson, 1992). Recent research in social and behavioral sciences has improved the understanding of how people perceive risk and has helped explain the complex yet significant link between perceiving a risk and taking protective action. Parental perceptions of risk are psychosocial factors which can influence whether certain actions, situations, or hazards are viewed as risky or risk-free (Gärling & Gärling, 1988; Gärling & Gärling, 1993).

Although the application of several behavioral research strategies to agricultural injury prevention has been advocated (Aherin et al., 1992;

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Table 1

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<tr>
<td>Texas</td>
<td>180,644</td>
<td>62</td>
</tr>
<tr>
<td>Missouri</td>
<td>98,082</td>
<td>34</td>
</tr>
<tr>
<td>Iowa</td>
<td>96,543</td>
<td>56</td>
</tr>
<tr>
<td>Kentucky</td>
<td>90,281</td>
<td>40</td>
</tr>
</tbody>
</table>


**Source: Centers for Disease Control & Prevention. CDC Wonder/PC (on-line mortality data set).
Elkind, 1991), only three studies were found that investigated parents’ concerns for the risks their children face on the farm (Aherin & Todd, 1989; Lee, Lenkins, Aherin, Westaby, & Gunderson, 1994; Hawk, Gay, & Donham, 1991). In each of these studies, inquiry about parents’ perceptions was limited to injury or illness hazards specified by the researchers.

These three studies, conducted primarily among Midwestern farm parents, provide a foundation for researchers in other parts of the country to expand upon. Large farming states typically exhibit a tremendous diversity in commodities and livestock (Texas Agricultural Statistics Service, 1994a, 1994b; Kentucky Agricultural Statistics Service, 1994). Therefore, one would expect wide variation in the types of concerns expressed by parents. A broader spectrum of parents’ concerns about injury could be assessed if surveys would allow parents to freely state their concerns, rather than choosing from potential hazards listed by researchers from another part of the country.

In the work reported here, we incorporated the modifications suggested above into a study of farm parents’ perceptions of agricultural injury risks among their children ages 9 to 15. We developed a set of questions to measure parental concerns and protective behaviors specific to injury and poisoning on the farm. Instead of supplying respondents with a pre-selected list of hazards from which to choose, we used an open-ended format. The questions were designed to draw out a variety of responses that would enable us to focus on commodity- and livestock-specific hazards in future intervention and prevention programs in a state having a large number of farms and a wide variety of farming activities.

**Methods**

This study was one part of a larger investigation which examined several facets of both parents’ and children’s injury concerns on Kentucky farms. The investigators had already developed a 27-item questionnaire addressing farm commodities, household characteristics, and tractor rollover protection (ROPS); the questionnaire was intended for distribution to parents whose children were to attend a 90-minute focus group on farm health and safety. That instrument was modified to include a supplemental set of questions on parental risk perceptions and protective practices.

**Questionnaire Development**

A multi-disciplinary team composed of a child development specialist, an epidemiologist, and an agricultural engineer developed the new set of questions. The team agreed that the new questions should possess two basic attributes: (1) They must permit parents to express concerns about protective behaviors across a wide array of children’s work activities, and (2) they must provide useful information to help local agencies plan and deliver farm youth injury prevention programs, especially for parental audiences. The result was a set of 13 questions seeking information in three areas: parental concerns (i.e., risk perceptions) about farm hazards, parents’ protective strategies to prevent agricultural injury, and children’s work activities. These questions were then attached to the existing 27-item questionnaire on farm commodities and household characteristics.

Six questions in the 13-item addendum were open-ended, a response mode in which answers are recorded in the respondent’s own words rather than selected from a predetermined list of categories (Aday, 1989). There were two reasons for choosing an open-ended mode of response. Since no research on farm parents’ risk perceptions and injury prevention practices for their children had been conducted in the Southeast, the response categories used in other studies might not be appropriate in Kentucky. Also, the use of open-ended questions may be better suited to new areas of inquiry where previous findings are insufficient to guide in the construction of response categories (Converse & Presser, 1986). This paper examines the four open-ended questions that dealt with parents’ concerns for children’s safety on the farm (see Table 2).
Table 2

Open-Ended Questions Asked of Farm Parents

<table>
<thead>
<tr>
<th>Question</th>
<th>Domain of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Thinking of all the farm work and farm chores that [child’s name] now does, which activity do you have the most concern that [he/she] will be injured or poisoned while doing?</td>
<td>X</td>
</tr>
<tr>
<td>(2) Now, thinking of the activities that [child’s name] is not allowed to be near, which one do you have the strongest feeling that [he/she] has no business being around?</td>
<td>X X X</td>
</tr>
<tr>
<td>(3) Are there any farm activities that [child’s name] has asked to do now, but [he/she] is not permitted to do because of safety reasons?</td>
<td>X X</td>
</tr>
<tr>
<td>(4) Which areas of your farm are off-limits for [child’s name] to play in?</td>
<td>X X</td>
</tr>
</tbody>
</table>

An important characteristic of these four open-ended questions was their emphasis on assessing intensity and frequency. The questions addressed parents’ top concerns and restrictions. The wording in two of these four questions (1 and 2 in Table 2) was an attempt to limit responses to the most intense injury and poisoning concerns and the most strongly felt restrictions parents place on children.

Sample Selection

A three-stage purposive sampling technique was used to select farm parents for participation. First, the project’s agricultural engineer selected seven rural counties in Kentucky that were geographically diverse and that varied in farm commodity production. In the second stage of sampling, the respective counties’ 4-H youth development leaders or agricultural extension agents used 4-H club membership rosters to select a sample of boys and girls between the ages of 9 and 15. Next, the 4-H leader or agent contacted the parents to ask if their selected children could participate in a focus group on farm injury issues, to be held at the county Cooperative Extension office. Each of the seven focus groups was designed to have six to eight participants, for a total potential sample size of 42 to 56 households. The third step in the sampling procedure was to ask one parent in each selected
household to complete the questionnaire. There was no attempt to balance the sample between fathers and mothers.

**Data Collection**

Data collection took place from October 1992 through April 1993. The first three focus groups consisted of children from a total of 20 households. A research assistant attempted to contact one parent from each household in order to complete the questionnaire by telephone. Although all households had telephones and no parent refused to complete the questionnaire, the researcher was able to reach only 12 of the 20 households (60%) by telephone. Because of this low initial response rate, the questionnaire was mailed to parents of children in the remaining four focus groups. Most parents returned the questionnaires when they brought their children to the focus group meeting; others mailed them back. Distributing the questionnaires by mail resulted in 19 completed questionnaires from the 28 eligible households (67.9%).

**Data Coding and Analysis**

The first step in the analysis was to prepare a verbatim listing of all answers to the open-ended questions. Next, the answers were sorted for patterns and similarities and were assigned numeric codes. These codes, together with codes for all other questions, were transferred to data entry sheets and entered into a personal computer. Data were analyzed using the Statistical Analysis System for the personal computer (SAS-PC) (SAS Institute, 1988).

**RESULTS**

**Characteristics of the Sample**

The 31 questionnaires provided data on 11 male and 20 female children, ages 9 to 15 years (median age =12 years), all living in farm households, with an average of four persons per household. The farms averaged 288 acres and reflected crops, livestock, and equipment common in eastern and central Kentucky, where 84 percent of the respondents lived. Crops included tobacco, alfalfa and other hay, fruits and vegetables, soybeans, horticultural products, and timber. Livestock included cattle, horses, dairy cows, sheep, poultry, and swine. With few exceptions, the leading source of gross farm income was either tobacco or livestock.

**Concerns and Restrictions Expressed by Parents**

Parents listed 110 concerns in response to Questions 1 to 4, as shown in Table 3. Of the 110 responses, half were related to machinery. Animals were next with 17 percent of the responses, followed by chemicals with 14 percent. The fourth largest category of concerns was related to tobacco production (7%). There were 13 concerns that did not fall into the four major groupings: Most of these were concerns about heights (e.g., hay loft) or water (e.g., ponds or creeks).

**Parents’ Leading Concerns about Injury and Poisoning (Question 1)**

In response to the first question, two-thirds of the parents (n=21, 67.7%) listed at least one leading injury or poisoning concern; three parents listed two top concerns; and one listed three. Only one concern was related to poisoning; the remainder of the 26 leading concerns were about traumatic injury.

Machinery led the list of hazards that parents feared most, accounting for 55.6 percent of the responses. These machinery-related concerns were diverse and included children driving tractors, riding on tractors, hitching and unhitching equipment on a tractor, using chain saws, using a lawn mower, mowing hay with a tractor, and bush hogging1 (see footnote next page). Animal hazards ranked second, accounting for one-third of the leading concerns. Animal concerns included milking cows, working cattle at steer shows, being in the
Parents’ Concern for Children’s Farm Safety

Table 3

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Leading concern (Question 1)</th>
<th>Leading proximity restriction (Question 2)</th>
<th>Restriction on child’s request (Question 3)</th>
<th>Areas off-limits for play (Question 4)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery</td>
<td>15</td>
<td>21</td>
<td>16</td>
<td>3</td>
<td>55</td>
</tr>
<tr>
<td>Animals</td>
<td>9</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Tobacco harvesting</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>40</td>
<td>20</td>
<td>23</td>
<td>110</td>
</tr>
</tbody>
</table>

vicinity of cattle, horseback riding, and exercising animals. While machinery was the leading concern for parents of both boys and girls, almost all of the animal concerns came from parents of girls.

Only two leading concerns were unrelated to animals or machinery: children being up in a hay loft and children being in a field of wet tobacco plants. The latter represents a risk, unique to people who work on tobacco farms, for a type of nicotine poisoning known as Green Tobacco Sickness (CDC, 1993; McKnight, Levine, & Rodgers, 1994).

Since one-third of the parents did not answer Question 1, we evaluated several characteristics to see if there were demographic differences that would distinguish between parents who listed a leading concern and those who did not. Chi square tests revealed no significant differences related to age or gender of the child, type of farm, source of gross farm income, acres in production, or whether the child was allowed to drive a tractor.

Proximity Restrictions (Question 2)

More than two-thirds of the parents (71%, n=22) indicated that their children should keep away from certain locations or activities on the farm. Keeping children away from machinery was mentioned most often—21 of the 40 responses (52.5%). These parents felt most strongly about keeping their children away from tractors, especially while mowing, bush hogging, or harvesting. Prohibitions concerning proximity to animals were few and were limited to swine production.

Keeping children away from pesticides and other agricultural chemicals, both in storage and in application, was also viewed as an important safety measure.

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1“Bush hogging”, a common term in the southern United States, is derived from the proprietary name of the Bush Hog® rotary field mower. A Bush Hog®, as well as similar mowers manufactured by other companies, is a large field-type mower pulled by a tractor and powered by the tractor’s power takeoff (PTO) (Ramm, 1980). It has one or more horizontal rotating blades and is used primarily for maintenance mowing in fields and pastures. Bush hogging has become a generic term that implies any mowing using a tractor and such a mower, regardless of manufacturer.
measure. Nine of the 11 comments that involved avoiding agricultural chemicals were made by parents of girls.

Keeping children away from tobacco harvesting was listed five times. Tobacco-related hazards include Green Tobacco Sickness and lacerations occurring during the manual harvesting of tobacco.

Tasks Children were Prohibited from Performing (Question 3)

Slightly more than half the parents (n = 18, 58.1%) listed at least one activity they had forbidden their children to do, even though the children had asked to do these activities. Similar percentages of girls' parents (60%) and boys' parents (54.5%) had forbidden children from doing work or activities the children had requested. Of the 20 prohibited activities listed, 16 (80%) were related to machinery. The most commonly prohibited machinery activities involved driving a farm tractor, especially while doing such chores as raking hay, mowing, or bush hogging. The remaining 20 percent of requested—yet prohibited—activities included using agricultural chemicals, ringing hogs (inserting rings into their snouts), and harvesting tobacco.

Prohibited Play Areas (Question 4)

Only about half the parents (n = 15, 48.4%) indicated that they had placed areas of the farm off-limits for children's play. Animals and animal structures were listed most often, including animal pens, horse barns, fields with a bull, and areas containing cows with young calves. The second most common off-limits areas were related to agricultural chemicals, especially storage containers and spray equipment. Ponds and farm buildings also were mentioned in response to this question.

Discussion

This preliminary study evaluated the utility of four new questions to assess farm parents' primary concerns and protective actions toward their children in a state with a large and diverse farm population. The findings, though obtained from a small sample, provide new insights into the use of open-ended questions to measure the social and behavioral factors that influence childhood injury on farms.

This study's use of open-ended questions was a departure from previous studies in which parents matched their answers to checklists, scales, and fixed response categories. We found that open-ended questions are appropriate and useful in evaluating parents' concerns and protective practices on the farm. This conclusion is based on two evaluative criteria: (a) The answers confirmed and expanded knowledge about parental concerns, and (b) the answers can be beneficial in planning risk reduction programs for farm youth.

The responses to our open-ended questions reflected the same general concerns that other investigators have found. A report of two other studies, one using Iowa farm parents and the other a national sample of farm parents subscribing to Successful Farming, concurred with our finding that parents consider machinery, chemical, and animal hazards as the three leading concerns for their children's safety (Hawk et al., 1991). These were also the top three concerns listed in a recent survey of California adult farmers who were asked to name the most hazardous farm job that they performed (Farrar, Schenker, McCurdy, & Morrin, 1995).

Even though the responses could be classified into broad categories, they clearly reflected the individual crops and livestock produced by the farms—for example, "being in a field of wet tobacco" or "ringing hogs." Answers gave new insights into at least two previously undocumented concerns. Neither Green Tobacco Sickness nor bush hogging were included in lists used by previous researchers. Yet, these concerns were voiced in the context of tractor operation, off-limits areas, chore restrictions, and leading injury or poisoning concerns. While these two concerns may
be limited to parents in the Southeast, they might have gone undetected if parents had been restricted by a checklist developed by previous researchers. Interestingly, parents did not identify some items that we thought would appear as answers to Questions 1-4. No comments were found about noise exposure, children operating a tractor without a ROPS, power takeoffs, power takeoff shafts, manure pits, or any electrical hazards.

The answers to the open-ended questions tended to be quite specific and relatively simple for the investigators to categorize by hazard. This suggests that the questions were easily understood and interpreted by most of the parents who did respond. Yet, the proportion of parents answering Questions 1-4 varied from 48 to 71 percent. Without replicating the study, it is difficult to know if these response rates are high or low, given the open-ended response mode. The phrasing of the questions could explain why one-third of the parents failed to list a leading injury concern (Question 1). This question dealt with activities that children are allowed to do. Possibly these parents do not allow their children to perform any tasks that they feel are dangerous; therefore they would not have concerns in response to this question.

This explanation is reinforced by Question 3, which documents that children's requests to participate in farm work, especially tractor chores, are often denied by parents. In fact, many of the parents who did not answer Question 1 gave multiple responses to Questions 2 and 3. Further research should focus on parents' mechanisms for making these decisions and on their criteria for assessing their children's cognitive or physical capacity for farm work.

The findings indicate that farm parents are already actively involved in injury prevention. Program developers should realize that many parents might be interested in learning more about such issues as age-appropriate tasks, pesticide protection, tractor safety, and other hazards specific to their type of farm.

The set of questions which we developed can be especially useful at the county and local community level, where current data on the frequency or severity of agricultural injuries are commonly lacking. By using these questions to generate local specific data on antecedent injury factors, agencies such as the Cooperative Extension Service, Farm Bureau, Farm Safety 4 Just Kids, 2 4-H, vocational agriculture programs, and others can strengthen program planning, promote local development of prevention programs, and design new efforts to help farm parents reduce injury risks among their children. The use of an open-ended format allows the same questions to be used across state and county boundaries, avoiding the necessity for local groups to revise checklist-type instruments to better suit local farming conditions (Wolfenden, McKenzie, & Sanson-Fisher, 1992).

Several limitations may have affected the results of this study. First, data on children's activities and restrictions were based on self-report rather than observation by the investigators. The low response rate resulted in a small sample size which prohibited analysis of subgroups based on age or sex of the children. Switching from a telephone to a self-administered mail survey, while resulting in a slightly increased response rate, produced incomplete questionnaires which had to be excluded from the analysis. Finally, a cross-sectional study could not assess changes in parental concerns and restrictions as the child matures or across the cycle of an agricultural production year.

Several directions for future research emerge from this study. Foremost should be efforts to

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2 Farm Safety 4 Just Kids is a grassroots organization dedicated to preventing farm-related childhood injuries, health risks, and fatalities. There are currently 45 chapters in 20 states and 2 Canadian provinces. Further information is available from: FS4JK, PO Box 458, Earlham, IA 50072-0458. Phone: (515) 758-2827.
Parents' Concern for Children's Farm Safety

replicate the study with a much larger sample, allowing for more comparisons across ages of children, types of farms, and other variables. Additional studies, determining how parents' protective behavior varies according to the gender of their children, may yield some insight into why death and injury rates for farm girls are much lower than for boys. Other researchers may also choose to adapt these questions to inquire about perceptions of agricultural illnesses rather than injuries. For instance, parental concerns and protective patterns related to skin cancer, hearing loss, respiratory problems, reproductive damage, and neurotoxic insults could provide information needed for better intervention programs.

The preliminary findings from our open-ended questions indicate that these questions could be useful for researchers in other states as well. Until recently, the majority of research on health and safety concerns of farm parents has been done in the Midwest. This study contributes perspectives from farm families in the Southeast. New initiatives in agricultural health and safety currently underway at the University of Texas Health Center in Tyler (Arthur Frank, MD, PhD, personal communication, May 1995) will provide an opportunity to expand this important research across the Southwestern states. We encourage other states with a large number of farms and ranches and a diversity of crops and livestock to undertake similar studies. Because our questions are not region-specific, they can be used in any part of the country and will detect parental concerns that are unique to each locality. These concerns can then be addressed through prevention and intervention programs that will reduce the risk of injury and illness to farm children.

REFERENCES


The authors wish to thank Carol Koetke and Carol Donnelly for their editorial assistance.
STAGE OF CANCER DIAGNOSIS IN RURAL Versus Urban AREAS OF TEXAS:
IMPLICATIONS FOR CHANGING THE DISPARITY THROUGH Health SERVICES

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ABSTRACT
Cancer incidence and mortality rates have consistently been shown to be higher in urban than in rural areas, and this was recently shown to be true for Texas. In spite of primarily lower incidence and mortality rates in Texas rural areas, these areas have a significantly higher proportion of total cancers and breast cancers diagnosed at a later, invasive stage of disease. To better understand these findings, data from the Behavioral Risk Factor Surveillance System were examined to identify potential risk factors. Rural women were less likely than urban women to have ever had a mammogram, and were also less likely to have had one in the previous two years. Rural residents also were less likely to have any kind of health insurance. Other preventive services, such as having a Pap smear, were less likely in rural areas; but this difference was not statistically significant. This kind of study may be used to assess the health care delivery system and to suggest changes that can be helpful in changing the disparity in cancer diagnosis between urban and rural areas.

INTRODUCTION

Both cancer incidence (Cutler & Young, 1975) and cancer mortality (Hoover, Mason, McKay, & Fraumeni, 1975) rates are higher in urban than in rural areas, and this has recently been shown to be true for Texas (Risser, 1996). The pattern of higher urban rates is found in both sexes and all ethnic groups. However, rural areas of Texas were found to have a higher proportion of
total cancers diagnosed at an invasive stage, rather than at the more treatable in-situ stage. To further investigate these differences, diagnosis patterns and differences in diagnostic risk factors for site-specific cancers were examined in rural and urban areas of Texas.

METHODS

*Texas Cancer Registry*

Cancer incidence data are collected and maintained by the Texas Cancer Registry, a statewide cancer registry system for the 254 counties in Texas, 205 of which were considered rural pre-1990 (see Figure 1). The data collected are largely limited to demographic and cancer site data. Cancer incidence data for 1980-1985 are available for 82 Texas counties and include data on cancer diagnosed at either a pre-invasive stage of disease (cancer in-situ) or at an invasive stage of disease. Ten of these counties are urban with major metropolitan centers and are ranked by the U.S. census bureau (Starsinic, 1985) as Metropolitan Statistical Areas (MSA); they are considered urban in this study. The remaining 72 counties are considered rural in this study. Using data from the Texas Cancer Registry, invasive cancer versus in-situ cancer at diagnosis were examined in residents of rural versus urban counties. These data indicate whether the rural population had a higher or lower proportion of invasive cancer at diagnosis compared to the urban population.

*Behavioral Risk Factor Surveillance System*

One way to assess the differences in cancer screening for early diagnosis in Texas is by the Behavioral Risk Factor Surveillance System (BRFSS). This is a monthly, random-digit-dialed telephone survey of non-institutionalized, civilian residents aged 18 and older. BRFSS uses a special multi-staged cluster design based on the Mitofsky-Waksberg method of random-digit-dialing (Waksburg, 1978). Data are collected on a monthly basis and provided by the Texas Department of Health, Bureau of Chronic Disease Prevention and Control. The survey is composed of a core questionnaire and state-added questions, and is administered by the University of Texas at Austin, Office of Survey Research utilizing a computer-assisted telephone interviewing (CATI) system (Harman, 1994).

Behavioral Risk Factor data are available from 1987, but only the years 1989-1993 were examined (1991-1993 for insurance status) since those years contained questions about risk factors of interest that could be combined to obtain a large sample of both rural and urban residents. These data were analyzed using the same rural/urban designations by county used for the cancer incidence data. Data from each of the five years were combined into a single dataset. After assuring that questions, responses, and weightings were consistent across years, the data were tested to determine that the prevalence for each selected risk factor was not changing significantly across years (Frazier, Franks, & Sanderson, 1992).

RESULTS

Likelihood of being diagnosed with invasive versus in-situ cancer in rural compared to urban regions of Texas is shown in Table 1. For
Table 1

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buccal cavity</td>
<td>1.05</td>
<td>(0.75-1.46)</td>
</tr>
<tr>
<td>Stomach</td>
<td>1.09</td>
<td>(0.86-1.38)</td>
</tr>
<tr>
<td>Colon</td>
<td>1.17</td>
<td>(0.69-1.98)</td>
</tr>
<tr>
<td>Rectum</td>
<td>1.19</td>
<td>(0.43-3.31)</td>
</tr>
<tr>
<td>Larynx</td>
<td>2.21</td>
<td>(0.39-12.56)</td>
</tr>
<tr>
<td>Lung</td>
<td>0.57</td>
<td>(0.18-1.84)</td>
</tr>
<tr>
<td>Melanoma</td>
<td>1.82</td>
<td>(0.23-14.36)</td>
</tr>
<tr>
<td>Breast</td>
<td>1.89*</td>
<td>(1.16-3.09)</td>
</tr>
<tr>
<td>Cervix</td>
<td>1.19</td>
<td>(0.90-1.57)</td>
</tr>
<tr>
<td>Other female genital</td>
<td>1.24</td>
<td>(0.62-2.49)</td>
</tr>
<tr>
<td>Bladder</td>
<td>3.23</td>
<td>(0.76-13.82)</td>
</tr>
<tr>
<td>Total cancers</td>
<td>1.42*</td>
<td>(1.24-1.64)</td>
</tr>
</tbody>
</table>

1 All odds ratios are age-adjusted by 10-year age groups, ages 20 and above.

* Significantly different from 1.0 at p< .05-level.

Odds Ratio Statistic

The odds ratio statistics used to express cancer diagnosis patterns are calculated using a cancer incidence dataset. As an incidence dataset, the odds ratio is equivalent to the crude rate ratio of invasive to in-situ cancer in rural areas, divided by the crude rate ratio of invasive to in-situ cancer in urban areas. The denominators cancel, and it is calculated as an odds ratio.

Since there may be a difference in the age- and race-distribution in rural compared to urban populations, and both age and race may also be related to the odds of pre-invasive diagnosis, odds ratios were adjusted for age and race by the Mantel-Haenszel method (Mantel & Haenszel, 1959) using six 10-year age groups (20-69, 70+) and four race/ethnic groups (Anglo, Hispanic, African American, Other). For total cancers, the race-adjusted odds ratios did not differ appreciably from the crude odds ratios, and there were insufficient numbers of cases to race-adjust some of the less common cancers. Therefore, only the age-adjusted odds ratios are presented. The relationship between invasive and in-situ diagnoses was examined in all cancer sites that had any in-situ diagnosis. Due to the small number of in-situ cases for some cancers, many of the confidence intervals are very wide; and even large odds ratios did not achieve statistical significance.
most cancer sites, there is a consistent pattern of a higher proportion being diagnosed at an invasive stage of disease in rural areas of the state. Due to the small numbers of in-situ cancers diagnosed for most cancer sites, only total cancers and breast cancer are statistically significantly higher. In rural areas, both males and females, individually, also had more invasive total cancer diagnosis. All of the other sites examined had a pattern of a higher proportion of cancers diagnosed at an invasive stage in rural areas, with the exception of lung cancer. Lung cancer had a lower proportion of invasive disease diagnosed in rural than in urban areas; however, this was not statistically significant.

As shown in Table 2, there is also a pattern of less cancer prevention activity in rural versus urban areas of the state. In Texas, rural women are significantly less likely to have ever had a mammogram. An identical finding also was seen for recent mammography screening (within 2 years).

Rural women in Texas are also less likely to have had a Pap smear within two years, but this difference is not statistically significant. Rural Texas residents are significantly less likely to have any kind of health insurance coverage than are urban residents.
STAGE OF CANCER DIAGNOSIS IN RURAL VERSUS URBAN AREAS OF TEXAS

DISCUSSION

One potential limitation of this study is that the behavioral risk factor data were collected in 1989-1993, while the cancer incidence data are from 1980-1985. Also, the cancer data are only available for residents of selected counties of the state while the behavioral risk factor data are collected statewide, and are not specifically related to each cancer case. Therefore, correlations between these two data sources are ecologic and do not necessarily reflect the characteristics of the specific cancer cases included in this study. Nevertheless, the correlations reported do suggest that both differences in health service availability and access could explain the differences observed in cancer diagnosis patterns between rural and urban areas of Texas.

Total Cancers

An important goal of health services is to increase the proportion of cancers that are diagnosed at a pre-invasive stage, resulting in less severe disease and better survival. This study found a higher proportion of total cancers and breast cancer diagnosed at an invasive stage in rural compared to urban areas. Conclusions drawn from the study are as follows:

1. Possible explanations include lack of available technology for early diagnosis, as well as lack of health insurance coverage to enable utilization of the technology.
2. There also may be differences in physician referral patterns between rural and urban areas or in patient self-referral patterns.
3. Another potential explanation could be differences in the likelihood of reporting in-situ cancers between rural and urban regions.

Breast Cancer

Breast cancer is a common cancer for which early diagnosis to reduce mortality is possible (Verbeek et al., 1984; Collette, Day, Romback, & DeWaard, 1984). However, early diagnosis requires access to, and use of, health services such as mammography. Points to consider are the following:

1. Mammography may be less available, or may be accessed less frequently, in rural compared to urban areas (Harris & Leininger, 1993).
2. Studies of breast cancer stage at diagnosis in rural versus urban areas have also shown that rural cases are less likely to have staged tumors (Howe, Katterhagen, Yates, & Lehnerr, 1992).
3. When stage is known, rural cases have more advanced disease than urban cases (Liff, Chow, & Greenberg, 1991).

Cervical Cancer

Cervical cancer can also be diagnosed at an early, pre-invasive stage. Although in Texas cervical cancer is more likely to be diagnosed at an invasive stage in rural areas, this difference is not statistically significant (see Table 1). Points to consider are the following:

1. Although the difference was not statistically significant, cervical cancer screening showed a pattern of less usage in rural regions of the state (see Table 2).
2. Other studies have shown that the more advanced cases of cervical cancer occur among lower socioeconomic groups and from agricultural regions (Walton, Kernodle, & Hulka, 1979).
3. Screening for cervical cancer has been in use for a much longer period of time than has been screening mammography. Therefore, both patients and physicians may be more likely to recognize the need for, and to utilize, cervical cancer screening than breast cancer screening.

Lung Cancer

The only exception to the overall pattern of a
higher odds of invasive cancer in rural versus urban areas was lung cancer. However, lung cancer is not usually subject to pre-invasive diagnosis and is therefore not as likely to follow the rural/urban pattern as those cancer sites more likely to be diagnosed at a pre-invasive stage.

FACTORS INFLUENCING UTILIZATION OF PREVENTIVE HEALTH CARE

Health Insurance Coverage and HMO Coverage

Rural/urban differences in health insurance coverage may also affect the early diagnosis of cancer (Salem et al., 1995). Women with HMOs have been shown to be more likely to have had a mammogram compared to other women (Rimer, Trock, Balschem, & Cristinzio, 1990; Rimer, 1992). Based on current data from the Texas State Department of Insurance, a rural county in Texas has an average of 1.03 HMOs, while an urban county has an average of 4.53 HMOs. The difference in HMO-coverage of rural areas of Texas, combined with the BRFSS results that rural Texans are significantly less likely to have any kind of health insurance, may also be related to the observed cancer diagnosis differences.

Texas state law has only required health insurance to provide coverage for mammography since 1988 (Senate Bill 1371, Chapter 1091). However, due to their primary interest in disease prevention, HMOs may have been more likely to provide coverage for mammography services for a longer period of time.

Information discovered in a recent study of stage at diagnosis of cancer among persons enrolled in HMOs versus fee-for-service were the following (Riley, Potosky, Lubitz, & Brown, 1994):

1. Earlier stages at diagnosis were found for those enrolled in an HMO.
2. Medicare patients enrolled in an HMO had a significantly lower odds ratio for distant disease at diagnosis than did fee-for-service patients, and this was particularly true for cancers that allow early diagnosis by screening, i.e., female breast, cervix, colon, and melanomas.

Physician Referral Patterns/Self-Referral

It is also possible that differences in physician referral patterns and in patient self-referral are related to rural/urban differences in the utilization of screening services. The single most important factor influencing older women to obtain a mammogram is having her physician discuss it with her (Fox, Murta, & Stein, 1991). Competing problems demanding the patient's and physician's attention may reduce the likelihood of referral for mammography in rural compared to urban residents (Wender, 1993).

Summary

The ratio of pre-invasive to invasive diagnosis in rural versus urban areas of Texas should be reexamined, including cancer data from a more recent time period, to determine whether there remains a significant rural/urban difference. If rural and urban areas are currently more similar regarding the relative frequency of pre-invasive diagnosis, it could indicate that mobile mammography and other inducements to earlier cancer diagnosis in rural areas have been making a significant difference. If not, this would suggest that more work is needed to reduce this disparity in Texas.

Conclusion

The most important observation from this study is that there is a consistent pattern of a greater odds of diagnosis at the invasive disease stage in rural compared to urban areas. Total cancers and breast cancer had statistically significantly higher invasive disease at diagnosis. Various hypotheses are suggested to explain these differences. Further investigation of the stage at diagnosis of cancer in rural compared to urban areas of Texas—for a
larger portion of the state and a more recent time period—could yield valuable information about use of health services and their contributions to cancer prevention and control in Texas.

REFERENCES


Stage of Cancer Diagnosis in Rural Versus Urban Areas of Texas


Authors’ Notes

Definitions of terms related to statistics used in tables.

**Odds Ratio:** The odds ratio is a measure of excess risk in a population. Therefore, in this manuscript, an odds ratio of greater than 1.0 means that it is more likely that the cancer was diagnosed at an invasive stage in rural than in urban areas.

**Confidence Interval:** Since the odds ratio is an estimate of risk, the 95% confidence interval of the odds ratio refers to the range within which the true risk will fall 95% of the time.
The objective of this research was to identify some epidemiological aspects of diabetes as it occurs in the Mexican-American population in the South Plains area of Texas and, therefore, to help predict, intervene, diagnose, and develop better treatment plans for this patient group.

INTRODUCTION

The occurrence of diabetes in local Mexican-American patients was noted as higher when compared to the general population in the South Plains area of Texas. Data are presented that add to our understanding of the underlying part genetics and environment plays in this ethnic group's propensity for the disease. This study considered individuals or subsets of populations that are identified as "at risk" populations. A comparison of the literature supporting this theory, along with empirical as well as clinical observations of Mexican-Americans in this area, included genetic-environmental interaction of the population and the influence of the new host environment in contrast to the population's traditional environment, particularly among recent migrants. Control of the disease was also seen as more difficult for this population; and the question arises as to its cause as one of cultural influences (traditional or new), compliance, or dialogue between patient and care giver.
Defining Hispanic

The ethnocultural group term, Hispanic, includes a variety of backgrounds, sometimes based on race and sometimes based on geographical areas such as Mexico, Meso-America, Latin America, and the Caribbean—for the new world—and from the old world, mainly Iberian or Mediterranean lands (Gonzales, 1976). There are five subsets within the term Hispanic: Mexican or Mexican-American, Puerto Rican, Cuban or Cuban American, Central or South American, and other Spanish/Hispanic, which includes Central and South American until 1985 (COSSMHO, 1988).

Mexican-Americans and Diabetes

"Ten million people have been diagnosed as having diabetes mellitus, and it is estimated that at least another 5 million are unaware that they have the ailment" (Larson, 1990). Mexican-Americans are almost twice as likely to have non-insulin dependent diabetes than are non-Hispanic whites: Puerto Ricans — 26.1 percent, Mexican-American — 23.9 percent, Cuban Americans — 15.9 percent, compared to non-Hispanic whites and blacks — 12.0 percent and 19.3 percent respectively (COSSMHO, 1988). In the United States, Hispanics have a 70 percent higher incidence of death from diabetes than do whites (Hayes-Bautista, Baezconde-Garbanati, Schink, & Hayes-Bautista, 1994, Oct). It is hypothesized that the Hispanic ethnic subset, Mexican-American, has a greater incidence because of the contribution of genetic factors from its Amerindian ancestry (Bennett, 1990).

Diabetes Mellitus and Genetic Factors

It has been found that IDDM does not fit any simple single gene mode of inheritance, and that environment does play a significant part in determining the incidence (Bennett, 1990). In NIDDM, genetic contribution of parentage has been shown to be a risk factor for developing the disease (Bennett, 1990). Differences between races and ethnicities exist, with the more frequent occurrence of NIDDM found in certain Amerindian tribes, particularly the Pima tribe, of the Southwestern United States (Bennett, 1990). A comparison rate of incidence in men and women in the United States is as follows: whites 5.5 - 7.3, blacks 8.6 - 11.0, Hispanics 11.6 - 9.8 and Pima Indians 32.6 - 37 (Bennett, 1990; Pachter, 1994). Thirty to 40 per-
Parentage Patterns of Hispanic Diabetics in West Texas

Percent of the Mexican-American gene pool is derived from Amerindian heritage (Stern, Pugh, Gaskill, & Hazuda, 1982). Because both environment and genetic factors have been assessed as being predictors of NIDDM within an ethnic group living in similar and dissimilar environments (Bennett, 1990), a secondary issue was to (a) find if a Hispanic genetic contribution plays a part in an increased risk for NIDDM in the white gene pool of people living within the same environment in closed communities and to (b) examine the extent the admixture plays in genetic susceptibility. Mexican-Americans, because of their Amerindian ancestry, have an increased risk for NIDDM that is two to three times greater than the white population within the United States (Hayes-Bautista, 1994).

Patients in this ethnic group also had more trouble complying with their treatment plans, which suggests the possibility that factors intrinsic to this culture are not fully understood and addressed by the medical community, nor effectively integrated into this patient population's plan of lifelong care. A more culturally sensitive delivery of health care may offer a better dialogue between patient and physician, which may result in better management of the disease by the patient.

Review of the Literature

Effects of Genetic Contribution

The contribution of heterogeneity (different ancestry) diluting genetic stock has had variable effects on the risk for developing diabetes. Work on the heterogeneity of the Pima Indians demonstrated that the less the mingling of other genetic backgrounds, the greater the risk for diabetes (Bennett, 1990). Southwest area studies suggested that the Amerindian contribution may increase the genetic susceptibility so that Mexican-American individuals may have additional risk for developing diabetes (Bennett, 1990; Gonzales, 1976; Samet, 1988).

Demographic Similarities in Mexican-American Populations

This research considered studies of Mexican-American populations in California, New Mexico, and Texas, all of which showed similarities of ancestry and exhibited high rates of diabetes. Studies done in San Antonio evaluated cardiovascular disease in a large Hispanic population which included 7-13% who had ancestors other than from Mexico. The majority were considered Mexican-American—a population sample comparable to this area (Dewey, 1984; Hazuda, 1985; Stern, 1982; Stern, 1984) which exhibited risk factors conducive to manifestation of diabetes. A survey of the Latino population in California (Hayes-Bautista, 1994) identified Latinos by census, showed 80.3 percent with Mexican origins and a high death rate for diabetes. In contrast, the study of Hispanics in the South Plains area in the Texas Panhandle recorded a majority designating Mexico as country of origin and few claiming Amerindian background. A review in New Mexico of local Hispanics showed 15-30 percent identifying Amerindian origins, while only 50 percent considered Mexico as their origin (Samet, Coultas, Howard, et al., 1988). These findings show a common and major component of Mexican ancestry, which could possibly indicate a risk factor for diabetes in these similar populations.

Socioeconomic and Environmental Factors: San Antonio

A study titled the "San Antonio Heart Project" examined three types of communities with different socioeconomic and environmental factors (Dewey, 1984; Hazuda, 1985; Stern, 1982; Stern, 1984). One area (or barrio) with the lowest socioeconomic standing (SES) consisted mainly of Mexican-American individuals. The second community included an almost equal non-Mexican-American population within the Mexican-American population (40-60%). The third, with the highest SES, was a community of predominantly non-
Mexican-American (95%) but intermixed with some Mexican-Americans. Sociocultural factors of acculturation and assimilation using categories such as income, education, work patterns, religion, and customs were correlated with the occurrence of diabetes, obesity, and hyperlipidemia. The socioeconomic status (SES) of the areas moved from low to high, while occurrence of diabetes went from high to low. In addition, as the SES increased, there was more evidence of acculturation and assimilation within the population. In the lower SES areas, the process of acculturation and assimilation had limited progress, which usually occurs in migrant populations because of isolation and lack of education. This contributed to nonacceptance of new health maintenance programs, including a skepticism about the usefulness of weight loss for health or life style (Stern, 1982).

Socioeconomic and Environmental Factors: Latinos in California

According to a California report (Hayes-Bautista, 1994), 60.4 percent of Latinos in the United States are of Mexican-American origin, while in California that percentage is 80 percent. This study of Latinos in California showed this group had a death rate from diabetes 70 percent higher than that of whites. This group had birth outcomes that were better than other groups having less poverty, higher education, and better access to health care. Data also showed that Latino families traditionally are structured into highly functional and nuclear units, tend to reside in their own communities which were usually urban, low income areas, are under-educated, and have less access to medical care.

Diabetes among Hispanics in New Mexico

Because there is an increased occurrence of diabetes in Mexican-Americans as compared to whites, it has been attributed to the genetic admixture with Amerindians. In a review of Hispanics in New Mexico with a high prevalence of diabetes, 15-30 percent acknowledged Amerindian origins and 50 percent designated Mexico as country of origin (Samet, Coultas, Howard, et al., 1988).

Methodology

Identifying Parentage

The objective in this pilot project was to identify patients who considered themselves Hispanic, usually the subset Mexican-American, and ascertain their family history. Medical records would be reviewed to determine NIDDM. Gathering family history is similar to a pedigree analysis, ascertaining genetic origins, consanguinity within the patient's family, first, second, and third degree relatives. Accurate diagnosis of the patient's disease, along with health status of family members and relatives, is essential (Elias & Annas, 1987).

Hereditary counseling identified these patients as Mexican-American supported by birthplace, Hispanic cultural signs, and/or Mexican parentage. Family history of diabetes, obesity, and hypertension or hypertriglyceridemia histories were taken to gain insight about the occurrence of diabetes, the severity of the disease, treatment procedures, prognosis, and effective treatment within this population in order to reveal any specific environmental determinants that lead to the Mexican-American manifestation of the disease.

Self-Identification of Ethnicity

Regional or national criteria used for categorization for administrative concepts may lead to mislabeling or misapplication in a micro population (Hahn, 1992; Hahn, Mulinare, Teutsch, 1992; OMB, 1978; Osborne, 1992). Therefore, for this study, the community understanding of race and ethnic characteristics provided most of the criteria for identification or classification of local residents. This classification may be accepted or rejected by the person being categorized. This study evaluated the individual's self-perception of background, which was then confirmed with other data to clarify
ancestry. Since diabetes is considered a familial disease, a positive family history of diabetes is stressed as a significant risk factor (Bennett, 1990).

**Demographics**

Demographic data of the Hispanic group and the non-Hispanic clinic patients were comparable except for a slight difference in age distribution of patients having diabetes (see Table 1). A higher occurrence of NIDDM was seen more frequently in the older ages within the Hispanic group, which may be influenced by ethnic origins.

**Anthropological Observations**

The physical appearance of this Hispanic patient group was relatively similar and characteristic of people found in Meso-America and the Amerindians located in the southwestern areas of North America: short in stature, a broad torso, dark hair and eyes, and a slightly darker complexion when compared to patients classified as white and non-Hispanic. These characteristics differed from Hispanics observed in the Puerto Rican and Cuban ethnocultural groups located in New York and Florida.

**Criteria for Diagnosis**

The medical records of these 202 patients were reviewed for diabetes, hypertension, and hyperlipidemia, along with risk factors of height and weight. Patients were diagnosed with NIDDM if the findings met the definitions of the disease as listed by the National Diabetes Mellitus Data Group and the World Health Organization Expert Committee on Diabetes (Rifkin, 1990), including a history of elevated blood glucose, hemoglobin Alc levels (when available), and clinical information about active management with diet, exercise, with or without oral hypoglycemic agents.

Hyperlipidemia was defined as cholesterol levels above 240 mg/L and triglyceride above 200 mg/L. Body Mass Index (BMI) (weight in kg/height in meters squared) was determined with the expected normal range to be 26-30. Studies of Mexican-Americans done in San Antonio provided BMI findings in that population that could be compared to this local population. Hypertension was listed as a health risk when blood pressure levels were over 140/90 mmHg or when patients were already on appropriate therapy (Dewey, Metallinos, Strode, et al., 1984; Hazuda, 1985; Stern, Rosenthal, Haffner, et al., 1984).

Chi square distribution analysis (SAS) was carried out with an alpha of .05.

**RESULTS**

**Genetic Origins and Ethnicity Defined**

In this teaching clinic, 658 patients were randomly encountered. Based on local acceptance of name identifiers, 202 (31%) had Hispanic surnames and these patients were asked whether they considered themselves Hispanic. All agreed they were white and Hispanic, with all but two identifying themselves as Mexican-American, and none claiming Amerindian background. They were asked to identify their country of origin for themselves, their parents, and grandparents using the areas of: the United States, Mexico, Latin America other than Mexico, Iberian or Southern Europe, Northern Europe, Africa, and “Other”. If patients identified the United States as the country of origin, they were then screened to ascertain birthplace as Texas, New Mexico, or any other Southwestern state. No subject indicated any other United States area except Texas. Some were unable to identify their birth origin; therefore, further questions were asked of patients and family members in order to identify factors within the family's history which were common to the Mexican-American culture such as if their ancestors had used the Spanish language or had other signs of the Hispanic or Mexican-American culture.

A few older patients had grandparents older than this Texas city who may have migrated from the interior of Mexico and settled in this area,
when it was sparsely populated, the borders poorly defined, and the area still considered as Mexico. A few other patients were recent migrants from Mexico. Often these and the older patients relied on their native Hispanic (locally called Tex-Mex) language. Interpretation of questions and answers on the part of interrogator and patient may have caused some errors. The 202 individuals with Hispanic surnames confirmed their Hispanic origins by self-identification, birth place, parental ancestry, and by other cultural identifiers such as the use of Spanish or Tex-Mex language. Sociocultural factors of acculturation and assimilation, considering places of worship and degree of association within the Hispanic community, were also qualifying factors.

Parental patterns indicated that Texas or Mexico was the birthplace for all but two of the subjects. Diabetic patients were more likely to have Mexican-born parents (p<.02) and grandparents (p<.001) than non-diabetics (see Table 1). None reported Amerindian ancestry. In this study, 8% of patients were born in Mexico, but most had established families in the local area.

In Table 2, the occurrence of diabetes and the presence of a positive family history for diabetes were compared showing a higher prevalence of both in the Mexican-American group. The positive family history significance as higher (p<.01) suggests a family tendency for the disease. The number of clinic patients is smaller than the original group since not all had data available.

The occurrence of hypertension and hyperlipidemia was determined for those with and without diabetes (see Table 3). The occurrence of hypertension among non-diabetics was similar, while those with diabetes showed a higher percentage (p<.05). The hyperlipidemia analysis showed little difference between cholesterol levels in either category, with or without diabetes; but the percentage of Mexican-American diabetics having elevated triglyceride levels was higher (p<.05).

**Body Mass Index**

Because obesity is considered a factor contributing to the occurrence or manifestations of diabetes, correlations of height, weight, and weight distribution measured and compared according to the Body Mass Index (BMI) is important to determine if this risk factor occurs frequently in any race or ethnic group (Bennett, 1990). Body size
PARENTAGE PATTERNS OF HISPANIC DIABETICS IN WEST TEXAS

Table 2

Clinic Patients with Diagnosis or Positive Family History for Diabetes

<table>
<thead>
<tr>
<th></th>
<th>Clinic N = 321*</th>
<th>Hispanic Group N = 202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>53 17%</td>
<td>55 27%</td>
</tr>
<tr>
<td>Family History</td>
<td>12 23%</td>
<td>32 58%</td>
</tr>
</tbody>
</table>

Table 3

Comparison Summary for Hypertension, Cholesterol, and Tryglyceride Levels

<table>
<thead>
<tr>
<th></th>
<th>Clinic N = 456</th>
<th>Hispanic Group N=202</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diabetes n = 55</td>
<td>Non-diabetes n = 147</td>
</tr>
<tr>
<td>Hypertension</td>
<td>123 27%</td>
<td>35 64%*</td>
</tr>
<tr>
<td>Cholesterol (over 240 mg/dL)</td>
<td>120 26%</td>
<td>16 29%</td>
</tr>
<tr>
<td>Triglyceride (over 200 mg/dL)</td>
<td>109 24%</td>
<td>26 47%*</td>
</tr>
</tbody>
</table>

*Significant statistical difference (p<.05).

evaluation by BMI (Table 4) fit the observation that Mexican-Americans were more likely to have a short stature and stocky build. Only 48 percent had a BMI below 30, so the majority would be overweight by current national standards. No significant difference in BMI means was found between males and females. In Table 5, a comparison of BMI means from this area and with San Antonio showed little differences between sexes either. The local BMI mean values were higher than for San Antonio, but the difference was not statistically significant.

DISCUSSION

Health statistics for Hispanics show lower death rates from heart disease, stroke, and cancer but a higher risk for diabetes and its complications. The death rate for Hispanics from diabetes is higher than that of Anglos or Asians.

The increased risk for diabetes, obesity, and for hypertension and hyperlipidemia in the Mexican-American population in this study may relate to their Mexican parentage patterns. This suggests a genetic potential for developing NIDDM, which
may render the individual more vulnerable to environmental factors that contribute to the disease process. In addition, the characteristic body habitus as a risk factor for obesity may increase the risk for developing this disease.

This study focuses on a small city in rural West Texas. In this community, agriculture provides the main source of income especially for most Mexican-American people. With this traditionally low pay base for unskilled labor, the people live in poor housing areas, clustered with other Mexican-American family groups. Isolation from the rest of the community and lack of education inhibit assimilation into the host society. Communication barriers, especially differences in language, compound this problem. Thus, in this rural area, people are more likely to work together and to live in closed communities which practice traditional cultural habits.

As occurs with Mexican-American migrant populations, the subjects in this study tended to cluster in areas already populated by those of similar cultural background. This reinforces their particular way of life including language, dietary habits, and concepts of health. Of particular concern is the strong cultural legacy of beliefs and customs carried over from the older members to the younger, particularly regarding health concepts and behaviors. The degree of adherence to ethnocultural beliefs and behaviors is partly related to the level of acculturation (Pachter, 1994).
This patient group is strongly influenced by such factors as:
1. being recent migrants, as is the status of some patients;
2. living in ethnic enclaves;
3. preferring to use their native language;
4. having been educated in their country of origin;
5. continuing the circular migration to their birthland; and
6. maintaining a high degree of interchange and contact with older members who reestablish a high degree of ethnic identity (Pachter, 1994).

It has been shown that diet and activity can help reduce weight, which can be useful in delaying the onset of diabetic complications, particularly in NIDDM (Rifkin & Porte, 1990). This concept of good health practices is one of the environmental factors that can be reversed in contrast to the risk factor of genetic inheritance.

**Indications for Health Care Providers**

Health care providers will have to consider better ways to educate and encourage acceptance of this and other concepts of good health by integrating them into the traditional cultures of other races and ethnic groups. Current education of the young introduces more scientifically advanced concepts about health. Public health measures such as immunizations can encourage preventive care, but it may be difficult for children to pass these ideas on to their parents, particularly if older family members are steeped in their traditional concepts of home and lifestyle. The possibility remains that “change” can produce benefits when people are assimilated into a host society with modern concepts of well-being that accompanies the amenities offered by it. Change can happen when the family decides to modify their environment and accept a lifestyle of people of a different culture (Dewey, 1984; Stern, 1982). Thus, adequate health education can be the basis for a more informed decision about health concepts which may lead to a better quality of life.

**Summary**

The observations that the highest occurrence of non-insulin dependent diabetes (NIDDM) was in Native-Americans, particularly the Pima Indians, compared to a low level in the American Caucasian with the those of Hispanic background falling in between suggested a genetic factor altering the risk of developing diabetes. A similar difference observed in this clinic between the prevalence of diabetes in patients with and without Hispanic background raised the question of the ancestry of the patients having a relation to the occurrence of diabetes in these patients.

A second point involved another study on people living in low socioeconomic areas with a high percentage of Hispanic families who were compared to a group which had a more equal mix of Hispanic and non-Hispanic and slightly higher socio-economic status (SES) and to a group of more non-Hispanic than Hispanic families with even higher SES. This work showed the occurrence of NIDDM in the Hispanic people decreased as the SES rose, which the authors felt reflected environmental effects related to differences in health concepts of the Hispanic families, with the lowest rejecting the concept of weight management and exercise to control diabetes, and the highest accepting current standards of care.

In this report, ancestral inquiry clearly showed a strong relationship to the existence of the patient’s diabetes and other family members with the disease and that most of these family members had Mexican roots, which suggested that the genetic background contributed to the increased tendency to develop diabetes. The findings of a relatively similar body appearance, supported by BMI findings of being overweight, suggested another environmental risk for developing diabetes. This finding along with BMI measurements from a study from another area were comparable, supporting a pattern of obesity in Hispanic subjects. The occurrence of hypertension and elevated cholesterol and triglyceride levels reflected the excess weight and the presence of diabetes.
The possible transmission of a genetic factor and the cultural acceptance of a heavy body as well as other environmental factors of the Hispanic family lifestyle may be contributing to the higher incidence of diabetes in this group. Patient management, rather than only using the non Hispanic approach, should try to understand the Hispanic culture and develop more appropriate educational methods to increase effectiveness of care of these diabetic patients and their families.

REFERENCES


THE RURAL-URBAN DEMAND INDICATOR (RUDI)

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Dr. Slinkman has been involved in developing information systems for health-related activities and also provides statistical expertise in research related to rural health.

ABSTRACT

There must be adequate demand in order for a market-based health sector to flourish. This paper describes a method to identify rural areas facing inadequate demand for health and other services. When demand is inadequate to encourage the development of a private-sector market, it may be desirable for government to provide additional market stimuli. Demand will be inadequate to sustain a privately based health sector in the absence of sufficient people with sufficient purchasing power. This article sets forth a two-dimensional indicator (Rural-Urban Demand Indicator—RUDI) which incorporates two components: the level of economic well-being and demographic characteristics of rurality-urbanity. This work focuses on measures that will be useful for policy makers and researchers.

INTRODUCTION

An adequate definition of rurality is a necessary foundation for the formulation of health policy. Rural areas are heavily dependent on the federal government for assistance in establishing and maintaining health care. Four types of programs provide the preponderance of federal spending for rural health. These are (a) Medicare and Medicaid programs; (b) health care block grants such as grants for Maternal and Child Health, Preventive Health and Health Services, and Alcohol, Drug Abuse, and Mental Health; (c) funding for programs to enhance health care resources such as the National Health Service Corps, grants to
schools to educate and train primary care providers, funding for the Federal Area Health Education Centers (AHEC), and Community and Migrant Health Centers, Primary Care Cooperative Agreements, and Rural Health Care Transition Grants; and (d) federal programs funded by the Office of Rural Health Policy and the Agency for Health Care Policy and Research which initiate, coordinate, and fund research on rural health topics. The federal government's Office of Technology Assessment's report "Health Care in Rural America" (1990, September) states that,

A major challenge in designing federal rural health policies is to identify those areas where residents' access to basic health care is sufficiently endangered to justify special protective measures. Endangered areas...require special attention and ongoing subsidies of providers in order to ensure a basic level of adequate health care to area residents...

A secondary problem for federal rural health policies has been how to identify areas that require special protection, while accommodating the tremendous diversity in rural health issues and problems in different areas of the country.

The use of inappropriate definitions of "rural" may cause unfair and inequitable distribution of resources. Current efforts to improve health services and health status in rural Texas and elsewhere require adequate data on which to base policy. In addition to a direct role in the formulation of health policy, an appropriate definition of rurality is an important component of other research efforts pertaining to rural health. For example, a measure of rurality might be an explanatory variable with respect to health status.

While one often hears of the need for a new measure of rurality, what is needed is a way of determining which counties are in greatest need of government intervention. Need is closely tied to the adequacy of market forces in an area. Congress has generally established health and other policy specifically directed at rural areas. However, resources to intervene are scarce with respect to claimants. RUDI can pinpoint counties in greatest need.

**DISCUSSION OF LITERATURE**

Two approaches to categorizing population areas are important in themselves and in their use as a base for other typologies. These are approaches developed by the Bureau of the Census and the Office of Management and Budget (OMB) (Hewitt, 1989). The Bureau of the Census approach is highly conceptual and can be described as "type of area concepts rather than specific areas outlined on maps" (U.S. Department of Commerce, 1990). OMB, on the other hand, based its definitions on counties. OMB's purpose was to develop categories—more practical than theoretical—which were to be used by all federal agencies. Because both of these approaches are essentially dichotomous—metropolitan or nonmetropolitan and urban or rural—researchers have developed more complex typologies to define rural status. For practical reasons, most of these efforts were based on the county as the unit of observation.

**Bureau of the Census**

The Census Bureau developed the distinction between urban and rural populations (U.S. Department of Commerce, 1990).

**Characteristics of Urban Populations**

1. 2,500 or More Inhabitants: These are defined as places incorporated as cities, villages, boroughs, and towns with 2,500 or more
inhabitants. There are a few exceptions, but this definition holds for Texas.

2. Census Designated Places: These are formerly unincorporated areas consisting of at least 2,500 residents.

3. Other Territory: This area has a total population of at least 50,000 made up of a central city or core (incorporated or unincorporated) within an urbanized area combined with contiguous, closely settled territory.

Characteristics of Rural Populations
1. 2,500 or Less Inhabitants
2. The rural population is comprised of all persons living elsewhere.

Since these places and urbanized areas are delineated along county lines, there are generally no data associated with clearly defined places and areas. However, the Census Bureau concept of urban populations and areas forms the basis of virtually all approaches.

Office of Management and Budget

Office of Management and Budget has designated economically and socially integrated geographic units with a heavily populated urban center as metropolitan statistical areas (MSA). There must be either a city with 50,000 or more residents or an urbanized area with at least 50,000 residents that is part of a county or counties that have at least 100,000 residents. There are several limitations to the OMB classifications.

Limitations to OMB Classifications
1. Counties, particularly in the west where they tend to be large, may not conform adequately to actual urban areas.
2. There is a large variation among MSAs with the more recently designated ones lacking some amenities that are often associated with metropolitan areas.
3. A few areas, not meeting the OMB definitions, have been legislatively designated as MSAs. One reason for this action is the potential increase in Medicare reimbursement for hospitals.

Beale Code: Concept of Adjacency

An important example of the way researchers have sought additional ways to distinguish among the large Census and OMB categories is the Beale code (Beale, 1984). This was developed by the Economic Research Section of the U.S. Department of Agriculture (USDA). Its ordered classification is shown in Table 1.

This typology introduces the major new concept of adjacency. Adjacency is determined by "physical boundary adjacency" and a finding that at least 2 percent of the employed labor force in the nonmetropolitan county commutes to metropolitan central counties. The commuter requirement implies integration of outlying areas with the metropolitan area. This typology has the advantage that the categories are ordered.

Economic Research Section of USDA: Concept of Major Economic Base

Another typology, also from the Economic Research Section of the USDA, identifies seven different types of rural communities. Non-metropolitan or rural counties are identified by the major economic base including the following:

1. Heavily dependent on agriculture
2. Heavily dependent on manufacturing
3. Heavily dependent on mining
4. High concentration of government activities
5. Persistent poverty
6. A high percentage of government-owned lands
7. Characterized as retirement settlements.

National Rural Health Association

Population Density

Population density is the basis for a typology proposed by the National Rural Health Association
NRHA Four Types of Rural Areas
1. Adjacent Rural Areas: counties contiguous to or within MSAs which are very similar to their urban neighbors.
2. Urbanized Rural Areas: counties with 25,000 or more residents but distant from an MSA.
3. Frontier Areas: counties with population densities of less than 6 persons per square mile, which are the most remote areas.
4. Countryside Rural Areas: the remainder of the county not covered by other rural designations..

There are two important contributions of this typology. One is that it includes some counties within MSAs; the other is the notion of frontier areas—counties of six or fewer persons per square mile—an idea which is in use by some government agencies funding rural research. Other factors introduced in one or more attempts to classify rural counties are as follows:

Table 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Central counties of metropolitan areas of 1 million population or more</td>
</tr>
<tr>
<td>1</td>
<td>Fringe counties of metropolitan areas of 1 million population or more</td>
</tr>
<tr>
<td>2</td>
<td>Counties in metropolitan areas of 250,000 to 1 million population</td>
</tr>
<tr>
<td>3</td>
<td>Counties in metropolitan areas of less than 250,000 population</td>
</tr>
<tr>
<td>4</td>
<td>Urban population of 20,000 or more, adjacent to a metropolitan area</td>
</tr>
<tr>
<td>5</td>
<td>Urban population of 20,000 or more, not adjacent to a metropolitan area</td>
</tr>
<tr>
<td>6</td>
<td>Urban population of less than 20,000, adjacent to a metropolitan area</td>
</tr>
<tr>
<td>7</td>
<td>Urban population of less than 20,000, not adjacent to a metropolitan area</td>
</tr>
<tr>
<td>8</td>
<td>Completely rural, adjacent to a metropolitan area</td>
</tr>
<tr>
<td>9</td>
<td>Completely rural, not adjacent to a metropolitan area</td>
</tr>
</tbody>
</table>

*Urban counties are those with a Beale code of 0 through 5; higher code numbers reflect rural counties.*
The Rural-Urban Demand Indicator (RUDI)

1. Largest settlement size
2. Combination of urbanization and population density
3. Distance from an MSA or population center
4. Other economic and sociodemographic characteristics.

Smith and Parvin's Index

One exception to the categorical approach to defining rurality is an index developed by Smith and Parvin (1973). Using county data, they constructed an index of rurality using principle components analysis. The index was constructed with nine variables.

Nine Variable Index
1. Total population density
2. Percent of persons living in rural areas
3. Total population
4. Percent of persons living on farms
5. The rate of change in population between 1940 and 1970
6. Percent of persons employed in the medical and dental professions
7. Percent employed in the service fields
8. Percent employed in entertainment and recreation
9. Percent employed in agriculture, forestry, fisheries, and mining.

Other Attempts to Conceptualize Rurality

Rural sociologists have spent considerable time and effort in attempts to conceptualize rurality. Dewey (1960) argues for the reduced importance, but not the elimination, of the rural-urban continuum. He adopts Wirth's (1938) qualities characterizing urbanism—anonymity, division of labor, heterogeneity, impersonal and formally prescribed relationships, and symbols of status that are independent of personal acquaintance. These qualities define a continuum, one extreme of which is rural and the other urban. Fuguitt (1963) emphasizes that changes in transportation and communication; in trade, institutional, and social relationships; in rural occupations; and in population have “compounded the difficulty” of defining rural and urban. More recently, Tickamyer (1983) noted that “A number of sociologists suggest that rural-urban differences are disappearing as the impact of industrialization, education, and, especially, the media pervades all corners and aspects of modern society.”

Cordes' Six Characteristics of Rural America

A recent and excellent discussion of economic changes in rural areas is provided by Cordes (1989). He cites six characteristics of rural America.

Six Characteristics of Rural America
1. The similarity of the economic structure of metro and nonmetro regions
2. Greater diversity among nonmetro versus metro counties
3. Highly specialized rural areas
4. The integration of the rural economy into the larger economy
5. The fragility and vulnerability of the rural economy
6. The newness of these developments.

Cordes believes, “Policy for today’s rural America must focus on two key ingredients: the overall diversity that exists within rural America and the common characteristics of instability and vulnerability at the local level.”

Theoretical Framework

The researchers believe that the primary reason for the lack of health personnel and facilities in rural areas is the lack of demand for them. Without demand adequate to enable suppliers to earn a living comparable to what they can earn in other markets, they, physicians and others, have no incentive to locate in rural areas. It is reasonable to assume that there are no insurmountable
THE RURAL-URBAN DEMAND INDICATOR (RUDI)

problems on the supply side; various federal projects—Indian Health Service, National Health Service Corps, and others—have been able to staff adequately funded projects in rural areas.

Demand for a health service differs from need for a service; it reflects what actually is or will be purchased. The determinants of demand for a health service are, in general, similar to the determinants of demand for other goods. Thus we would expect price, income, population, price of related goods, and selection (taste) to be important determinants of demand. However, several unique elements in the demand for health services have been observed.

Elements Influencing Demand for Health Services

1. The out-of-pocket price of health services is strongly affected by the existence of health insurance. The relevant price for a demand study would be the out-of-pocket price paid by the consumer.

2. Physicians (suppliers) influence demand when they tell a patient, “Come back in two weeks.”

3. Responsiveness to price varies from very little (in the case of life threatening emergencies) to very much (in the case of certain optional procedures).

4. There are investment elements considered in the demand for health similar to those in the demand for education, i.e. protecting or enhancing future income.

5. Ceteris paribus: Demand increases with age.

6. The time cost of obtaining health services importantly influences demand.

METHODOLOGY

Economic Theory of Demand

Over a long period, there has been concern about the availability of health care resources for persons living in rural areas. Where there is adequate demand, resources will locate without government involvement. Economic theory has defined a number of general determinants of demand, i.e. price, income, price of related goods, population, selection (taste), and expectations. The level of education functions as a proxy for selection with regard to demand for health services. Additionally, several factors have been suggested that particularly apply to health services. These include the cost in time, the desire to protect earning capacity, and the physician’s role in stimulating demand.

For our purposes, the important demand determinants appear to be population and income. Price of health services is omitted because it varies from person to person depending upon insurance, and because demand for many health services is somewhat unrelated to price. Price of other goods is omitted since there is probably no alternate choice of available health services. Time, either travel or waiting, is an important determinant of demand but not attainable in examining aggregated data. For demand to be adequate, there must be a large enough market to attract providers, i.e. to enable a physician to earn an income commensurate with income elsewhere. The size of the market is determined by the number of people participating and by the purchasing power of those people. Thus, population and economic factors are essential in evaluating problems faced by rural areas.

Variables

The variables employed in the model are: median family income (1989), percent of the population below poverty (1989), percent unemployment (1991), population, average population in adjacent counties, population density, percent urban, percent of persons aged 25 and older with four or more years of college, and percent of persons aged 25 and older with less than a high school education. Where the year is not indicated, the data are from 1990 (see Table 2). The variables have been standardized so that the mean is zero, and the values are expressed in standard deviations. The unit of observation is the county; there
are 254 Texas counties and 3,074 nationwide. Hawaii is included; Alaska is not since data are not provided by counties. Yellowstone National Park County was also excluded from the analysis. The District of Columbia is treated as a county. All data are from the Area Resource File.

DATA ANALYSIS

The original intent of this research was to develop an index variable which captures the concept of rurality. Index numbers are generally weighted averages. Usually the weights are arbitrary although there can be, and are, many rationales for the assignment of weights.

An index number should be sensitive to change in its underlying variables. Statistically, this implies that the weights used for the index numbers should be chosen so that the variance of the index number is maximized. The solution to this problem is well known in multivariate statistics. The weights that maximize the variance of a linear combination of variables is the first principle component of the covariance matrix of the variables.

To obtain a single variable reflecting rurality...
<table>
<thead>
<tr>
<th>County</th>
<th>DEMOS Value</th>
<th>Population (hundreds)</th>
<th>Average Adjacent Population (hundreds)</th>
<th>Population Density</th>
<th>Percent Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenedy</td>
<td>-3.33</td>
<td>5</td>
<td>1099</td>
<td>.00</td>
<td>0.0</td>
</tr>
<tr>
<td>Loving</td>
<td>-3.20</td>
<td>1</td>
<td>284</td>
<td>.00</td>
<td>0.0</td>
</tr>
<tr>
<td>King</td>
<td>-3.06</td>
<td>4</td>
<td>28</td>
<td>.00</td>
<td>0.0</td>
</tr>
<tr>
<td>McMullen</td>
<td>-2.73</td>
<td>8</td>
<td>342</td>
<td>.01</td>
<td>0.0</td>
</tr>
<tr>
<td>Kent</td>
<td>-2.52</td>
<td>10</td>
<td>58</td>
<td>.01</td>
<td>0.0</td>
</tr>
<tr>
<td>Foard</td>
<td>-2.45</td>
<td>18</td>
<td>53</td>
<td>.03</td>
<td>0.0</td>
</tr>
<tr>
<td>Bee</td>
<td>-.06</td>
<td>251</td>
<td>190</td>
<td>.29</td>
<td>53.9</td>
</tr>
<tr>
<td>Calhoun</td>
<td>-.05</td>
<td>191</td>
<td>283</td>
<td>.35</td>
<td>57.1</td>
</tr>
<tr>
<td>Val Verde</td>
<td>-.04</td>
<td>387</td>
<td>30</td>
<td>.12</td>
<td>85.9</td>
</tr>
<tr>
<td>Deaf Smith</td>
<td>.01</td>
<td>192</td>
<td>374</td>
<td>.13</td>
<td>77.0</td>
</tr>
<tr>
<td>Hood</td>
<td>.02</td>
<td>290</td>
<td>441</td>
<td>.68</td>
<td>14.0</td>
</tr>
<tr>
<td>Milam</td>
<td>.02</td>
<td>229</td>
<td>651</td>
<td>.22</td>
<td>47.1</td>
</tr>
<tr>
<td>Bexar</td>
<td>1.72</td>
<td>11854</td>
<td>318</td>
<td>9.50</td>
<td>94.3</td>
</tr>
<tr>
<td>El Paso</td>
<td>1.89</td>
<td>5916</td>
<td>634</td>
<td>5.83</td>
<td>97.5</td>
</tr>
<tr>
<td>Galveston</td>
<td>2.13</td>
<td>2174</td>
<td>15050</td>
<td>5.45</td>
<td>92.6</td>
</tr>
<tr>
<td>Harris</td>
<td>2.29</td>
<td>28182</td>
<td>1304</td>
<td>16.25</td>
<td>96.5</td>
</tr>
<tr>
<td>Tarrant</td>
<td>2.42</td>
<td>11701</td>
<td>4014</td>
<td>13.48</td>
<td>98.7</td>
</tr>
<tr>
<td>Dallas</td>
<td>2.62</td>
<td>18528</td>
<td>3118</td>
<td>21.05</td>
<td>99.6</td>
</tr>
</tbody>
</table>
based on multiple variables, it is necessary to use one of the dimensions-reducing techniques such as principle components analysis, factor analysis, or multidimensional scaling. The simplest of the dimension-reducing techniques is principle component analysis. The objective of this technique is to describe the multivariate variation of all United States counties in our eight dimensional (variable) space in terms of a set of uncorrelated variables, called canonical variables or factors, which are linear combinations of the original variables (Everitt, 1983). The factors are derived in the order of the amount of variation explained. Principal components analysis is equivalent to principle factor analysis when no priors are specified. For this research, if the variables specified are important descriptors of rurality, the first principle component or factor should explain most of the variation among the variables and be readily interpretable as a measure of rurality.

Factor Analysis

Factor analysis was used to extract the principle components. The authors expected the analysis to result in a single factor. However, we were surprised to find that it was necessary to include two principle components. Together, the first two components accounted for 73 percent of the variation in the multivariate data set. In addition, the first two principle components or factors had a clear interpretation.

Both varimax and promax rotations were performed. There was little difference between the two types of rotations. Varimax is an orthogonal rotation that results in independent factors. Promax rotations allow for correlated factors. Because the results of the promax rotation were very close to the varimax rotation, we chose the orthogonal rotation because of the desirable property of statistical independence.

In analyzing rurality, it is necessary to consider both demographics and economic elements. Thus, it appears that no single index number is capable of capturing the subtleties of the concept of rurality.

An exploratory factor analysis was run using principle components. Based on the eigenvalues obtained, a two-factor structure appeared to be indicated. Varimax rotation was then performed constraining the structure to two factors. Two clearly defined factors emerged from the analysis with no secondary loadings. Factor 1, comprised of demographic variables, was named DEMOS; and Factor 2, comprised of income-related variables, was named EWB for economic well-being. These two factors explain 66.2 percent of the variance in the variables.

Because of concern that the Varimax rotation might artificially indicate independence of the two factors, an oblique rotation, Promax, was performed. A comparison of the Varimax and Promax rotations indicated that the two factors were, indeed, independent. The factor structure was similar to that of the Varimax rotation except that a secondary loading of unemployment occurred. For this reason we chose to work with the results from the Varimax rotation.

RESULTS

The weightings of the variables on each factor from the Varimax rotation are shown in Table 2. As can be seen, the items are clearly divided between the two factors, EWB and DEMOS, with no secondary loadings. Variables loading on a factor with a weighting of .50 or greater were used to construct the factor. Factor 1 consists of population, population density, average adjacent population, and percent urban. Factor 2 consists of median family income, percent of population below poverty, percent unemployed, and the two education variables. From each of these two factors, a corresponding value is calculated for each county, similarly called EWB and DEMOS. As a result of the standardization described above, each of these values is distributed with a mean of zero and a standard deviation equal to one.

DEMOS

The values of DEMOS in Texas range from
<table>
<thead>
<tr>
<th>County</th>
<th>EWB value</th>
<th>Median family income</th>
<th>Percent of population below poverty</th>
<th>Percent of population graduating from college</th>
<th>Percent of population with less than 9 years education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starr</td>
<td>4.58</td>
<td>10,903</td>
<td>60.0</td>
<td>6.7</td>
<td>56.3</td>
</tr>
<tr>
<td>Maverick</td>
<td>-3.80</td>
<td>13,438</td>
<td>50.4</td>
<td>7.3</td>
<td>48.3</td>
</tr>
<tr>
<td>Zavala</td>
<td>-3.24</td>
<td>14,072</td>
<td>50.4</td>
<td>6.9</td>
<td>47.9</td>
</tr>
<tr>
<td>Willacy</td>
<td>-2.88</td>
<td>16,254</td>
<td>44.5</td>
<td>8.8</td>
<td>46.0</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>-2.81</td>
<td>17,619</td>
<td>41.9</td>
<td>11.5</td>
<td>41.1</td>
</tr>
<tr>
<td>Dimmit</td>
<td>-2.81</td>
<td>13,552</td>
<td>48.9</td>
<td>7.8</td>
<td>45.4</td>
</tr>
<tr>
<td>Delta</td>
<td>-.03</td>
<td>26,614</td>
<td>22.3</td>
<td>12.5</td>
<td>13.8</td>
</tr>
<tr>
<td>Dallam</td>
<td>-.01</td>
<td>23,442</td>
<td>18.1</td>
<td>7.2</td>
<td>13.5</td>
</tr>
<tr>
<td>Young</td>
<td>-.00</td>
<td>26,563</td>
<td>16.2</td>
<td>11.2</td>
<td>15.4</td>
</tr>
<tr>
<td>McLennan</td>
<td>.00</td>
<td>28,953</td>
<td>20.6</td>
<td>16.6</td>
<td>11.6</td>
</tr>
<tr>
<td>Cooke</td>
<td>.01</td>
<td>29,324</td>
<td>16.4</td>
<td>11.9</td>
<td>12.6</td>
</tr>
<tr>
<td>Coryell</td>
<td>.03</td>
<td>25,120</td>
<td>11.4</td>
<td>11.0</td>
<td>6.8</td>
</tr>
<tr>
<td>Randall</td>
<td>1.91</td>
<td>37,156</td>
<td>6.3</td>
<td>26.4</td>
<td>36.0</td>
</tr>
<tr>
<td>Rockwall</td>
<td>1.95</td>
<td>47,397</td>
<td>6.5</td>
<td>28.6</td>
<td>5.6</td>
</tr>
<tr>
<td>King</td>
<td>1.95</td>
<td>29,000</td>
<td>7.3</td>
<td>24.5</td>
<td>9.7</td>
</tr>
<tr>
<td>Roberts</td>
<td>2.17</td>
<td>31,895</td>
<td>6.2</td>
<td>17.4</td>
<td>5.5</td>
</tr>
<tr>
<td>Collin</td>
<td>2.18</td>
<td>52,987</td>
<td>5.8</td>
<td>39.1</td>
<td>4.4</td>
</tr>
<tr>
<td>Loving</td>
<td>2.19</td>
<td>30,833</td>
<td>0.0</td>
<td>4.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>
THE RURAL-URBAN DEMAND INDICATOR (RUDI)

-3.33 to 2.62, with the negative number indicating the most sparsely populated county and 2.62 indicating the opposite extreme. The national figures range from -3.33 to 3.84. Sixty-three percent, or 161 Texas counties, are more sparsely populated than the national mean. Three of the four counties nationwide scoring lowest on DEMOS are in Texas; these are Kenedy, Loving, and King. The DEMOS values for three groups of Texas counties are shown in Table 3: the six counties with the highest DEMOS value; the six counties with the lowest value; and the six counties centered around the national mean of zero. A map of Texas showing counties with low DEMOS values is shown in Figure 1.

Counties with DEMOS ≤ -1.645

Economic Well-Being: EWB

The range of values for EWB in Texas is from -4.58 to 2.19, with the national figures ranging from -4.58 to 4.54. Fifty-nine percent, or 150 Texas counties, are economically less well-off than the national mean. Three of the four counties scoring lowest nationwide on EWB are in Texas; these are Starr, Maverick, and Zavala. The figures for the Texas counties with the six highest, the six lowest, and six central EWB values are shown in Table 4. The complete list may be obtained by writing the authors. Counties with low EWB values are demonstrated in Figure 4.

A scatter diagram is plotted with an observation for each Texas county on both an EWB and DEMOS scale (see Figure 3). On initial examination, the counties are distributed heavily in a circle around the center, which is the mean of both factors. Outside of the circle of heavy concentration, around the joint mean, the observations evidence a somewhat triangular shape. The lower corner of the triangle is at a low EWB and the mean of DEMOS. The upper left hand corner of the triangle indicates a low DEMOS and an EWB above the mean. A third in the upper right quadrant indicates a high DEMOS and a high EWB. Somewhat surprisingly, there are relatively few observations for a low DEMOS and a low EWB. For a DEMOS of less than -2, almost all observations have an EWB above the mean.

Counts with EWB ≤ -1.645
Figure 3

Economic Well-Being Versus Demographic Index
State of Texas
From the perspective of adequate demand and need for government intervention, the neediest counties are those with a low value for both EWB and DEMOS. There are no counties with a value below -2.0 on both measures. Only two Texas counties have measures below -1.0 on both EWB and DEMOS: Edwards County and Kinney County. The location of these two counties is shown in Figure 4.

**Figure 4**

Counties with DEMOS \( \leq -1.0 \)
and EWB \( \leq -1.0 \)

**IMPLICATIONS**

RUDI is highly suitable for policy purposes. The continuous measure and its two-dimensional quality provide the possibility of fine-tuning policy recommendations. The measures allow one to discriminate between inadequate demand due to sparse population, low economic resources, or both. Using this measure, policy makers can tailor their recommendations more precisely to the needs of the county.

From the federal perspective, it is possible to rank counties across the nation in terms of need. If this ranking were done, Texas (with a high proportion of poor counties) as well as sparsely populated counties, would rank at a high need level relative to the national norm. If federal aid were tied to need, Texas would be in a good position to assert a claim based on need.

At the state level, we find that more than half the Texas counties are below zero on both scales. Not only can state policy makers determine the counties of greatest need, but they can look at the state as a whole and determine clusters of counties or regions that evidence significant lack of demand. RUDI may facilitate reframing the problem, allowing policy makers to consider different solutions than have been tried in the past. By focusing on demand, we made it impossible to assume that all rural counties are in need of assistance. Additionally, the two dimensional measure, suggesting—as it does—two types of problems, has relevance for policy action. For example, counties with a very low DEMOS may best be served by transportation services or mobile units. Counties with a slightly higher DEMOS measure accompanied by a low EWB values may need assistance in attracting and paying for providers. Counties with high DEMOS levels may have adequate physicians but lack of access to these physicians by low income individuals. A measure like this reflects different degrees of need so that assistance might be provided only to the degree needed or tailored to the specific type of need.

The frequently held notion that poverty and rurality are closely tied is not supported, either in Texas or nationally. That this is true for Texas is shown in the previous section. This can additionally be illustrated by looking at the five poorest counties in Texas. All five of these counties—Starr, Maverick, Zavala, Willacy, and Hidalgo—have DEMOS values higher than the national mean. Although we do not propose to say what the policy implications of this finding are, we do believe it should sharpen the policy discussion.

RUDI can readily be reestimated when variables change. For example, population changes are
THE RURAL-URBAN DEMAND INDICATOR (RUDI)

occurring in both directions. Some counties are losing population while others are gaining. In this dynamic situation it is important to update RUDI frequently.

There are, of course, other implications. The measure will be used by researchers to gain a better understanding of rural health and other issues. It can be used by policy makers outside of health as well. Since it is a demand indicator, it may be useful in examining issues related to infrastructure and community development. It may also be of interest to the private sector

RECOMMENDATIONS FOR FUTURE RESEARCH

The next step is to further explore the usefulness of RUDI for policy purposes and for research. A number of important policy issues need exploration. For example, on the policy side, does an extremely low value on DEMOS imply a county so sparsely populated that the government sector should not intervene? Does this imply that in these areas, persons select wilderness and isolation at their own risk? If this is the conclusion, above what level of DEMOS should intervention be considered? Additionally, is there a way to combine DEMOS and EWB to define counties in need?

The two components of RUDI should be tested for their usefulness in research pertaining to rural and urban areas. For example, are either or both of the measures useful as determinants of health status? Heretofore, efforts to use rurality as a predictor of health status have had mixed results. However, the interval level measure provided by DEMOS may allow more adequate predictability based on rurality. A second research use might be to use the two measures to predict the presence of health providers and facilities.

REFERENCES


THE RURAL-URBAN DEMAND INDICATOR (RUDI)


Note:

This paper is an updating and modification of work previously published in this journal in the third quarter of 1991 titled "Index of Demand: An Economic Dimension of Rurality". The original article set forth a continuous measure of rurality-urbanity, which incorporated the level of economic well-being for US counties. This progression of research, to arrive at an adequate measure of demand, has let us separate our measure into two components described in this article.

There are four changes in this article from the earlier one. One, this article uses data from the 1990 Census in contrast to the earlier article that used 1980 data. Two, the estimation was done for all counties in the US, whereas the previous estimation was carried out for only Texas counties. Results provided here are for Texas. Three, in this article, the measure of demand is comprised of two factors instead of the original one. Four, there has been some revision in the mix of variables employed. This article describes our methodology, provides results related to Texas, and discusses implications of RUDI for policy and research.

A list of Texas counties and the DEMOS and EWB values of each is available from the authors. Please write:

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HEALTHFIND: FINDING PHYSICIANS FOR RURAL TEXAS

Susan L. Watson, BA, MPAff
Coordinator: HealthFind
Texas Center for Rural Health Initiatives

The Author

Susana Watson holds a Master's in Public Affairs from the LBJ School of Public Affairs, University of Texas at Austin. She has coordinated the past four HealthFind Exchanges for the Center for Rural Health Initiatives, the office of rural health in Texas.

- ABSTRACT

Many rural areas in Texas continue to face shortages in the supply of primary care physicians. In response to a legislative mandate to assist rural communities with health care professional recruitment, the Center for Rural Health Initiatives, the state office of rural health in Texas, began a program called HealthFind. HealthFind is a physician recruitment program specifically designed to promote community involvement in recruiting and retaining primary care physicians. The program is a low-cost, long-term recruitment event that encourages comprehensive community participation. Awarded the 1995 "Program That Has Made a Difference in Texas Rural Health" by the Texas Rural Health Association, the effects of HealthFind are felt statewide. Through the efforts of HealthFind, 60 physicians have committed to, or are currently practicing in, rural Texas communities.

- INTRODUCTION

Physician Shortages in Texas

In Texas, 24 counties have no primary care physician in direct patient care; 20 have only one physician; and 21 have two physicians (Health Professional Resource Center [HPRC], 1995). Although some of these counties with no physician have populations that are too small to support a full-time practice, 15 of these 24 counties have more than 1,500 residents; and 6 counties have more than 3,000 people. While 16 percent of all Texans live in
rural areas, only 7 percent of all licensed physicians and 12 percent of all primary care physicians in direct patient care practice in nonmetropolitan counties (Texas State Board of Medical Examiners [TSBME], 1995; HPRC, 1995).

Some shortage areas, particularly those with smaller populations, are reasonably well served by neighboring counties. For example, San Jacinto County has 18,268 people and only one practicing primary care physician.

**Shortage Areas**

In spite of the significant attention and resources focused on the quantity, education, and distribution of primary care physicians, large numbers of underserved areas and populations still exist in Texas. Texas has 117 entire-county Health Professional Shortage Area (HPSA) designations, 36 partial population HPSA designations, and 177 Medically Underserved Area (MUA) designations. Of these, 91 percent of entire-county HPSAs are nonmetropolitan (rural); 50 percent of partial population HPSA designations are rural; and 77 percent of all MUAs are rural (HPRC, July 1995).

THE CENTER FOR RURAL HEALTH INITIATIVES AND HEALTHFIND

The Center for Rural Health Initiatives (CRHI) is the state office of rural health and was established in 1989 by the Texas Legislature under HB 18, the Omnibus Health Care Rescue Act. One of the Center's mandated tasks was to establish a fee-for-service rural health physician recruitment program. HealthFind is the embodiment of that mandate.

**HealthFind: A Rural Physician Recruitment Program**

Modeled after a program in Georgia, the HealthFind program is based on the premise that community representatives are the best recruiters for their area and that retention is an integral part of recruitment. When HealthFind was formulated, CRHI attempted to design a program that would give communities and their residents an opportunity to become directly involved in physician recruitment. It was reasoned that if a comprehensive, community-driven approach was taken, the likelihood for physician retention would increase. Correspondingly, if physicians could personally ask representatives about the health resources, as well as community resources, to obtain a sense of what living in that community would be like, they would make better, long-term practice location decisions.

The HealthFind program includes two components: a series of workshops for rural communities and the HealthFind Exchange.

**Workshops**

The Center provides community training workshops two to three months prior to each Exchange. The purpose of these workshops is to familiarize communities with HealthFind and the intricacies of physician recruitment in general. Workshop attendees learn from experienced HealthFind participants how to prepare for HealthFind and develop marketing strategies and how to get the entire community involved in re-

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1 HPSA: This designation reflects a lack of reasonable access to primary care physicians and is based on a population-to-population ratio above 3,500:1.

2 "Direct patient care" physicians exclude inactive or retired physicians, physician intern/residents, and physicians practicing in teaching, administration, research, military or VA/PHS employment settings.

3 MUA: This designation reflects a lack of reasonable access to primary care, and status is based on percentage of aged population, poverty rate, infant mortality rate, and ratio of primary care physicians per 1,000 population.
recruitment. Insight about rural recruitment from the physician's perspective is provided by physicians who have attended HealthFind.

These workshops have expanded over the past two years to include other rural health issues such as grantsmanship, legal and legislative issues, rural health clinics, and community assessment. Whenever possible, speakers are from rural communities who share experiences and expertise with rural colleagues. As a parallel activity, Center staff visit primary care physicians in residency programs to educate them about needs and opportunities in rural Texas and to promote HealthFind.

HealthFind Exchange

The second component of the HealthFind program is the Exchange, a weekend-long event that gives rural communities opportunities to meet primary care physicians interested in rural practice. To be eligible to attend the HealthFind Exchange, communities must either be located in one of the 196 nonmetropolitan Texas counties or be located in a nonurbanized portion of a Texas metropolitan county and have a population of 30,000 or fewer. Practicing primary care physicians or physicians in primary care residency training are eligible to attend. Spouses are also strongly encouraged to attend HealthFind.

At the Exchange, each community displays, in an exhibit booth, aspects of community life and the medical practice setting. Community representatives distribute information packets, maps, and other resources that describe the economic, demographic, and social aspects of the community. The Chamber of Commerce is often the source of this information.

Community involvement is paramount in the recruitment process. For example, assembling the exhibit booth is a method for involving the entire community. Items given as mementos to physicians who visit the booth are donated by businesses. Often the products of local industry, donations range from bags of locally-grown rice to homemade jams to leather key chains.

Another way to involve community members in the recruitment process is to organize a team of up to six people to attend the HealthFind Exchange. In order to answer the widest array of questions possible, communities bring a variety of representatives who meet with physicians at the Exchange and provide information about practice opportunities and community life. Past representatives include hospital administrators, practicing physicians and other health professionals along with their spouses, local business leaders, elected officials, and school employees. Bringing a community team provides different community groups with a sense of investment and ownership in local health care. As one community member said, "It's kind of exciting to be that first person...[who meets the] doctor that comes into your community and says, 'Hey, look who I found!...'"

HealthFind attempts to provide a friendly, relaxed environment for people to meet and interact. In addition to interviewing physician candidates, other HealthFind activities include meals, coffee breaks, and a reception. This gives participants the opportunity to get to know each other in informal social settings.

Comprehensive Information Exchange

Another unique component of HealthFind is the set of information sheets shared among registrants. Prior to each HealthFind Exchange, communities complete detailed information sheets about their communities, such as the distance from the nearest airport, local shopping availability, and local schools. Community information sheets also provide information about the local medical environment, such as how many and what kind of practicing physicians are in the area, local hospital facilities, and referral hospital information.

Likewise, physicians complete an information sheet detailing education and practice preferences along with information about spouse and family. These sheets are exchanged among all participants. Both parties can review the information and contact attendees prior to the event. They
also provide a record of information for follow-up and later referral.

**HealthFind: Location and Attendees**

The geographic distribution of HealthFind communities is evenly dispersed and shows no direct correlation to the location of the HealthFind Exchanges. Exchanges have been held in Austin, San Antonio, Fort Worth, and Dallas.

Since the first HealthFind Exchange in September 1991, a total of 122 communities and 372 physicians (unduplicated counts) have registered for HealthFind (see Figure 1). Thirty-two percent of participating communities have come to HealthFind one time; 29 percent have come twice; 13 percent have participated three times; and 26 percent have attended four or more HealthFind Exchanges.

Of the 372 physicians who have attended HealthFind, the majority (64%) are family physicians; 21 percent specialize in internal medicine; seven percent are pediatricians; 3 percent are OB/GYNs; and the remaining 5 percent consist of general surgeons, anesthesiologists, psychiatrists, and emergency medicine physicians. Twenty-three percent of all HealthFind physicians have attended more than one Exchange.

In the early years of HealthFind, the ratio of communities to physicians participating in the event was almost 2:1. Over time, an increasing number of physicians has resulted in an inversion of that ratio (see Figure 2). There are now more than two physicians for each exhibiting community attending the HealthFind Exchange. The high physician-to-community ratio ensures a busy and productive weekend for participating communities.
Is HealthFind Successful?

A community's success at HealthFind cannot be measured immediately following an Exchange. Typically, physicians who attend HealthFind are still in residency training and are not ready for immediate practice. Additionally, the recruitment process requires time for activities such as community site visits and contract negotiations.

To measure recruitment success, the Center conducts regular telephone surveys of communities following each HealthFind Exchange. It also tracks the practice location of physicians who have attended HealthFind through information provided by licensure data from the State Board of Medical Examiners. Based on information from these sources, 60 physicians (16%) who have participated in HealthFind have committed to, or are currently practicing in, rural Texas. This number is probably slightly lower than the actual number mostly due to CHRI and out-of-state licensees.

Of all communities who have participated in HealthFind, 28 (23 percent) have recruited at least one physician. Of these 28 communities, 18 have recruited one physician; 6 have recruited two; 3 have recruited three; and 1 community has recruited five.

An additional 16 physicians who have attended HealthFind are practicing in other rural Texas communities and may have selected a rural practice site based on the HealthFind experience (see Figure 3).

There appears to be a correlation between the number of times a community has attended HealthFind and successful recruiting. Of the 28 communities that have recruited a physician, only three attended a single HealthFind Exchange. Two communities attended two Exchanges; four
Physicians Recruited or Practicing in a Rural or HealthFind Community as of September 1995

Number of Physicians Recruited in County*

* Does not include one physician identified through a CRHI mail survey as recruited but whose community was not identified.


attended three times; and 19 of the communities participated in HealthFind four or more times. One community has attended every HealthFind Exchange. The success of this level of participation is evidenced by the recruitment of five physicians.

There are other, less tangible benefits of participating in HealthFind that are very important and positive aspects. For example, communities have characterized the opportunity to meet with representatives from sponsoring health agencies as an important benefit of attending HealthFind. These agencies include the Texas Academy of Family Physicians, Texas Organization of Rural and Community Hospitals, Texas Higher Education Coordinating Board, Texas Association of Community Health Centers, Texas Osteopathic Medical Association, Texas Medical Association, Texas Society of the American College of Osteopathic Family Physicians, Texas Department of Health, and the Texas Health Foundation (co-sponsor). HealthFind also provides an opportunity to network with other communities.

Physicians and spouses see HealthFind as a way to make informed decisions about practice location. As one physician stated, "I came here to meet people from the community, all in one day—to get a lot done. It's nicer than going through a headhunter, because they [the headhunters] tell you what they think you want to know, and you
HealthFind: Finding Physicians for Rural Texas

don’t get a complete picture.” In addition to obtaining a comprehensive picture of rural communities, HealthFind also offers a practice management seminar during the Exchange to provide information about the business aspect of rural practice.

At HealthFind, physicians discover that practicing in rural Texas can be financially, as well as personally, rewarding. Rural Texas communities offer lucrative, competitive, and flexible recruitment packages. In the fall of 1994, the Center conducted a special survey of all prior HealthFind communities. Based on 66 responses, the survey reflects that the average first-year income guarantee is $135,956 with a low guarantee of $93,600 per year and a high guarantee of $250,000 per year. Other components included in the physician recruitment package are summarized in Figure 4.

Low Cost, High Commitment

HealthFind is a low-cost recruitment tool for rural communities. The fall 1994 survey showed that the average cost of using a private recruiting firm is $24,667 and can be as much as $35,000 in contrast to registration fees of $500 to participate in HealthFind. Even when factoring in travel costs and expenditures for the exhibit booth (which vary greatly depending on the community), HealthFind gives communities a chance to meet 70-80 interested physicians at a fraction of the cost of using a private recruiter.

HealthFind is time- and labor-intensive. Communities must be willing to invest the time and effort necessary to prepare for and attend HealthFind, as well as to conduct follow-up activities. Communities should also plan to make HealthFind an ongoing part of their overall recruitment strategy; it is not a quick fix.

Many physicians at HealthFind are in the early years of their residency training and may not be available for practice for one to almost three years. While this “lag time” may at first seem frustrating and ineffective, it is imperative to keep two key points in mind. One is that the vast majority

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<th>Percent of Respondents Offering Incentives</th>
<th>Recruitment Incentive</th>
<th>Percent of Respondents Offering Incentives</th>
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<td>Practice management</td>
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<td>Other (i.e., relocation costs)</td>
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NOTE: Respondents could mark all applicant responses; therefore, percentages do not add up to 100.
of physicians in residency training make a practice decision by the time they start their last year of residency. Communities should also realize that physician recruitment requires constant effort. Physicians, like any other professionals, will invariably move or retire at some point in their careers. Communities must always be prepared to meet changing health care needs.

OTHER STATE AND FEDERAL PROGRAMS OFFERING INCENTIVES FOR RURAL PRACTICE

HealthFind is not, and should not, be the only mechanism rural Texas communities use to recruit physicians and provide better access to care. Rather, it should be one component in a comprehensive recruitment and retention plan. Several state and federal programs currently provide assistance to rural physicians. These programs enhance recruitment and retention efforts through their incentives.

State Physician Education Loan Repayment Program

For example, the 74th Texas Legislature, under HB 1, appropriated $1 million to the Physician Education Loan Repayment Program, targeting funding for 90 physicians to receive loan repayment funds each year of the biennium. A rider also expands eligibility for funding to new family practice faculty in order to promote the retention of quality educators in family practice training programs. A greater number of communities can now utilize these funds as added recruitment incentives.

National Health Service Corps Loan Repayments

Pending renewed funding by the U.S. Congress, substantial loan repayment funds (up to $25,000 per year for the first two years a physician is in the community and up to $35,000 per year for years three and four) are available through the National Health Service Corps. As with the state loan repayment program, physicians must meet certain eligibility requirements. However, this program requires that communities meet eligibility requirements and submit a formal application that must be approved before a physician may receive funds.

Physician Relief Services

A common barrier to attracting physicians to a rural practice is the issue of insufficient relief services. The Center for Rural Health Initiatives administers a registry service for rural physicians who must leave their practices for a brief time periods. Rural physicians may contact the Center for a listing of locum tenens physicians willing to provide practice coverage.

Continuing Medical Education

The Center also assists rural communities in accessing continuing medical education programs through a program called Tex-Link. Under Tex-Link, any hospital located in one of the 196 nonmetropolitan counties in Texas may receive the necessary satellite downlink equipment (purchased with CRHI funds) to connect with HealthNet, Texas Tech University Health Sciences Center's satellite-fed continuing education program. A second part of this initiative is the expansion of continuing medical education programming through a coalition of health sciences centers, medical schools, schools of nursing, and other health education training programs to meet the tremendous continuing education needs of rural health professionals.

Funds for New Practice Start-ups

During the past legislative session, SB 979 created the Medically Underserved Community-State Matching Incentive Program, which provides matching funds to underserved communities that are recruiting physicians. These funds, up to $25,000
HEALTHFIND: FINDING PHYSICIANS FOR RURAL TEXAS

Per community, are to be used to defray start-up costs for new physicians in underserved areas. Although the Texas Department of Health has not yet fully developed program rules, communities will soon be able to benefit from this program.

CONCLUSION

To successfully recruit and retain physicians in the changing health care environment, rural communities must invest the time necessary to be informed, active participants. They should familiarize themselves with programs that can offer tremendous recruitment support at little or no financial cost. HealthFind is a proven method for rural communities to recruit primary care physicians. As part of an ongoing, long-term recruitment strategy, HealthFind provides rural Texas communities with a low-cost method of meeting regularly with primary care physicians interested in rural practice. Ongoing participation in HealthFind will benefit the community economically and, more importantly, will greatly increase the likelihood of constant, quality physician care in their communities.

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Texas State Board of Medical Examiners. (1995). Demographics of Texas physicians. Austin, TX: Texas State Board of Medical Examiners.

PROGRAMS, CONTACTS, AND ADDRESSES

PHYSICIAN EDUCATION LOAN REPAYMENT PROGRAM
Texas Higher Education Coordinating Board Division of Student Services P.O. Box 12788 Austin, Texas 78711 (512) 483-6340

NATIONAL HEALTH SERVICES CORPS LOAN REPAYMENT and MEDICALLY UNDERSERVED COMMUNITY-STATE MATCHING INCENTIVE PROGRAM
Texas Department of Health Community Oriented Primary Care 1100 W. 49th Street Austin, Texas 78756 (512) 458-7771

PHYSICIAN RELIEF SERVICES and TEX-LINK
Center for Rural Health Initiatives P.O. Drawer 1708 Austin, Texas 78761-1708 (512) 479-8891

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