The Lower Rio Grande Valley Community Health Assessment

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October 2001
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EXECUTIVE SUMMARY

This report summarizes the results of the Lower Rio Grande Valley Community Health Assessment. The main goals of the Assessment were to determine health status, assess the capacity of the public health infrastructure, and assist with the implementation of the MPH program. The counties of Cameron, Hidalgo, Starr, and Willacy constituted the assessment region for this project. The report is divided into chapters addressing specific priority issues identified by the LRGV community. The report is to be used as a baseline for follow-on research projects.

POPULATION

The population in the LRGV is primarily Hispanic and tends to be younger than in other areas of the state. Tremendous population growth characterizes the region and this growth is projected to continue. Between 1990 and 2000, the population in the LRGV grew approximately 40 percent. This trend is similar to the growth experienced on the Mexican side of the border where population grew 25 percent during the same time period. There are seasonal fluctuations in population size due to Winter Texans who visit the region during the winter months and migrant farm workers who return home to the region during the winter months.

Educational levels in the LRGV tend to be lower than the state average. Less than fifty percent of the population aged 25 and over has finished high school and less than 15 percent has completed a Bachelor’s Degree or higher. The economy in the region has shifted from an agricultural base to a primarily service economy. This change can be traced to the growth of the maquiladora or manufacturing industry in Mexico as well as to the implementation of NAFTA and increased trade with Mexico.

Low educational attainment, seasonal migration patterns, and shifts in the economic base of the region may explain why unemployment tends to be higher
than the state average while wages are lower. A high proportion of the LRGV population lives on incomes below the Federal Poverty Level – 37.3 percent or double the state average. Low wages and unemployment also affect health insurance coverage. Only 1 in 4 persons in the LRGV have health insurance coverage compared to 1 in 3 for the state as a whole. Low income also affects housing decisions. One factor leading to the development of colonias (substandard housing developments) in the LRGV is the lack of adequate and affordable housing. All of these issues – low educational attainment, low wages, high unemployment, lack of health insurance coverage, and the development of colonias – are interrelated and may be exacerbated by immigration patterns in the region.

**MENTAL HEALTH**

The prevalence of elder and child maltreatment is lower in the LRGV than in the state as a whole. However, there is a higher incidence of confirmed elder maltreatment cases than for the state and children with fatal maltreatment injuries are more likely to have had prior contact with Child Protective Services authorities.

Alcohol related mortality is higher for the LRGV than for the state but drug related mortality is lower. For both, the trend is toward increasing incidence. LRGV youths report they are more likely to have used cocaine or crack but less likely to have used marijuana or inhalants compared to all youths in Texas. Adults and youths who enter substance abuse treatment programs are more likely to have entered through the court system in the LRGV than for the state as a whole.

For other psychological conditions, incidence rates in the LRGV are lower than for the state as a whole. Rates for depression, schizophrenia, bipolar disorder, and anxiety disorders all show lower incidence rates. This may be attributable to the mental health seeking behavior of LRGV residents as well as to a lack of treatment facilities in the region.
ENVIRONMENTAL HEALTH

Increasing population in the LRGV is straining the current infrastructure. Stressed local governments have turned to state, federal, and nongovernmental organizations for assistance in addressing the increased demand for water, solid waste disposal, and sewer services. Community participants in the Assessment process expressed concern over water quality. In particular, community residents were concerned with the risk of disease transmission related to water quality. Border residents indicate they do not drink tap water for fear of contamination. Water system samples indicate occasional contamination of drinking water supplies. However, organic chemicals are rarely mentioned and pathogens such as Giardia and Cryptosporidia are not mentioned at all. The obvious risk to residents comes from inadequately protecting stored water supplies (i.e., insufficient sterilization of water supplies). Rates of Hepatitis A and gastrointestinal disease are higher in the Border area than in other areas of the state. The rate of mosquito-borne illness (Dengue Fever) is higher in this region and can be related to standing water in discarded containers.

Residents, particularly in colonias, indicate solid waste disposal services are unavailable or are only sporadically available. It is a particular imperative that essential services (water, sewer, solid waste disposal) are extended to the colonias.

Air quality in the LRGV appears to be good at this time. As population and cross-border traffic increase, however, air quality may become an issue. The most pressing issue is lack of adequate water supply. Currently, the Rio Grande is spoken for. There is no extra water. In the future, either desalination or a shift of agricultural water to urban use will have to occur to meet urban water demands. Related to the shrinking size of the lower Rio Grande is its pollution level. While available data indicate that much of the lower Rio Grande is not suitable for recreation or fishing, monitoring is sporadic.
**CHRONIC AND INFECTIOUS DISEASE**

The Lower Rio Grande Valley population experiences lower mortality rates from heart disease, cancer, stroke, and injuries than does the Texas non-Hispanic White population. While overall cancer rates are lower for the LRGV population, they are, in fact, increasing over time. In addition, while the rates for most cancers are lower for LRGV Hispanics, cervical and liver cancers are the exceptions. There are twice as many deaths from cervical and liver cancer in the LRGV probably related to the fact that Hispanics are less likely to be screened and are more likely to be diagnosed later in the disease process than are non-Hispanic Whites.

LRGV Hispanics also experience lower injury mortality than the Texas non-Hispanic White population particularly with regard to suicide. Homicide mortality rates are slightly higher for Hispanics in the LRGV compared to Texas non-Hispanic Whites but are lower compared to Texas Hispanics. In addition, fatal injuries involving a motor vehicle are more likely to have involved alcohol for LRGV Hispanics than for other groups.

Diabetes, liver cancer, and cirrhosis are the only chronic diseases in which mortality rates along the border are considerably higher than for the Texas non-Hispanic White population. Rates in the LRGV follow the pattern established statewide for Hispanics. Chronic Obstructive Pulmonary Disease (COPD) mortality rates are highest among non-Hispanic Whites in Texas, however, LRGV Hispanics do have higher mortality rates for COPD than do Hispanics statewide.

With regard to infectious diseases, rates for Hepatitis A, gastrointestinal disease and tuberculosis are considerably higher in the LRGV than rates for the state. The rate for Hepatitis A in the LRGV was almost four times the rate for the state. Rates of amebiasis along the border were 3.5 times the statewide rate while in Cameron County the rates were 16 times the state average. Rates of Shigellosis, Salmonellosis and Cambybacterosis were also higher along the Border and in some LRGV counties than for the state as a whole. Tuberculosis rates in the LRGV are twice the state rate. Of concern to health officials is that the proportion of tuberculosis attributable to the foreign born is rising and that
nearly one-third of all cases in Texas occur among those born in Mexico. Equally disconcerting is the fact that multi-drug resistant tuberculosis is more common among those born in Mexico.

In the LRGV, rates of sexually transmitted disease tend to be lower than the statewide rates; however, there does appear to be a pattern of increase in the incidence rate for the LRGV. Syphilis rates also show an interesting pattern. While the rates for Primary and Secondary Syphilis are lower than the rates for the state, the rate for Congenital Syphilis is higher in the LRGV suggesting the influence of sociocultural factors which prevent screening for syphilis during pregnancy.

**RESOURCES**

State data indicate the LRGV does not have a sufficient number of medical providers – physicians, nurse practitioners, physician assistants – to adequately serve the region. Thus, the area is designated as a medically underserved area. In addition to the supply issue, there is a distribution issue in that providers tend to be concentrated in certain areas leaving other areas without services.

Dental services are also problematic in the region. Compared to the state, the ratio of population per dentist is about two times to five times higher depending on the county. The region is also designated as a dental professional shortage area.

Mental health services are also lacking in the region particularly long-term services. Long-term mental health services are available outside of the region which is inconvenient for most of the population. Therefore, regional facilities are used more for crisis stabilization as is reflected in the readmission rate which is double the rate for the state.
**CULTURAL FACTORS**

Hispanics constitute the majority of the population in the LRGV and it is important to the understanding of health in the region to place behavior in the context of cultural differences. Even within the Hispanic culture, various subcultures can influence beliefs and, thus, primary health care choices.

The Hispanic culture is family centered. The family is an individual’s safety net. It is, thus, very important to involve the extended family in health care decisions in order to maximize patient compliance. Women play a particularly important role in family health care.

Religion also is important in the Hispanic culture. The decision to use traditional versus western medicine may be influenced by religious beliefs. Evidence suggests folk healers are used more frequently in Hispanic communities for chronic conditions. It is, therefore, very important that networks with medical professionals be established to ensure adequate care for those with chronic diseases. Ultimately, the decision to seek medical treatment is an economic decision and Hispanic populations are less likely to be insured and less able to pay for treatment leading them to seek alternative medical treatment.

**PROMOTORAS**

Promotoras are health outreach persons working within their own communities to bridge the gap between service providers and the community. The roles promotoras perform are varied but fall into four broad categories: facilitator, health educator, health advocate, or direct outreach. Many organizations in the LRGV utilize promotoras to more effectively provide services.

Current debates over the role of promotoras have focused on issues of pay and training. With regard to pay, many of the organizations in the LRGV using promotoras do provide a salary. However, some opponents argue that this payment for the promotora should be only the reward of seeing the improved health of their community.
Certification and training are being debated across the state. Currently, there is no uniform training for promotoras. Education varies by organization in both amount and content. One side argues that formalized training and certification would actually be antithetical to the whole promotora concept of lay persons working voluntarily to improve their communities. The other side argues that formalized training and certification would result in the increased effectiveness of the promotora. Regardless of the outcome of the debate, promotoras will continue to provide an essential service in the Lower Rio Grande Valley.

SUMMARY

The LRGV is evolving from a rural and economically challenged region into a thriving urban center at the nucleus of international trade. This transformation impacts every aspect of life in Valley and is evidenced by a continuing economic diversification and a burgeoning population. The difficulty is that the infrastructure of the region has not been able to keep pace with the rapid growth. Water resources, health care services, and housing are limited.

These limitations have had a tremendous impact on the health of the population as individuals attempt to find alternatives to fill the voids. Infectious diseases like Hepatitis A and amebiasis can be traced to the lack municipal water supplies and inadequate storage of what water is available. The lack of health care providers, particularly those who are culturally competent, may impact the disease experience of the region’s population as much of the disease burden appears to be related to health behavior rather than external factors.
The University of Texas Health Science Center at Houston School of Public Health (UTHSC-H SPH) is composed of a main campus in Houston and three existing regional campuses. The existing programs are located in San Antonio (since 1979; hosted by the University of Texas Health Science Center at San Antonio or UTHSCSA), El Paso (since 1992; hosted by University of Texas at El Paso or UTEP), and Dallas (since 1998; hosted by UT Southwestern Medical Center at Dallas). The 76th Texas Legislature, based upon recommendations of the UT Board of Regents, established a fourth MPH program hosted by UT-Brownsville and Texas Southmost College. This Regional Campus is being developed as part of the Lower Rio Grande Valley Regional Academic Health Center or RAHC. The RAHC contains a medical education
component for third and fourth year medical students and residents (Harlingen) and a research component (UT Pan American, Edinburgh), in addition to the public health component. The UT Health Science Center-San Antonio administers the first two components.

UTHSC-H SPH established the regional system to allow the Master of Public Health (MPH) degree to be offered to students who are unable to move to Houston for study. Typical students include local public health professionals, allied health professionals, patient care practitioners, such as nurses and physicians, and recent college graduates wanting to enter the health field. The regional campuses also perform research and service in their communities and form collaborative partnerships with local institutions.

The School of Public Health and its regional campuses are accredited by the Council on Education in Public Health. As such, the School offers degrees and performs service and research that are related to six disciplines: Behavioral Sciences, Biological Sciences, Biometry, Environmental Sciences, Epidemiology, and Management and Policy Sciences.

The establishment of the Brownsville component offered UTHSC-H SPH a unique educational opportunity. The Texas-Mexico border, which is almost fifty percent of the US-Mexico border, is more than 1,200 miles long. It currently experiences, and will continue to experience, both the benefits and detrimental effects of the NAFTA treaty, migration and immigration, and rapid growth. The Texas State Comptroller’s report (1998) attests to the degree to which the border has been underserved from almost any perspective, but most particularly in terms of education and especially graduate education. Graduate education affords the opportunity for residents to increase their knowledge to solve problems locally. It also increases economic development by providing an educated workforce attractive to both public and private enterprises in need of skills beyond those historically associated with border enterprises. Previous studies (Lower Rio Grande Valley Development Council, 1989; Selwyn, Barrera, Loe, and Moore, 1992; Center for Health Policy Studies, 1992; Selwyn, Loe, and Moore, 1992) and experiences clearly show that the only effective solutions to
the public health challenges along the border involve bringing together the knowledge and resources of health professionals and community leaders from both the U.S. and Mexico.

The funding of the Brownsville MPH program by the legislature allows the UTHSC-H SPH to utilize our previous experience in community health assessment to conduct a health assessment with the guidance and leadership of the Lower Rio Grande Valley (LRGV) Community including the counties of Cameron, Hidalgo, Starr and Willacy. This process has several broad goals and specific aims.

**GOALS AND SPECIFIC AIMS**

The Lower Rio Grande Valley Community Health Assessment had two broad goals. These were to determine the Lower Rio Grande Valley’s health status and assess the capacity of the public health infrastructure, and to implement the MPH program. Within each of these goals are specific aims and objectives. These are as follows:

**Implementation of the MPH Program**

1. document graduate public health education needs in order to design a program that is responsive to the needs of the LRGV Community, addresses demand across the LRGV, including suggested courses and attributes of likely students
2. identify public health issues that have the greatest research need in the LRGV
3. identify community service initiatives that address specific, identified essential public health services deficits
4. identify sites, support personnel, and possible topics to provide future research/practicum/internship opportunities for graduate students in real-time laboratory environments within the community
5. identify demand in the community for continuing and outreach education
6. establish collaborations with institutions, agencies, and policy makers in the community
7. establish a standing community advisory committee to the program
Health Status and Capacity

1. establish a formal relationship with a community organization, under whose auspices the assessment will function and who will share responsibility for the success of the assessment
2. train personnel including SPH faculty and staff and LRGV residents in the community assessment process
3. catalog public and private health agencies/organizations and other community resources and the specific missions and services they provide
4. define current and predict future demographic trends for the community
5. document health/disease status of the community
6. document public health services not provided but needed
7. determine the community need for public health workforce
8. determine barriers to primary care
9. establish a baseline database for tracking community conditions and provide public access to it via the Internet

METHODS

The Assessment was divided into four phases – planning, data collection, synthesis, and recommendations. While there are distinct phases of the Assessment, movement between phases was not linear. Evaluation at each stage often necessitated moving between phases in a non-linear fashion to ensure community concerns were addressed.

Activities during the planning phase included identification of participating agencies and organizations, formation of a review committee, establishment of specific review objectives, and logistical arrangements. Phase II, Data Collection, included such activities as review and analysis of extant data and determination of and planning for additional data needs. In Phase III, data was synthesized and a preliminary report prepared. This report and the final results presented herein represent Phase IV of the Assessment and are to be shared with community stakeholders in the near future.
**Planning**

The critical first step in the entire process was the formation of a LRGV Community Assessment Oversight Committee (herein referred to as the Oversight Committee). Figure 1.1 is an organizational chart emphasizing the leadership role of this group. This committee was responsible for guiding the decision making process outlined below. It included people with an awareness of and sensitivity to the health issues and priorities of the community and the mission of the UTHSC-H SPH.

![Figure 1.1 Community Health Assessment Proposed Organizational Chart](image)

The committee was composed of members from established organizations recognized in the community as both providing leadership in public health and possessing an awareness of the history of the region. Members understood the internal and external relationships between organizations and institutions, political environments, and formal and informal leadership structures. Committee members had diverse interests and represented associations and local
organizations that had the support of the community. In addition, the Oversight Committee included faculty who understood the mission of the UTHSC-H SPH and the procedures, details, and nuances of the collaborative community assessment model (see page iii for a listing of Oversight Committee members).

The Oversight Committee assisted the Principal Investigator in determining assessment priorities and providing an entrée to community leaders. The Oversight Committee had responsibility for reporting content including recommendations for implementing programs for the community and for the MPH program.

Another critical development during the Planning phase was the formation of the Community Review Committee. Each member of the Oversight Committee identified key community members to involve in the LRGV Health Assessment. A total of 60 individuals were identified from a wide range of community organizations including schools, clinics and hospitals, health departments, mental health centers, state agencies, farm worker organizations, religious organizations, Chambers of Commerce, bi-national groups, family support groups, and newspapers. Of the 60 individuals invited to participate, 27 chose to do so (see page iv for a complete listing).

Three meetings were held with this group in April 2000 to identify and prioritize the health concerns of the LRGV community. Table 1.1 provides a list of health concerns identified by the Community Review Committee. This data was categorized into broad subject areas and the Community Review Committee was asked to prioritize each category. Table 1.2 is the prioritized list of issues presented to and approved by the Oversight Committee to guide the Data Collection Phase of the project.¹

¹ Note that while these issues were identified as important to the community, extant data limitations made addressing some issue difficult. Issues identified with an asterisk in Table 1.2 indicate where data limitations prevented thorough research of that topic.
TABLE 1.1

Health Issues

<table>
<thead>
<tr>
<th>Population Demographic Characteristics</th>
<th>Lifestyle and Behavior</th>
<th>Community Health Services and Facilities</th>
<th>Communicable Disease</th>
<th>Mental Health</th>
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</thead>
<tbody>
<tr>
<td>Infant Mortality</td>
<td>Chronic Disease Control</td>
<td>Vector Control Services</td>
<td>Rabies</td>
<td>Adolescent Mental Health</td>
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<tr>
<td>Skin Disorders</td>
<td>Activity level</td>
<td>Water Quality &amp; Quantity</td>
<td>Vector Control</td>
<td>Family Violence</td>
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<tr>
<td>Rates of cervical, breast, prostate cancers</td>
<td>Nutrition</td>
<td>Cancer Treatment</td>
<td>STD/HIV</td>
<td>Substance Abuse</td>
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<tr>
<td>Undocumented population</td>
<td>Solid Waste Disposal</td>
<td>TB</td>
<td>Risk Behaviors</td>
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<tr>
<td>Incidence of Accidents</td>
<td>Alternative Medicine Utilization</td>
<td>Dengue Fever</td>
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<tr>
<td>Census Undercounts</td>
<td>Multicultural health education – especially Environmental Health</td>
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<td>Migrants</td>
<td>School based clinics</td>
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<tr>
<td>Immigration</td>
<td>Sewer &amp; Pesticides</td>
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<tr>
<td>Immunization Rates</td>
<td>Education</td>
<td></td>
<td></td>
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<tr>
<td>Health Professions shortages including wages, training</td>
<td>Services for children with special needs</td>
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<tr>
<td>Housing &amp; homelessness</td>
<td>Emergency Room Utilization</td>
<td></td>
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<tr>
<td>Migrant Health Status</td>
<td>Cross border utilization</td>
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<tr>
<td>Snowbirds Utilization</td>
<td>Trauma Care</td>
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<td></td>
<td>Respite Care</td>
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<td></td>
<td>Prenatal care</td>
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<td></td>
<td>Dental Services</td>
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<tr>
<td>Issue</td>
<td>Priority</td>
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<td><strong>Population Demographic Characteristics</strong></td>
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<td>Emerging Political Issues</td>
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<td>Educational resources and skills development</td>
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<tr>
<td>Health Professions shortages</td>
<td>12</td>
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<tr>
<td><strong>Lifestyle and Behavior</strong></td>
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<tr>
<td>Chronic Disease Prevalence</td>
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<tr>
<td>Accidents, Criminal Justice, and Violence</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Substance Abuse</td>
<td>10</td>
<td></td>
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<tr>
<td>Nutritional Issues</td>
<td>11</td>
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<td></td>
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<tr>
<td><strong>Community Health Services and Facilities</strong></td>
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<td></td>
</tr>
<tr>
<td>Insurance Coverage</td>
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<tr>
<td>Infrastructure (including Environment)</td>
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<tr>
<td>Health Care Utilization</td>
<td>9</td>
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<tr>
<td>Health Education</td>
<td>3</td>
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<tr>
<td>Health Professions</td>
<td>13</td>
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</tr>
<tr>
<td><strong>Communicable Disease</strong></td>
<td>2</td>
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<td></td>
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<tr>
<td>Vaccine Preventable Disease</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Immunizations</td>
<td>15</td>
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<td></td>
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<tr>
<td><strong>Mental Health</strong></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Violence (including family violence)</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Abuse</td>
<td>10</td>
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</table>
Data Collection

Based on the priorities established by the Community Review and Oversight Committees in the Planning Phase as listed in Table 1.2, existing data were collected by individual researchers. An analysis of the data was presented to the community during a workshop held in June 2000. Attendees included members of the Community Review Committee, the Oversight Committee, and other interested community members (see Appendix 1A). Specific presentations were offered on the major topics identified in Table 1.2. Based on the data presented at the workshop, attendees were asked to identify key issues deserving of further research. Five research initiatives were identified and subsequently approved by the Oversight Committee. These include:

1. Collaboration and Partnering. This project addressed the need for sharing information, coordinating services, and collaborating on projects to maximize resources.
2. Health Information System. The focus of this initiative was to provide baseline and trend data in a single location to addresses the LRGV need for ready access to regularly updated health data.
3. Educational Assessment. To ensure an education system responsive to the needs of the greatest number of employers and potential MPH students, this initiative focused on the identification of supply and demand issues related to potential students and the need for alternative public health education delivery programs.
4. Promotoras. This initiative addressed the efficacy of Promotora programs including an evaluation of recruitment, training, and retention.
5. Adolescent Mental Health. This project was designed to address concerns regarding adolescent mental health. A school-based health needs assessment was administered in the four county Lower Rio Grande Valley. The core instrument was the CDC Youth Risk Behavior Survey, modified to include more information on ethnic culture and a measure of depression.

Environmental Health was another research issue identified by the Community Review Committee and approved by the LRGV Oversight Committee for further study. The research on this topic was limited to extant data review only. A separate chapter of this report is devoted to that review.
Based on the information gathered from the community at the June conference, researchers proceeded with data collection in support of the five community approved research initiatives. In February 2001, another community conference was held. Attendees to this conference are listed in Appendix 1B. Input received from the community was used to further refine this report as well as to guide the planning process for the follow-on research initiatives on promotor/a efficacy, health information systems, collaboration and partnering, mental health needs assessment, and an assessment of public health education needs. [The results of these five initiatives are published as separate appendices to this report.]

**Synthesis**

The goals for the assessment as identified earlier in this chapter (see page 10) have been partially completed. While the implementation of the MPH program in Brownsville is ongoing, several of the objectives identified within this broad goal have been accomplished. The Assessment process, itself, identified practicum/internship sites within the LRGV community for SPH students. More specific information on learning opportunities was obtained through community surveys. Also, these surveys were used to assess the demand for public health education in the LRGV so that the Brownsville MPH program remains responsive to the needs of community. The results of these surveys are presented in a separate appendix to this report and will be released at a later date. In addition to the identification of practicum/internship sites, the Assessment process established collaborations between the SPH and community agencies, institutions, and policy makers.

The goal of increasing community capacity to improve health status was met through the completion of several of the specific objectives identified earlier in this chapter. Community members were trained in the assets mapping process through a two-day workshop held in November 2000. The workshop was facilitated by Frank Moore and Olive Roen of the UTHSC-Houston SPH.
Over 40 participants from a variety of community organizations participated in the training session. Walk South Texas, a community walking event, was another effort by the Collaboration and Partnering project to encourage cooperation between community groups as they work to improve the health of the Lower Rio Grande Valley population. Finally, a database was established to track community health status indicators not only in the Lower Rio Grande Valley but also in Mexican municipios. The results of this initiative are available to the public and can be accessed through the Internet.

Assessment results will be presented to the Community Review Committee and the general public in a meeting to be held in the near future. Feedback from both groups coupled with the issues already identified in this report as needing further research, provide opportunities for further collaboration between the Brownsville Regional SPH Campus and the LRGV Community.
References

Center for Health Policy Studies. *Cameron County Primary Health Care Review.* University of Texas Health Science Center at Houston, School of Public Health (1992).

Lower Rio Grande Valley Development Council. *The Valley Primary Health Care Review.* University of Texas Health Science Center at Houston, School of Public Health (1989).


APPENDIX 1A. June 2000 Conference Participants

Paul Ballard, Administrator, Mission Hospital
Rachel Barrera, UT-Brownsville
Virginia Barrera-Garcia, South Texas Poison Center
Elisa Beas, Director, Starr County
Roy Becker, CEO, Valley Primary Care Network
Patricia Brattin, Valley Baptist Medical Center
S. Frances Burns, Texas Department of Health
Gracie Camarena, Migrant Health Promotion
Gloria Cantu, UT-Pan American
Alfonso Cartas, Texas Department of Health
Martin S. Casas, Ninos Primero Program
Raquel Castillo, Cameron County Health Department
Maria G. Cazares, Texas Department of Health
Carol Cornelison, TexCare Partnership
Melissa Davis, Texas Department of Health
Paloma de Andres, San Benito Independent School District
Dr. Esmeralda De La Cruz, Nuestra Clinica del Valle
Sylvia Delgado, AAMA-Ninos Primero Program
Laura Delgado, UT-Pan American
Coni Diedrich, Tropical Texas Center for MHMR
Katherine Dougherty, UT-Brownsville
Marilyn Dyer-Whelan, UT-Brownsville
Karen Fossom, Planned Parenthood of Hidalgo County
David Fuentes, Cameron County Health Department
Rogelio Fuentes, TDHS Regional Director
Edna G. Escobedo, UT-Brownsville
Doreen D. Garza, TMBHCO
W. Layton Golemon, CEO, Tropical Texas Center for MHMR
Alice Gonzalez, CoPrima Association Clinic
Esteban Gonzalez, Texas Department of Health
Esmeralda Guajardo, Cameron County Health Department
Hilda Guerra, UTHSC-Houston Starr County Health Studies
Cindy Hayes, TexCare Partnership
Ella Herriage, UT-Brownsville
Cecilia Hinojosa, Planned Parenthood
Ileana C. Hinojosa, Texas A&M Extension Service and SRPH
LeRoy Jackson, Region One Education Service
Rudy Jimenez, UT-Pan American
J. Mike Keenan, Director, Hidalgo County Health Department
Joe R. Lacher, UT-Brownsville
Debra L. Lachico, Texas Department of Human Services
Mary Leal, Holy Family Services Birth Center
Sylvia Leal, UT-Pan American
Beatriz Lopez, City of La Joya Senior Citizen Center
Janie Luna, UTHSCSA RAHC
Nancy MacNaughten, UTHSC-Houston
Rosalie Manzano, UT-Brownsville
Aurelio Martinez, Nuestra Clinica Del Valle
Genoveva Martinez, Migrant Health Promotion
Josefina Martinez, Area Agency on Aging
Ana Milan, Brownsville Independent School District
Alicia Montes, Director, City of La Joya Senior Citizen Center
Nancy Nadeau, UT-Pan American
Dana G. Norman, Texas Department of Health
Noemi Ochoa, Region One Education Service
Eddie Olivarez, Rio Grande Valley Council on Alcohol and Drug Abuse
Hector X. Palacios, Tropical Texas Center for MHMR
Josue Ramirez, City of Brownsville
Lee Raymons, Texas Department of Health
Abby Reese, Holy Family Services Birth Center
Paul Resendez, Central Clinic Pharmacy
Dan Reyna, New Mexico Border Health Office
Larry Rincones, Texas A&M CHUD
Tara Rios, Dentist
Antero Rios, TDHS
Cecilia Rios, TDHS
Maria Rodriguez, HRSA
Alice Roel, Little Neighbors Social Services
Carlos Rubenstein, TNRCC
Luisa Saenz, Coordinator, Coalition for Valley Families
David Salazar, TMBHCO
Simon Salinas, County Judge, Willacy County
Fernando Salinas, City of La Joya Senior Citizen Center
Graciela Salinas, Cameron County
Yvette Salinas, Administrator, Cameron County Health Department
Brian Smith, Director, Texas Department of Health Region 11
Howdy Smith, Rio Grande Valley Border Senior Games
Rogelio Tijerina, Hidalgo County Health Department
Nancy Trevino, Rio Grande Valley Council on Alcohol and Drug Abuse
Paul Villas, Executive Director, TMBHCO
Nancy Vizcarra, Little Neighbors Social Services
APPENDIX 1B.  February 2001 Conference Participants

Mary Helen Alvarez, Texas Department of Health
Roy Becker, Valley Primary Care Network
Gloria Cantu, UTMBHCO
Raquel Castillo, Cameron County Health Department
David Castillo, Cameron County
Maria G. Cazares, Texas Department of Health
Carol Cornelison, TexCare Partnership
Melissa Davis, Texas Department of Health
Gloria De La Cruz-Vasquez, Texas Department of Health
Coni Diedrich, Tropical Texas Center for MHMR
Katherine Dougherty, UT-Brownsville
Ramon Escobar, Rio Grande Valley Council on Alcohol and Drug Abuse
Violeta Flores, Texas Department of Health
Karen Fossom, Planned Parenthood of Hidalgo County
David Fuentes, Cameron County Health Department
Rogelio Fuentes, TDHS Regional Director
Olga Gabriel, Coalition for Valley Families
Brent Alan Garza, TDHS
Cecilia Garza, Texas Department of Health
Doreen D. Garza, TMBHCO
Alice Gonzalez, CoPrima Association Clinic
Esteban Gonzalez, Texas Department of Health
Esmeralda Guajardo, Cameron County Health Department
Hilda Guerra, UTHSC-Houston Starr County Health Studies
Ella Herriage, UT-Brownsville
Ileana C. Hinojosa, Texas A&M Extension Service and SRPH
Scott Horney, Texas Department of Health
Edanili Lacar, Texas A&M SRPH
Debra L. Lachico, Texas Department of Human Services
Mary Leal, Holy Family Services Birth Center
Janie Luna, UTHSCSA RAHC
David Luna, THHSC, Border Affairs Director
Jose Martin, Provost, UT-Brownsville
Alice Martinez, Cameron County
Martha Ann Martinez, Coordinator, Children’s Program Services
Josefina Martinez, LRGV DC AAA
Eldon Nelson, Dean, UT-Brownsville
Dana G. Norman, Texas Department of Health
Adriana Perez, Texas Department of Health
Josue Ramirez, City of Brownsville
Lucy Ramirez, Nuestra Clinica del Valle
Lee Ramon, Texas Department of Health
Anne Rentfro, UT-Brownsville
Annette Rios, RGV Council on ADA
Antero Rios, TDHS
Cecilia Rios, TDHS
Rene Rodriguez, Texas Department of Health
Lydia Salinas, Texas Commission for the Blind
Howdy Smith, Rio Grande Valley Border Senior Games
Troy Sweet, Brownsville Independent School District
Margarita Tagle-Greenlees, Texas A&M SRPH
Herb Tolentino, Texas Department of Health
Nancy Trevino, Rio Grande Valley Council on Alcohol and Drug Abuse
Derric Trevino, Texas Department of Health
Gloria Vasquez, Texas Department of Health
Leo Vela, Regional Dean, RAHC
Paul Villas, Executive Director, TMBHCO
Sister Mary N. Vincelli, Texas Department of Health
Tony Zavaleta, Vice-President, UT-Brownsville
The Lower Rio Grande Valley of Texas is comprised of the counties of Cameron, Hidalgo, Starr, and Willacy. Traditionally, this region has been known as an agricultural area providing citrus fruits, grains, and vegetables throughout
the United States. Migrant farm workers make their permanent homes in the Valley but the seasonal nature of their work only allows for them to spend Winters in the region. Another group of seasonal residents are called “Winter Texans.” These people are attracted to the warm climate of the Valley as they seek refuge from the winters of the Midwestern and Northeastern United States. Also, because of its warm climate and proximity to Mexico, the Valley region attracts a large number of tourists and immigrants. The combination of an agriculturally based economy, low wage workers, and high immigration resulted in the region being identified as one of the poorest in the United States.

In the late 1980’s and early 1990’s, the economy of the region shifted. Part of this shift can be attributed to the passage of the North American Free Trade Agreement (NAFTA) which promoted increased trade between the U.S. and Mexico. The leading industries in the region today are services, state and local government, and retail trade (U.S. Department of Commerce, 2000). While the importance of agriculture has declined relative to other sectors in the economy, farming is still an integral part of the economy of the region.

**POPULATION**

**Lower Rio Grande Valley Population**

Economic changes in the Valley have helped to stimulate population growth. In 2000, the Lower Rio Grande Valley (LRGV) of South Texas had an estimated population of 978,369 representing an increase of 39 percent from 1990 population totals (see Table 2.1). In addition, while Hispanics represent 32 percent of the population in the whole state, Hispanics in the Valley are over 87 percent of the population.
Following the same pattern as the state, the majority of this growth can be traced to urban centers. While Cameron County grew 28.9 percent between 1990 and 2000, its major city, Brownsville, grew 41.2 percent. Hidalgo County also experienced substantial growth during the decade increasing its population by 48.5 percent. Here, too, it is the major population centers in the county that reflect the majority of this growth. Between 1990 and 2000, Edinburg’s population increased 62.1 percent and McAllen grew 26.7 percent. This population growth is expected to continue well into the 21st century. It is projected that by 2010 the LRGV will have a population of over 1,297,000, an 84 percent increase over the 1990 population (Texas State Data Center, 2000).

The LRGV population is younger than the population of the state as a whole. In 1999, over one-third of the population in the LRGV was 17 years of age or younger compared to nearly one-quarter of the population in Texas (Texas State Data Center, 2000). Preliminary data from the U.S. Census Bureau (2001) indicates there was little change between 1990 and 2000 with regard to the population under age 18. The proportion of the population in both the LRGV...
and the State aged 65 and over was nearly equivalent at 9 percent and 10 percent respectively in 1999 (Texas State Data Center, 2000).

The Mexican Population

Residents of the LRGV acknowledge the artificial nature of the border between their communities and Mexico. For them, this is a seamless region. Many of the economic and health concerns in the Texas LRGV are the same as those faced by residents of Mexico. In assessing changes on either side of the border, it is important that the impact on all affected populations be considered. The Mexican population living in the municipios (counties) bordering the LRGV is more than double that living in the counties on the U.S. side of the lower Rio Grande. Like the U.S. border region, the Mexican border region has experienced significant growth in the last decade. Between 1990 and 2000, it is estimated the population grew 26.3 percent. This growth is expected to continue through 2010 with a projected increase of 60 percent from 1990 population levels. The municipio of Matamoros contains the city of Matamoras, sister city to Brownsville. As indicated in Table 2.2, this municipio had a population of over 400,000 in 1998 and a growth rate of 32 percent since 1990. The Municipio of Reynosa contains the McAllen’s sister city, Reynosa. The Municipio of Reynosa experienced a 31 percent increase in population between 1990 and 1998.

| TABLE 2.2 |
| Mexico LRGV Population |
| Area | 1990 | 1998 | Growth |
| State of Tamaulipas | 2,249,581 | 2,686,580 | 19% |
| Municipios | | | |
| Camargo | 15,043 | 15,450 | 3% |
| Gustavo Diaz Ordaz | 17,705 | 14,810 | (16%) |
| Matamoros | 303,293 | 400,760 | 32% |
| Miguel Aleman | 21,322 | 22,980 | 8% |
| Reynosa | 282,667 | 370,530 | 31% |
| Rio Bravo | 94,009 | 103,810 | 10% |
| Valle Hermoso | 51,306 | 57,460 | 12% |

Source: The National Institute of Statistics, Geography and Informatics (INEGI)
POPULATION MOBILITY

**Immigration**

According to the Immigration and Naturalization Service (1999), 660,477 immigrants were admitted to the U.S. in 1998. Of these, nearly seven percent or 44,428 intended to reside in Texas. The majority of those who planned to live in Texas were from Mexico (51.7%).

Illegal immigration into the United State from Mexico has been a concern for years. Recently, a weak economy in Mexico has complicated the problem. With poor economic conditions in their homeland, it is not surprising that many Mexicans attempt to enter the U.S. illegally. In 1996, the INS estimated there were 700,000 undocumented immigrants living and working in Texas (INS, 1996). Estimates of undocumented workers are not available for counties but it is reasonable to assume that there are a disproportionate number living in the LRGV and that many more pass through on their way north. Dealing with the unique problems of this population places an additional burden on the resources of the LRGV community.

**Migrant Farmworkers**

A *seasonal* farmworker is “an individual whose principal employment (51% of time) is in agriculture on a seasonal basis, who has been so employed within the last twenty-four months,” (Larson, 2000). A *migrant* farmworker is a seasonal farmworker who “establishes for purposes of such employment a temporary abode,” (Larson, 2000). It is estimated that there are between 1 and 5 million migrant farmworkers in the U.S. today (Reynolds and Kourous, 1998; Gabbard, Mines, Boccalandro, 1994). In Texas, there are 196,704 migrant and seasonal farmworkers (see Table 2.3) and 29 percent of those live in the four county Lower Rio Grande Valley region for at least a portion of the year (Larson, 2000).
The actual number of persons impacted by migrant and seasonal farm labor is underestimated, however, because these totals exclude the families of these workers. Including the families nearly doubles the total for each region.

### TABLE 2.3
Migrant and Seasonal Farmworker Population

<table>
<thead>
<tr>
<th>Region</th>
<th>Migrant and Seasonal Farmworkers</th>
<th>Non-Farmworkers in Migrant and Seasonal Households</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>196,704</td>
<td>164,707</td>
<td>361,411</td>
</tr>
<tr>
<td>LRGV</td>
<td>56,954</td>
<td>41,981</td>
<td>98,935</td>
</tr>
<tr>
<td>Cameron</td>
<td>9,219</td>
<td>6,350</td>
<td>15,568</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>40,500</td>
<td>30,350</td>
<td>70,850</td>
</tr>
<tr>
<td>Starr</td>
<td>5,045</td>
<td>3,413</td>
<td>8,458</td>
</tr>
<tr>
<td>Willacy</td>
<td>2,190</td>
<td>1,868</td>
<td>4,058</td>
</tr>
</tbody>
</table>

Source: Migrant and Seasonal Farmworker Enumeration Profiles Study, Texas.

Migrant farm workers in the U.S. follow one of several migratory patterns – East Coast, Midwest, and West Coast (CDC, 1992). East Coast migrants generally originate in Florida while West Coast migrants call California home. Farm workers in the Midwest stream are often based in South Texas where they will work the winter crop before migrating to the Mid-western states.

The Department of Labor (2000) conducted a survey of hired crop labor during 1997-1998. While the National Agricultural Workers Survey includes both non-migrant and migrant farm workers, the majority of respondents (56 percent) are migrant workers. The data indicate the majority of the total hired crop workers (81 percent) were born outside of the U.S.; however, 90 percent of migrant farm workers were born outside the U.S. while over 65 percent of non-migrant workers were foreign-born. Of those farmworkers born outside of the U.S., 95 percent had migrated from Mexico. Fifty-two percent of all farm workers surveyed lacked work authorizations. Those without authorizations tended to be younger than those with authorizations – median age of 27 versus median age of 36.
The median level of completed education for all farmworkers was sixth grade unless the worker was educated outside of the U.S. in which case educational attainment was lower. The farm worker population fell into two longevity categories – those who have been in the U.S. less than two years (32 percent) and those who have been here for fifteen years or more (27 percent). Overall, 42 percent of the workers maintain a home outside of the U.S.; however, 51 percent of those in the U.S. less than two years have a home outside of the U.S. Given the physical demands of farm work, it is not surprising that this is a relatively young workforce. The median age of these workers is 29 and over 75 percent are between the ages of 18 and 44.

Overall, the amount of time spent in farm work among farm workers has been declining. In FY1990-1992, 26.2 weeks were spent working on farms. In FY1996-1998, 24.4 weeks were spent in farm work. This trend is particularly apparent for foreign-born workers who have seen their weeks worked fall from 28 in FY1990-1992 to 24.9 in FY1996-1998.

The average hourly wage during 1997-1998 was $5.94, which represents a decline of more than 10 percent in real wages since 1989. The median annual income of respondents was $7,500 while the median annual family income was $10,000. In addition to low wages, farm workers receive no fringe benefits. Reynolds and Kourous (1998) indicate 80 percent of farm workers lack employer-provided health insurance. While there are federally funded migrant health clinics, Reynolds and Kourous (1998) indicate less than 15 percent of migrants are actually reached by these services. In addition, forty-six percent of all farmworkers indicate they were not covered by unemployment insurance and only 28 percent indicated they had Workers' compensation coverage.

Inadequate income results in housing and health problems for migrant farm workers. Families are often only able to afford or are provided substandard housing or housing with limited space leading to overcrowded and unhealthy living conditions. Nutritional status is impacted by these income and housing limitations. Migrant farm workers have neither the funds to purchase food nor the access to grocery stores where food may be available more cheaply (Institute of
Many farm workers and their families report having to go without food sometime in the preceding year (Institute of Medicine, 1996). Health problems resulting from nutritional deficiencies include lower height and weight, vitamin A, iron and calcium deficiencies, and developmental problems (Institute of Medicine, 1996).

Health problems are often exacerbated because so few farm workers have health insurance coverage or reliable access to health care. While tuberculosis is commonly found in migrant farm worker camps, ensuring continuation of treatment has been difficult because of the migratory nature of farm work. Innovative programs have been developed to ensure completion of medical treatment to reduce the risk of developing multi-drug resistant tuberculosis. The Texas Department of Health established the TB-net program to track and ensure TB treatment completion by following migrants as they move from camp to camp and clinic to clinic (TDH, 2000b).

In addition to tuberculosis, migrant workers experience high rates of respiratory illness, parasitic infections, hypertension and diabetes (Luna, 1997). Farmworkers are also at increased risk for pesticide poisoning (Reynolds and Kourous, 1998), Green Tobacco Sickness, and certain cancers (NIOSH, 1997). The children of farmworkers have high rates of severe asthma, chronic diarrhea, and continuous otitis media (HRSA, 1998).

Winter Texans

The Lower Rio Grande Valley is a popular tourist destination and tourism is an important facet of the LRGV economy. A study of winter visitors in the LRGV indicates the average length of stay for a winter Texas is 3.5 months (Center for Tourism Research, 1999). The study further estimates that the number of visitors who actually wintered in the LRGV was 124,000 during the Winter of 1998-1999 (Center for Tourism Research, 1999). It is only in recent years that Texas has become a warm-weather destination for winter visitors. In
In fact, Texas trails Florida and California as a tourist destination earning only a 12 percent market share compared to a 48 percent market share for Florida and 20 percent market share for California.

In Cameron and Hidalgo Counties, out of state travelers originate primarily from Midwestern states such as Minnesota, Nebraska, Kansas, Illinois, and Ohio (TDED, 2000). The majority of these temporary residents (74 percent) reside in RV/Mobile Home parks during their stay. The annual median income of LRGV Winter Texans was $41,500 (Center for Tourism Research, 1999).

Winter Texans contribute significantly to the economies in the areas in which they spend the winter months through direct and indirect contributions. Approximately 41 percent of Winter Texans volunteer their time to local organizations (Center for Tourism Research, 1999). In addition, they contributed over $329 million directly to the local economies (Center for Tourism Research, 1999). Table 2.4 indicates Cameron and Hidalgo Counties benefit most from all types of tourism including both short and long-term visits. In all counties, however, destination spending increased by approximately 5 percent between 1990 and 1999 (TDED, 2000).

**TABLE 2.4**

*Travel Impacts on County*

<table>
<thead>
<tr>
<th>Place</th>
<th>Destination Spending ($000)</th>
<th>Local Tax Receipts ($000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameron</td>
<td>425,650</td>
<td>9,420</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>594,280</td>
<td>10,100</td>
</tr>
<tr>
<td>Starr</td>
<td>14,550</td>
<td>130</td>
</tr>
<tr>
<td>Willacy</td>
<td>10,820</td>
<td>70</td>
</tr>
</tbody>
</table>

Source: Texas Department of Economic Development, 1999 Report of Travel to Texas, Section VI.
FERTILITY

Fertility rates in the state have been highest among Hispanics throughout much of the last twenty years (Texas Department of Health, 1998). In the LRGV with county fertility rates ranging from 88.1 per one thousand women of child-bearing age in Willacy County to 120.3 in Starr County, fertility is 1.1 to 1.5 times higher than the Texas fertility rate of 77.3 (Texas Department of Health, 2001b).

A major public health concern related to the Hispanic fertility rate is that many Hispanic women receive little or no prenatal care during pregnancy. In 1999, 20.7 percent of all mothers in the state received late or no prenatal care. In the LRGV during the same period, 39.3 percent of mothers giving birth in Hidalgo, 36.3 percent in Cameron, 32.3 percent in Starr, and 32.8 percent in Willacy received late or no prenatal care (Texas Department of Health, 2001). Despite the lack of prenatal care, Hispanic infants were less likely to suffer complications during delivery or congenital abnormalities (Texas Department of Health, 2001). However, adequate prenatal care is essential to decreasing pregnancy related deaths as well as infant and maternal morbidity. An example of the importance of the relationship between prenatal care and infant health can be found with neural tube defects (NTDs). The Centers for Disease Control and Prevention (CDC) conducted a study of NTDs along the Texas-Mexico border in response to an anencephaly cluster identified by TDH in 1991. The findings indicate the rate of NTDs along the border is high and can be largely attributed to recent Mexican immigrants who are not likely to receive prenatal care (CDC, 2000). See Chapter 4, Environmental Health, Neural Tube Defect for additional information.
SOCIAL CHARACTERISTICS

Education

A literate well-trained workforce supports economic growth. In Texas, over 72 percent of those aged 25 and older have graduated from High School. However, only 44.6 percent of Hispanics aged 25 and older are high school graduates. Given that the population in the LRGV is predominantly Hispanic, it is not surprising that educational attainment for people in this region tends to follow the statewide pattern for Hispanics. Figure 2.1 shows that the percentage of the population completing high school ranges from a low of 31.6 percent in Starr County to a high of 50 percent in Cameron County. According to a report issued by the Lyndon B. Johnson School of Public Affairs (1997), two factors may account for the low educational levels. First, many of the families are simply unaware of the available educational opportunities. Secondly, while many parents indicate they want their children to be educated, any level of education the children attain beyond their parents’ achievements is considered a success.

Figure 2.1
Percent 25 and Over Completing High School, 1990

Figure 2.2 depicts the percentage of residents who have completed at least a bachelor’s degree. Although the proportion of LRGV residents aged 25 and over who have completed at least a bachelor’s degree is lower than the percentage for the general population of Texas, it is nearly double the proportion for Texas Hispanics in Cameron and Hidalgo counties.

Several colleges and universities provide educational opportunities for LRGV residents. South Texas Community College, Texas Southmost College, Texas State Technical College, The University of Texas Pan American and The University of Texas Brownsville all serve the Lower Rio Grande Valley. Enrollment projections for LRGV educational institutions show significant growth through 2015. Table 2.5 shows the growth projected for each institution based on historical enrollment patterns and projected population change.
Table 2.5
Projected Changes in Enrollment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Texas Brownsville</td>
<td>9.9%</td>
<td>11.5%</td>
<td>19.3%</td>
</tr>
<tr>
<td>University of Texas Pan American</td>
<td>9.9%</td>
<td>11.5%</td>
<td>19.3%</td>
</tr>
<tr>
<td>South Texas Community College</td>
<td>18.8%</td>
<td>14.4%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Texas Southmost College</td>
<td>8.2%</td>
<td>10.3%</td>
<td>16.1%</td>
</tr>
<tr>
<td>Texas State Technical College – Harlingen</td>
<td>4.7%</td>
<td>12.6%</td>
<td>16.6%</td>
</tr>
</tbody>
</table>


Another factor affecting educational attainment is the cost of higher education and the availability of financial assistance (Texas Higher Education Coordinating Board, 2001). LRGV institutions provide a significant amount of financial aid to their students. Approximately 68% of students at The University of Texas at Brownsville and 57% of students at The University of Texas at Pan American receive financial assistance. The average amount of annual aid received by these students is $4,700 (Texas Higher Education Coordinating Board, 2001).

**Economic Characteristics**

**INDUSTRY**

Historical agricultural patterns in the LRGV are reflective of trends in the U.S. as a whole as production is concentrated on fewer and fewer farms. As shown in Figures 2.3 and 2.4, the number of farms is decreasing while the average farm size is increasing.
Figure 2.3
Number of Farms

Source: U.S. Department of Agriculture, 1997 Agricultural Census, Table 1, County Summary Highlights.

Figure 2.4
Average Size of Farm

Source: U.S. Department of Agriculture, 1997 Agricultural Census, Table 1, County Summary Highlights.

There has been a shift in what is produced agriculturally in the LRGV. The U.S. Department of Agriculture’s 1997 Census of Agriculture (1999) indicates that since 1987, the production of cotton has declined in the LRGV while there has been an increase in the production of sorghum and soybeans. There has been some variation between counties, however. Cameron and Hidalgo Counties have seen significant increases in the production of some citrus
while at the same time seeing a decline in the amount of land in orchards. Willacy and Cameron counties have increased their production of sugarcane while Hidalgo County has decreased its production.

Between 1992 and 1997, the number of workers hired as farm labor declined by 45 percent in the Lower Rio Grande Valley (U.S. Department of Agriculture, 1999). Starr County experienced a 60 percent decrease in farm workers between 1992 and 1997 while Willacy County experienced only a 12 percent decrease (Figure 2.5).

Table 2.6 shows that the three major industries in the LRGV since 1980 have been retail trade, government, and services. Agriculture is a significant employer proportionally only in Starr and Willacy counties, but even here its overall economic contribution has declined over time. The majority of government employment is attributable to state and local governments. Like farming, manufacturing shows a decreasing proportion of total employment in the LRGV and continues to be a significant employer only in Cameron and Hidalgo counties.

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2 A major freeze in December 1989 resulted in the loss of citrus acreage to other uses. Heavy rains during 1997 helped to leech the soil of salts built up from irrigation, which benefited citrus crops in the LRGV (Davis, 1997).
### TABLE 2.6
Percentage of Total Employment by Major Industry

<table>
<thead>
<tr>
<th>County</th>
<th>Retail Trade</th>
<th>Government</th>
<th>Services</th>
<th>Manufacturing</th>
<th>Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameron</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>19.2</td>
<td>17.9</td>
<td>18.7</td>
<td>14.3</td>
<td>4.1</td>
</tr>
<tr>
<td>1990</td>
<td>19.9</td>
<td>18.8</td>
<td>26.9</td>
<td>12.0</td>
<td>1.9</td>
</tr>
<tr>
<td>1997</td>
<td>18.6</td>
<td>18.9</td>
<td>29.8</td>
<td>10.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Hidalgo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>18.7</td>
<td>21.2</td>
<td>15.8</td>
<td>9.5</td>
<td>7.3</td>
</tr>
<tr>
<td>1990</td>
<td>21.1</td>
<td>21.1</td>
<td>21.5</td>
<td>10.1</td>
<td>3.5</td>
</tr>
<tr>
<td>1997</td>
<td>20.5</td>
<td>20.7</td>
<td>25.4</td>
<td>7.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Starr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>16.3</td>
<td>29.8</td>
<td>14.8</td>
<td>0.9</td>
<td>23.1</td>
</tr>
<tr>
<td>1990</td>
<td>16.6</td>
<td>30.2</td>
<td>18.7</td>
<td>0.5</td>
<td>14.7</td>
</tr>
<tr>
<td>1997</td>
<td>15.8</td>
<td>26.7</td>
<td>23.4</td>
<td>0.7</td>
<td>11.0</td>
</tr>
<tr>
<td>Willacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>13.9</td>
<td>21.0</td>
<td>12.7</td>
<td>9.9</td>
<td>20.8</td>
</tr>
<tr>
<td>1990</td>
<td>15.3</td>
<td>25.7</td>
<td>16.8</td>
<td>7.5</td>
<td>12.9</td>
</tr>
<tr>
<td>1997</td>
<td>14.3</td>
<td>25.5</td>
<td>23.4</td>
<td>3.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>


---

**Maquiladoras**

A maquiladora is a Mexican corporation operating under special rules allowing the import into Mexico of raw materials on a duty-free basis for the assembly or manufacture of finished goods for later export (Office of NAFTA, International Trade Administration, 1998). These corporations may be up to 100 percent foreign-owned. They are attractive to foreign investors because of the
proximity of Mexico to the U.S. and because of the availability of inexpensive labor. In 1995, 38 percent of maquiladoras were U.S.-owned and another 14 percent were owned jointly by the U.S. and Mexico (U.S. Department of Commerce, 2001).

The maquiladora program has been in operation for over 35 years but has changed somewhat in that time. Initially, the program confined maquiladora status to corporations operating on the Mexican border. The program now allows these corporations to operate anywhere in Mexico. As of April 2001, there were 3,895 maquiladora plants operating in Mexico (Federal Reserve Bank of Dallas, 2000; Maquila Portal, 2001). Sixty-one percent of these plants were located along the border with the U.S.; however, in the first three quarters of 2000, employment grew more rapidly in maquiladoras in the interior versus those along the border – 16.7 percent versus 11.5 percent (Federal Reserve Bank of Dallas, 2000). Total employment as of December 31, 2000, was 1.339 million with an annual payroll of $25 billion (Gerber, 2001). By the end of 1999, 139 maquiladoras were operating in Matamoras (Brownsville) employing over 60,000 people while 115 maquiladoras were operating in Reynosa (McAllen) and employing over 50,000 people (Texas Comptroller of Public Accounts, 2001; Texas A&M Real Estate Center, 1999; Vargas, 2001). Maquiladoras are the leading source of employment along the border in Mexico (Federal Reserve Bank of Dallas, 2000).

In recent years, there has been a trend to locate new Maquiladoras in the interior of Mexico. The Department of Commerce (2001) indicates this move away from the border is prompted by several factors. First, real estate costs along the border have increased limiting the ability of smaller maquilas to afford operations in the area. Secondly, labor is less expensive and competition for employees is less of a problem at interior locations. Finally, employee turnover affects location decisions. Employee turnover at border maquiladoras can be as high as twenty percent each month whereas interior maquiladoras are experiencing much lower employee turnover and absenteeism.
Employee turnover among Maquiladora workers in Tamaulipas seems to be the exception, however. In Matamoras and Reynosa, employee turnover is often less than ten percent (Bloom, 2001). This has been attributed to the fact that unionization in these areas is nearly 100 percent and all employment is controlled by the Unions. Potential workers must apply for work through the Unions.

Recent changes in the U.S. economy are having an effect in Mexico. A decrease in the demand for maquiladora products is putting a strain on the Mexican economy particularly in the auto and high tech areas (Federal Reserve Bank of Dallas, 2001). While layoffs are forecast across Mexico, Jorge Reyes Moreno, secretary of Economic and Employment Development in Tamaulipas, states that “while 4,400 jobs have been lost statewide due to the economic situation in the U.S., Tamaulipas currently knows of 51 corporate plans or proposals to be developed in the state,” (Sedas, 2001). These developments should lead to the creation of 24,700 new jobs and investments of $1.25 billion in the state.

**TRADE WITH MEXICO**

The North American Free Trade Agreement (NAFTA) was implemented in 1994. NAFTA removes trade and investment barriers between the U.S., Canada, and Mexico. Since the implementation of NAFTA, U.S. trade with Mexico has tripled rising from $81 billion in 1993 to $247 billion in 2000 (U.S. Census Bureau, Foreign Trade Division, 2001). Exports to Mexico also tripled between 1993 and 2000 rising from $41 billion to $111 billion. The state Business and Industry Data Center (2000) estimates that Texas accounted for over 47 percent of U.S. shipments to Mexico in 1999. Exports to Mexico from Texas rose 103.2 percent between 1993 and 1999 (Federal Reserve Bank of Dallas, 2000). The major commodities exported to Mexico from Texas were computers and electronic products, chemical manufactures, and petroleum and coal products (Office of Trade and Economic Analysis, International Trade
According to a study by the U.S. Office of Trade and Economic Analysis (2001), trade with Mexico directly or indirectly supported 612,000 jobs in Texas. Data for U.S. Mexican trade by border point of entry is displayed in Table 2.7. This table shows that the largest amount of activity in the Lower Rio Grande Valley occurs at the Brownsville and Hidalgo ports. Overall, trade through LRGV ports accounts for 16.1 percent of all Texas trade through border points of entry.

**TABLE 2.7**
Selected Port Trade Activity, 2000
($ millions)

<table>
<thead>
<tr>
<th>Port</th>
<th>County</th>
<th>Exports to Mexico</th>
<th>Imports from Mexico</th>
<th>Total Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brownsville</td>
<td>Cameron</td>
<td>$6,374.1</td>
<td>$6,049.5</td>
<td>$12,423.6</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>Hidalgo</td>
<td>$6,221.9</td>
<td>$6,888.5</td>
<td>$13,110.4</td>
</tr>
<tr>
<td>Rio Grande City</td>
<td>Starr</td>
<td>$118.8</td>
<td>$116.6</td>
<td>$235.4</td>
</tr>
<tr>
<td>Progreso</td>
<td>Hidalgo</td>
<td>$129.0</td>
<td>$15.6</td>
<td>$144.6</td>
</tr>
<tr>
<td>Roma</td>
<td>Starr</td>
<td>$92.4</td>
<td>$16.1</td>
<td>$108.5</td>
</tr>
</tbody>
</table>

Source: Texas Center for Border Economic and Enterprise Development

**WORKFORCE**

While there has been a shift in the base of the LRGV economy over time, employment has not suffered. As shown in Figure 2.6, unemployment rates have declined since 1990. Unemployment rates in the Lower Rio Grande Valley are substantially higher than for the state as a whole.
While the unemployment rate has declined, wages have remained fairly constant as shown in Figure 2.7. Average weekly wages in the LRGV are substantially less than average weekly wages for Texas.
INCOME

Incomes in the LRGV are much lower than incomes in Texas as a whole. The per capita income in Texas in 1999 was estimated to be $26,834. In the LRGV, per capita income in 1999 ranged from $14,280 in Cameron County to $8,588 in Willacy County (U.S. Department of Commerce, 2001). Since 1969 (see Figure 2.8), the ratio of each county's per capita income to per capita income for the state has stayed fairly constant. Incomes for residents of Cameron and Hidalgo counties have ranged from nearly 60 percent to 50 percent of state per capita income. In contrast, the incomes of Starr County residents ranged from 43 percent in 1969 to a low of 29.5% in 1989. Willacy County per capita income ranges from 42 to 49 percent of state per capita income.

![Figure 2.8: Per Capita Income Ratio of County to State](image)

With the ratio of county to state per capita income so low in the LRGV, it is not surprising that there are more people in the Valley living in poverty than the state average. Figure 2.9 compares the proportion of people living in poverty for 1989 and 1997. Between 1989 and 1997, the percentage of the population in...
poverty declined across the board. The greatest decrease is seen for Starr County where the proportion of the population in poverty dropped from 60 percent to 46.7 percent. For 1997 alone, 16.7 percent of the Texas population was living on income below the federal poverty level while 37.3 percent of individuals in the LRGV were doing so. This is more than double the average for the state as a whole. Starr County continues to have the highest proportion of the population in poverty at 46.7 percent.

![Figure 2.9](image)

The likelihood of living in poverty varies by age. Children are more likely than other age groups to be living below the federal poverty line. Table 2.8 indicates the proportion of the population under age 18 living in poverty by data source and year of estimate. The Census Bureau estimates that approximately 1 in 4 children in the state were living below the federal poverty line in 1997. In the Lower Rio Grande Valley, approximately 1 in 2 children were living in poverty. The Texas Health and Human Service Commission estimates for 1999 affirm
these proportions indicating little has changed over time to improve the situation of residents in the LRGV.

TABLE 2.8

Estimates of Population Under Age18 in Poverty

<table>
<thead>
<tr>
<th>Place</th>
<th>1997 Census Bureau</th>
<th>1999 Health and Human Services Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>23.6</td>
<td>24.0</td>
</tr>
<tr>
<td>Cameron County</td>
<td>45.2</td>
<td>46.8</td>
</tr>
<tr>
<td>Hidalgo County</td>
<td>47.9</td>
<td>49.7</td>
</tr>
<tr>
<td>Starr County</td>
<td>56.4</td>
<td>55.1</td>
</tr>
<tr>
<td>Willacy County</td>
<td>50.3</td>
<td>55.9</td>
</tr>
</tbody>
</table>


HEALTH INSURANCE COVERAGE

Compared to the rest of the nation, rates of health insurance coverage in Texas are low. The U.S. Census Bureau (2000) estimates that in 1999, 15.5 percent of the U.S. population was uninsured while 23.3 percent of the Texas population was uninsured at some time during the year. The uninsured situation is magnified in the LRGV region. Figure 2.10 shows the proportion of the LRGV population without health insurance as estimated by the Texas Health and Human Services Commission (1999). While throughout the state approximately 1 in 4 persons are without insurance, in the LRGV, 1 in 3 persons are without insurance.
Figure 2.10
Percentage of Population Without Health Insurance, 1999

Source: Texas Health and Human Services Commission, Fiscal Policy Division, Research Department (1999). Estimated Number of Persons Without Health Insurance in Texas by County in 1999

Households

As noted in the Texas Comptroller report (1998), *Bordering the Future*, the problem with housing along the border is that residents’ earnings fall below what is required to afford either a house or an apartment. In 2000, the median price of a home in Texas was $111,900, Brownsville $74,400, Harlingen $81,100, and McAllen $80,000 (Real Estate Center at Texas A&M University, 2001).

The U.S. Department of Housing and Urban Development through survey and census data develops a Fair Market Rent (FMR) value that is an estimate of gross rent including the cost of shelter and utilities (U.S. Department of Housing and Urban Development, 1995). The 1997 FMRs for the Lower Rio Grande Valley are listed in Table 2.9. Areas that have experienced similar levels of population growth are also listed in the table. While rents are lowest in Starr and Willacy counties as well as the McAllen-Edinburg-Mission area, rents in the Brownsville-Harlingen-San Benito area are higher than those in Laredo and El Paso. The U.S. Department of Housing and Urban Development (2001) suggests that only 25-30 percent of gross monthly income be spent on housing.
Despite the fact that rents are not uniformly lower in the LRGV than other areas, median income is lower than in areas with similar growth patterns. In fact, the proportion of income that should be devoted to housing is insufficient in the Lower Rio Grande Valley to cover the cost of housing. This is not true for the other areas in the table.

### TABLE 2.9
Final 1997 Fair Market Rent and Median Household Income

<table>
<thead>
<tr>
<th>Place</th>
<th>FMR$^{1}$</th>
<th>Median Household Income</th>
<th>% of HUD Recommendation for Median Income$^{2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brownsville-Harlingen-San Benito</td>
<td>$510</td>
<td>$21,699</td>
<td>112.8%</td>
</tr>
<tr>
<td>McAllen-Edinburg-Mission</td>
<td>$423</td>
<td>$20,034</td>
<td>101.4%</td>
</tr>
<tr>
<td>Starr County</td>
<td>$370</td>
<td>$14,178</td>
<td>125.4%</td>
</tr>
<tr>
<td>Willacy County</td>
<td>$370</td>
<td>$18,616</td>
<td>95.4%</td>
</tr>
<tr>
<td>Laredo</td>
<td>$465</td>
<td>$23,386</td>
<td>95.5%</td>
</tr>
<tr>
<td>El Paso</td>
<td>$505</td>
<td>$25,866</td>
<td>93.7%</td>
</tr>
<tr>
<td>Austin</td>
<td>$670</td>
<td>$40,250</td>
<td>80.0%</td>
</tr>
<tr>
<td>San Antonio</td>
<td>$423</td>
<td>$32,374</td>
<td>62.8%</td>
</tr>
</tbody>
</table>

$^{1}$ FMR is based on rent for a 2 bedroom unit.

$^{2}$ HUD recommends that rent not exceed 25% of income. Value is FMR/25% of area median income.

Source: U.S. Department of Housing and Urban Development and Texas Comptroller of Public Accounts

**COLONIAS**

Two definitions of *colonia* are contained in Texas statute. Chapter 775 of the Texas Government Code defines *colonia* as “a geographic area that is an economically distressed area and is located in a county any part of which is within 50 miles of an international border.” Chapter 2306 of the Texas Government Code defines *colonia* as “a geographic area located in a county any part of which is within 150 miles of the international border and that has a majority population composed of individuals and families of low income and very low income, based on federal Office of Management and Budget poverty index.
and meets the qualifications of an economically distressed area or has the physical and economic characteristics of a colonia as determined by the department [of Housing and Community Affairs].” In general, when discussing colonias, we refer to “unincorporated settlements along the Texas-Mexico border that may lack basic water and sewer systems, electricity, paved roads, and safe and sanitary housing,” (Federal Reserve Bank of Dallas, 1995).

According to the Texas House of Representatives Research Organization (1999), the development of colonias can be traced back to the beginnings of the maquiladora program. The job opportunities created by the maquiladora program led to an increase in population. In an environment of burgeoning population, it was difficult, if not impossible, to find affordable housing. As the search for alternatives began, some land developers seized an opportunity and purchased land on the outskirts of incorporated areas where development standards were nonexistent. In the state of Texas, counties had no power for planning, zoning, or building code enforcement (Powell, 1995). Regulatory powers are vested in cities and the state to limit the power of counties. This lack of oversight outside of city limits allowed colonias to proliferate.

Developers subdivided and sold land on a contract for deed (CFD) basis in which the seller retains legal title to the property until the buyer purchases the land in full. Purchases are primarily owner financed. This option is attractive to border residents who are more likely than other Texas residents to operate on cash basis and are, therefore, less likely to have developed the credit history necessary to purchase a home through traditional means (Sharp, 1998).

The buyers were frequently promised that services such as water and sewer would soon be made available but these promises were often never fulfilled. In addition to the lack of basic of services, buyers were often forced by monetary limitations into building their homes in stages with whatever material was affordable. As time passes, owners continue to improve their homes so that older homes in colonias tend to be better constructed since the residents have had more time to invest them.
The Texas Water Development Board (1995) estimated there were over 1,500 colonias in Texas with a total population of over 400,000. Table 2.10 gives an overview of the characteristics of colonias by the county in which they are located. Hidalgo County has, by far, the largest number of colonias (in both Texas the LRGV) while Willacy County has the fewest. The Board is working with federal and state agencies to bring essential services to these colonias.

Even when the basic infrastructure is available, some housing units in the colonias are unable to access them because they cannot pass the inspection necessary to qualify for connection (Federal Reserve Bank of Dallas, 1995). Because residents cannot afford to make the necessary repairs to bring their homes up to standard, they go without available services.

TABLE 2.10

Characteristics of Colonias by County

<table>
<thead>
<tr>
<th>County</th>
<th>Number of Colonias</th>
<th>Number of Lots</th>
<th>Number of Housing Units</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameron</td>
<td>118</td>
<td>14,950</td>
<td>8,974</td>
<td>41,832</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>868</td>
<td>44,342</td>
<td>28,758</td>
<td>136,462</td>
</tr>
<tr>
<td>Starr</td>
<td>117</td>
<td>9,000</td>
<td>6,345</td>
<td>28,584</td>
</tr>
<tr>
<td>Willacy</td>
<td>8</td>
<td>1,282</td>
<td>878</td>
<td>3,542</td>
</tr>
</tbody>
</table>

Source: Texas Water Development Board, Colonia Database

It was not until the 1980’s that colonias began to attract the attention of policy makers and legislators. The House Research Organization (1999) detailed the history of colonia legislation. During the 1989 legislative session, legislators approved several bills aimed at stopping the spread of colonias and bringing basic infrastructure to existing colonias. The following legislative session in 1991 saw the enactment of laws to provide low interest loans to
colonia residents for hookups to water and wastewater and required new subdivisions in unincorporated areas to meet model rules. The model subdivision legislation allowed counties to enforce rules for subdivisions but did not require them to do so. This measure gave counties a way of preventing the development of new colonias. In 1993, the Texas Legislature decreased to 10% the amount borrowers would have to repay on Economically Distressed Area Program (EDAP) loans and authorized the Attorney General's office to enforce health and safety laws as well as monitor and prosecute violations of model subdivision rules.

During the 1995 legislative session, the ability of state and local governments to enforce new colonia laws was strengthened. Subdividers were required to provide information in Spanish and English to buyers and potential buyers regarding the terms of their contracts. Developers within 50 miles of the border were required to have their plats certified to ensure they met model rule standards and to have the certified plats approved by the County Commissioners Court. Additional legislation required the Texas Department of Housing and Community Affairs to convert Contracts for Deeds (CFDs) into mortgages and established colonia self-help centers to educate residents on building and maintaining their homes.

Legislation passed in 1997 required counties more than 50 miles from the border to adopt the requirement for certified plats. In addition, colonia residents in certain areas were allowed to submit applications for utility services even if their subdivision plat had not yet been certified. During the 1999 legislative session, policy makers allowed for annexed colonias to retain their eligibility for assistance for five years following the annexation, established an owner-builder loan program through the colonia self help center, and established a guaranteed loan program through the Texas Department of Housing and Community Affairs for CFD conversion. Additionally, legislation granted variances and other exemptions to allow residents to receive basic services even if their subdivisions had not been platted as required by previous legislation, and strengthened the
enforcement ability of the attorney general and local governments in enforcing plating requirements.

Legislation passed during the 77th legislative session established a new colonia model subdivision program revolving loan fund and a permanent revolving loan fund for the owner-builder (self help) loan program. The 77th Legislature also authorized the issuance of bonds to aid counties in building roads to serve colonias and authorized counties to assess property owners for the installation of streetlights on county roads serving colonias.

As a result of legislation, there have been many improvements in the colonias. Completed construction projects have brought needed services to over 46,000 residents in 144 colonias (Texas Water Development Board, 2001). There are still many colonias without services. Currently, there are 8 projects under construction in the LRGV, 4 projects with completed plans and specifications, and 17 projects in which planning grants have been awarded (Texas Water Development Board, 2001). These projects represent a total of $240.7 million in construction commitments and will benefit 480 colonias and 124,475 colonia residents.

The Texas Water Development Board is not the only state agency financing projects along the border and in the Lower Rio Grande Valley. The Texas Secretary of State (2001) reported that state agencies spent in excess of $3 billion in state and federal matching funds for border initiatives. Non-governmental organizations also invest heavily in the border region. The North American Development Bank (2001) indicates it has invested over $296 million in Texas environmental infrastructure projects between 1995 and 2000 and plans to invest an additional $530 million between 2002 and 2005. Planned investments for 2002-2005 include $43.9 million in Hidalgo County, $28 million in Cameron County, and $95 million in Starr County.

While the decision to live in a colonia may seem incomprehensible to many, it represents a careful balancing of issues. In 1988, the Texas Department of Human Services conducted a survey in rural areas of south and
west Texas Border counties. Residents’ reasons for choosing to live a colonia included:

- Lower cost of land
- Lack of affordable housing in nearby cities
- Lower building costs associated with homes
- Improvements in overall quality of life compared to previous place of residence
- Lower building costs associated with homes

These findings were supported by another study from the Center for Housing and Urban Development in 1993. In this study, colonia residents indicated they felt safer and their housing was better than it had been previously. Residents also indicated draining and flooding were a major problem in their neighborhoods as were poor streets and roads. The most serious personal problems for residents in colonias are first, economic, and, second, health.
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Chapter 3

Mental Health

FAMILY VIOLENCE

Child Abuse and Neglect

Fatal Maltreatment of Children

Domestic Violence

Adult Protective Services

ALCOHOL AND SUBSTANCE ABUSE

Alcohol Related Mortality

Drug Related Mortality

Alcohol and Drug Related Injury

Alcohol and Drug Related Crime

Youth Substance Abuse

MENTAL DISORDERS

REFERENCES
Mental health is a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and to cope with adversity. Mental health is indispensable to personal well-being, family and interpersonal relationships, and contribution to community or society. Mental disorders are health conditions that are characterized by alterations in thinking, mood, or behavior (or some combination thereof), which are associated with distress and/or impaired functioning and spawn a host of human problems that may include disability, pain, or death. Mental illness is the term that refers collectively to all diagnosable mental disorders.

U.S. Department of Health and Human Services, 2000

This chapter addresses the mental health issues affecting residents in the Lower Rio Grande Valley, specifically, substance abuse, violence, and mental illnesses. These issues are among the ten leading health indicators identified in Healthy People 2010 as critical to the health of the nation and have been identified as major public health concerns in the United States.

Alcohol and drug related arrests, accidents, and mortality are indicators of substance abuse. Tracking these measures is important in assessing needs and planning prevention activities and services. Understanding the scope of domestic violence (both spousal and child abuse) is necessary for planning services to protect and treat victims. Understanding the epidemiology of mental illness in the LRGV provides important information about the prevalence of these issues and assists in assessing treatment needs.

Mental health data for the LRGV is limited if available at all. Many of the following sections rely on data for Hispanics in the United States and Texas. However, a recurring theme throughout this chapter is the fact that socio-cultural factors prevent Hispanics from reporting on mental health conditions. Due to this underreporting, the statistics on the following pages may actually underrepresent the true scope of mental health disease in the Hispanic community and especially the LRGV.
Family violence and violence against women is rising in public awareness, but still is an often overlooked mental health issue. Domestic violence is believed to be under-reported, especially among Hispanics. Cultural traits contribute to Hispanic underreporting. For example, in the Hispanic culture loyalty, reciprocity, and solidarity with family members (including extended family members) are valued more than the welfare of the individual (Hampton, 1999).

**Child Abuse and Neglect**

In 1998, the U.S. rate of child maltreatment was 12.9 per 1,000 children, a decrease from the 1997 rate of 13.9 per 1,000 (U.S. Department of Health and Human Services, 2000). Although child deaths caused by abuse and/or neglect do not occur often, the rate of child maltreatment fatalities has steadily increased over the last decade. Nationwide in 1997, an estimated 1,196 children died of abuse and neglect, a rate of approximately 1.7 deaths per 100,000 children in the general population (U.S. Department of Health and Human Services, 1999 and 2000). In 1998, 1,100 children died of abuse and neglect, a rate of 1.6 deaths per 100,000 children in the general population. Children under one year old account for 38 percent of the deaths while 78 percent of deaths occur in children less than 5 years of age (U.S. Department of Health and Human Services, 1999 and 2000).

In Texas the agency that collects data on child abuse and neglect is the Texas Department of Protective and Regulatory Services. Within the agency, Child Protective Services (CPS) has the responsibility to investigate and assess reports of child abuse and neglect. Texas CPS conducts an average of 100,000 investigations of child abuse/neglect each year. The average monthly caseload of CPS workers was 28.4 investigations in 1999 (Texas Department of Protective Services, 1999).
and Regulatory Services, 1998). The CPS state plan lists as a goal reducing the caseload per worker to 18 (Texas Department of Protective and Regulatory Services, 1999). In FY 1997, 103 children died because of abuse or neglect. In FY 1998, that number increased to 176 (Texas Department of Protective and Regulatory Services, 1998).

Figure 3.1 shows that in 1999, the prevalence of confirmed child abuse and neglect in the LRGV was 4.8 per 1,000 children and 7.1 per 1,000 children in Texas. For that same year, Cameron and Willacy counties (7.4 and 9.6 per 1,000 respectively) had higher frequencies of reported abuse than for Texas as a whole. For 1998, the rates also remain higher in Cameron and Willacy when compared to Texas. Explanations for this difference could vary from differential reporting, small population numbers, or unknown demographic factors.

Figure 3.1
CPS-Confirmed Child Abuse/Neglect

Source: Texas Department of Protective and Regulatory Services, 1999 Legislative Data Book.

1 The Texas Department of Health divides the state into 11 Public Health Regions. Nineteen counties are contained within Region 11 including the counties of McMullen, Live Oak, Bee, Refugio, Aransas, San Patricio, Nueces, Kleberg, Kenedy, Willacy, Cameron, Hidalgo, Starr, Brooks, Jim Hogg, Zapata, Jim Wells, Duval, and Webb.
**FATAL MALTREATMENT OF CHILDREN**

A study by the National Committee to Prevent Child Abuse (1997) reports that 41 percent of child maltreatment fatalities have had prior contact with CPS agencies. In FY 1997 and FY 1998, 36 percent of Texas child abuse or neglect fatalities had prior CPS contact (Texas Department of Protective and Regulatory Services, 1998). In South Texas (PHR 11), 67 percent in FY 1997 and 53 percent in FY 1998 of child abuse or neglect fatalities had prior contact with CPS (Texas Department of Protective and Regulatory Services, 1998). High caseload and staff turnover, supervision, training, and policy are cited as potential reasons why children with prior CPS contact die (Texas Department of Protective and Regulatory Services, 1999).

In FY 1999, the LRGV had four child abuse and neglect deaths compared to 135 deaths that occurred in Texas (Texas Department of Protective and Regulatory Services, 2000). These deaths equate to 2.5 child deaths per 100,000 for the state and 1.2 child deaths per 100,000 for the Lower Rio Grande Valley.

The impact of child abuse is not confined to childhood. Adults with a history of childhood abuse (including sexual and emotional abuse) are at increased risk of suicidal behavior (Gould, Stevens, Ward, Carlin, Sowell, and Gustafson, 1994), psychiatric and substance problems (Kendler, Bulik, Silberg, Hettema, Myers, 2000), and a higher level of Adrenocorticotropic hormone (ACTH) or stress hormones (Heim, Newport, Heit, Graham, Wilcox, Bonsall, Miller, Nemeroff, 2000).

**Domestic Violence**

The reduction of domestic violence is another Healthy People 2010 priority. Domestic violence refers to the “intentional emotional and/or physical abuse by a spouse, ex-spouse, boyfriend/girlfriend, ex-boyfriend/ex-girlfriend, or date,” (Centers for Disease Control and Prevention, 2000). Women are more likely than men to suffer lethal injuries as a result of domestic violence. Analysis
of data from the FBI indicates that in 1998, an intimate partner was responsible for 32 percent of all female homicide deaths but only 4 percent of male homicide deaths (Centers for Disease Control and Prevention, 2001).

Bauer, Rodriguez, and Perez-Stable (2000) reported that 50 percent of injured women treated in the emergency room had been abused by their partner sometime in their lifetime. Many of these survivors will later suffer physically and emotionally. Bauer, et. al. (2000) also found that recently abused women are 3.5 times more likely to have symptoms of depression when compared to women with no history of abuse.

Abuse during pregnancy is also a domestic violence issue. A 1996 review of the literature found that between 0.9 percent and 20.1 percent of women experience abuse by an intimate partner during pregnancy (U.S. Department of Health and Human Services, 2000). Most of the studies reported intimate partner violence to be between 4 and 8 percent. These reports indicate that males who are physically and/or sexually violent toward their partners are also likely to abuse their children. Those who commit domestic violence were likely to have witnessed or been victims themselves of domestic abuse as children.

In 1996, males committed 82 percent of the family violence acts in the LRGV (Cameron, Hidalgo, and Willacy) while in Texas as a whole 78 percent of offenders were male (Streeter, Danis, Trapp, Durden and Sullivan, 1998). The Texas Council on Family Violence and the Center for Social Work at the University of Texas estimate that 25 percent of the female population 18 and older are at risk for being abused by their partners (Streeter, Danis, Trapp, Durden and Sullivan, 1998). The American Medical Association estimates that “one in four woman is likely to be abused by her partner in her lifetime,” (Glazer, 1993). The Texas Department of Protective and Regulatory Services estimates that 16.2 percent of children 0-17 years of age are at risk for abuse and neglect (Streeter, Danis, Trapp, Durden and Sullivan, 1998).

According to the Texas County on Family Violence (1998) factors often associated with domestic violence are unemployment, economic stress, and
male dominated families. Factors that diminish violence include close-knit families and economic and social support systems in the extended family.

Moreover, reported spousal abuse rates by Mexican Americans born in the U.S. are 2.4 times higher than the rates to those born in Mexico (Hampton, 1999). Risk factors associated with this abuse include urban residence, lack of social support, young age, infrequent or no church attendance, and having four or more children (Lown and Vega, 2001). Vega (1990) indicates that the level of acculturation impacts domestic violence. As families become more acculturated, the traditional strength of the extended family dissipates and social support networks are disrupted. Several studies have also reported that alcohol and spousal abuse are highly associated with domestic violence (Hampton, 1999). A Substance Abuse and Mental Health Services Administration (1999) report states that Mexican Americans and Puerto Ricans exhibit heavier alcohol use and alcohol dependence than other Hispanic ethnic groups and than the general U.S. population.

**Adult Protective Services**

Adult Protective Services (APS) is a branch of the Texas Department of Protective and Regulatory Services charged with investigating reports of abuse, neglect, and exploitation of the elderly and disabled. Table 3.1 characterizes APS investigations for FY 2000.
TABLE 3.1
Adult Protective Services Investigations, FY 2000

<table>
<thead>
<tr>
<th>Region</th>
<th>Population at Risk*</th>
<th>APS Validated Investigations</th>
<th>Incidence of Maltreatment per 1,000 adults at risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>4,732,632</td>
<td>33,978</td>
<td>7.2</td>
</tr>
<tr>
<td>LRGV</td>
<td>204,721</td>
<td>1,110</td>
<td>5.4</td>
</tr>
<tr>
<td>Cameron</td>
<td>72,251</td>
<td>378</td>
<td>5.2</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>115,449</td>
<td>620</td>
<td>5.4</td>
</tr>
<tr>
<td>Starr</td>
<td>12,665</td>
<td>76</td>
<td>6.0</td>
</tr>
<tr>
<td>Willacy</td>
<td>4,356</td>
<td>36</td>
<td>8.3</td>
</tr>
</tbody>
</table>

*includes estimated population of aged and disabled
Source: Texas Department of Protective and Regulatory Services, 2000 Annual Data Book

Figure 3.2 shows the incidence of confirmed APS investigations in 1998, 1999, and 2000. All areas show a decrease in confirmed cases over time. With the exception of Starr and Willacy counties, the LRGV has a lower incidence than does the state as a whole. Starr and Willacy counties have a considerably higher incidence of confirmed investigations than any of the other locations in 1998 and 1999. In 2000, however, Starr County saw a decline in incidence to a level below that of the state while Willacy County continued to have a higher incidence of confirmed investigations than the state. Explanations for this difference could vary from differential reporting, small population numbers or demographic or social factors such as unemployment, economic considerations, or the availability of social support networks.
Figure 3.2
Incidence of Confirmed APS Investigations

Source: Texas Department of Protective and Regulatory Services, Legislative Data Book

ALCOHOL AND SUBSTANCE ABUSE

Alcohol Related Mortality

Alcohol related mortality includes deaths from alcoholic gastritis, psychoses, hepatitis, cirrhosis of the liver, and overdose. From 1980 through 1998, the rates of alcohol related mortality increased for both Texas and Texas Hispanics as depicted in Figure 3.3. Rates for the Texas population increased only 9 percent during this time while rates among Texas Hispanics increased by 74 percent. In addition, between 1980 and 1998, the LRGV had a 97 percent increase in alcohol related mortality. In 1980, when compared to the LRGV, Texas had an excess of two deaths per 100,000 persons for alcohol related mortality. However, in 1998, the LRGV had an excess of 0.6 deaths per 100,000 persons when compared to Texas. Men have a much higher alcohol related mortality rate compared to women. In 1998, the difference in age–adjusted alcohol mortality rates between males and females in the LRGV was 11.6 per 100,000 (Texas Department of Health, Epigram, 2001). Alcohol related mortality
rates increase substantially in the male population as men age. In the Lower Rio Grande Valley in 1998, males 20-39 years had only 3 alcohol related deaths per 100,000 population compared to males 40-59 years of age who had 29 deaths per 100,000. Males aged 60-99 and older had the highest rates, 32.3 deaths per 100,000 population.

### Figure 3.3
**Alcohol Related Mortality (1980-1998)**

Source: Texas Department of Health, Bureau of Vital Statistics, Epigram

### Drug Related Mortality

As shown in Figure 3.4, age-adjusted drug-related mortality rates from 1980 to 1998 are substantially lower in the LRGV compared to Texas. Drug related mortality includes deaths from drug psychoses, dependence, suicide, homicidal poisonings, and overdose. Since 1980, drug related mortality rates increased for both the Texas population and Texas Hispanics. In 1980, the difference in drug related deaths between the Texas population and Texas Hispanics was 1.8 deaths per 100,000 population. In 1998, this difference was only 0.3 deaths per 100,000. Comparing Texas to the LRGV, Texas had an
excess of 1.7 deaths per 100,000 in 1980 and an excess of 2.2 deaths per 100,000 in 1998.

**Figure 3.4**

Age-adjusted Drug Related Mortality

Source: Texas Department of Health, Bureau of Vital Statistics, Epigram

**Alcohol and Drug Related Injury**

Another indicator of substance abuse is motor vehicle accidents with injuries where alcohol or drugs are contributing factors. Alcohol related motor vehicle accidents occur much more frequently than drug related motor vehicle accidents. Figure 3.5 shows that Hidalgo County had the highest rate of alcohol related motor vehicle accidents in any area in 1997. In 1998, both Willacy and Hidalgo Counties had 91 accidents per 100,000 population. Overall, Texas and the LRGV experienced similar alcohol related motor vehicle accident rates.
Figure 3.5
Alcohol Related Motor Vehicle Accidents with Injuries

![Alcohol Related Motor Vehicle Accidents with Injuries graph]

Source: Texas Commission on Alcohol and Drug Abuse

Figure 3.6 depicts drug related motor vehicle accidents with injuries. Willacy County had much higher rates of drug related accidents in both 1997 and 1998. While the Willacy County rates are high, they reflect only one accident in 1997 and three accidents in 1998. Texas has higher rates overall than does the Lower Rio Grande Valley.

Figure 3.6
Drug Related Motor Vehicle Accidents with Injuries

![Drug Related Motor Vehicle Accidents with Injuries graph]

Source: Texas Commission on Alcohol and Drug Abuse
Alcohol and Drug Related Crime

Alcohol and drug related crimes are other indicators of the magnitude of substance abuse in a population. According to the Uniform Crime Report data from Texas Department of Public Safety, alcohol offenses outnumbered drug crimes in both the LRGV and Texas (TCADA, 1999). Almost 60 percent of all arrests in the state for drug possession involve possession of marijuana. In the Lower Rio Grande Valley, over 60 percent of drug possession arrests are for marijuana. This varies from county to county ranging from 62 percent in Starr County to 80 percent in Willacy County.

In contrast, only 16 percent of arrests for drug trafficking involve marijuana statewide. In the Lower Rio Grande Valley there is much variation. Marijuana was implicated in 16.7 percent of arrests in Cameron County, 49.3 percent of arrests in Hidalgo County, 68.9 percent of arrests in Starr County, and 83.3 percent of arrests in Willacy County for drug trafficking. Nationwide, marijuana is the drug most often involved in drug trafficking arrests (35.4 percent of arrests) followed by Cocaine powder (25.8 percent), Crack Cocaine (15.3 percent), and Methamphetamine (13.8 percent) (U.S. Department of Justice, 2001a).

Table 3.2 lists the characteristics of persons admitted to substance abuse treatment programs in the Lower Rio Grande Valley and the state in 1998. In general, adults are more likely to be admitted for alcohol abuse treatment while youths are more likely to be admitted for marijuana abuse treatment. Males are more likely than females to enter TCADA-funded substance abuse treatment programs. While one in five adults enters treatment programs through court referral at the state level, three of four admissions in Cameron County, one of three in Hidalgo County and only one in ten in Starr and Willacy Counties enters drug treatment through the court system. The majority of youth admissions, however, do come through the court system.

Dependency to substances varies by race and ethnicity. While alcohol dependency is observed in 36.2 percent of adult admissions to TCADA-Funded programs statewide, 59.7 percent of clients admitted for this reason were White
compared to 25.6 percent who were Hispanic (TCADA, 2001). Hispanics represent the majority of those admitted for dependency to Heroin (54 percent) and Rohypnol (70 percent). Overall in the state, over 70 percent of youth clients are admitted for marijuana dependency. Of those admitted statewide for amphetamines, ecstasy, and ephedrine addictions, the majority are White. Hispanics are over-represented in admissions for Rohypnol (96.9 percent), heroin (88.1 percent), cocaine (76.8 percent) and inhalants (85.7 percent) (TCADA, 2001).

The findings for adolescents are especially troubling since one of the risk factors for criminality is drug abuse (Texas Criminal Justice Policy Council, 1998). Other factors include low verbal skills and academic failure as well as poverty (U.S. Department of Health and Human Services, 1999a). Given the low educational attainment of LRGV youth in TCADA programs (see also Chapter 2), the proportion of those seeking treatment who have been referred by the Criminal Justice system, the lack of mental health services for adolescents in the LRGV (see Chapter 6), and the socio-cultural constraints the Hispanic population faces in accessing available mental health services (U.S. Department of Health and Human Services, 1999a), the prospect of improving substance abuse related criminality for adolescents seems daunting. Additional investigation is needed to focus on the connection between criminality and substance abuse in the LRGV and the differences within the LRGV regarding referral from the Criminal Justice system and regional differences in addiction patterns.
Table 3.2
Characteristics of Admissions for Substance Abuse Treatment, 1998
TCADA-Funded Programs

<table>
<thead>
<tr>
<th>Area</th>
<th>Total Admissions</th>
<th>Alcohol</th>
<th>Cocaine &amp; Crack</th>
<th>Marijuana Hashish</th>
<th>% Male</th>
<th>% Criminal Justice Referred</th>
<th>Average Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas Adult</td>
<td>35,079</td>
<td>36.2%</td>
<td>34.1%</td>
<td>8.8%</td>
<td>64.1%</td>
<td>21.9%</td>
<td>11</td>
</tr>
<tr>
<td>Youth</td>
<td>4,739</td>
<td>10.7%</td>
<td>9.1%</td>
<td>71.7%</td>
<td>76.3%</td>
<td>62.3%</td>
<td>8</td>
</tr>
<tr>
<td>Cameron County</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>455</td>
<td>63.9%</td>
<td>15.8%</td>
<td>15.2%</td>
<td>85%</td>
<td>74%</td>
<td>11</td>
</tr>
<tr>
<td>Youth</td>
<td>57</td>
<td>12.3%</td>
<td>15.8%</td>
<td>63.2%</td>
<td>89%</td>
<td>79%</td>
<td>9</td>
</tr>
<tr>
<td>Hidalgo County</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>607</td>
<td>37.6%</td>
<td>38.1%</td>
<td>13.3%</td>
<td>77%</td>
<td>37%</td>
<td>11</td>
</tr>
<tr>
<td>Youth</td>
<td>161</td>
<td>9.3%</td>
<td>19.2%</td>
<td>61.5%</td>
<td>81%</td>
<td>71%</td>
<td>9</td>
</tr>
<tr>
<td>Starr County</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>24</td>
<td>29.2%</td>
<td>58.3%</td>
<td>**</td>
<td>71%</td>
<td>8%</td>
<td>12</td>
</tr>
<tr>
<td>Youth</td>
<td>16</td>
<td>25.0%</td>
<td>31.3%</td>
<td>43.8%</td>
<td>56%</td>
<td>13%</td>
<td>8</td>
</tr>
<tr>
<td>Willacy County</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>13</td>
<td>46.2%</td>
<td>23.1%</td>
<td>30.8%</td>
<td>92%</td>
<td>8%</td>
<td>11</td>
</tr>
<tr>
<td>Youth</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

** Admission less than four

Source: TCADA, Substance-Related Statistics by County

**Youth Substance Abuse**

In 1998, The Texas School Survey of Border students was conducted for the first time among students in grades 4 through 12 as part of the biannual survey of alcohol and drug abuse (Maxwell and Wallisch, 2000). Students from 15 border counties were over-sampled and their substance abuse patterns were compared to students elsewhere in Texas. Border counties included El Paso and Webb (Laredo), as well as counties in the LRGV. Powder cocaine and
Rohypnol were identified as drugs used more often by border students than their non-border counterparts. Fourteen percent of border students had used powder cocaine compared to 13 percent of non-border students. For Rohypnol, 8 percent of border students reported using it compared to 5 percent of non-border students. In fact, TCADA (2001) indicates the use of Rohypnol in the state actually began along the border. Reports of tobacco, alcohol, and inhalant use were comparable between border and non-border students.

Mexican researchers also report an increase in use of these two drugs among Mexican children and adolescents (Maxwell and Wallisch, 2000). Rohypnol (flunitrazepam) is a tranquilizer that can be purchased legally in Mexico for between $1-5 per tablet. Europe and Latin America use it medically as a sedative hypnotic and pre-anesthetic medication. It works like diazepam (Valium), but has ten times its effect. Often it is taken with alcohol, marijuana, or cocaine. Some mistakenly believe it is “safe” because it has professional packaging and others have the misconception that it cannot be detected in urine drug tests (Maxwell and Wallisch, 2000). Because the drug is odorless and tasteless and produces amnesia, it can be administered to a person without his or her knowledge and has been associated with date rape and other sexual assaults (Maxwell and Wallisch, 2000; U.S. Department of Justice, 2001b; Office of National Drug Control Policy, 1998).

Patterns of first use of illegal substances are similar between non-border and border students (Maxwell and Wallisch, 2000). Characteristics of child and adolescent substance users include male, Hispanic in grades 4-8, parents with a high school education or less, not living with both parents, poor grades in school, and having an after-school job. Factors that seem to be preventive are involvement in after school activities and programs.

To consider trends in substance abuse in the LRGV, one can refer to the Texas School survey conducted every other year since 1988 (Newman and Maxwell, 1999). The following figures are results from McAllen ISD, Los Fresnos ISD, and Texas from 1990-1998 for high school seniors (Newman and Maxwell, 1999).
Figure 3.7 shows that since 1994, the percent of 12th graders reporting ever using cocaine has increased for Texas, McAllen, and Los Fresnos. McAllen and Los Fresnos high school seniors reported higher rates of ever use of cocaine/crack than did all students in Texas. Ever use in 1998 was 20 percent among Los Fresnos seniors, compared to 16 percent for McAllen, and 13 percent in Texas.

![Figure 3.7](image)


As shown in Figure 3.8, from 1990-1998, reports of ever using marijuana were lower among McAllen and Los Fresnos high school seniors than among students in Texas overall. In 1998, the percentage of teens reporting having ever used marijuana was 46 percent for Texas, 42 for McAllen, and 37 percent Los Fresnos. As with cocaine, all areas have seen a rise in marijuana use since 1992.
From 1990 to 1998, Texas 12\textsuperscript{th} graders reported having ever used inhalants more often than students in McAllen and Los Fresnos have (see Figure 3.9). From 1990 through 1998, inhalant use among McAllen and Los Fresnos seniors has remained constant at about 10-11 percent, but declined for Texas 12\textsuperscript{th} graders from 22 to 17 percent.
As shown in Figure 3.10, the proportion of seniors reporting alcohol use during the 8-year period has remained consistently at 80-90 percent regardless of the location of the school.

![Figure 3.10](image)


**MENTAL DISORDERS**

The American Psychiatric Association (1994) defines mental illness as a disorder affecting a person's thought, behavior, and interactions with other people. Psychiatric disorders vary in type and severity. Anxiety disorders, depression, bipolar, personality disorders, schizophrenia, and substance abuse are the most common. About 20 percent of the U.S. adult population has a diagnosable mental disorder during any given year (Kessler, 2000). Four of the 10 leading causes of disability in the U.S. and other developed countries are mental disorders and include major depression, bipolar disorder, schizophrenia,
and obsessive-compulsive disorder (Murray and Lopez, 1996). People often suffer from more than one mental illness at the same time (Regier, Narrow, Rae, Manderscheid, Locke, and Goodwin, 1993).

The distribution of mental illness in the Hispanic population is not well understood. National data examining mental illnesses group together the Hispanic population and do not consider the cultural and geographical differences that exist between Mexicans, Puerto Ricans, Cubans, Central Americans, etc. (Molina and Aguirre-Molina, 1994). As indicated by Molina and Aguirre (1994), several researchers believe that mental illness and ethnicity are confounded in epidemiologic studies by the level of acculturation. For example, newer immigrants may suffer more stress if they are unable to adapt to a new lifestyle. Some researchers also believe that mental health services are underused in the Hispanic population. Reasons for this may include less perceived need, use of alternative sources of treatment, and barriers inhibiting use.

Approximately 5 percent of the U.S. adult population suffers from major depression (National Institute of Mental Health, 2000; U.S. Department of Health and Human Services, 1999). Major depression affects women twice as often as men and the average age at onset is the mid-20s. Depression may be under-diagnosed in ethnic minorities due to differences in cultural beliefs, expression of symptoms, and health/help seeking behaviors (Hogue, Hargraves, and Collins, 2000). The Texas Department of Mental Health and Retardation (2001) estimates that 2.7 percent of the Lower Rio Grande Valley population suffers from major depression while another 2 percent suffer from lifetime dysthymia.2

Approximately 1.1 percent of the U.S. adult population has schizophrenia (National Institute of Mental Health, 2000; U.S. Department of Health and Human Services, 1999). Schizophrenia affects men and women with equal frequency. However, men tend to be diagnosed earlier, usually in their late teens or early 20s and women usually are diagnosed sometime between 20 and 30. The prevalence of schizophrenia in the Lower Rio Grande Valley is estimated at less

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2 This estimate is based on data for Tropical Texas Center for MHMR which serves Cameron, Hidalgo, and Willacy Counties. Starr County is included in statistics for the Border Region MHMR Community Center which also serves Jim Hogg, Webb, and Zapata Counties.
than one percent of the adult population (Texas Department of Mental Health and Retardation, 2001).

Bipolar disorder affects approximately 1.2 percent of the U.S. adult population (National Institute of Mental Health, 2000; U.S. Department of Health and Human Services, 1999). Men and women are equally likely to develop bipolar disorder. The average age at onset for a first manic episode is the early twenties. Bipolar Disorder is estimated to have a prevalence rate of 0.6 percent in the LRGV adult population (Texas Department of Mental Health and Retardation, 2001).

Approximately 13.3 percent of American adults ages 18 to 54 have an anxiety disorder in a given year (National Institute of Mental Health, 2000; U.S. Department of Health and Human Services, 1999). Anxiety disorders often co-exist with depressive disorders, eating disorders, or substance abuse. People can have more than one anxiety disorder at the same time. Anxiety disorders more commonly occur in women. The Texas Department of Mental Health and Mental Retardation (2001) estimates 1.6 percent of the LRGV adult population suffers from an anxiety disorder.

Pediatric medicine specialists consider attention deficit/hyperactivity disorder (ADHD) the most common childhood neurobehavioral disorder. Bauchner (2000) estimates that between 4 and 12 percent of U.S. children of school age suffer from attention deficit/hyperactivity disorder. Further, these children are at risk for functional problems, academic underachievement, troublesome interpersonal relationships, and low self-esteem. Bauchner (2000) also asserts that these problems can continue into adulthood. While data on this disorder is limited, the Texas Department of Mental Health and Retardation (2001) does estimate that 5 percent of children ages 0-17 in both the state and the Tropical Texas Center for MHMR catchment area suffer from serious emotional disturbances while 20 percent suffer some form of behavioral or emotional disorder.

Table 3.3 below summarizes the mental disorder prevalence as discussed in this section. Rates for Tropical Texas are lower than national rates because
rates are based on studies done in the 1980’s. TDMHMR is working on revising the prevalence estimates using newer data. It is expected that the numbers of mental health disorders are greatly under-reported especially because of the large Hispanic population and the lower socioeconomic status of the population in the LRGV. As indicated previously, prevalence rates for Hispanics are probably similar to Whites but help-seeking behavior is decidedly different so Hispanics are less likely to be represented in TDMHMR statistics. Further, differences in prevalence rates have been noted between Hispanics born in the U.S. and those born in Mexico (U.S. Department of Health and Human Services, 1999). Overall, it is difficult to determine the true extent of the mental health problems in the LRGV due to a lack of documentation of need. One study currently underway by Dr. Bob Roberts of the UTHSC-Houston examining adolescent mental health needs will provide additional data.

### TABLE 3.3
SUMMARY OF PREVALENCE RATES FOR SPECIFIC DIAGNOSES

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>U.S.</th>
<th>Tropical Texas Center for MHMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Depression</td>
<td>5.0%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>1.1%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>1.2%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Anxiety Disorder</td>
<td>13.3%</td>
<td>1.6%</td>
</tr>
<tr>
<td>ADHD</td>
<td>4-12%</td>
<td></td>
</tr>
<tr>
<td>Serious Emotional Disorder (age 0-17)</td>
<td></td>
<td>5.0%</td>
</tr>
<tr>
<td>Behavioral or Emotional Disorder (age 0-17)</td>
<td></td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Note: According to the Texas Department of Mental Health and Mental Retardation, prevalence rates are based on the Epidemiological Catchment Area studies and further adjusted for socioeconomic characteristics of Texas Counties.
References


Chapter 4 Environmental Health

Jimmy Perkins
Josie Cisneros

INTRODUCTION
Community Input

THE LOWER RIO GRANDE VALLEY (LRGV) AND THE TEXAS BORDER COUNTIES

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El Paso Colonias Study

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Monitored Contaminants

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FOOD SAFETY

CONCLUSIONS

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Appendix I. Abbreviations

Appendix II. Annotated Bibliography

Appendix III. Environmental Websites

Appendix IV. Major Water Providers in the Lower Rio Grande Valley

Appendix V. Water Treaties

Appendix VI. Hazardous Material Route Maps
INTRODUCTION

The role of the environment in public health continues to be important. While many major water and food borne diseases that accounted for up to 50 percent of deaths in the U.S. were largely controlled early in the last century, they continue to plague other countries and even in the U.S. continue to be larger factors in health than is generally acknowledged. The environment is recognized to contain potential risks to health from chemicals and radiation, but it is also important in our psychological well-being. Changes in environmental aesthetics, the threatened loss of drinking water, increased traffic, and many other environmental factors can affect our health and are important to the general public. In general, any community faces at least ten potential environmental issues relevant to public health:

1. Outdoor Air  
2. Indoor Environment  
3. Water Quantity  
4. Water Quality  
5. Wastewater Treatment  
6. Solid Waste  
7. Hazardous Materials  
8. Vector Control  
9. Food Safety  
10. Land Use

The U.S. Environmental Protection Agency (EPA) and the Mexican Government (SEMARNAP) have created the U.S. Mexico Border XXI Program. While that program does not focus on the LRGV (it focuses on the Tijuana, Mexicali, and Juarez and associated U.S. areas), it does follow key environmental indicators (EPA, 2000). These are as follows and have been researched in this report for the LRGV.

- Emissions of air pollutants, particularly volatile organic compounds
- Number of exceedance days for each ambient air quality standard
- Ambient air concentrations of criteria air pollutants
- Sister cities with hazardous spill contingency plans
- Number of enforcement actions in the border area
• Amounts of hazardous waste repatriated to the U.S.
• Recycling capacity
• Permitted solid waste disposal capacity
• Fraction of population served by potable water
• Transboundary surface water quality

Community Input

Based on the community meeting held in Harlingen in June, 2000, the Lower Rio Grande Valley community's six highest priority topics related to the environment were expressed as:

1. a survey of drinking water quality,
2. an analysis of air quality,
3. an investigation of current and planned hazardous material transportation routes,
4. an accounting of sewage treatment and release on both sides of the border,
5. a review of existing indoor air quality data in homes, and
6. a comparison of food safety programs on both sides of the border.

In this chapter, we have attempted to address these issues. In some cases, data availability did not allow the kind of analysis expected or needed and these instances are identified.

THE LOWER RIO GRANDE VALLEY (LRGV) AND THE TEXAS BORDER COUNTIES

Although the focus of this report is the LRGV (Cameron, Hidalgo, Starr and Willacy counties), data from relevant comparison cites and counties are required to provide an understanding of the context for the environmental conditions in the LRGV. Thus, data from El Paso and Laredo, as major border cities, are included. In addition, Austin, the state capital, plus Corpus Christi and
San Antonio (regional cities) also serve as important benchmarks where appropriate. However, Dallas/Fort Worth and Houston are not considered here because these metropoles are much too large and remote from the LRGV to compare to the LRGV. Finally, because the environment does not recognize political boundaries, data from the Mexican cites of the border city pairs of Cuidad Juarez, Nuevo Laredo, Matamoros, and Reynosa were included where available.

The 43-counties of the Texas Border region are very heterogeneous. According to the Texas Natural Resource Conservation Commission, rainfall can range from 7 inches (e.g., El Paso) to 25 inches (e.g., Brownsville) per year (TNRCC, 2000a). Air can flow off the desert or the Gulf, and it can be relatively clean (e.g., Cameron County) or relatively dirty (e.g., El Paso county). Water flow in the Rio Grande can be nearly adequate (e.g., upper and lower regions) to virtually non-existent (e.g., upper middle). Therefore, it sometimes can be hard to make generalizations even in the four county region considered here, occasionally causing coverage of topics to appear inconsistent or selective.

### OUTDOOR AIR

#### Criteria Pollutants

The Environmental Protection Agency (EPA) has set air quality standards for six key (criteria) air pollutants (see Table 4.1). For each pollutant, the determination of compliance is made by comparing the region’s “design value” to the standard. These design values vary for each pollutant and are described in Table 4.1.

In 1997, the EPA proposed new standards for particulate matter to its National Ambient Air Quality Standards (NAAQS) by adding PM$_{2.5}$ (annual and 24-hr average) and ozone (8-hour average). Although these standards are not currently being enforced due to legal complications, a recent Supreme Court
Decision has supported them, and, in all likelihood, enforcement should begin soon. The EPA is convinced that particulate matter of 2.5 microns in diameter or less (PM$_{2.5}$) found in urban areas, can have adverse human health effects due to the size and ability of these particles to readily be deposited in the deepest part of the lung. PM$_{2.5}$ generally comes from combustion products, such as diesel exhaust from trucks, and from the spontaneous, atmospheric formation of these particles from other pollutants such as the gases sulfur dioxide and ammonia. Effects including increased respiratory disease, decreased lung function (particularly in children and people with asthma), alterations in lung tissue and in respiratory tract defense mechanisms, prompted the EPA to set these new air quality standards (EPA 2000a). Increased Border traffic is likely to increase the levels of very small particulates (PM$_{2.5}$) in the future. Because activities on both sides of the border affect air quality, major sources on the Mexican side need to be identified.

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>TIME</th>
<th>STANDARD</th>
<th>DESIGN VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>8 hours</td>
<td>9 ppm</td>
<td>Second highest value over 2 yrs.</td>
</tr>
<tr>
<td></td>
<td>1 hour</td>
<td>35 ppm</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>3 months</td>
<td>1.5 μg/m$^3$</td>
<td>Quarterly daily average</td>
</tr>
<tr>
<td>Nitrogen dioxide</td>
<td>Annual</td>
<td>100 μg/m$^3$</td>
<td>Annual mean of quarterly daily average</td>
</tr>
<tr>
<td>Ozone</td>
<td>1 hour</td>
<td>0.12 ppm</td>
<td>3 year average of annual fourth highest value</td>
</tr>
<tr>
<td></td>
<td>8 hour*</td>
<td>0.08 ppm</td>
<td></td>
</tr>
<tr>
<td>Particulates (PM$_{10}$)</td>
<td>Annual</td>
<td>50 μg/m$^3$</td>
<td>3 year mean of average of quarterly means in one year</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>150 μg/m$^3$</td>
<td>99th percentile of 24-hr mean concentrations averaged over 3 yrs**</td>
</tr>
<tr>
<td>Particulates (PM$_{2.5}$)</td>
<td>Annual*</td>
<td>15 μg/m$^3$</td>
<td>3 year mean of average of quarterly means in one year</td>
</tr>
<tr>
<td></td>
<td>24 hour*</td>
<td>65 μg/m$^3$</td>
<td>98th percentile of 24-hr mean concentrations averaged over 3 yrs.</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>Annual</td>
<td>80 μg/m$^3$</td>
<td>Annual daily mean</td>
</tr>
<tr>
<td></td>
<td>24 hour</td>
<td>365 μg/m$^3$</td>
<td>24 hour daily average</td>
</tr>
</tbody>
</table>

*The ozone 8-hour standard and the PM$_{2.5}$ standards are included for information purposes only. A 1999 federal court ruling has delayed implementation of these standards.

**This is the design value based on the new PM standard. The current value is the expected number of exceedances of 150 per year and can not exceed 1.0
In the LRGV, most air pollution comes from combustion products, especially from vehicles and power plants. With the exception of El Paso and Cuidad Juarez, air quality in the border region is generally good. Measurements exceeding the design value for one or more of these pollutants have occurred in other non-border areas of the state, and El Paso has been designated as being in nonattainment for carbon monoxide, ozone, and particulate matter. However, even El Paso’s air quality has improved. In El Paso, only two exceedances for particulate matter, three for carbon monoxide, and 5 for ozone occurred in 1997-2000 (TNRCC Natural Outlook, December 2000). Thus, TNRCC has notified EPA that El Paso is in compliance if only U.S. emissions are considered. Exceedances of criteria air pollutants have not been observed in the middle or lower Rio Grande valley.

Mexico

Mexico has adopted similar standards to the U.S. Both sides of the border have monitoring stations, which track all 6 criteria air pollutants. According to the EPA’s Border Information Center on Air Pollution, there are more stations along the U.S. side of the border than in Mexico (EPA 2000b). Stations in Mexico are located in Tijuana and Mexicali (across from California), Nogales (across from Arizona), and Ciudad Juarez (across from El Paso). Among Texas border cities, only El Paso and Ciudad Juarez have important air pollution problems based on current standards. Apparently from the perspective of Mexico, Ciudad Juarez has the most air pollution problems because it is the only city along the Texas border with a monitoring station. Plans are in place to add stations in Mexico across from Del Rio and Eagle Pass due to Mexico’s interest in improving ambient air quality monitoring capabilities in Ciudad Acuna and Piedras Negras. These locations are subject to air pollution from the largely uncontrolled Carbon I and II power plants located on the Mexican side. Currently, there are no monitoring stations on the Mexican side of the LRGV.
**Air Quality in Lower Rio Grande Valley**

Overall, the air quality of the LRGV is good. For the LRGV, air quality monitoring stations maintained by EPA and TNRCC are located in Edinburg, Mission, and Brownsville. Ozone, carbon monoxide, and particulate matter are the primary contaminants measured. However, the Brownsville site has measured sulfur dioxide in the past. None of the three stations measure nitrogen dioxide or lead. Along with sulfur dioxide, there are few sources for these pollutants in the LRGV, and, thus, they are not important pollutants to be measured there.

**CARBON MONOXIDE**

According to data from the EPA, carbon monoxide design concentrations show a slight downward trend since 1991 for the cities of San Antonio, Brownsville, El Paso, Austin, and Laredo (see Figure 4.1.) The only Border city with carbon monoxide readings near the federal 8-hour standard is El Paso. Brownsville is the only LRGV city where carbon monoxide is measured and since 1991 it shows a downward to steady trend. The last calculated (98-99) Brownsville design value of 3.2 ppm is far below the federal standard of 9 ppm. Overall, both Brownsville and Austin had the lowest levels of CO in the last 2 years.

**Figure 4.1.** Carbon monoxide design values, for comparison to the standard of 9 ppm, are determined by finding the second maximum 8-hour average concentration at a particular site, for 2 years of continuous data.
Even though ozone contamination is currently of great concern in many areas of the United States, the LRGV has very low ozone concentrations compared to other cities. Ozone exceedances have occurred in Austin, Dallas & Ft. Worth, El Paso, Houston and San Antonio, but exceedances have not been measured in the LRGV. EPA data shows that Cameron, Hidalgo, and Webb counties have lower ozone levels than other Texas counties (see Figure 4.2). El Paso county is the only border county that has exceeded the old one-hour average federal ozone standard of 0.12 ppm. Bexar County follows El Paso and may soon be in non-compliance. The LRGV counties are far below the federal standard. Cameron County shows the lowest ozone concentration over time. (Note the new 8-hour standard is not yet enforced but it is not anticipated that the LRGV would be out of compliance).

Figure 4.2. Ozone design values, for comparison to the standard, are determined by taking the 3-year running average of the annual fourth highest, daily maximum, 1-hour ozone concentration.
PARTICULATE MATTER

The current design value is calculated by finding the expected number of exceedances (times that a site will exceed the standard per year) averaged for three years. Thus a site that exceeds twice in three years would average 0.67 per year and this would be rounded to 1.0 indicating non-compliance. Since only El Paso County has exceeded the standard, Figure 4.3 was constructed to show actual data. When the new PM2.5 standard takes effect the PM10 design values as shown in Table 4.1 will be based averaging the yearly 99th percentile of daily (24-hr averaged) PM$_{10}$ concentrations over 3 running years for each site.

Twenty-four hour PM10 data from the EPA indicate that Cameron, Hidalgo and Webb counties have never exceeded the federal standard of 150 $\mu$g/m$^3$ (see Figure 4.3). Bexar and Travis counties tend to have the lowest particulate readings. Higher levels in the LRGV compared to central Texas are probably due to the more arid climate and agricultural practices.

Figure 4.3 24-hour particulate matter (10 microns or less) highest values for each year by site.
**FUTURE CONCERNS**

Air quality may become a problem in currently compliant areas as the Border region's population grows and its economy develops. Compared with other metropolitan areas of Texas, the LRGV has very few "fixed" (or "point") emission sources, such as factories and power plants. For example, one of the three ingredients for ozone is volatile organic chemicals (the others are UV light and nitrogen dioxide). In the LRGV the amount of VOC’s released from point sources is relatively small. According to Figure 4.4, emission sources were more numerous in El Paso and San Antonio and much more numerous in the petrochemical area of Corpus Christi (Nueces) than in the LRGV.

![Figure 4.4](image_url)

**Figure 4.4.** Total amount of Volatile Organic Chemicals released from point sources for the year 1997 in 5 Texas counties (EPA 2000c).
INDOOR ENVIRONMENT

Most people spend about 90 to 95 percent of their time indoors and indoor air quality can be very different from that outdoors; in many cases, higher concentrations of pollutants are found indoors. Common indoor contaminants include allergens (e.g., dust mites, materials derived from cockroaches, and pet dander), combustion products (e.g., carbon monoxide, cigarette smoke, and by products from cooking and heating fuels), molds, particles, and volatile organic chemicals (e.g., from outgassing of construction materials and home furnishings). Perhaps the most important aspect of the housing in the LRGV is the presence of colonias. For a good discussion of the background on these housing developments see Colonias Factbook (TDHS, 1988).

Nine-Home Study

The EPA completed a pilot study conducted in nine LRGV homes (EPA, 1994). Aside from this small pilot study, no other information appears to exist relating specifically to levels of indoor volatile organic carbon compounds (VOCs) in the LRGV. In general, the results were similar to what the EPA had found in other homes around the country. Although outdoor air pollution was very low, indoor air samples contained elevated levels of combustion products from methane, propane, and butane. Other detectable air contaminants of interest included allergens, such as pet dander, dust mites, and roach "bits". The presence of these materials can adversely affect asthma as can molds.

Also measured were volatile organic compounds (VOCs) from synthetic materials. Formaldehyde is one example that has been studied fairly extensively. In the EPA study, very low concentrations of pesticides were found in air, blood, dust, food, and urine but none in drinking water; the amounts were so small that they were not considered to be a health concern.
Microbiological contamination of stored drinking water in homes with central water supplies was highlighted as a potential problem. Urinary arsenic concentrations were a bit higher than those typically seen in the United States. The amount of lead in the diet also was greater than that usually seen, but the blood lead levels were not elevated. One salient finding was the measurement of extremely high levels of polychlorinated biphenyls (PCBs) in fish caught in the Arroyo Colorado. Prohibitions on consumption of fish from contaminated waters have been required in many areas of the United States, particularly in the Midwest and East. The advisory for eating fish from the Arroyo was recently lifted (TDH, 2001a).

**El Paso Colonias Study**

The University of Texas School of Public Health Regional Campus at El Paso conducted a survey of 269 households in four colonias in El Paso County. None of the homes had a central drinking water supply. According to the Texas Department of Health, only eight percent of the sampled water containers had an effective residual chlorine concentration (TDH, 2000b). One of the most important findings of this study was the relatively high prevalence (21 percent) of diarrhea among children, particularly those under one year of age. Despite a high awareness of the importance of good drinking water, bacteria of potential fecal origin were isolated from almost 80 percent of the food preparation areas and 40 percent of the respondents' hands.

**Texas Border Counties And Colonias Survey**

In 1997, TDH conducted a survey of 2,194 border homes representing approximately 7,838 individuals (TDH, 2000a). The purpose of this survey was to identify possible environmental health problems along the border with an emphasis on colonias. The survey, which included Cameron, El Paso, Hidalgo, Maverick, Val Verde, and Webb counties, was completed in June 2000. This six
county region contains 90 percent of the border population and includes all of the major trans-border "sister" cities. The following sections summarize findings of this survey.

HEPATITIS A FINDINGS

When compared to the state, the survey’s six border counties have significantly higher reported incidences of infectious diseases such as shigellosis, amebiasis, and Hepatitis A. Of the 427 children tested for Hepatitis A (Hep A) antibodies, nine percent tested positive. Children with positive antibody results were more likely to live in homes without sewer connections than those with non-positive results (TDH, 2000a). The prevalence of Hep A among these children also varied with age (see Figure 4.5). Overall, in children of age 1-12, 15 percent of colonia children and seven percent of non-colonia children, tested positive for antibodies (TDH, 2000a). The prevalence of positive tests was highest in Maverick, Val Verde, and Webb colonias with 48 percent of children 1-12 testing positive for antibodies (TDH, 2000a). Nationally, the prevalence of antibodies to Hep A is 10 percent for children under age 10 (TDH, 2000a).

![Figure 4.5. Hepatitis A antibody results by age group for colonias and non-colonias in 6 border counties (TDH, 2000a).](image-url)
LEAD FINDINGS

As part of the TDH survey, blood samples were collected from 427 children for measurement of lead. 31% of the households with children < 12 years of age volunteered. Only three per cent of the children surveyed had blood lead levels in excess of 10 $\mu$g/dl, the current level of concern used by the Center for Disease Control and Prevention (CDC, 2001). Elevated levels for border children in this study ranged from 10-22 $\mu$g/dl. Blood lead levels were similar for colonia children and non-colonia children. The CDC recommends that when “more than 18 percent of children having blood lead levels > 10 $\mu$g/dl” in a region, then further monitoring and follow-up are necessary.

The study indicated lower blood lead levels for border children as compared to the rest of the state for which an overall value of 5% has been reported (TDH, 2000a). These latter data are derived from the Medicaid Early Periodic Diagnosis Treatment Program (EPSDT, TDH, 2000c). The EPSDT program requires screening at 12 and 24 months of age and at other periodic visits for children less than 6 years of age. A criticism of these data is that in many border areas the EPSDT screening program is underutilized and it is only available to Medicaid patients. Undocumented persons are not eligible for the program, which makes it even more difficult to determine if adequate screening is taking place in the border. From EPSDT data the four border counties found to have the highest percentages of elevated blood lead levels are in Table 4.2. None of these counties are in the LRGV and none of the values exceed the CDC guideline for action of 18%.
There is evidence that use of Mexican pottery containing lead in the glaze is hazardous. A 1990 study cited in TDH’s Border Homes Survey indicated that a random sample of 36 pots from three of the most popular markets in a large Mexican border community were found to leach lead with an average of about 560 ppm (TDH, 2000c & Trotter 1990). Another study also cited by TDH states that 27-37 percent of LRGV residents made kitchen use of pottery purchased in Mexico (TDH, 2000c).

Thus why the low blood lead levels for the Border? While the TDH survey seems to confirm the low rates that are reported from the EPSDT data, it should be noted that the TDH survey may have been biased by the 31% response rate and that the EPSDT data are biased as previously described. It also can be argued that not enough border children are screened on a yearly basis (TDH, 2000a). Alternatively the rates may be accurate and reflect young housing stock with little or no lead based paint. In addition while leaded pottery may be available in the home it may be little used or otherwise contribute less to the diet than is thought.

**DRINKING WATER FINDINGS**

Historically, studies on water quality of the Rio Grande show that water downstream of binational sister cities has been contaminated with fecal coliforms

<table>
<thead>
<tr>
<th>Area</th>
<th>% of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of Texas</td>
<td>9.2</td>
</tr>
<tr>
<td>Dimmit County</td>
<td>10.1</td>
</tr>
<tr>
<td>Zapata County</td>
<td>12.6</td>
</tr>
<tr>
<td>Webb County</td>
<td>13.6</td>
</tr>
<tr>
<td>Presidio County</td>
<td>16.0</td>
</tr>
</tbody>
</table>
due to discharge of untreated sewage (TDH, 2000a). Data from the border homes survey indicate that 41 percent of households do not drink water from the tap. In Cameron and Hidalgo counties, 70 percent of residents (colonia and non-colonia) reported that the water in their homes was not used for drinking (TDH, 2000a). Residents of colonias were less likely to drink tap water than non-colonia residents. Those who did not drink tap water, drank bottled water or water from vending machines (TDH, 2000a). Nineteen percent of colonia and non-colonia households purchased bottled water. Thirty-one percent of colonia and 17 percent of non-colonia households purchased water from vending machines (TDH, 2000a).

Over half of the households in Cameron and Hidalgo counties (63 percent) purchased vended or bottled water (TDH, 2000a). Those residents who purchased water from either tanker trucks or vending machines, stored their water in 5-gallon containers. Washing their containers frequently with chlorine bleach and dishwashing detergent was reported by 79 percent (TDH, 2000a). To assess the safety of stored water, container water from 3 percent of the households was tested for residual chlorine. An acceptable level of chlorine was considered to be greater than or equal to 0.5 mg/L (TDH, 2000a). Almost all results failed this criterion; 57 percent were below 0.2 mg/L and 37 percent had levels from 0.2-0.5 mg/L. However, there was no significant difference in residual chlorine levels for colonia versus non-colonia residents.

WATER AND SEWER CONNECTION FINDINGS

Of the six border counties studied, four percent of colonia and less than one percent of non-colonia residents reported no water service (TDH, 2000a). The finding that only four percent of colonia residents have no water connection is unexpectedly low. Other estimates provided by the Texas Water Development Board and TNRCC (cited within the study) estimated that approximately 10-15 percent of Texas colonias do not have water services (TDH, 2000a). Reasons
for not being connected to waterlines included unavailable service, temporary disconnection, and inability to afford service. In households with connections, six percent of colonia residents shared the connection with other homes. Ninety-eight percent of households with water connections were connected through public or private water companies.

Overall, of the counties studied, only four percent of surveyed residents indicated having a well on their property. Respondents from colonias were significantly more likely than those from non-colonias to have a well on their property. Seventy-two percent of colonia households with wells indicated they used well water as their normal source of water compared to forty percent of those residents in non-colonias who had wells (TDH, 2000a). Of the colonia residents who used well water, only a small percentage (13 percent) used the well water for drinking or cooking.

There was a significant difference in sewage connections for colonia and non-colonia residents; 54 percent of households in colonias were connected to public sewage services versus 94 percent of non-colonia residents (TDH, 2000a). Of those residents with no sewage system hookup, seventy-six percent reported draining their wastewater into septic tanks with drain fields. Ten percent used septic tanks with no drain field. Twelve percent did not know or did not answer. Two percent stated they drained their waste into a cesspool or open pit. Most residents who did not have a sewer connection did have septic tanks, however, the adequacy of the septic tank system was not determined.

**SOLID WASTE REMOVAL FINDINGS**

Most households surveyed received regular public or private garbage pick-up; 98 percent reported that they removed garbage at least weekly. A small percentage of those surveyed received no regular garbage removal (5%). Ninety-six percent of those who did not receive services resided in colonias (TDH, 2000a). While 99% of non-colonia residents received regular garbage
pick-up, only 70 percent of colonia residents received regular services. Maverick, Val Verde and Webb colonia residents were less likely than residents of other colonias to receive regular garbage services (TDH, 2000a).

Thirty-seven percent of those without garbage pick-up, stated that they could not afford it or it was not available to their community (TDH, 2000a). However, the majority of Cameron and Hidalgo residents indicated not receiving garbage pick up because they could not afford it versus residents in Maverick, Val Verde and Webb counties who did not receive service because it was simply not available to them. Thirty percent of residents with no service stated that they burned their garbage while 34 percent took it to the landfill and 23 percent took it to a collecting station (TDH, 2000a, the remaining 13 percent of disposal methods was not identified). Another finding of the study was that recycling was more available to non-colonias households than to colonias.

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WATER QUANTITY

**Rapidly Increasing Demand**

The Texas Water Development Board projects that municipal water demands for the U.S. Border region will increase by 123 percent between 1990 and 2050 (TWDB, 2000b). Municipal demand for water in the LRGV region is estimated to increase 83 percent by the year 2050 (see Table 4.3). This projection implies increasing economy in the use of water in light of the expected population increase of the entire border region from 3.4 to 9.1 million persons (TWDB, 2000a). Also, these water demand figures do not include usage for agriculture, electricity generation, livestock, manufacturing, mining, and steam generation. Therefore, there will be considerable pressure for the population of the LRGV to reduce its water consumption, which will be difficult given the predictions.
Table 4.3. Current and Projected Water Needs For the Lower Rio Grande Valley in Acre Feet (Sharp 1998).

<table>
<thead>
<tr>
<th>CITY</th>
<th>2000</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edinburg</td>
<td>7,620</td>
<td>15,051</td>
</tr>
<tr>
<td>Harlingen</td>
<td>10,759</td>
<td>15,777</td>
</tr>
<tr>
<td>Brownsville</td>
<td>30,971</td>
<td>49,046</td>
</tr>
<tr>
<td>McAllen</td>
<td>46,536</td>
<td>95,722</td>
</tr>
<tr>
<td>Total</td>
<td>95,876</td>
<td>175,596</td>
</tr>
</tbody>
</table>

Sharp (1998) states that the LRGV region lacks sufficient supplies of water for distribution. The LRGV is almost completely dependent on surface water (see Appendix IV). There are no freshwater aquifers along the coast. There are significant constraints on the acquisition or collection of more surface water. Thus, conservation, re-use, and acquisition of new sources, such as desalinized water or water imported by pipeline, will be necessary. The cost of water is predicted to increase substantially.

**WATER DELIVERY**

**Absence of Water Utilities**

Hayes et al. (1995) report that although high-quality, potable water is delivered to most US border residents by pressurized systems, over one million people in the U.S. border area system out of a population of 5,722,694 (area includes border counties of Texas, New Mexico, Arizona and California) do not have access to a public water system. (Note: In light of the results of the recent TDH survey (2000a), this estimate may be high for the LRGV). According to the Cameron County Program Development & Management Department, 26 of
Cameron County’s 99 (26%) existing colonias are not served by any public water supply system and therefore have no source of water (Turner Collie & Braden Inc., 2000). This is higher than estimates cited earlier of TWDB (TDH, 2000a). These colonia residents may rely on wells as their source of water but the majority have no public water supply.

The North American Development Bank (NADBank) reports an estimated need of 1 billion dollars (see Table 4.4) for development of new drinking water delivery systems for the region within 100 km of the U.S.-Mexican border (Lehman, 1999 and TWDB, 1997). The capital requirement is regarded as equal on both sides of the border. A specific estimate for the LRGV region of Texas is not readily available. Water supply is one, if not the most important issue facing LRGV communities.

**TABLE 4.4  ESTIMATED BORDER INFRASTRUCTURE NEEDS (BILLION $, NADBANK, 1999).**

<table>
<thead>
<tr>
<th>NEED</th>
<th>MEXICO</th>
<th>UNITED STATES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water</td>
<td>0.5</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Solid waste</td>
<td>1.2</td>
<td>2.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Waste water</td>
<td>2.8</td>
<td>1.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>4.5</td>
<td>4.5</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**Municipal Supplies**

The LRGV has a fragmented water supply system: there are many suppliers, each with relatively few customers. Hayes, *et al.* (1995) report that 83 percent of the water systems in the U.S. border area serve fewer than 3,300 people; 61 percent serve fewer than 500 people; and 31 percent serve fewer than 100 residents. The majority of public water systems serving Cameron, Starr and Willacy are extremely small to medium size (Appendix IV). Hidalgo is the
only county with medium to large size water systems. Population increases will likely put a significant strain on the water use demands for the existing small water systems in the LRGV.

DRINKING WATER QUALITY

There are generally many potential threats to water quality including chemical and microbiological contamination. Although the public is often most concerned about chemical contamination of water, microbiological contamination probably is the more important issue, especially in the LRGV.

Infectious Diseases

TDH keeps a variety of health-related statistics on its Internet site. Among those are rates of disease caused by microorganisms that are transmitted via the fecal-oral path, primarily through contaminated water and food. The incidences of hepatitis A, as well as amebiasis, camblybacteriosis, salmonellosis, and shigellosis, are "markers" of water and food quality (i.e., fecal contamination) and water availability (e.g., for hand washing).

HEPATITIS

Hepatitis A, B, and C are unrelated viruses that cause acute to chronic inflammation of the liver (TDH, 2000b). Hepatitis A infection results in lifelong immunity to subsequent infections and does not lead to chronic illness. Hepatitis A can be transmitted via fecal/oral route, by ingesting fecal contaminated food and water or through close contact with an infected person. Hepatitis A can remain infectious for up to 10 months in water (TDH, 2000b).

Hepatitis B can cause cirrhosis of the liver, cancer, and death. The age of a person when infected plays an important role in whether illness is acute or
chronic (TDH, 2000b). Hepatitis B is primarily transmitted through contact with infected blood and through unprotected sexual contact with an infected person. Hepatitis C also causes liver damage resulting in cirrhosis, cancer, and death. It is primarily transmitted through contact with infected blood (TDH, 2000b). Thus Hepatitis A is the focus of this chapter.

For residents of the 43 county-Border region, the 1998 rate for hepatitis A was 1.6 times greater than the rate for the state of Texas (see Figure 4.6). However, for the LRGV, rates over the last 5 years have at times been considerably higher than the State rate, which has been fairly consistent (see Figure 4.7).

![Figure 4.6](image)

**Figure 4.6** 1998 Hepatitis and Gastrointestinal Disease Rates for the LRGV, the US Border, and Texas (TDH, 2000d).
Gastrointestinal diseases such as amebiasis, camblybacterosis, salmonellosis and shigellosis are caused by bacteria. Eating foods contaminated with these bacteria, drinking contaminated water, or having hand-to-mouth contact with feces of an infected person or animal is primary cause of gastrointestinal diseases (TDH, 2000b).

In 1998, Cameron County had 20 cases of amebiasis. Per capita, this rate is 16 times the average for the entire state (see Figure 4.8), which had a total of 75 cases. Cameron County has an estimated 130,000 colonia residents, 38 percent of the 343,000 colonia residents in Texas (Sharp, 1996). In 1998, the annual incidence rate per 100,000 people in the Border region for amebiasis was 3.5 times higher than the statewide rate. Thus, provision of all residences and businesses with running water from properly managed water utilities is a critical goal.

Figure 4.7 1994 -1998 Hepatitis A rates for LRGV counties and the state of Texas (TDH, 2000e).
In 1998, the annual incidence rate per 100,000 people in the Border region for cambybacterosis was 1.4 times higher than the rate for the entire state of Texas (Figure 4.8, TDH, 2000b). Willacy County had a cambybacterosis rate 2.3 times higher than the state of Texas. It also had the highest rate compared to the other LRGV counties. Salmonellosis was most common in Hidalgo County (Figure 4.8), in 1998, where the rate was 1.4 times greater than the rate for the state of Texas, while the border region had a rate 1.2 times higher than the entire state. Shigellosis prevalence in both Cameron and Hidalgo counties was more than twice the statewide rate in 1998.

### Drinking Water Analysis

#### MONITORED CONTAMINANTS

Water utilities are required by EPA regulations to regularly sample drinking water for various contaminants. They regularly report to the state, and recently have been required to annually report to their customers regardless of the

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**Figure 4.8.** 1998 Gastrointestinal disease ratios for LRGV counties, compared with the State’s rate (TDH, 2000d).
number of customers they serve. The primary constituents monitored in drinking water and the associated maximum contaminant levels (MCLs) are provided in Table 4.5. Amounts exceeding MCLs have potential to cause adverse health effects and, therefore, are required to be reported to the public. The MCLs apply to delivered water or water that comes from the tap.

<table>
<thead>
<tr>
<th>Substance</th>
<th>MCL</th>
<th>Unit</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total coliforms</td>
<td>5</td>
<td>%</td>
<td>Naturally present</td>
</tr>
<tr>
<td>Fecal coliforms</td>
<td>0</td>
<td>%</td>
<td>Animal and human wastes</td>
</tr>
<tr>
<td>Alpha radiation</td>
<td>15</td>
<td>pci/l</td>
<td>Erosion of natural deposits</td>
</tr>
<tr>
<td>Beta radiation</td>
<td>50</td>
<td>pci/l</td>
<td>Erosion of natural deposits</td>
</tr>
<tr>
<td>Arsenic</td>
<td>50</td>
<td>ppb</td>
<td>Discharge from manufacturing, natural deposits, animal feed, herbicides</td>
</tr>
<tr>
<td>Selenium</td>
<td>50</td>
<td>ppb</td>
<td>Discharge from mines, natural deposits</td>
</tr>
<tr>
<td>Barium</td>
<td>2</td>
<td>ppm</td>
<td>Discharge from metal refineries, natural deposits</td>
</tr>
<tr>
<td>Nitrate</td>
<td>10</td>
<td>ppm</td>
<td>Runoff from fertilizer, septic tank leach, sewage, natural deposits</td>
</tr>
<tr>
<td>Fluoride</td>
<td>4</td>
<td>ppm</td>
<td>Water additive, natural deposits</td>
</tr>
<tr>
<td>Trihalomethanes</td>
<td>100</td>
<td>ppb</td>
<td>Byproduct of water disinfection</td>
</tr>
<tr>
<td>Turbidity</td>
<td>0.50</td>
<td>NTU</td>
<td>Soil runoff</td>
</tr>
<tr>
<td>Lead</td>
<td>15</td>
<td>ppb</td>
<td>Corrosion from household plumbing, natural deposits</td>
</tr>
<tr>
<td>Copper</td>
<td>1.3</td>
<td>ppm</td>
<td>Corrosion from household plumbing, natural deposits, leaching of wood preservatives</td>
</tr>
</tbody>
</table>

*Indicates no more than 5 percent of samples taken in one month may result positive for Total Coliforms. There may be no fecal coliforms detected.

Many other constituents are measured as well (see Table 4.6), but as of this report, EPA has not set MCLs for these chemicals and, thus, monitoring requirements are variable. Many of the organic chemicals are not expected in drinking water and when they occur are an indication of industrial contamination. Drinking water in the more industrialized areas of the country, particularly the Mississippi Valley, is often contaminated with these organics.
On the other hand, presence of the inorganics can be an indication of industrial or natural contamination as the source for all of these elements in naturally occurring mineral deposits. Also for some of the inorganics, the highest levels found in drinking water usually affect only the aesthetic qualities of the water. These include bicarbonate, conductivity, dissolved solids, and hardness (CaCO₃).

Table 4.6. Other Chemicals Measured by Water Utilities

<table>
<thead>
<tr>
<th>Class of Chemical</th>
<th>Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic</td>
<td>Antimony, aluminum, asbestos, beryllium, bicarbonate, cadmium, calcium chloride, chromium, conductivity, dissolved solids, hardness (CaCO₃), iron, magnesium, manganese, nickel, silver, sodium, sulfate, thallium, and zinc</td>
</tr>
<tr>
<td>Organic</td>
<td>Insecticides (many), PCBs (many), semi-volatile compounds (many), and volatile organic compounds (many)</td>
</tr>
</tbody>
</table>

Drinking water reports for calendar year 1998-1999 were gathered from several water utility systems throughout the LRGV and a comparative analysis was performed. The analyzed water systems include: Brownsville Public Utilities, Harlingen Water Works (Cameron County), McAllen Public Utilities, La Joya Water Supply, Sharyland Water Supply, North Alamo Water Supply (Hidalgo County), Rio Grande City Public Utilities (Starr County), and City of Raymondville (Willacy County). Specific comparisons are categorized below.

Coliforms

Coliforms are bacteria that are associated with human and/or animal wastes. They are bacteria that grow on a certain media at a certain temperature. Fecal coliforms are similar but grow under different conditions and are thought to be more indicative of fecal contamination. Coliforms are found in human and animal intestinal tracts (EPA 2000d). Their presence in drinking water is a strong indication of sewage or animal waste contamination. An example of a fecal coliform is *Escherichia coli*. Some strains of *E. Coli* can produce a powerful toxin,
which causes severe illness specifically to the kidney (EPA 2000d). Monitoring of fecal and total coliforms is required for all water systems as an indicator of possible human or animal fecal contamination that may lead to disease.

The analyzed public water systems in the LRGV indicated little total coliform contamination (see Figure 4.9) and none reported any fecal coliform detection. Detection of any fecal coliform is a violation of the Safe Drinking Water Act. Brownsville Public Utilities and North Alamo Water Supply Corporation (in Edinburg) were the only sites that detected total coliform contamination but values were still below the allowed maximum contaminant level.

![Figure 4.9. Percent total coliform detection for various water systems in the LRGV, including the maximum contaminant level (MCL), according to 1998-1999 drinking water quality reports.](image)

**Figure 4.9.** Percent total coliform detection for various water systems in the LRGV, including the maximum contaminant level (MCL), according to 1998-1999 drinking water quality reports.

**Metal or Cation Contaminants**

Lead and copper, metals found in natural deposits and sometimes used in water service lines, can cause short and long-term health effects. Lead interferes with the chemistry of red blood cells, causes abnormal physical and
mental development, and, in severe cases, causes stroke and kidney disease as well as cancer (EPA, 2000e). Copper taken in excess levels (as indicated in Table 4.5 copper is about 100 times less toxic than lead) may cause stomach and intestinal problems, liver and kidney damage, and anemia (EPA, 2000e).

Figure 4.10 shows the relative contamination of the various drinking water systems with respect to the five primary metal contaminants in Table 4.6. For each system and each metal, the highest reported value detected by the system is shown as a percentage of the MCL. Rio Grande City Public Utilities, which is in Starr County, detected copper and lead in at least one sample at levels that were about 70 percent of the MCL. This is high compared to other LRGV cities and may be indicative of metal contamination that that occurs more frequently but is not detected due to infrequent sampling. The source of these contaminants needs to be known.

Figure 4.10. Concentrations (as a percentage of their MCLs) of the 5 primary metals detected in LRGV water systems and reported in 1998-1999 drinking water quality reports. Values for each system are reported in the order of the legend.
Ingestion of high levels of arsenic in drinking water may cause effects on the nervous, circulatory, hepatic, and gastrointestinal systems, developmental effects, and hearing impairment. It has also been linked to skin, liver, bladder, kidney, and lung cancer (EPA, 2000e). The metals barium and selenium are regulated since barium may cause gastrointestinal effects, muscular weakness and high blood pressure and selenium may cause damage to the nervous system, fatigue, and irritability (EPA 2000e). In the LRGV, arsenic, barium, and selenium contamination is low for all water systems studied, however the Clinton administration (EPA) proposed a new arsenic standard of 5 ppm. The Bush administration is currently reviewing that proposal and will likely propose a higher number, 10-15 ppm. The final value will be important given the values in Figure 4.10, which are in the neighborhood of 2-4 ppm.

**Anions and Radioactive Contaminants**

Certain minerals are radioactive and emit forms of radiation known as alpha and beta radiation. Drinking water containing alpha and beta radiation in excess of the MCL, over many years, leads to an increased risk of cancer (EPA, 2000e). In the LRGV, radioactive constituents are at low levels (see Figure 4.11).

Fluoride is a naturally occurring component of water, however in many cities it is added to water (about 1 ppm) to improve dental health. Each community decides whether to add fluoride to their drinking water. In some cases, people who drink water with fluoride at levels in excess of the MCL, over many years, may contract bone disease (EPA, 2000e). Excessive levels of nitrate in drinking water can cause serious illness to infants due to interference in the oxygen-carrying capacity of a child’s blood (EPA, 2000e). Nitrate also causes diuresis and hemorrhaging of the spleen.

Brownsville Public Utilities for the year 1998-1999 reported nitrate and fluoride levels in at least one sample that were equivalent to the MCLs (see Figure 4.11). Since the source of drinking water for these systems is the Rio
Grande, the high levels reported for Brownsville are likely due to upstream contributions of sewage, fertilizer, and livestock runoff to the Rio Grande. Again given the infrequency of sampling required under the Safe Drinking Water Act, these values may be indicative of an overall tendency for Rio Grande water to be marginally acceptable as drinking water.

**Figure 4.11.** Anions and radioactive constituent concentrations reported as a percentage of the respective MCL for various LRGV water systems according to 1998-1999 drinking water quality reports. Contaminants are reported in the order on the legend.

**Turbidity and Trihalomethanes**

In general, turbidity in LRGV drinking water systems is high and occasionally exceeds the MCL of 0.5 NTU. The NTU is a turbidity unit and floating or suspended solids cause turbidity. The Rio Grande receives runoff and return irrigation waters that have high suspended-solids loads. These solids can be removed with better flocculation and filtration water treatment processes. The
turbidity standard is important because bacteria, viruses, and parasites can be sequestered on particles and there they are less affected by disinfection normally caused by added chlorine (EPA 2000e). La Joya Public Water System reported the highest turbidity (see Figure 4.12).

Trihalomethanes are produced when added chlorine finds its way back to the Rio Grande. There, naturally occurring bacteria manufacture simple chlorinated organic compounds that have been associated with cancer in rodents and are suspected of causing cancer in humans. The current EPA standard for trihalomethanes is 100 ppb (see Table 4.5). By January 2002, water systems serving 10,000 or more must meet a new standard of 80 ppb (Federal Register, 1998). Smaller water systems have until January 2004 to comply with the new standard. Five studies have linked trihalomethanes to neural tube defects and an increased risk of first trimester miscarriage (Waller, Swan, DeLorenze and Hopkins, 1998; Klotz and Pyrch, 1998; Bove, Fulcomer, Klotz, Esmart, Dufficy, and Savrin, 1995; Savitz, Andrews, Pastore, 1995; Dodds and King, 2001). However, apparently EPA (Federal Register, 1998) does not link the new standard to any presumed risk of NTDs related to trihalomethane exposure. Rather the new standard is based on a small risk of cancer, particularly bladder cancer. (See also the last section of this chapter on NTDs).

LRGV water systems did not exceed the trihalomethane MCL (100 ppb) during 1998-1999 (Figure 4.12). However, since that analysis the picture has changed. In late summer 2001 the TNRCC required several LRGV water systems to warn customers that drinking water had exceeded the trihalomethane standard (see Figure 4.13). Only one of those, La Joya, was included in the analysis shown in Figure 4.12. The others are smaller systems that are not currently regulated under this standard and therefore are not required to monitor. Once again this is an example of how that infrequent monitoring cannot reveal patterns of water contamination.
Figure 4.12. Turbidity and trihalomethanes levels reported as a percentage of their respective MCLs for various LRGV water systems according to 1998-1999 drinking water quality reports.

Summary

These data indicate few instances where drinking water systems have reported results that exceeded MCLs. However, given the nature of the Rio Grande and the runoff and sewage it is known to receive, the industrial run-off, largely from the Mexican side, that it is suspected to receive, and its overuse and lack of dilution flows, it is expected that various contaminants will appear in LRGV drinking water. The occasional drinking water exceedances that indicate a potential problem are in fact red flags for episodes such as the trihalomethane results of 2001.

The major source of drinking water, the Rio Grande, is too polluted for recreation (as seen in the next section). While the drinking water treatment process removes many types of pollution, some pollutants cannot be removed and the same pollutants are not always measured in finished drinking water versus raw Rio Grande water. For example, treatment processes do not remove
nitrates and fluorides, and Brownsville water occasionally equals or exceeds these standards. In addition, utilities are not required to monitor most organic pollutants and they are poorly monitored in the Rio Grande. However, it is expected that the Rio Grande possesses these pollutants from industry and agriculture and their concentrations would be expected to be maximal at Brownsville, the point furthest downstream. Thus, a more thorough monitoring and warning system for the Rio Grande is warranted.

WATER QUALITY FOR RECREATION AND ECOSYSTEMS

There have been several water quality studies of the Rio Grande since 1994. The Texas Natural Resource Conservation Commission (TNRCC) has completed two assessments and the International Boundary Water Commission
one study of Rio Grande water quality related to “conventional” pollutants not toxic substances. In addition the IWBC and others completed an initial study of toxic substances in the Rio Grande (IWBC, 1994) and a follow up study (EPA, 2001). Unfortunately, the river is long and, therefore, only a small part of the results relate to the LRGV.

Table 4.7 shows that only the final 2 segments (2301 and 2302) of the TNRCC study relate to water quality for the LRGV. In phase I (TNRCC, 2000b), TNRCC found that in several regions of the Rio Grande, the concentrations of chlorides, fecal coliform bacteria (under low-flow conditions), nitrogen, phosphorus, sulfates, and total dissolved solids were sufficient to be classified as either a health concern or a possible health concern. These inorganic pollutants and the bacteria generally are products of sewage or agriculture. Nothing appears to have been reported about the surface water amounts of anthropogenic organic pollutants such as those that may be the result of regulated or unregulated spills, leaks, or outfalls from industry and agriculture.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Location</th>
<th>Concerns or Possible Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>2314</td>
<td>Above El Paso</td>
<td>Phosphorous, fecal coliform (at low flow)</td>
</tr>
<tr>
<td>2308</td>
<td>Through El Paso</td>
<td>Phosphorous, total dissolved solids; not for recreation</td>
</tr>
<tr>
<td>2307</td>
<td>Below El Paso</td>
<td>nitrogen, phosphorus, chlorides, sulfates, total dissolved solids, fecal coliform (at low flow)</td>
</tr>
<tr>
<td>2306</td>
<td>Big Bend</td>
<td>Phosphorous, fecal coliform (at low flow)</td>
</tr>
<tr>
<td>2305</td>
<td>Amistad</td>
<td>chloride, sulfates, total dissolved solids</td>
</tr>
<tr>
<td>2304</td>
<td>Del Rio and Laredo</td>
<td>fecal coliform (low flow), nitrogen, phosphorous; not for recreation</td>
</tr>
<tr>
<td>2313</td>
<td>San Felipe Creek</td>
<td>chlorides, nitrogen, phosphorus</td>
</tr>
<tr>
<td>2303</td>
<td>Falcon</td>
<td>total dissolved solids, phosphorous</td>
</tr>
<tr>
<td>2311</td>
<td>Upper Pecos</td>
<td>Nitrogen</td>
</tr>
<tr>
<td>2310</td>
<td>Lower Pecos</td>
<td>chloride, sulfates, total dissolved solids, nitrogen, phosphorous</td>
</tr>
<tr>
<td>2309</td>
<td>Devils River</td>
<td>nitrogen, total dissolved solids</td>
</tr>
<tr>
<td>2302</td>
<td>Below Falcon</td>
<td>total dissolved solids, fecal coliform (at low flow), nitrogen, phosphorus, not acceptable for recreation</td>
</tr>
<tr>
<td>2301</td>
<td>Rio Grande Tidal</td>
<td>Phosphorus</td>
</tr>
</tbody>
</table>
Segment 2301 is located downstream of the International Bridge in Cameron County (TNRCC 2000e). Data from TNRCC’s preliminary findings of their Phase II report (TNRCC 2000e) indicates that this segment is used for contact recreation and aquatic life. The only concern for this segment according to latest data is high levels of chlorophyll-a (TNRCC 2000e). There was no further elevated phosphorus in the Phase II results. However perhaps due to low flow these conditions appear worse in the more recent IWBC data that are discussed next.

Segment 2302 is located above 2301 up to Falcon Dam in Starr County and is used for contact recreation, aquatic life and domestic water supply (TNRCC 2000e). From the same preliminary findings, TNRCC states that contact recreation use is not supported in the lower 25 miles of this segment due to elevated fecal coliform densities. Ammonia-nitrogen, chlorophyll, chloride, sulfate and total dissolved solids are currently additional concerns for this segment (TNRCC 2000e).

A similar study published by the U.S. International Boundary and Water Commission (IBWC 2000) states the same concerns in more detail for these segments and indicates that segment 2301 may be as impacted as 2302 (see Table 4.8). All but the last monitoring station in Table 4.8 is included in segment 2302. Apparently, more data are needed for segment 2301.

A new development in the winter of 2001 is the failure of the Rio Grande flow to be significant enough to push through to the Gulf of Mexico (Davis, 2001). A sand dune was blocking the river more than 400 feet from the Gulf as late as July 2001. Apparently, this has occurred for the first time since the great drought of the 1950s. In late July, the sand bar was removed with heavy equipment (Gregor, 2001). As the River becomes more sluggish as a result of drought and greater withdrawals on both sides of the River, it can be expected that concentrations of all pollutants will increase and additional water treatment may be required.
Table 4.8. U.S. International Boundary Water Commission, 2000 Data for Segments 2302 and 2301

<table>
<thead>
<tr>
<th>Monitoring Station</th>
<th>Location</th>
<th>Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>13187</td>
<td>Rio Grande 2.5 miles below Falcon Dam</td>
<td>pH</td>
</tr>
<tr>
<td>13186</td>
<td>Rio Grande below Rio Alamo near Fronton</td>
<td>Phosphorus, total dissolved solids, chlorophyll-a and ammonia-nitrogen</td>
</tr>
<tr>
<td>13185</td>
<td>Rio Grande at Fort Ringold, 1 mile downstream Rio Grande City</td>
<td>Total dissolved solids</td>
</tr>
<tr>
<td>13184</td>
<td>Rio Grande at SH 886 near Los Ebanos</td>
<td>Exceedances of total dissolved solids</td>
</tr>
<tr>
<td>13664</td>
<td>Rio Grande 0.5 miles below Anzalduas Damm, 12 miles from Hidalgo</td>
<td>Exceedances of total dissolved solids</td>
</tr>
<tr>
<td>13181</td>
<td>Rio Grande International Bridge on US 281 at Hidalgo</td>
<td>Total dissolved solids, ammonia-nitrogen, and total phosphorus</td>
</tr>
<tr>
<td>15808</td>
<td>Rio Grande upstream of Pharr International Bridge on US 281</td>
<td>Exceedances of total phosphorus, concern for fecal coliforms, total dissolved solids, and ammonia-nitrogen</td>
</tr>
<tr>
<td>13177 (Segment 2301)</td>
<td>Rio Grande at El Jardin Jump Station near Brownsville</td>
<td>Total dissolved solids, fecal coliform, chlorophyll-a, chloride, sulfate, ammonia-nitrogen, and total phosphorus</td>
</tr>
</tbody>
</table>

The toxic substances studies have only been reviewed in summary form (IBWC, 1994 and EPA, 2001). They indicate that only a small number of samples contain toxic substances. Fewer than one percent of the 15,000 possible occurrences (apparently 150 chemicals and 100 sites) of toxic substances were detected. Arsenic seemed to be the chief occurrence although
there were numerous other chemicals detected at levels above the “level of concern”. In the LRGV, it appears that the river below Brownsville and the drainage from the Anhelo dam south of Las Milpas are the prime areas of concern. It appears that concentrations downstream of El Anhelo Drain increase towards Brownsville.

**WASTE WATER TREATMENT**

The Border region faces a large, unmet need for development of wastewater treatment facilities. Control of sewage has been a prime environmental public health issue since cities were built. According to the Texas Water Development Board, more than 50 of Hidalgo County’s 765 colonias lack drinking water, and 85% do not have access to adequate on-site wastewater or sewer service. Forty-four percent of the colonia residents rely on cesspools, or pit privies; another 50% are serviced by septic tanks and drain fields, many of which are inadequately sized and do not meet Texas standards (Jensen 1995).

Outside of the colonias, it is safe to assume that all Publicly Owned Treatment Works (POTWs or sewage treatment plants) on the U.S. side are treating sewage to secondary or tertiary levels. Whether these plants frequently operate beyond capacity is not readily available. In those instances, raw or untreated sewage would be dumped directly to the Rio Grande and its tributaries. On the Mexican side, it is not known to what extent that sewage is being treated before it enters the Rio Grande. Based on past practices, it will be dumped raw into the river or treated only through the primary stage (basically a settling stage that removes about 60% of the solids) until the NADBank and the Mexican and American governments (the EPA has apparently been the source for some Mexican POTW construction) build the necessary infrastructure. The NAD Bank estimates that $4.3 billion is needed for construction of wastewater treatment
plants in the entire U.S.-Mexico border region. This probably is the most important input affecting water quality.

Industrial waste is rarely mentioned in the LRGV because so little is known about it. An inventory of point sources from the U.S. side to the Rio Grande was not attempted due to time constraints. However, they are likely to be insignificant compared to those from the Mexican side. While the larger companies that operate maquilas on the Mexican side are likely to be in compliance with Mexican laws, smaller companies are no doubt bending the rules in light of lax Mexican enforcement. Mexico simply does not have the resources to enforce laws as needed.

It is important to make one final note. When all LRGV sewage and industrial wastes are treated, the Rio Grande will likely continue to be considered unsafe for recreation. Where this has occurred in the U.S., there are still many rivers and streams that are considered unsafe due to non-point source runoff. The latter comes largely from agriculture and the streets of cities. Hopefully, other areas of the U.S. will determine how to control these sources by the time the LRGV controls sewage and industrial wastes.

MUNICIPAL SOLID WASTE

Provision of adequate services for dealing with solid waste (i.e., "garbage, refuse and trash") is important for the LRGV as it is for the entire country. Because of concerns about air pollution, primarily the creation of the air pollutants called dioxins and furans, burning of wastes in centralized incinerator facilities has fallen out of favor in the last two decades, leaving landfills as the primary approach. While landfill capacity in many parts of the U.S. is declining rapidly, it has held up relatively well in Texas. Throughout the Border region of Texas, landfill capacity in 1994 was sufficient to last from only five to 30 years (TNRCC, 2000d). However, at least 10 Border counties have no active landfills; many landfills have
limited capacity, and many need improvements to meet existing standards (TNRCC, 2001). At the 1998 rate of usage, the LRGV sites will be at capacity in another 12 years. This linear estimate does not include rapid growth, meaning capacity probably will be reached in a decade, or less.

Furthermore, the waste management needs of the maquiladoras can impact the Texas side of the Border. The 1983 La Paz Agreement between the U.S. and Mexico requires the return of waste produced in maquiladora manufacturing operations to the country of origin. Nonhazardous waste produced in the processing of materials of U.S. origin must be transported back to the U.S. Thus, the remaining disposal capacity of Texas landfills could be reduced by a sudden flow of additional waste due to process changes or the region experiencing additional maquiladora growth (TNRCC, 2001).

Appropriate municipal waste disposal is an essential public health service desired by all, but no one wants to have a disposal facility near them - 'Not in my backyard' (NIMBY) is the universal cry. Development of new solid waste disposal sites is a looming problem for all communities. NIMBY and "environmental justice" are both powerful slogans reflecting real forces that must be considered. Obviously, recycling must be promoted. The TNRCC and the Texas Water Development Board have found the need for seven new landfills, ten landfill expansions, and 69 new recycling centers in Texas (TNRCC, 2001b). Specific solid waste disposal needs for the LRGV are not apparently available. The NADBank (Lehman, 1999) estimate for solid waste infrastructure needs by 2003 is 1.2 billion dollars in Mexico and 2.5 billion dollars in the United States (Table 4.4). The expected rapid increase in LRGV population means that needs of this scale will continue for decades.

Lack of access, due to distance or non-availability, to managed waste sites can cause illegal dumping. The TNRCC assessed the impacts of illegal dumping on 32 county governments (within 100 miles of the Rio Grande). This study indicated that the cost of cleanup of about 20,000 reported sites would be $21.88 million (TNRCC 1997).
HAZARDOUS MATERIALS AND WASTE

The safe transport, storage, use, and disposal of hazardous materials will be a growing problem as the LRGV continues to develop. Industrial activity on both sides creates jobs, which require materials. Some of these materials are hazardous, although most of them are not. In addition, the majority are raw materials not wastes. Under the U.S. Resource Conservation and Recovery Act (RCRA), the EPA requires companies in the United States to keep records of hazardous wastes delivered, used, and shipped. In addition, the EPA inventories the environmental releases (i.e. to air and water) of many so-called “toxic” materials through the Toxics Release Inventory (EPA, 2000f). However, both of these mechanisms deal only with the wastes, not the raw hazardous materials. The raw materials are many times greater in quantity than the wastes and are clearly the bigger issue in terms of potential for hazardous materials transport accidents and spills.

Importantly, because of the North American Free Trade Agreement (NAFTA), all materials (not just hazardous) that cross the border must be accounted for in a materials balance approach. In other words, if one pound of benzene crosses the border and only 95% of it is incorporated into the product, then the disposition of the other 5% must be determined. Unless the waste material can be used in Mexico, it is the manufacturer’s obligation to return it to the U.S. All hazardous material and waste must clear U.S. Customs when crossing the border (EPA, 2001x). Thus, data on industrial waste and material shipments is kept by U.S. Customs. Only U.S. industrial waste is tracked by TNRCC. Facilities having one or more hazardous chemicals (this is a legal definition and does not include all chemicals) present at any one time during the calendar year must file a Texas Tier Two Report to TDH's Toxic Substances Control Division. Therefore, data for hazardous materials at U.S. facilities is kept by TDH (TDH, 2000f).
According to an estimate cited by TNRCC, 53% of the hazardous waste returned to the United States from Mexico in 1995 was transported to or through Texas (TNRCC 2000d). This repatriation of wastes produced from U.S. materials increases the burden on waste facilities in Texas and on the inspection and transportation infrastructure. Based on 1998 data (TNRCC 2000d), 63% of twin plants in Mexico were along the Texas border, with 636,000 employed in Mexico and 378,000 employed in the United States. The economic benefits of maquilas are substantial, but they also place some burdens on Border communities.

Figure 4.14 shows the wastes that were generated by maquiladoras in several Mexican border cities. Figure 4.15 shows that the vast majority of this waste is repatriated to the U.S. These figures also show that wastes identifiable as "hazardous" under RCRA typically are but a modest proportion (~20%) of the total waste generated from U.S. owned maquiladoras in Mexico. Note that but the wastes generated in Mexico (see Figures 4.14 and 4.15) that are not shipped to the U.S. indicates recycling or another disposal option in Mexico.

![Figure 4.14. Hazardous and non-hazardous waste generated by Mexican border maquiladoras in Mexico during 1997.](image-url)
Figure 4.15. Tons of wastes, both hazardous (RCRA) and non-hazardous, received by border cities from US owned maquiladoras in Mexico during 1997.

The EPA requires record keeping in a very detailed manner; thus the types of materials used, such as heavy metals or solvents, are known. EPA also reports data by individual companies, mostly the top 10 volume facilities. For example, mostly carbon tetrachloride is transported through McAllen, mostly spent ("used" non-halogenated) solvents through Laredo, and metals, benzene, phenols, ignitable, corrosive, and reactive wastes through Brownsville (EPA, 2000g).

The most important means of dealing with hazardous waste and materials is to eliminate them where possible. The TNRCC’s Pollution Prevention Initiative for the Texas/Mexico border region attempts to do that through workshops and conferences, assistance visits at maquiladoras, and training exercises for maquiladora managers. As of December 1998, participating facilities have reduced their hazardous waste generation by 8,600 tons, nonhazardous waste generation by 52,000 tons, volatile organic compounds (VOCs) by 53,000
pounds and conserved 31 million gallons of water and 10.9 million kilowatt hours of energy. These projects have saved these facilities $8.4 million in material savings and avoided disposal costs (TNRCC, 2001c).

Attempts to find information on hazardous material transportation routes for Starr and Willacy counties have been unsuccessful, however, the Texas Department of Transportation – Traffic Operations Division, has “Non-Radioactive Hazardous Material Route Maps” for Cameron and Hidalgo counties (Appendix VI). For Harlingen (Cameron county), hazardous material routes encompass a loop formed by interstate highway 77 and state highway 499 (see Appendix VI). Highways 206, B77, 507 and 106 are also hazardous material routes. Outside the loop, routes include business routes 83, B83 and state highway 54. For Hidalgo county, hazardous material transportation routes include interstate highway 281, state highway 107, FM roads 2061, 1925, and 2128 (see Appendix VI). Analysis is appropriate to determine if these routes are appropriate for the communities living around them and future growth. It is important to note that the sister cities of Brownsville-Matamoros and McAllen-Reynosa have hazardous materials spills contingency plans in place (EPA, 2000). These will require periodic update as populations increase.

**VECTOR CONTROL**

Disease can be spread from animals to humans by physical contact, and, thus, control of animal vectors has been an environmental public health concern. A classic vector control health concern is rabies. The state of Texas has operated an ambitious, and successful, Oral Rabies Program (TDH, 2001b) in which millions of food baits with rabies vaccine for coyotes have been dropped from airplanes over border counties to stop the northern spread of canine rabies. This program appears to have been successful in reducing the spread of rabies in coyotes, which is important because coyotes serve as a vector for the virus to
dogs and humans. The ORP has now entered a maintenance phase along the border and is actively conducting an airdrop program to fight rabies in foxes in central and northern Texas. However, local responsibilities for rabies control remain unending.

For over 100 years, public health officials have recognized that mosquitoes can carry several important diseases, including dengue, malaria, and yellow fever. The spread of dengue fever in tropical and then temperate regions of the world beginning after World War II, and recent dengue outbreaks in Mexico and along the Border, make mosquito control an important issue in the LRGV. Following the development of DDT as the first truly effective insecticide, control of mosquitoes, which can carry dengue and other diseases, has been a major activity. Mosquito control is primarily achieved by eliminating habitats, increasing surveillance, and spraying when necessary. Furthermore, public health officials know that many small containers, including old tires around homes and businesses are sufficient to breed dangerous mosquitoes, therefore public education about mosquito control is important. However, while local governments continue mosquito control programs, as climate changes and populations along the border increase, these programs might not be able to keep up.

**Dengue Fever**

In recent years, considerable attention in Texas has been given to dengue fever. Four closely related viruses cause the disease (Kautner, 1997). More importantly, the disease comes in three forms (mild to severe). Dengue fever (DF) is like the "flu" (mild to severe). Dengue hemorrhagic fever (DHF) is more serious: it can require hospitalization to control fluid volume and blood pressure. Finally, dengue shock syndrome (DHS) is the most serious. It can occur in perhaps 1/3 of DHF cases, and it can produce 50 percent lethality without treatment. However, 95 percent survive with treatment. In Reynosa during
1995, only 8 percent of patients showed signs of DHF, and only one percent actually developed DHF (MMWR, 1996).

The primary mosquito vector for Dengue virus is *Aedes Aegypti* and it is abundant in the LRGV. *A. Aegypti* is an urban, day-biting mosquito and, thus, Dengue outbreaks are typically in urban areas having high levels of mosquito to human contact. *A. Aegypti* breeds in small pools of water as might be found around the house. In the 1980s, a new mosquito vector for Dengue apparently moved into the United States from South Asia and has spread throughout the Southern States and into the LRGV. The accelerating frequency of cases in Texas and the introduction of a new, efficient vector, *Aedes albopictus*, portend a major resurgence of dengue and its life threatening consequences. *Aedes Albopictus* is a forest mosquito with less mosquito to human contact than *A. Aegypti*. *A. Albopictus* has the ability to vertically transmit Dengue virus to its’ offspring giving it the potential to act as a natural reservoir for the virus. This potential for a natural reservoir of Dengue virus increases the importance of mosquito control efforts (Moore and Mitchell 1997).

Mosquito control through the use of spraying is only partially effective and may not end an epidemic, and, in fact, it may actually prolong a epidemic (Newton and Reiter, 1992). More effective for *Aedes* control is source reduction of breeding places, i.e., the elimination of containers holding water where the mosquitoes deposit their eggs. To be most effective, source reduction requires the education and cooperation of the affected local populations. Mosquitoes reproduce during the tropical storm season starting in August and lasting well into November. The transmission risk of Dengue virus is greatest during this period.

There have been an increasing number of outbreaks of the disease in the 1990s. Most of the cases are in Mexico and thus a large fraction of the Texas cases have had recent travel to Latin America. For example, in 1995, a dengue outbreak occurred in northeastern Mexico (MMWR, 1996). In Reynosa there were 2706 cases; Matamoros had 408 cases, and Tampico had 1404 cases. During 1995, the virus also appeared in Texas: there were 9 confirmed cases
and 20 probable cases in Texas (see Table 4.9). Four cases occurred in Brownsville, with 3 in Corpus Christi and 2 in Laredo. Of the 29 cases, 23 had been travelers to Mexico, Central America or the Caribbean, suggesting that 6 cases had been acquired in US. The 1999 outbreak (Table 4.9) was associated with a tropical storm that left flood conditions in Laredo and Webb County. Thus, the larger number of US acquired cases was attributed to these conditions. One prediction of the current global climate change trend is for more frequent large rainfall events perhaps increasing the likelihood of Dengue outbreaks.

**TABLE 4.9: Recent Dengue Fever outbreaks in Texas**

<table>
<thead>
<tr>
<th>Area</th>
<th>1980</th>
<th>1986</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>61 (23)</td>
<td>17 (8)</td>
<td>29 (7)</td>
<td>10 (3)</td>
<td>66 (18)</td>
</tr>
<tr>
<td>PHR 11</td>
<td>51</td>
<td>16 (6)</td>
<td>13 (7)</td>
<td>5</td>
<td>53 (18)</td>
</tr>
<tr>
<td>LRGV</td>
<td>34</td>
<td>11 (4)</td>
<td>13 (7)</td>
<td>5 (3)</td>
<td>20</td>
</tr>
<tr>
<td>Cameron</td>
<td>26</td>
<td>8 (4)</td>
<td>4 (3)</td>
<td>2 (1)</td>
<td>7</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>7</td>
<td>3</td>
<td>9 (4)</td>
<td>3 (2)</td>
<td>10</td>
</tr>
<tr>
<td>Starr</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Willacy</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

NOTES:
( ) indicates locally acquired cases


Awareness by physicians is imperative if early intervention for serious complications is to forestall significant mortality (Rodriguez-Tan and Weir, 1998). In 1995, there were approximately 240,000 cases of dengue in Central and South America. Thus, a tremendous reservoir exists at the Texas border.
Neural tube defects (NTDs) are among the most common of human birth defects and are a topic of considerable concern and research worldwide. Cause(s) are not known. Many risk factors have been identified including, exposure to the drugs valproic acid/carbamazepine, methotrexate, and aminopterin, low socio-economic status/poverty, hyperthermia (Hendericks, et al., 1999), and exposure to trihalomethanes (Dodds and King, 2001; Klotz and Pyrch, 1999; Bove, Fulcomer, Klotz, Esmart, Dufficy, and Savrin, 1995). In addition, folic acid deficiency, obesity, anticonvulsant exposure, and diabetes have been identified as risk factors (Texas Department of Health, 2001c).

The most important known factor is dietary folic acid. For example, if blood levels of folic acid are <150 μg/l, risk for NTD’s are 6.6 per 10,000 births. However, if the blood levels are > 400 μg/l, the rate is 0.8 per 10,000 births (Daly et al. 1997). The report indicates that folic acid prevents NTD’s if taken during the periconceptional period. Thus, the American Pediatric Association recommends that women of childbearing age take a daily multivitamin supplement with 400 μg of folic acid before pregnancy because neural tube closure normally occurs by the end of the 4th week of pregnancy. Beginning January 1, 1998, the United States began requiring the addition folic acid (140 μg per 100 gm of flour) to grain products (Daly et al. 1997).

Rates NTDs at all stages of pregnancy in the US have been reported in the range of 7.2 to 15.6 cases per 10,000 live births (Hendricks, et al., 1999). However, over a 6-week period in 1991 six anencephalic infants were delivered in Cameron County. In 1992, TDH reported this finding (27 per 10,000 for 1990-1991) as one of the highest reported NTD rates in the U.S. since the early 1970’s for women conceiving from 1990 to 1991 (Hendricks, et al., 1999). TDH implemented surveillance in the 14 counties along the Texas/Mexico border. The results of a major study conducted from 1993-1995 based on the surveillance
program found a NTD rate of 14.6 (see Table 4.10), for the 14 county Border region, and compared this rate to rates of other geographic areas around the country.

### Table 4.10. Comparison of NTD rates for Texas Border Counties and other geographic areas

<table>
<thead>
<tr>
<th>Location</th>
<th>NTDs</th>
<th>Rate per 10,000 live births</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanta</td>
<td>87</td>
<td>11.3</td>
<td>1990 - 1991</td>
</tr>
<tr>
<td>Texas*</td>
<td>197</td>
<td>14.6</td>
<td>1993 - 1995</td>
</tr>
<tr>
<td>South Carolina</td>
<td>187</td>
<td>14.6</td>
<td>1993 - 1995</td>
</tr>
</tbody>
</table>

*14 Border counties in Texas

Ninety-three percent of the 197 Texas border cases were Hispanic, 10 cases were Anglo, 2 Non-Hispanic-Black and one Egyptian. Hispanic NTD rates (14.9 per 10,000) were higher than Anglo NTD rates (10.6 per 10,000), however, the difference was not statistically significant (Hendricks, et al., 1999). Rates for Mexico-born Hispanic women (15.1 per 10,000) were significantly greater than rates for United States-born Hispanic women (9.5).

Overall this study was the first to establish baseline NTD rates for the entire predominantly Hispanic Texas/Mexico Border (see Table 4.11). Rates for each year from 1993 to 1995 were remarkably stable, and the 3-year 14-county rate of 14.6 per 10,000 live births was not significantly different from the Cameron County rate of 14.7 per 10,000 for 1986-1989, the period preceding the 1990-1991 cluster, or 17.4/10,000 for the 1993-1995 period (Table 4.11) suggesting that this is a baseline rate and that the high number of cases that occurred in Cameron County in 1990-1991 may have been unusual but not unrelated to causes that are normally present on the border.
Recent surveillance monitoring by TDH found a cluster of seven anencephaly births from November 2000 to April 2001 in Laredo. A comparison with Texas NTD Project data (Table 4.12) showed that the Laredo births produced a rate for the city higher than the rate for all 14 border counties from 1993 to 1998. However, the city case rate was not significantly different from the rate for the county during 1993-1998 or for the county during a similar cluster investigation in 1997 (Texas Department of Health, 2001c). Of course the comparison problem is the small sample sizes that result in large confidence intervals or uncertainty about a value for any given year.

For both the Laredo and the Cameron County cases it is likely that the unusually high rates were caused by a related short-term change in some causative factor. However the small sample sizes and the complex nature of causation have not allowed epidemiologists to discover the cause of NTDs, the reasons behind these two episodes, or the continued high rates along the border as well as in other parts of the country.
Table 4.12: Anencephaly Rates in Laredo/Webb County

<table>
<thead>
<tr>
<th>Cases</th>
<th>Rate per 10,000 live births</th>
<th>95% Confidence Interval for Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observed Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laredo, Nov 2000-Apr 2001</td>
<td>7</td>
<td>26.7</td>
</tr>
<tr>
<td><strong>Comparison Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texas NTD Project data, 14 border counties, 1993-1998</td>
<td>160</td>
<td>6.2</td>
</tr>
<tr>
<td>Texas NTD Project Data, Webb County, 1993-1998</td>
<td>31</td>
<td>10.8</td>
</tr>
<tr>
<td>Texas NTD Project Data, Webb County, 1997</td>
<td>10</td>
<td>19.4</td>
</tr>
</tbody>
</table>

Source: Texas Department of Health, Texas Birth Defects Monitoring Division, Monitor, Volume 7, Number 1, June 2001

FOOD SAFETY

Concern over pathogens in food and overall food safety is a public health issue of growing interest for residents of the Border region. In Texas, every major city’s health department has food inspectors who inspect each city’s food establishments. If the city is small or the restaurant is in a rural area, then, there is likely to be no health department and it is up to the TDH regional offices to inspect these food establishments. Restaurant inspection is a basic local government activity. Central databases apparently do not exist to quantitatively compare food conditions in the Border region versus the rest of the state or nation. Attempts to gather information on food inspections and food handling procedures in Mexico has proven difficult. Therefore, no comparison of food safety have been made for the U.S. and Mexican Border.
The Lower Rio Grande Valley is a unique region with unique environmental needs. Overall, the Valley’s environment is good. However, there are several issues that warrant further attention. The need for more drinking water and better delivery systems, the relatively poor quality of the Rio Grande for recreation, and the suspected and sometimes confirmed less than adequate quality of drinking water were apparent. These issues will become increasingly obvious as the border’s population increases in the near future. Rural, unincorporated communities…colonias, characterized by their lack of basic needs and services such as drinking water, sewage, and solid waste must continue to be addressed. Two issues that were not addressed well due to lack of time or difficulty in obtaining information were an accounting of sewage and industrial waste releases on both sides of the border and a comparison of food safety programs. Attempting to obtain information from Mexico was difficult. It is important to keep in mind that on the border everything that Mexico does to its environment will inevitably affect the U.S. and vice-versa. For this reason, it is important that all parties concerned on both sides of the border partake in solving environmental problems.
REFERENCES


CDC, About the CDC Childhood Lead Poisoning Prevention Program. [http://www.cdc.gov/nceh/lead/about/about.htm](http://www.cdc.gov/nceh/lead/about/about.htm) Centers for Disease Control, Atlanta, GA, USA (2001).


EPA, *US/Mexico Border Information Center on Air Pollution*  

EPA, *AirData*. Environmental Protection Agency.  

EPA, *E. coli in drinking water*,  

EPA, *Drinking Water Contaminants*,  

EPA, *Toxic Release Inventory*,  

EPA *Haztrak*  
www.epa.gov/earth1r6/6en/h/haztrak/haztrak.htm Environmental Protection Agency (2000g).

EPA, Second Phase of the Binational Study Regarding the Presence of Toxic Substances in the Rio Grande/Río Bravo and its Tributaries Along the Boundary Portion-Between the United States and México,  

http://www.epa.gov/OGWDW/mdbp/dbpfr.html

Gregor, A. Dredging restores river’s link to Gulf. *San Antonio Express-News*,  


IBWC, *Binational Study Regarding the Presence of Toxic Substance in the Rio Grande/Rio Bravo and its Tributaries along the Border Portion Between*


TDH, *Disease Information*, www.tdh.state.tx.us/ideas/factsht/factsht.htm Texas Department of Health, Austin, TX, USA (2000).


TDH, Texas Department of Health Infectious Disease Epidemiology and Surveillance Division. Personal contact: Gary Heseltine, MD. (2000c).


TNRCC, *1996 Summary of River Basin Assessment*  

TNRCC, *Border Pollution Prevention*,  

TNRCC, *Border Issues, June 2001*  

TNRCC, *Border Activities, June 2001*,  


TWDB, *2002 State Water Plans, Population Projections by County*  

TWDB, *Municipal Water Demands Projections*,  

APPENDICES

Appendix 4A: Abbreviations of importance to this chapter

BECC = Border Environment Cooperation Commission
CDC = Centers for Disease Control (and Prevention)
COG = Council of Governments (e.g., AACOG = Alamo Area COG)
EDAP = Economically Distressed Areas Program
EPA = United States Environmental Protection Agency
IBWC = International Boundary and Water Commission
LRGVDC = Lower Rio Grande Valley Development Council (state-mandated water plan)
MRGV = Middle Rio Grande Valley
NADBank = North American Development Bank
PCBs = polychlorinated biphenyls
TDA = Texas Department of Agriculture
TDH = Texas Department of Health
TDOT = Texas Department of Transportation
TDPW = Texas Department of Parks and Wildlife
TWDB = Texas Water Development Board
USDA = United States Department of Agriculture
USDOT = United States Department of Transportation
USFWS = United States Fish and Wildlife Service
USGS = United States Geological Survey
VOCs = volatile organic compounds
Appendix 4B: Annotated Bibliography

DHHS (1999): Assuring a Healthy Future along the U.S.-Mexico Border. Washington: Department of Health and Human Services. 50 p. This has a little bit on the environment along the border.

EPA (1996): US-Mexico Border XX1 Program: 1996 Implementation Plans. Washington: United States Environmental Protection Agency. 108 p. This is a listing of programs; it provides no content, but it might provide names of contacts. It has a good glossary.


Furino A (1999): The Impact of NAFTA on U.S./Mexico Border Health and HRSA-Sponsored Programs. San Antonio: University of Texas Health Science Center San Antonio, Center for Health Economics and Policy. 72 p. Section 3 considers AIDS, Dengue fever, gastrointestinal disease, STDs, tuberculosis, and vaccine-preventable diseases as the diseases most seen in the study area. The document mentions binational initiatives, such as the International Boundary and Water Commission, that deals with water related issues. The report provides recommendations to improve case finding and epidemiological approaches to communities that are affected by water-borne diseases (stemming from the environment).


TDH (1999). *An Environmental Health Survey and Analysis along the Texas-Mexico Border*. Austin: Texas Department of Public Health. 30 p. Document deals with conducting household surveys along the border in order to establish a health database of the US/Mexico border. The document aims at assessing sanitation, general health conditions, and potential sources of exposure to environmental contaminants at distinct areas along the border. The document also mentions environmental health concerns such as pesticide exposure, poor water quality, pollution due to air emissions, industrial waste, transport and storage of hazardous chemicals, food and drug chemicals, and fish contamination. Areas of major concern included development of vector-born diseases due to inadequate solid waste disposal, poor hygiene due to lack of potable water, and exposure to pesticides. Environmental degradation, as part of the document, mentions El Paso as a non-attainment city for ozone, CO, and PM$_{10}$. Rio Grande water quality data states that water downstream of the binational sister communities is greatly contaminated with fecal coliform bacteria. Fishing advisories also have been released because of the presence of DDT, toxaphene, chlordane and PCB’s.

Villas, P, Garza DD, Lopez A, Salazar, D (1999): *Inventory of Texas-Mexico Border/South Texas Health Related Activities*. Edinburg: The University of Texas System, Texas-Mexico Border Health Coordination Office. 589 p. This is a listing of programs; it provides no content, but it might provide names of contacts.
## Appendix 4C: Environmental Websites

<table>
<thead>
<tr>
<th>Site</th>
<th>URL</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATSDR</td>
<td>atsdr.cdc.gov/</td>
<td>The Agency for Toxic Substances and Disease Registry site provides many services, including FAQs and searches</td>
</tr>
<tr>
<td>Border EcoWeb</td>
<td><a href="http://www.borderecoweb.sdsu.edu">www.borderecoweb.sdsu.edu</a></td>
<td>The San Diego State University Website provides many links, with search capabilities</td>
</tr>
<tr>
<td>Cancer Lit</td>
<td><a href="http://www.cancernet.nih.nci.gov/">www.cancernet.nih.nci.gov/</a></td>
<td>Major database for published papers about cancer; can start at the main site, nih.nci.gov</td>
</tr>
<tr>
<td>CAS</td>
<td><a href="http://www.cas.org">www.cas.org</a></td>
<td>The Chemical Abstracts Service is THE site for specific (physical) information on all chemicals, including standard nomenclature</td>
</tr>
<tr>
<td>CDC</td>
<td><a href="http://www.cdc.gov">www.cdc.gov</a></td>
<td>The Center for Disease Control and Prevention has lots of human disease stuff; e.g., can search MMWR from here</td>
</tr>
<tr>
<td>EPA</td>
<td><a href="http://www.epa.gov">www.epa.gov</a></td>
<td>The United States Environmental Protection site is very big. Many sub-locations can be reached from here, such as Region 6, which includes Texas and provides up-to-date environmental information on issues related to the US/Mexico border, including the EPA's US/Mexico Border Program. Other good locations are &quot;Surf Your Watershed&quot; for information on rivers and &quot;EMPACT&quot;, for data on air quality for Texas cities</td>
</tr>
<tr>
<td>IARC</td>
<td>193.51.164.11</td>
<td>The International Agency for Research on Cancer site has the official list of 800+ carcinogenic chemicals; the site also provides search capabilities</td>
</tr>
<tr>
<td>MEDLINE</td>
<td>Uthscsa.edu</td>
<td>Click on Library, and then click on Medline, which is THE Major database of scientific papers. The search engine (Ovid) is free at the library; staff can register for free remote access, and health professionals can register for low-cost remote access</td>
</tr>
<tr>
<td>MMWR</td>
<td>www2.cdc.gov</td>
<td>Morbidity Mortality Weekly Report is a good source for stories and references. Can search MMWR topically, nad it can be reached through the CDC site</td>
</tr>
<tr>
<td>NIEHS</td>
<td>Niehs.nih.gov</td>
<td>The National Environmental Health Sciences site has many resources; can search their journal, Environmental Health Perspectives, and can get access to the National Toxicology Program</td>
</tr>
<tr>
<td>NIH</td>
<td>nih.gov</td>
<td>The National Institutes of Health is a great, very-large starting place for biomedical information</td>
</tr>
<tr>
<td>Site</td>
<td>URL</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>NLM</td>
<td>nlm.nih.gov</td>
<td>The National Library of Medicine provides access to many databases, including Medline</td>
</tr>
<tr>
<td>NTP</td>
<td>ntp-server.niehs.nih.gov</td>
<td>National Toxicology Program</td>
</tr>
<tr>
<td>OSHA</td>
<td>osha.gov</td>
<td>The Occupational Safety and Health Administration site is not so good for environment per se, but it is good for chemicals; it has many resources and links</td>
</tr>
<tr>
<td>Rio Grande Basin Coalition</td>
<td>rioweb.org</td>
<td>The Rio Grande / Rio Bravo Coalition Website provides information about ecological and water issues, emphasizing public awareness information about the Rio Grande Basin</td>
</tr>
<tr>
<td>TDH</td>
<td><a href="http://www.tdh.state.tx.us">www.tdh.state.tx.us</a></td>
<td>The Texas Department of Health site is a good place to start rummaging around; it has many topical buttons to click</td>
</tr>
<tr>
<td>TNRCC</td>
<td><a href="http://www.tnrcc.state.tx.us">www.tnrcc.state.tx.us</a></td>
<td>The Texas Natural Resource Conservation Commission site provides many things, including information on air quality</td>
</tr>
<tr>
<td>Tox Tutor</td>
<td>sis.nlm.nih.gov/toxtutor1</td>
<td>As a part of the National Library of Medicine site, Tox Tutor is a useful education place</td>
</tr>
<tr>
<td>TOXNET</td>
<td>sis.nlm.nih.gov/sis1</td>
<td>As a part of the National Library of Medicine site; this is a cluster of 11 chemical databases</td>
</tr>
<tr>
<td>US/Mexico Border</td>
<td>www/stanford.edu/depts/hasrg/latinam/ambiente2.html</td>
<td>A faculty member at Stanford provides a large list of various government publications about environmental issues of the US/Mexico border</td>
</tr>
</tbody>
</table>
Appendix 4D: Summary of Major Water Providers in the Lower Rio Grande Valley (GW ground water, PSF = purchased surface water, SF = surface water)

Cameron County

<table>
<thead>
<tr>
<th>Water System Name</th>
<th>Primary Source of Water</th>
<th>Population Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Mirada Country Estates</td>
<td>PSF</td>
<td>110</td>
</tr>
<tr>
<td>River Bend Resort</td>
<td>GW</td>
<td>344</td>
</tr>
<tr>
<td>Indian Lake, Town of</td>
<td>PSF</td>
<td>772</td>
</tr>
<tr>
<td>Arroyo Water Supply Corp.</td>
<td>SF</td>
<td>850</td>
</tr>
<tr>
<td>Brownsville Navigation District</td>
<td>PSF</td>
<td>1,000</td>
</tr>
<tr>
<td>Valley Mud No 1</td>
<td>PSF</td>
<td>1,236</td>
</tr>
<tr>
<td>Palm Valley Estates Utility Dist.</td>
<td>PSF</td>
<td>1,500</td>
</tr>
<tr>
<td>Rio Hondo, City of</td>
<td>SF</td>
<td>1,818</td>
</tr>
<tr>
<td>Primera, City of</td>
<td>PSF</td>
<td>2,030</td>
</tr>
<tr>
<td>Combes Town of</td>
<td>PSF</td>
<td>2,040</td>
</tr>
<tr>
<td>Santa Rosa, City of</td>
<td>SF</td>
<td>2,225</td>
</tr>
<tr>
<td>Valley Mud No 2 Rancho Viejo</td>
<td>SF</td>
<td>2,448</td>
</tr>
<tr>
<td>Los Fresnos, City of</td>
<td>SF</td>
<td>3,918</td>
</tr>
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<td>Olmito Water Supply Corp.</td>
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Hidalgo County

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### Starr County

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### Willacy County

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<td>Sebastian Mud</td>
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<td>Raymondville, City of</td>
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Appendix 4E. Water Treaties
Appendix 4F. Hazardous Material Route Maps
NON-RADIOACTIVE
HAZARDOUS MATERIAL
ROUTE MAP

PREPARED BY THE
TEXAS DEPARTMENT OF TRANSPORTATION
TRAFFIC OPERATIONS DIVISION
HIDALGO COUNTY, EDINBURG, TEXAS
Chapter 5

Chronic and Infectious Disease

OVERVIEW

Vaccine Preventable Disease

CARDIOVASCULAR DISEASE

HEPATITIS

Heart Disease

TUBERCULOSIS

Stroke

SEXUALLY TRANSMITTED

CANCER

DISEASES

Lung

Syphilis

Prostate

Chlamydia and Gonorrhea

Breast

HIV/AIDS

Colon

Lymphoma

Ovarian

Cervical

INJURIES

Traffic Accidents

Syphilis

Homicides

Chlamydia and Gonorrhea

Suicides

HIV/AIDS

DIABETES

CHRONIC OBSTRUCTIVE

PULMONARY DISEASE (COPD)

INFECTIOUS DISEASE
The burden of infectious and non-infectious disease has been reported to be higher along the U.S. Mexico Border than in the U.S. as a whole, even when considering only the U.S. Hispanic population (Sharp, 1998). However, there are many instances where disease rates, and especially mortality rates, are lower in Hispanics than in non-Hispanic Whites or African Americans (Abraido, 1999). Rates presented in this chapter from the Vitalnet System are age-adjusted to the 2000 US Census standard population\(^1\) (Expert Health Data Programming, Inc., 1999) and the summary rates for the four LRGV counties studied were calculated using weighted averages.\(^2\)

Mortality and morbidity are important indicators of the health of a community. With assessment of mortality and morbidity, we can describe the magnitude and patterns of ill health in a population (PAHO, 1999). The data we present are categorized by broad demographic variables (sex, race/ethnicity, and age) but are limited on other attributes that may be equally important, such as immigration status, education, literacy, access to clean drinking water, and adequate sewage disposal. These socioeconomic factors are known to be associated with poor health outcomes and are potentially important risk factors for mortality in U.S. counties bordering Mexico.

Many of the leading preventable causes of death are caused by health-damaging behaviors including tobacco use, lack of physical activity, poor nutrition, and obesity, failure in early detection of cancers and other chronic diseases, and inadequate treatment (CDC, 1999b). The five leading causes of death in Texas between 1980 and 1998 were heart disease, cancer, stroke, injuries, and chronic obstructive pulmonary disease (COPD). For the LRGV,
diabetes replaces COPD as one of the top five leading causes of death (Figure 5.1). Among LRGV Hispanics, these six diseases account for approximately 82% of all deaths (83% among males and 81% among females). Among Texas Whites, these six diseases accounted for 86% of all deaths (85% among males and 86% among females).

Deaths from cardiovascular disease, stroke, and cancer, account for 71 percent of all deaths among Texas Whites, 59 percent of deaths among Texas Hispanics, and 65 percent of deaths among LRGV Hispanics. Deaths related to diabetes account for three percent of deaths among non-Hispanic White Texans, eight percent among Hispanic Texans, and nine percent among LRGV Hispanics.

Age-adjusted all-cause mortality rates are 1.2 times higher among Texas Whites than Texas Hispanics (928 deaths per 100,000 population compared to 769 per 100,000) and 1.25 times higher among Texas Whites than LRGV Hispanics (928 deaths per 100,000 population compared to 740 per 100,000). This difference in mortality has been called the Hispanic Paradox (Liao, Cooper, Cao, Durazo-Arvizu, Kaufman, Luke, and McGee, 1998).
The primary components of cardiovascular disease are heart disease and stroke. These two diseases are the first and third leading causes of death in the United States, Texas and the LRGV. As defined by the Council on Cardiovascular Disease and Stroke within the Texas Department of Health (2001c: 6) cardiovascular disease is the “group of diseases that target the heart and blood vessels and is the result of complex interactions between multiple inherited traits and environmental issues including diet, body weight, blood pressure, and lifestyle habits.”

Cardiovascular disease was responsible for 37 percent of all deaths in Texas during 1998 (TDH, 2000b). Risk factors include overweight, smoking, high blood pressure, high blood cholesterol and poor nutrition, and a sedentary lifestyle. In addition, individuals with diabetes have an elevated risk for developing cardiovascular disease. It is these risk factors that are largely responsible for development of and deaths from cardiovascular disease. Data from the Texas Department of Health (2000g) indicates African-Americans are more likely than other racial/ethnic groups to be overweight, smoke, and have high blood pressure. Hispanics are less likely than other racial/ethnic groups to smoke or have high blood pressure. However, Hispanics are more likely than other groups to have a sedentary lifestyle and diabetes.

Heart Disease

Figure 5.2 shows Hispanics in the LRGV experienced fewer deaths from heart disease than did Texas non-Hispanic Whites (ICD 9 Codes: 390-398, 402, 404-429). LRGV Hispanics experienced an average of 231.6 deaths per 100,000. Hispanics in Texas averaged 247.6 deaths per 100,000 and non-Hispanic Whites in Texas experienced an average of 319.5 deaths per 100,000. Over time, the heart disease mortality pattern for LRGV Hispanics has changed
relative to Texas Hispanics. In 1980, LRGV Hispanics had a heart disease mortality rate of 256.7 compared to a mortality rate of 300.4 for Hispanics statewide. Both rates have declined over time, however, in 1995, the rates for LRGV Hispanics began to increase, and, in 1997, exceeded the rate for Hispanics statewide.

![Figure 5.2. Heart Disease Mortality](image)

**Source:** Texas Department of Health, Epigram System

Between 1980 and 1998, both non-Hispanic White and Hispanic males had higher age-adjusted heart disease death rates than non-Hispanic White and Hispanic females (266.4 and 198.2 deaths per 100,000 population compared to 155.2 and 120.5 deaths per 100,000 population, respectively).

Ischemic/coronary heart disease (ICD 9 Codes: 410-414) accounted for approximately 20% of the deaths among Texas Whites and LRGV Hispanics. Among Texas Whites, there was a decrease from 25% in 1980 to 20% in 1998, while the comparative decrease among Hispanics was from 23% to 20%.

Change in heart disease mortality since 1980 has varied by race/ethnicity. Heart disease mortality among Texas non-Hispanic Whites and Texas Hispanics has declined an average of two percent per year (Figure 5.2). This decline

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represents a statistically significant decrease of 4.8 deaths per 100,000 per year (p<0.0001).

**Stroke Mortality**

Seven percent of all deaths in Texas in 1998 were attributed to stroke. African-Americans have a risk of dying from stroke that is twice as high as the risk for non-Hispanic Whites and Hispanics. The CDC recommends primary prevention of stroke by reducing tobacco use, controlling hypertension, and increasing exercise. As shown in Figure 5.3, both non-Hispanic Whites and Hispanics have had slowly decreasing mortality rates from stroke since 1980. However, the rate of decline has been greater for the non-Hispanic White population than for the Hispanic population.

![Figure 5.3. Stroke Mortality](image)

Source: Texas Department of Health, Epigram System

Stroke mortality rates among Texas non-Hispanic Whites, have decreased 36% (p=0.001) during which time the rate among Hispanics has decreased only 23% (p=0.04). Among Texas non-Hispanic Whites in 1998, stroke mortality rates for females, have been higher than for males (65.4 compared to 55.3 per 100,000). However, among the Texas Hispanic population, rates are higher among males (60.9 per 100,000) than among females (47.8 per 100,000). Rates
among the LRGV Hispanic population are also higher for males than females (64.2 per 100,000 versus 35.8 per 100,000).

**ALL CAUSE CANCER MORTALITY**

Cancer is the second most common cause of death for the U.S., Texas, and the Lower Rio Grande Valley. In general, Hispanic mortality rates from all-cause cancer (ICD 9 codes: 140-208) are lower than non-Hispanic White mortality rates in Texas. Texas Hispanics experience 25% fewer all-cause cancer deaths than non-Hispanic Whites (150.9 vs. 207.3 per 100,000 persons). The leading causes of cancer mortality among all Texans were lung, prostate, breast, and colon cancer, and lymphoma. Liver cancer, while not a leading cause of cancer mortality for all Texans, is one of the leading causes of cancer mortality for males in the LRGV so will be included in this analysis. In addition, cervical and ovarian cancer are also discussed since the LRGV community expressed concern about the risk of cervical and ovarian cancer.

As shown in Figure 5.4, between 1980 and 1998, cancer mortality for all groups increased. However, since 1993, rates have decreased for non-Hispanic Whites from 219.2 to 203.2 per 100,000. In contrast, rates have remained relatively stable for Texas Hispanics changing from 151.5 to 154.1 per 100,000 over the same period. Among LRGV Hispanics, however, rates have continued to increase rising from 145.2 to 158.5 per 100,000 between 1993 and 1998. The gap in cancer mortality between Texas Hispanics and LRGV Hispanics has narrowed over time, and, in 1997, the cancer mortality rate for LRGV Hispanics exceeded that for Texas Hispanics for the first time. In 1997, the cancer mortality rates for LRGV Hispanic females (129.8) exceeded the rate for Texas females (123.5) but dropped again in 1998 (118.3 versus 124.3). LRGV Hispanic males cancer mortality rates exceeded the rates for Texas Hispanic males beginning in 1996, and, in 1998, had a mortality rate of 216.7 compared to 197.5 for Texas Hispanic males.
Figure 5.4 Cancer Mortality

Source: Texas Department of Health, Epigram System

Figure 5.5 shows cumulative cancer mortality rates for Texas and the LRGV for the leading causes of cancer deaths in the state. LRGV Hispanics experienced nearly thirty percent fewer deaths than White Texans from breast, prostate, and colon cancer and lymphoma. They also experienced nearly 60% fewer deaths from lung cancer.

Figure 5.5. Cancer Mortality
1980 to 1998

Source: Texas Department of Health, Epigram System
As shown in Figure 5.6, ovarian cancer rates for White Texans are more than twice the rates for Hispanics in the LRGV. Cervical and liver cancer rates for White Texans, however, are nearly half the rate for LRGV Hispanics.

![Figure 5.6: Cancer Mortality 1980-1998](image)

Source: Texas VitalWeb

**Lung Cancer**

Lung cancer is the leading cause of cancer-related deaths in the U.S., Texas and the LRGV. In Texas, 33.8 percent of male cancer death and 24 percent of female cancer deaths can be attributed to lung cancer (TDH, 2000a). While rates of lung cancer mortality have been declining for men, they have been rising for women.

LRGV Hispanics had the lowest mortality rate for lung cancer at 25.1 deaths per 100,000 (see Figure 5.7). Mortality rates for Texas Hispanics averaged 28.5 deaths per 100,000 and for Texas non-Hispanic Whites the average rate was considerably higher at 61 deaths per 100,000.
According to the CDC (1999b), over 85 percent of lung cancer deaths are smoking-related. While 43.8 percent of Texans indicate they have ever smoked, only 21.9 percent indicate they are current smokers (CDC, 2001i). Additionally, males are more likely than females to have ever smoked (51.6 percent versus 36.5 percent) and are also more likely to be smoking currently (25.2 percent versus 18.7 percent). Twenty percent of Hispanic Texans indicate they are current smokers compared to 23 percent of White Texans (Bolen, Rhodes, Powell-Griner, Bland, Holtzman, 2000).

**Prostate Cancer**

Prostate cancer is the second leading cause of cancer-related mortality in PHR 11 and Texas accounting for 11 percent of all male cancer deaths in 1998 (TDH, 2000a). The prostate cancer mortality rate among Hispanics is lower than that of non-Hispanic Whites (Figure 5.8). Throughout the 1980’s, there were great fluctuations in the rates within the LRGV probably due to the small number of deaths which range from a low of 8 in 1983 to a high of 19 in 1986. In the 1990’s, there was much less variation in the number of deaths between years.
After 1990, the rates for LRGV Hispanics became more similar to those found for the Texas Hispanic population.

**Figure 5.8 Prostate Cancer Mortality**

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<td>85</td>
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<td>40</td>
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</table>

Source: Texas Department of Health, Epigram System

**Breast Cancer**

Breast cancer is the second leading cause of cancer deaths among women in the U.S., Texas, and PHR 11. The gap in breast cancer mortality rates between Hispanics and non-Hispanic Whites has narrowed over time (Figure 5.9) as mortality rates among Hispanics both in the LRGV and in Texas have increased significantly (p<0.001) since 1980.
Mammography is the most effective method for early detection of breast cancer. CDC (1999b) estimates that nearly 30 percent of deaths from breast cancer could have been prevented with regular screening for women aged 50 and older. Unfortunately, 42 percent of Hispanic women, 24 percent of white women, and 20 percent of black women in Texas report not having had a mammogram in the last two years (CDC, 1999b). Explanations may include the fact that Texas has the highest percentage of adults in the U.S. aged 18-64 without health insurance coverage (CDC, 1999b). Hispanic women have a lower incidence of breast cancer, but a higher mortality post diagnosis (Abraido-Lanza, Dohrenwend, Ng-Mak, and Turner, 1999). This finding could be attributed to the high proportion of Hispanic women who delay screening for breast cancer or to the high proportion of persons without insurance coverage. Both of these factors could delay diagnosis until a later stage of the disease.
Colon Cancer

Colon cancer mortality has been relatively stable (p=0.16) among the Texas White population with an average rate of 21.6 per 100,000 persons (Figure 5.10). Rates among Texas Hispanics show an increasing trend from 12.6 per 100,000 persons in 1990 to 15.3 per 100,000 persons in 1998 (p<0.001). Mortality from colon cancer for Hispanics in the LRGV has shown a similar increase, but the rates are considerably lower when compared to the Texas White population.

![Figure 5.10 Colon Cancer Mortality](image)

Source: Texas Department of Health, Epigram System

Screening tests for colon cancer include sigmoidoscopy and fecal occult blood test. In 1997, 70 percent of the U.S. population aged 50 and over reported not having had a sigmoidoscopy within the last five years while 82 percent had not had a fecal blood test (CDC, 1999b). In Texas, 79 percent of Hispanics and 72 percent of Whites had not had a sigmoidoscopy in the last five years while 94 percent of Hispanics and 77 percent of Whites had not had a fecal blood test (CDC, 1999b).
**Lymphoma**

Lymphoma (ICD 9 Codes: 200-208) is the fifth leading cause of cancer death in Texas. Average mortality (1980-1998) for cancer of lymphatic and hematopoietic tissues was 20.4 per 100,000 among non-Hispanic Whites in the state, 15.2 among Hispanics in Texas, and 13.2 for LRGV Hispanics. Lymphoma rates for LRGV Hispanics are similar to rates for Hispanics statewide, but, again, show a great deal more volatility (see Figure 5.11). Rates for males are higher than they are for females regardless of ethnicity or place of residence. For LRGV Hispanic males, the average rate is 17 while LRGV Hispanic females had an average rate of 10.3. The average Lymphoma rate for non-Hispanic White males statewide was 26 and for females the rate was 16.3.

![Figure 5.11](image)

*Source: TDH, VitalNet*

**Ovarian Cancer**

Ovarian cancer is the deadliest of the gynecologic cancers. Nearly 1 in 57 women will develop this cancer. If detected early, it is very treatable. Unfortunately, most persons with the disease are asymptomatic until the later
stages of the cancer which helps to explain why nearly 50 percent of those diagnosed will die within five years of diagnosis (Miller, Kolonel, Bernstein, Young, Swanson, West, Key, Liff, Glover, Alexander GA, 1996).

Nationally, White women have both a higher incidence and higher mortality rate from ovarian cancer when compared to other racial/ethnic groups. In 1998, the age-adjusted incidence rate for White women in the U.S. was 14.7 compared to 11.1 for Hispanic women (SEER, 2001). Information for Texas shows that in 1996, the Anglo incidence rate was 13.9 compared to 10.2 for Hispanics (Texas Cancer Registry, 1999). Mortality data shows that the state follows the national trend. As shown in Figure 5.12, non-Hispanic Whites in Texas have higher mortality rates from ovarian cancer compared to both Hispanics in Texas and in the LRGV. Rates for non-Hispanic Whites average 8.9 per 100,000 and among Hispanics, 6.3 per 100,000.

Figure 5.12
Ovarian Cancer

Source: TDH, VitalNet
Cervical Cancer

Mortality from cervical cancer among the Texas Hispanic population is higher than among the non-Hispanic White population and the difference seems to be relatively constant over time (see Figure 5.13). Statewide cervical cancer rates are two times higher for Hispanics than for non-Hispanic Whites. Rates within the LRGV have been somewhat erratic probably due to the small number of cases. The age-adjusted mortality rate since 1990 has averaged 1.6, 2.9 and 4.0 deaths per 100,000 persons for non-Hispanic Whites, Texas Hispanics and Hispanics in the LRGV respectively. Again, Hispanic women tend to be diagnosed at a later stage of disease and this may be due to inadequate screening due to lack of insurance, cultural practices, lack of awareness, language or system barriers. With regard to screening, the Pap test is the screening test for cervical cancer. Nearly 20 percent of women in U.S. aged 18-64 indicate they have not had a pap test in the past three years and nearly 50 percent of those newly diagnosed with cervical cancer indicate they had no pap test in the previous five years (National Cancer Institute, 1999).

Source: Texas Department of Health, VitalNet System
Liver Cancer

Primary liver cancer accounts for only 1.5 percent of all cancer cases in the U.S., but it is one of the deadliest cancers having a five year survival rate of less than 10 percent (National Cancer Institute, 1996). U.S. mortality rates for this cancer are highest among Asian-Americans and lowest for non-Hispanic whites. Rates for Hispanics in the U.S., however, are nearly two times the rates for non-Hispanic whites. Hepatitis B, Hepatitis C, and cirrhosis have been associated with the most common form of liver cancer -- hepatocellular carcinomas or HCC (National Cancer Institute, 1996).

As shown in Figure 5.14, liver cancer mortality rates have been more stable for Texas Whites and Texas Hispanics that for LRGV Hispanics. In both cases, however, mortality is increasing. Rates are much more volatile for LRGV Hispanics which is probably due to the small number of cases (6 cases in 1987, 25 cases in 1992, and 32 cases in 1994). In 1998, the number of cases in the LRGV nearly doubled from 33 in 1997 to 62.

Figure 5.14
Liver Cancer Mortality

Source: TDH, VitalNet
Of the three liver cancer risk factors mentioned above, Hepatitis B and C rates (see Figure 5.23) are either lower in the LRGV than in Texas as a whole (Hepatitis B) or are very similar to the rates for Texas as a whole (Hepatitis C). Conversely, cirrhosis mortality mirrors liver cancer mortality (Figure 5.15). Mortality rates for Hispanics are increasing while rates for Texas non-Hispanic Whites are stable. Again, the variability in mortality rates observed for the LRGV is probably related to the small number of cases which exceeded 100 only in 1997.

![Figure 5.15: Cirrhosis Mortality](image)

Source: Texas Department of Health, VitalNet

The link between Cirrhosis and Liver Cancer may be especially critical for the LRGV given that the majority of the population is Hispanic. The data indicate liver cancer and cirrhosis mortality are higher among Hispanics. In addition, Caetano as quoted in Associated Press (2001) indicates cirrhosis mortality is also high in Mexico suggesting a heightened sensitivity to cirrhosis among Mexican-Americans. This sensitivity is exacerbated by the drinking patterns of Mexican-Americans. Caetano and Galvan (2001) report that Mexican-American men are much more likely than other Hispanic men to report frequent heavy
drinking. Drinking behavior data for the LRGV is not available, however, Table 3.2 (Chapter 3) does show that the majority of admissions to TCADA-funded programs are for alcohol abuse and the percentage of total admissions related to alcohol are higher in Cameron, Hidalgo, and Willacy Counties than in Texas as a whole.

**INJURIES**

Injuries are the fourth leading cause of mortality in Texas. For all-cause injury mortality (Figure 5.16), rates are lower among LRGV Hispanics compared to the similar rates of non-Hispanic Whites and Texas Hispanics. The leading causes of injury include motor vehicle traffic and non-traffic accidents (ICD 9 Codes: 810-825), suicide (ICD 9 Codes: 950-959) and homicide (ICD 9 Codes: 960-969). An examination of the leading causes of mortality along the U.S.-Mexico border for the period 1995-1997 found that accidents and adverse effects (E800-949) were the third leading cause of death in Mexico for all ages (Pan American Health Organization, 2000). Among Mexican males on the U.S.-Mexico border, this was the second leading cause of death whereas it was the third leading cause of death for U.S. males on the border. Among U.S. females on the border, accidents were not a leading cause of death but among Mexican females on the border, accidents were the fifth leading cause of death. In both the U.S. and Mexico during the 1995-1997 period, accidents and adverse effects were the leading cause of death for all persons under age 45.
Traffic Accidents

As Figure 5.17 shows, mortality rates for traffic accidents are similar across groups. Since 1980, the average mortality from traffic accidents has been 21.9 per 100,000 for non-Hispanic Whites and 21.1 for Hispanics.
One factor contributing to fatal injuries in motor vehicle accidents is alcohol use. Figure 5.18 shows the percentage of motor vehicle fatal injuries related to alcohol. While the percentages in 1998 for Starr County and in 1997 for Willacy County are very high, the actual number of fatalities are low – five fatalities in Starr County and one in Willacy County. In 1998, 21.2 percent of alcohol-related fatalities in the state involved persons under 21 compared to 20 percent in Cameron County and 21.9 percent in Hidalgo County.3

Figure 5.18
Alcohol-related Motor Vehicle Fatal Injuries as a Percent of All Motor Vehicle Fatal Injuries


While data are not available on the race/ethnicity of victims, researchers have found that Hispanic teenagers have a higher risk of death per billion vehicle miles of travel than White teenagers (8 versus 5 deaths per billion vehicle miles) (Baker, Braver, Chen, Pantula, and Massie, 1998).4 The U.S. Department of Transportation (2000) indicates that income is the most important factor in

3 There were no alcohol-related motor vehicle fatalities for individuals under 21 years of age in Starr County in 1997 or in Willacy County in 1998.
4 Estimates of miles driven come from the 1990 Nationwide Personal Transportation Survey conducted by the U.S. Department of Transportation. Since this is a telephone survey, Hispanics may be under-represented.
determining the number of miles traveled on an annual basis. There is a nearly 40 percent gap in annual miles traveled between households earning $80,000 and over and households earning $15,000 and less with the high income households traveling nearly 16 miles more per day than low income households. Giuliano (2000) found statistically significant differences in total daily travel distance between Hispanics and Whites. Hispanics, on average, travel 36 miles daily compared to 43 miles for Whites. The median travel distance is 25 miles for White persons and 20 miles for Hispanic persons. However, Hispanics were more likely to walk or use public transportation than were Whites as only 83 percent of trips by Hispanics were by private vehicle compared to 88 percent for non-Hispanics (U.S. Department of Transportation, 2000).

Additional risk factors as indicated by Baker et al (1998) may be related to safety belt use, driving behavior, older model vehicles, quality of roads, and agriculture-related road hazards (equipment and irrigation ditches). Data from TDH (2001f) indicates only 40 percent of passengers aged 0-14 with traffic related major trauma injuries in Region 11 in 1999 used motor vehicle restraints. This figure is the same as for state as a whole. For the age group 15-19 in Region 11, only 42 percent of drivers and 31 percent of passengers with traffic related major trauma injuries used seat belt restraints compared to state percentages of 52 percent of drivers and 32 percent of passengers.

In summary, state and county data indicates the accident mortality experience of Hispanics and Whites is very similar. National data on travel behavior, however, indicates Hispanic and low-income households travel fewer miles. In terms of travel distance alone, these groups should have a lower risk of injury simply because their exposure is lower. That the mortality experience is similar points to factors other than distance traveled as integral to explaining mortality patterns. Additional information on the travel behavior of LRGV residents is necessary to fully explore the observed accident mortality.
Homicides

Homicide rates in the U.S. have been declining since 1993 (U.S. Department of Justice, 2001). It was not one of the leading causes of death for all persons in 1998, but was one of the top ten causes of death for all males (#10), all Hispanics (#7), and Hispanic males (#5). In Texas, homicide rates for all groups depicted in Figure 5.19 have been declining since 1980. Following the national pattern, homicide is one of the leading causes of death for males (#3) and Hispanics (#8), but not a leading cause of death for all persons in the state. Mortality from homicide was highest for Texas Hispanics relative to the other groups. Homicide mortality rates among Hispanics in the LRGV are similar to the rates for Texas Whites.

The homicide mortality rate shows some variation by age. In the U.S. and Texas, homicide is one of the top five causes of death for individuals from age one to age 34. Also, in both the U.S. and Texas, homicide is the second leading cause of death for individuals aged 15-24. The U.S. Department of Justice
(2001) indicates that in addition to being the group most likely to be victimized, this age group is also the most likely group to commit homicides – 34.5 percent of all homicide offenders are between the ages of 18 and 24. Overall, injury violence most affects minorities, youth, and those in poverty (U.S. Department of Justice, 2001).

**Suicide**

In 1998, suicide was the eighth leading cause of death in Texas. It was also one of the ten leading causes of death for White Texans and one of the five leading causes of death for those under age 44 (TDH, 2000b). As indicated in Figure 5.20, suicide mortality rates are highest for Texas Whites and are similar for Hispanics in both Texas and the LRGV. Although rates are lower in the LRGV relative to other groups, residents may be vulnerable because the prevalence of depression is higher among Latino adolescents than other ethnic groups (Flores and Zambrana, 2001). In addition, studies cited by Flores and Zambrana (2001) along the Texas border with Mexico found that 23 percent of Texas adolescents and 12 percent of Mexican adolescents reported having thoughts of suicide. Increasing the risk of suicide for LRGV residents is the diminished capacity of the LRGV mental health system to respond to the mental health needs of their community (see Chapter 6). One risk factor for suicide is the existence of barriers to accessing mental health treatment (Department of Health and Human Services, 1999). Other risk factors include feelings of hopelessness, isolation, substance abuse, and relational, social, work or financial loss.
Figure 5.20  Suicide Mortality

Source:  Texas Department of Health, Epigram System

DIABETES

Diabetes has become more common in the U.S. and is considered to be one of our most serious public health problems. “Between 1980 and 1996, the age-adjusted prevalence of diabetes increased by 19 percent, and the age-adjusted incidence increased by 18 percent,” (CDC, 1999b). It is unclear whether this increase results from an actual increase in the incidence of the disease, an increase in detection of the disease, or both. While it is estimated that 10.3 million persons in the U.S. have diagnosed diabetes, the CDC (2001h) estimates half as many persons have undiagnosed diabetes, which makes them more prone to develop the potentially fatal complications of diabetes such as kidney failure, blindness and limb amputation.

Rates of diabetes are higher among minorities, individuals with lower household incomes and educational levels, and among persons in older age
groups (Texas Department of Health, 2001d). As with cardiovascular disease, obesity and lack of physical activity also increase the chances of developing diabetes. Once an individual has diabetes, the risk of developing cardiovascular disease is increased by 2-4 times. In addition, the risk of contracting tuberculosis is increased (CDC, 2001f).

Age standardized mortality rates for diabetes mellitus are higher along the border than for the U.S. as a whole (Pan American Health Organization, 2000). In Texas, as shown in Figure 5.21, diabetes rates are higher among Hispanics than non-Hispanic Whites. Rates are similar for both sexes within race/ethnicity groups. There has been a gradual increase in mortality from diabetes since 1980 and the increase has been slightly greater among Hispanics than non-Hispanic Whites. Rates among LRGV Hispanics are similar to rates for Texas Hispanic. The age-adjusted rate for diabetes related deaths along the Mexican side of the border between 1995 and 1997 was 63.5 per 100,000 which is slightly higher than the rates for Hispanics in both Texas and the LRGV (Pan American Health Organization, 2000).

![Figure 5.21 Diabetes Mortality](source: Texas Department of Health, Epigram System)
Chronic obstructive pulmonary disease (COPD) is a chronic lung disease in which breathing becomes difficult due to obstruction of air flow (U.S. Department of Health and Human Services, 2000). The term encompasses two diseases – emphysema and chronic bronchitis. COPD was the fourth leading cause of death in the U.S. and the fifth leading cause of death in Texas in 1998. Smoking is responsible for 80 to 90 percent of COPD cases (U.S. Department of Health and Human Services, 2000). While there is no way to regain the lost lung function due to COPD, smoking cessation does slow the decline of lung function.

Beyond smoking, risk factors for COPD include age, occupational and environmental exposures, and a history of childhood respiratory infections (National Institutes of Health, 1981). Age increases the risk of developing COPD but has differential effects on men and women. Women under age 65 have higher rates of COPD while men over age 65 have higher rates of COPD. There are differences by racial/ethnic group as well. Men are more likely to die from COPD than are women. Non-Hispanic Whites have higher prevalence rates and age-adjusted death rates for COPD than minorities. U.S. Hispanics tend to have the lowest prevalence and death rate from COPD.

In Texas, rates are substantially higher among non-Hispanic Whites than Hispanics (Figure 5.22). While the LRGV rates are lower than the rates for Texas Whites, rates for both groups are increasing which is consistent with national trends showing a 30 percent increase in both prevalence and age adjusted death rates since 1980 (U.S. Department of Health and Human Services, 2000).
The mortality rate for LRGV Hispanics is higher than the rate for Texas Hispanics. Differences in mortality rates may be attributable to smoking behavior. However, data on the smoking behavior of LRGV residents is not currently available. Variables associated with smoking include low educational attainment and high levels of acculturation (CDC, 1998). LRGV residents have educational levels similar to Texas Hispanics and are probably less acculturated than Hispanics statewide. Thus, mortality from disease attributable to smoking should be lower than statewide rates. The higher level of mortality observed for the LRGV in Figure 5.22 may actually be the result of small numbers of cases or unidentified environmental factors.

U.S.-Mexico border data indicates the 1995-1997 age-adjusted mortality rates for COPD were 20.4 on the U.S. side of the border and 20.2 on the Mexican side of the border (Pan American Health Organization, 2000).
In Bordering the Future, Sharp (1998) noted that the community burden of infectious disease is higher along the U.S.-Mexico Border than in the U.S. as a whole and also higher than among the rest of the U.S. Hispanic population. Infectious diseases account for nearly two percent of deaths among Texans. Infectious diseases contributing to this burden include HIV/AIDS, Measles, Meningococcus, Meningitis, Pneumonia, Influenza, Polio, Septicemia, Shigella/Amebiasis, Syphilis, Tuberculosis, Viral Hepatitis, and Whooping Cough.

Vaccine Preventable Diseases

Vaccine preventable diseases reported by the state of Texas include measles, mumps, pertussis, and rubella (Texas Department of Health, 2000e). In 1999, there were 7 cases of measles reported in the state of Texas, but no cases reported in the LRGV. There were 35 cases of mumps statewide with two cases in the LRGV -- approximately the number of cases that would be expected for the region. In addition, there were 152 cases of pertussis statewide and 5 in the LRGV, fewer than would have been expected for that region. Finally, there were 9 cases of rubella statewide and 2 (22 percent of total cases) in the LRGV, higher than the 5 percent of state population that the region accounts for.

Varicella is a viral disease in which a primary infection results in chickenpox. A vaccine for varicella was licensed in 1995. In 1999, Texas reported a decrease in the number of cases reported and in the number of varicella-related deaths (Texas Department of Health, Associateship of Disease Control and Prevention, 2000). The number of chickenpox cases in the state in 1999 was 7,473 and in the LRGV, was 278 (3.7 percent of all cases in the state).

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5 Data are not available by race/ethnicity.
Because vaccinations are an effective tool for reducing morbidity and mortality, rates of vaccination are monitored in an effort to increase the coverage level. The Healthy People 2010 goal is for 90 percent for young children to have received universally recommended vaccines. Coverage was 81 percent nationally and 75 percent in Texas in 1998 (TDH, 2000c). The percentage of children who were up-to-date on their immunizations in 1998 was the same for both White and Hispanic Texans at 66.4 percent. In 1999, the Texas Department of Health conducted the school-based Texas Retrospective Immunization Survey using immunization records of kindergarten students to assess their immunization status at two years of age (Texas Department of Health, 2000c). Data on vaccination rates are not available by county, but data from the 1999 survey comparing values for Public Health Region 11 and Texas are listed in Table 5.1. For all immunizations, PHR 11 had rates comparable to the state rates.

<table>
<thead>
<tr>
<th>Table 5.1</th>
<th>Immunization Rates at 24 Months of Age by PHR and Vaccine Category</th>
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<tbody>
<tr>
<td></td>
<td>Texas</td>
</tr>
<tr>
<td>4-3-1</td>
<td>63.7 %</td>
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<td>4-3-1-3</td>
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</tr>
<tr>
<td>HIB3</td>
<td>78.5 %</td>
</tr>
<tr>
<td>MMR1</td>
<td>83.3 %</td>
</tr>
</tbody>
</table>

DPT: diphtheria, tetanus toxoids, and pertussis
OPV: oral polio virus vaccine
MMR: measles, mumps, and rubella
Hib: Haemophilus influenzae type b

4-3-1: 4 DPT, 3 OPV, 1 MMR
4-3-1-3: 4 DPT, 3 OPV, 1MMR, 3 Hib

Source: TDH, 1999 Retrospective Immunization Survey, Texas Immunization Rates by Public Health Region
Hepatitis

Hepatitis A, B, and C (see also Chapter 4) are relatively common viral diseases along the Texas-Mexico border (Figure 5.23). Hepatitis A is the most common, accounting for nearly 60% of all hepatitis cases in Texas and 89% of hepatitis reported from the LRGV. According to the CDC (2001a), Hepatitis A is an infection of the liver spread through contact with fecal material from an individual infected with the Hepatitis A virus. Adults are more likely than children to evidence symptoms of the infection but children play a large role in transmitting the infection to others. Hepatitis A is found most frequently in young adults and children. It is likely to be food or waterborne.

In 1998, there were 3,538 cases of Hepatitis A reported by the state. Of those cases, 17.5% were in the LRGV (nearly 4 times more than expected). Statewide rates for Hepatitis A were 18.0 per 100,000. Rates in the LRGV were 65.1 per 100,000. Hepatitis A has been recognized as epidemic along the Rio Grande River for several years, and, in a 1998 Texas Department of Health study (2000d), 37 percent of surveyed children under 13 years of age and living in colonias had evidence of Hepatitis A infection, compared with 17 percent non-colonia, border residents and six percent for San Antonio. Residence in a colonia was found to be a risk factor. In contrast, the consumption of bottled water and additional years of maternal secondary education were protective factors.

Hepatitis B is an infection of the liver that can lead to chronic liver disease and liver cancer. Only about 70 percent of persons infected show signs and symptoms of the disease. As with Hepatitis A, children are more likely than adults to be asymptomatic. Hepatitis B is transmitted through the exchange of blood or body fluids. The number of new infections has declined over time with the greatest decline occurring among children and adolescents. This decline has been attributed to routine Hepatitis B vaccination (CDC, 2001b). The 1998 rate for Hepatitis B in Texas was 10.0 cases per 100,000. For PHR 11, 8.0 cases per 100,000 cases were reported and approximately 5.5 per 100,000 in the LRGV.
Hepatitis C, like Hepatitis B, is spread by contact with the blood or body fluids of an infected person. In 75-85 percent of cases, infection is chronic and approximately 70% of those infected develop chronic liver disease. Hepatitis C infection is the leading indication for liver transplant. Nearly 80 percent of infected persons are asymptomatic. Unlike Hepatitis A and B, there is no vaccine to prevent Hepatitis C. Like Hepatitis B, new infections have declined since the 1980’s. This decline has been linked to improved blood donor screening (CDC, 2001c). In 1998, Hepatitis C rates were 2.4, 4.7, and 2.6 per 100,000 for Texas, PHR 11, and the LRGV respectively. The majority of cases from PHR 11 were from Webb (Laredo) and Nueces (Corpus Christi) Counties.

Figure 5.23
Hepatitis

Tuberculosis

Despite occasional peaks, the number and rate of tuberculosis cases in the U.S. have been steadily declining since 1953 (see Figure 5.23). The same pattern of decline observed on the national level can be seen in Texas and the
Lower Rio Grande Valley, although data for the LRGV is only available from 1991 forward (see Figure 5.25).

**Figure 5.24**
Tuberculosis in the U.S.

![Graph showing tuberculosis rates in the U.S.](image)

Source: Centers for Disease Control and Prevention, 1999 Surveillance Report, Table 1.

**Figure 5.25**
Tuberculosis Rates

![Graph showing tuberculosis rates](image)

Source: Texas Department of Health, Tuberculosis Elimination Division, County Statistics and 1999 Annual Epidemiology Report
In state rankings of tuberculosis rates, Texas is seventh nationally for 1999 at 8.2 per 100,000 (CDC, 1999). What the statewide data masks is that rates along the border are nearly double the rates for the state. The 1999 rate of 15.3 for the LRGV would place it second in the nationwide rankings behind only Hawaii. Elevated levels of tuberculosis along the border with Mexico have been traced to several factors including elevated TB rates in Mexico, lack of coordinated health services between the U.S. and Mexico, the fluid nature of the border with traffic constantly moving back and forth between the two countries, and limited access to available health care resources due to the lower socioeconomic status of residents in the area (CDC, 2001d).

TB rates in Mexico are higher than in the U.S. – 6.4 versus 17 per 100,000 in 1999 (CDC, 2001d). Like the U.S., the TB problem in Mexico is more acute along the border (CDC, 2001d). However, TB rates on the Mexican side of the border are dramatically higher than they are on the U.S. side of the border. During 1998-1999, the TB rate in Brownsville was 21.8 but the rate in Matamoros was 70.3 per 100,000. Similarly, the rate in McAllen was 15.1 while the rate in Reynosa was 43.9 per 100,000. The extreme difference between Mexican and U.S. sister cities has been attributed to comparatively lower socioeconomic status and more crowded living conditions in the Mexican cities (CDC, 2001d).

The rate of TB in Mexico is disconcerting for a number of reasons. First, while the rate of TB in the U.S. is declining, the proportion of TB attributable to foreign-born persons is increasing (CDC, 2001e). In 1990, 24 percent of TB cases were reported for foreign-born persons, but, in 1999, 43 percent of reported TB cases were among the foreign-born. The country of origin for 23 percent of foreign-born TB cases was Mexico and nearly 75 percent of those individuals resided in states bordering Mexico (CDC, 2001e). In Texas in 1999, foreign-born individuals accounted for one-third of all cases of TB. The primary country of origin for Texas foreign-born TB cases was Mexico accounting for 55 percent of the TB-infected foreign-born population (Texas Department of Health, 2001b).
Another reason to be concerned about the Mexican TB rate is the continuing problem of Multidrug-resistant TB (MDR TB). Persons with TB disease who do not complete therapy may develop strains of TB that are resistant to available drugs. TB therapy may be disrupted due to non-compliance, inconsistent health care, or unreliable drug supplies (Texas Center for Infectious Disease, 1999). According to the Texas Department of Health (TDH, 2001b), MDR TB was identified in 16 patients in 1998 and 10 patients in 1999. According to the CDC (2001), it can cost up to $1 million to treat a case of MDR TB and some cases of it may never be cured. Drug-resistant TB is more common among Mexican-born TB patients than among U.S.-born patients (CDC, 2001d). A survey conducted between 1995 and 1997 found that the migratory patterns of TB patients along the border might be responsible for the higher incidence of drug-resistant TB in Mexican born TB patients (Wells, Ocana, Moser, Bergmire-Sweat, Mohle-Boetani, and Binkin, 1999). Specifically, among foreign-born Hispanics with TB, those living along the border were more likely to have emigrated from border areas in Mexico than those living in non-border urban counties (62.4% versus 25.4%). Additionally, foreign-born Hispanics with TB in border counties were more likely than those from non-border urban counties to return to Mexico (83.4% versus 65.1%) and to do so on a daily basis (36.7% versus 2.3%).

With increased international travel and the widening global marketplace, no area of the world is isolated from outside influences. Recognizing this, the U.S. and Mexico have begun to establish partnerships to address joint health concerns. Grupo Sin Fronteras in the Lower Rio Grande Valley was formed in 1991 to address binational TB case management. Another group, TB Net, was established to coordinate treatment for migrant farm workers by creating a tracking and referral network. Ten Against TB includes six Mexican-border states and four U.S. border states working in partnership to address TB issues and coordinate resources (CDC, 2001d).
**Sexually Transmitted Diseases**

**SYPHILIS**

Nationwide, infectious syphilis is now at its lowest rate ever. New cases tend to be concentrated in the Southeastern U.S. with nearly 50 percent of all cases clustered in only 28 counties (CDC, Division for STD Prevention, 1999). According to the 1998 HIV/STD Report to the Legislature (TDH, 1999a), statewide in 1998, 430 cases of primary and secondary (P&S) syphilis were reported. The 37% decrease between 1997 and 1998 continues a downward trend begun in the early 1990’s (see Figure 5.26). While the state rate in 1995 for P&S syphilis was 8.3 cases per 100,000, the rate in 1998 was 2.2 cases per 100,000 population. The majority of P&S cases (67 percent) reported in Texas occur among African Americans. In 1998, the rate of P&S syphilis among African Americans in the state was 12.9 cases per 100,000 population. In contrast, the case rate for Hispanics in 1998 was 1.1 per 100,000 population while the rate for non-Hispanic Whites was 0.4 cases per 100,000. Differences between racial and ethnic groups have been traced to poverty, access to health care, rates of substance abuse, and racism – all of which disproportionately affect African-Americans (CDC, 2001j). In the LRGV, African-Americans account for 0.5 percent of the population.

In 1995, the rates for PHR 11 and the LRGV were 1.3 and 1.4 cases per 100,000, respectively. These rates steadily declined and in 1998, PHR 11 and LRGV reported 0.2 and 0.1 cases per 100,000 population, respectively.
One of the most serious forms of syphilis is congenital syphilis. Pregnant women with syphilis may experience spontaneous abortion, stillbirth, or premature delivery. Left untreated, a child born to a syphilis-infected mother may be developmentally delayed or may die.

In 1998, there were 99 cases of congenital syphilis reported in Texas representing a decrease of 38 percent over the number of cases reported in 1997. The majority (55 percent) of congenital syphilis cases occur among African-Americans, but Hispanics account for 39 percent of all cases statewide. The highest numbers of cases statewide are reported from Harris County, however, in 1999, Hidalgo County had the second highest number of cases at 14. Also in 1999, the majority of congenital syphilis cases (52 percent) occurred among the Hispanic population while the proportion of cases occurring among African-Americans was 37 percent (TDH, 1999a; TDH, 2001a).

Figure 5.27 indicates that congenital syphilis from 1994 to 1998 was as prevalent in the LRGV and PHR11 as for the entire state, again pointing out that awareness among Hispanic mothers is poor. Declines in 1998 for the LRGV relative to the state may be temporary.
CHLAMYDIA

Chlamydia is the most common sexually transmitted disease. Women with the infection may experience pelvic inflammatory disease, ectopic pregnancy and infertility. In 1998, a total of 60,626 cases were reported representing a 20 percent increase from the 1997 total of 50,661 cases (TDH, 1999a).

Women account for the majority (83 percent) of chlamydia cases reported in Texas because women are more likely to be screened for the disease than are men. Among women, the statewide rate was 504 cases per 100,000 for 1998. African-American women had the highest rate at 1,026 followed by Hispanic women at 563 per 100,000. Chlamydia rates decrease with age and women aged 24 and under have the highest rates and account for 74 percent of chlamydia cases (TDH, 2000h). In 1999, the rate of chlamydia for women aged 24 and under was 2135.2 per 100,000 in the LRGV and 2616.9 for the entire state. Figure 5.28 shows that cases reported for both men and women within PHR 11 and the LRGV since 1995 have increased but that these rates were considerably lower than at the state level.
GONORRHEA

Gonorrhea is the second most reported sexually transmitted disease (CDC, 2000). Complications of untreated gonorrhea include sterility in both men and women and pelvic inflammatory disease and ectopic pregnancy (TDH, 1999a). There were 32,934 cases of gonorrhea reported in 1998. The rate in 1998 of 166.7 per 100,000 represents a 24 percent increase from the 1997 rate of 136.9 per 100,000. Again, African-Americans had the highest rate of disease in 1998 at 756 cases followed by Hispanics at 77 cases and Whites at 29 cases per 100,000. The border area of the state has the lowest reported rates of gonorrhea (TDH, 1999a). While rates in the LRGV and PHR 11 are lower than rates for the state as a whole, they did show a consistent pattern of increase between 1995 and 1997 (Figure 5.29).

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6 Note that a case of gonorrhea is only counted by TDH if it has been identified by a culture. Gonorrhea, treated as a result of clinical or microscopic findings would not be definitively confirmed so would not be counted as a case.
HIV/AIDS

Throughout the U.S. and in Texas, there has been a decline in AIDS cases. Between 1997 and 1998, there were 10 percent fewer AIDS diagnoses in the state (TDH, 1999a). In addition to the decline in new diagnoses, there has been a decline in the number of AIDS deaths attributable to the use of new drug therapies and prevention efforts.

While the overall state rate in 1998 was 21.4 AIDS cases, the rate for males was 36.3 and for females 6.8 per 100,000. African-American females have rates much higher than those for females of other ethnic groups at 34.5 cases per 100,000. In contrast, the rate for Hispanic females is 3.9 and for White females 2.8 (TDH, 1999a). African-American males had the highest rate of any group at 105.2 per 100,000. White males had a 1998 AIDS rate of 28.9 while Hispanic males had a rate of 27.4 per 100,000 (TDH, 1999a). However, the rate for U.S. Hispanics increased between 1997 and 1998 while the rate for African-Americans decreased. The recent upward trend for U.S. Hispanics is not so apparent in the LRGV (see Figure 5.30).
The distribution of AIDS cases in PHR 11 among at-risk groups is similar to the distribution in the state. The majority of cases are among male homosexuals (approximately 59 percent of cases) while the majority of cases among women involve injection drug use (approximately 46 percent of cases) (TDH, 1998).

**SUMMARY**

Two points become obvious in discussing the chronic and infectious disease experience of the LRGV. First, the small number of cases for each disease in the LRGV causes much fluctuation in the rate over time making comparisons between groups difficult. Second, much of the excess mortality or morbidity in the LRGV may be attributable to factors such as differential access to health care, lack of health insurance, and socio-cultural factors related to health seeking behavior particularly preventive health screening.

Differences in health seeking behaviors are seen most clearly in the mortality experience for breast cancer. Rates have been lower for Hispanics
compared to non-Hispanic whites but the gap between the two is narrowing as Hispanic rates rise and non-Hispanic White rates fall. Socio-cultural differences may also be responsible for differences in cervical cancer mortality. Currently, mortality rates for LRGV and Texas Hispanics are higher than the mortality rates for non-Hispanic Whites in Texas probably due to the fact that Hispanic women tend to be diagnosed at later stages of the disease. For both breast and cervical cancer, Hispanics are less likely than other racial/ethnic groups to participate in regular screening programs.

Liver cancer mortality is higher among both LRGV and Texas Hispanics which may be partly attributable to high levels of alcohol use and the attendant development of cirrhosis for which Hispanics may have increased susceptibility. Infectious diseases also reflect the impact of socio-cultural conditions. The migration patterns and crowded living condition of many immigrant families make them more susceptible to tuberculosis infection. These same conditions make treatment difficult and explain, in part, why TB rates continue to be higher in the LRGV than in the state as a whole. Despite the higher rate of TB morbidity in the LRGV, rates have been declining and the gap between the state and the LRGV is narrowing. This is probably due to increased efforts by both Texas and Mexico to address the underlying socio-cultural conditions affecting TB transmission and progression.

This chapter addressed the leading causes of death statewide. Confining the discussion to the leading causes means that some important mortality differences were overlooked. Table 5.2 shows the causes of death where the ratio of the LRGV age-adjusted death rate is at least equal to the rate for the entire state (the complete table can be found in Appendix 5A). While the LRGV rates are higher than rates for the entire state for many of the causes of death, the inclusion of other minority populations in the calculation of the rate obscures the larger difference between White Texans and LRGV Hispanics as well as the differences between Hispanics statewide and in the LRGV. While many of these mortality differences were not explored in this chapter, they are deserving of further research.
<table>
<thead>
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<th>CAUSE OF DEATH</th>
<th>LRGV Hispanic Rate</th>
<th>Number</th>
<th>Texas Hispanic Rate</th>
<th>Number</th>
<th>Texas White Rate</th>
<th>Number</th>
<th>Texas All Rate</th>
<th>Number</th>
<th>LRGV/ TX All</th>
<th>LRGV/ TX White</th>
<th>LRGV/ TX Hispanic</th>
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<td>Infectious Disease</td>
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<td>23.22</td>
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Source: TDH, Vitalnet System
References


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# Appendix 5A.

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<td>Gastric &amp; Duodenal Ulcer</td>
<td>1.56</td>
<td>1.76</td>
<td>2.56</td>
<td>4.711</td>
<td>2.44</td>
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<td>Cancer all</td>
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<td>147.39</td>
<td>204.92</td>
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<td>201.18</td>
<td>517.441</td>
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<td>207.44</td>
<td>396.407</td>
<td>203.70</td>
<td>523.932</td>
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<td>9.50</td>
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<td>0.54</td>
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<td>Cancer of the Esophagus</td>
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<td>66.44</td>
<td>132.634</td>
<td>68.03</td>
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<td>947</td>
<td>14.82</td>
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<td>70.40</td>
<td>127.838</td>
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<td>83.202</td>
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<td>9.42</td>
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<td>9.90</td>
<td>18.820</td>
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<td>15.99</td>
<td>5.079</td>
<td>23.19</td>
<td>42.120</td>
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<td>Texas White</td>
<td>Texas All</td>
<td>LRGV/ TX White</td>
<td>LRGV/ TX Hispanic</td>
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<td>2.16</td>
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<td>24.52</td>
<td>28.75</td>
<td>28.15</td>
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<td>20.65</td>
<td>21.43</td>
<td>20.80</td>
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<td>1.02</td>
<td>1.10</td>
<td>0.9</td>
<td>1.0</td>
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<tr>
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<td>23.22</td>
<td>18.66</td>
<td>21.40</td>
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<td>0.43</td>
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<td>17.80</td>
<td>1.1</td>
<td>1.2</td>
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<td>0.60</td>
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<td>1.1</td>
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<td>Digestive System Diseases</td>
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<td>1.1</td>
<td>1.1</td>
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<td>Testicular Cancer</td>
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<td>0.31</td>
<td>0.29</td>
<td>1.1</td>
<td>1.0</td>
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<tr>
<td>Chronic Bronchitis</td>
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<td>0.79</td>
<td>1.41</td>
<td>1.24</td>
<td>1.1</td>
<td>1.0</td>
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<td>Drowning</td>
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<td>2.27</td>
<td>2.29</td>
<td>2.44</td>
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<td>1.2</td>
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<td>Nephritis, Nephrotic Syndrome, And Nephrosis</td>
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<td>10.58</td>
<td>7.55</td>
<td>8.86</td>
<td>1.3</td>
<td>1.5</td>
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<td>0.35</td>
<td>0.15</td>
<td>0.25</td>
<td>1.3</td>
<td>2.3</td>
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<tr>
<td>Chronic Liver Disease &amp; Cirrhosis</td>
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<td>19.03</td>
<td>9.82</td>
<td>11.44</td>
<td>1.4</td>
<td>1.6</td>
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<td>11.29</td>
<td>7.72</td>
<td>9.10</td>
<td>1.4</td>
<td>1.6</td>
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<td>5.65</td>
<td>1.4</td>
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<td>Cancer of the Liver</td>
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<td>8.43</td>
<td>3.75</td>
<td>4.76</td>
<td>1.5</td>
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<tr>
<td>Endocrine, Nutritional, Metabolic, Immune Diseases</td>
<td>48.59</td>
<td>49.57</td>
<td>25.38</td>
<td>31.21</td>
<td>1.6</td>
<td>1.9</td>
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<td>0.31</td>
<td>0.29</td>
<td>1.7</td>
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<td>2.95</td>
<td>3.95</td>
<td>1.7</td>
<td>2.3</td>
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<td>42.00</td>
<td>17.75</td>
<td>23.30</td>
<td>1.8</td>
<td>2.3</td>
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<tr>
<td>Cholelithiasis &amp; other gallbladder</td>
<td>2.75</td>
<td>2.27</td>
<td>1.34</td>
<td>1.48</td>
<td>1.9</td>
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<td>0.90</td>
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</tr>
<tr>
<td>Symptoms, Signs, And Ill-Defined Conditions</td>
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<td>19.79</td>
<td>19.32</td>
<td>20.21</td>
<td>2.5</td>
<td>2.6</td>
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</table>
HEALTH CARE PROVIDERS

FACILITIES

SUMMARY

REFERENCES

HEALTH CARE PROVIDERS

In Texas, 162 of 254 counties are either partially or wholly designated Health Professional Shortage Areas while 223 counties are wholly or partially designated Medically Underserved Areas. In the Lower Rio Grande Valley, part of Cameron County and all of Hidalgo, Starr and Willacy Counties have been designated Medically Underserved Areas. Due to the lack of health care providers in the LRGV, each of the four counties has been designated a Primary Medical Care and Dental Health Professional Shortage Area (Office of Policy and Planning, 2000).

1 The federal government will designate a rational service area as medically underserved depending on its Index of Medical Underservice. This index is calculated by determining the values for population to primary care physician ratio; infant mortality rate; percent of population over the age 65; and percent of the population in poverty. These four demographic indicators are converted to weighted values and the sum of these values equals an Index of Medical Underservice (IMU) score. Areas with IMU scores equal to or less than the national average IMU (62.0) are designated as MUAs.

2 Three major criteria are necessary in order for a designation to be granted: the service area must be rational for the delivery of health care, the population-to-physician ratio must be greater than 3,500:1, and the primary care resources in the surrounding areas must be inaccessible to the service area population. The applicable ratios for mental health professionals and dentists are as follow: mental health 30,000:1; and dental 5,000:1.
Table 6.1 lists the ratio of primary care physicians\(^3\) to population for the state and the four counties in the LRGV. While there is much variation in the number of persons per direct care physician in the LRGV, in all cases, the ratio exceeds the state ratio. In Willacy County, the ratio of population to genera/family practice physician was lower than the state ratio in 1999. The actual number of these physicians licensed in this county was 7.

<table>
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<tr>
<th>Region</th>
<th>Ratio per Direct Care Physician</th>
<th>Ratio per General/Family Practice</th>
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<td>Texas</td>
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<td>3,790</td>
</tr>
<tr>
<td>Cameron</td>
<td>886</td>
<td>7,847</td>
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<tr>
<td>Hidalgo</td>
<td>1,042</td>
<td>4,782</td>
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<td>Starr</td>
<td>5,846</td>
<td>8,770</td>
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<tr>
<td>Willacy</td>
<td>1,788</td>
<td>2,810</td>
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</table>

Source: Office of Policy and Planning, Texas Department of Health, Selected Facts for 1999

In addition to shortages of direct care physicians, the LRGV also lacks physician specialists. Table 6.2 lists physicians licensed in one of the 4 LRGV counties by specialty for 1999. In all cases, the ratio of population to specialist exceeds the state ratio. The LRGV experiences particular shortages in the specialties of dermatology, endocrinology, infectious disease, occupational medicine, oncology, pathology, psychiatry, pulmonary disease, and rheumatology. Ratios for these specialists are four to ten times greater than the state ratio.

\(^3\) Primary care physicians are those with the following specialties: Family/General Practice, Internal Medicine, OB/GYN, Pediatrics
### Table 6.2

**Physicians by County and Specialty, 1999**

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<thead>
<tr>
<th>Specialty</th>
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<th>Texas</th>
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<td></td>
<td>Number</td>
<td>Ratio</td>
<td>Number</td>
<td>Ratio</td>
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<td>Other</td>
<td>1</td>
<td>978,369</td>
<td>103</td>
<td>202,445</td>
<td></td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>15</td>
<td>65,225</td>
<td>777</td>
<td>26,836</td>
<td></td>
</tr>
<tr>
<td>Pathology</td>
<td>19</td>
<td>51,493</td>
<td>1,479</td>
<td>14,099</td>
<td></td>
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<tr>
<td>Pediatrics</td>
<td>127</td>
<td>7,704</td>
<td>3,768</td>
<td>5,534</td>
<td></td>
</tr>
<tr>
<td>Physical Med &amp; Rehab</td>
<td>8</td>
<td>122,296</td>
<td>509</td>
<td>40,966</td>
<td></td>
</tr>
<tr>
<td>Psychiatry</td>
<td>25</td>
<td>39,135</td>
<td>2,590</td>
<td>8,051</td>
<td></td>
</tr>
<tr>
<td>Public Health</td>
<td>1</td>
<td>978,369</td>
<td>68</td>
<td>306,644</td>
<td></td>
</tr>
<tr>
<td>Pulmonary Diseases</td>
<td>4</td>
<td>244,592</td>
<td>334</td>
<td>62,431</td>
<td></td>
</tr>
<tr>
<td>Radiology</td>
<td>38</td>
<td>25,747</td>
<td>2,664</td>
<td>7,827</td>
<td></td>
</tr>
<tr>
<td>Rheumatology</td>
<td>1</td>
<td>978,369</td>
<td>151</td>
<td>138,092</td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>98</td>
<td>9,983</td>
<td>5,720</td>
<td>3,645</td>
<td></td>
</tr>
<tr>
<td>Urology</td>
<td>12</td>
<td>81,531</td>
<td>784</td>
<td>26597</td>
<td></td>
</tr>
</tbody>
</table>

Source: Texas State Board of Medical Examiners, 09/99
Several programs have been implemented to attract physicians to underserved areas. The National Health Services Corps Loan Repayment program provides a federal match for state dollars spent on repayment of education loans for physicians who agree to a two-year commitment to practice in an underserved area. In addition, Texas authorized the Physician Education Loan Repayment Program (PELRP) in 1985 that also draws federal matching funds. The state created the Texas Health Service Corps to provide a stipend to physicians pursuing a primary care specialty and willing to practice in an underserved area. This program is administered by the Texas Center for Rural Health Initiatives and does not receive federal matching funds (Texas Higher Education Coordinating Board, 2001).

Nurse Practitioners (NP) and Physician Assistants (PA) have been used to address primary care physician shortages, although in the Lower Rio Grande Valley there are few practicing Physician Assistants or Nurse Practitioners. As shown in Table 6.3, the ratio of population to Nurse Practitioner is much higher in the LRGV than for the state. There is more variability in the ratios for Physician Assistants.

Table 6.3

<table>
<thead>
<tr>
<th>Region</th>
<th>Nurse Practitioner</th>
<th>Physician Assistant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Ratio</td>
</tr>
<tr>
<td>Texas</td>
<td>2,530</td>
<td>7,903</td>
</tr>
<tr>
<td>Cameron</td>
<td>29</td>
<td>11,316</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>43</td>
<td>12,286</td>
</tr>
<tr>
<td>Starr</td>
<td>1</td>
<td>61,722</td>
</tr>
<tr>
<td>Willacy</td>
<td>2</td>
<td>9,958</td>
</tr>
</tbody>
</table>

Source: Texas Board of Nurse Examiners, 1999; Texas Board of Medical Examiners, 1999.
Oral health is a critical component of public health and is addressed in initiatives such as the Healthy People 2010 plan. According to the 1999 Behavioral Risk Factor Surveillance System (BRFSS), only 59.7 percent of Texas residents 18 and over visited the dentist or dental clinic in the preceding year. In addition, only 45 percent of Hispanics 18 and over had visited the dentist in the last year. Results of the survey further indicate that visits to the dentist increase with income and education. Access to health care, as has been discussed previously, is mediated not only by financial and socio-cultural considerations, but also by the availability of services. Table 6.4 shows that the LRGV lacks dental professionals. One criterion for determining whether or not a region is designated a dental professional shortage area is that the population to full-time-equivalent dentist ratio exceeds 4,000:1 (Bureau of Primary Health Care Programs, 2001). In all areas of the LRGV, this standard is exceeded. In fact, the ratio of population to primary care dentist is twice as high in LRGV as for the state. The dental hygienist situation is even more critical as the ratio of population to hygienist is 2 to 21 times higher than the state ratio.

<table>
<thead>
<tr>
<th>TABLE 6.4</th>
<th>Ratio of Population to Dental Professional, 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Texas</td>
</tr>
<tr>
<td>Persons per Primary Care Dentist$^d$</td>
<td>2,748</td>
</tr>
<tr>
<td>Persons per Dental Hygienist</td>
<td>2,950</td>
</tr>
</tbody>
</table>

Source: Health Professions Resource Center, Texas Department of Health

The Texas Department of Health indicates that a nursing shortage is affecting the whole state (Statewide Health Coordinating Council, 2001). While the number of licensed nurses has increased, many are either non-practicing or work only part-time. The Texas Board of Nursing Examiners (2001) indicates
that 82.8 percent of all licensed registered nurses are employed in nursing, 3.4 percent are employed outside of nursing, and 13.7 percent are unemployed. Complicating the issue, the Texas Higher Education Coordinating Board (2001) indicates the number of students enrolled and graduating from nursing programs has declined significantly. From 1995 to 1999, there was a 24 percent decrease in the number of persons enrolling in nursing programs and a 13 percent decrease in the number of persons graduating from nursing programs.

Figure 6.1 shows the ratio of population to registered nurse for Texas and the four LRGV counties.

![Figure 6.1: Ratio of Population to Registered Nurse, 1999](image)


The Texas Higher Education Coordinating Board (2001) documented shortages along the Texas-Mexico Border in Advanced Practice Nurses, Licensed Psychologists, Social Workers, Respiratory Care Technicians, Physical Therapists, Physical Therapy Assistants, Occupational Therapists, Occupational Therapy Assistants, and Pharmacists. Based on the documented shortages, it suggested the legislature create a new Health Professional Loan Repayment Program to further alleviate shortages in underserved areas of the state. This program would provide funds for high demand occupations including advanced

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4 Primary Care includes dentists with practice type of general dentistry, pediatric dentistry or dental public health

5 Includes licensed vocational nursing programs, associate and bachelor’s degree RN nursing programs.
practice nurses, clinical social workers, clinical psychologists and licensed practical counselors. The Board further recommended the establishment of a grant program for recruitment and retention of nursing students, implementation of a cooperative pharmacy program at UT-Pan American, and the construction of a technical infrastructure for distance education and tele-education.

### FACILITIES

Table 6.5 provides a description of health facilities and capacities in the LRGV. In Cameron County, the population to bed ratio is similar to the ratio for the state, however, Hidalgo and Starr counties have a higher population to bed ratio than the state despite the fact that a greater proportion of their licensed beds are staffed. The lack of facilities in Willacy County and the fact that Starr County facilities are operating at capacity suggests that excess need is either not being met or is being met elsewhere. Dependence on facilities outside of the county create additional barriers to care, the most significant being non-availability of services. Other barriers include the lack of transportation and the travel time required to access emergency services.

**TABLE 6.5**
Health Facilities, 1999

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
<th>Acute Care Hospital</th>
<th>Licensed Beds</th>
<th>Staff Beds/% of Beds Staffed</th>
<th>Population to Staffed Bed Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameron</td>
<td>321,738</td>
<td>5</td>
<td>1,125</td>
<td>832/74%</td>
<td>386</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>535,539</td>
<td>9</td>
<td>1,398</td>
<td>1,334/95%</td>
<td>401</td>
</tr>
<tr>
<td>Starr</td>
<td>52,618</td>
<td>1</td>
<td>44</td>
<td>44/100%</td>
<td>1,195</td>
</tr>
<tr>
<td>Willacy</td>
<td>19,670</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Texas</td>
<td>20,044,141</td>
<td>472</td>
<td>72,201</td>
<td>56,993/78.9%</td>
<td>352</td>
</tr>
</tbody>
</table>

Source: Office of Policy and Planning, TDH, Selected Facts for 1999

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6 This program would augment existing loan repayment programs for physicians and physician assistants.
Community Mental Health and Mental Retardation centers were established throughout Texas in 1967 to ensure the provision of mental health and mental retardation (MHMR) services outside of state facilities. These facilities receive state funding to provide various MHMR services. The LRGV is served by two of these Centers. The Tropical Texas Center for MHMR serves Cameron, Hidalgo, and Willacy Counties while Starr County is served by the Gulf Bend MHMR Center. The Tropical Texas Center provides outpatient mental health services throughout its service area.

While there are no licensed private psychiatric hospitals in the Lower Rio Grande Valley (Health Facility Licensing and Compliance Division, 2001), the Texas Department of Mental Health and Mental Retardation (TDMHMR) has allotted the Rio Grande Valley 110 state mental health beds. Fifty-five of these beds are located in the Valley while the remaining 55 beds are located at San Antonio State Hospital. According to Layton Golemon, Executive Director of the Tropical Texas Center (2001), of the 55 beds in the Valley, 40 are located at the Rio Grande Center and an additional 15 beds are leased from the community specifically for adolescents. Six additional beds are leased by the Tropical Texas Center for crisis/respite care. There are no state operated beds available for children aged twelve and under in the Valley.

While the 55 beds are dedicated to patients needing long-term residential mental health services, Goleman (2001) states that in actual practice, patients rarely utilize the inpatient services for longer than 30 days. If it appears that a patient will require a long-term stay, the patient and his family are encouraged to consider a transfer to the San Antonio State Hospital. Families resist transferring to San Antonio because of transportation issues. It is cost prohibitive to visit a relative while they are hospitalized 250 miles away in San Antonio. Thus, as stated by Golemon (2001), “long term mental health care is available but not accessible.” So, in practice, at the end of 30 days, the patient has either been transferred or discharged. In fact, fiscal year 1998 data indicates the Tropical Texas Center for MHMR has one of the lowest averages among all of the state
hospitals/centers for days per 1,000 population at 26.6 compared to the state average of 48.6 days per 1,000 population (Texas Department of Mental Health and Mental Retardation, 2000). In contrast, Tropical Texas has much higher admission and re-admission rates when compared to the state as a whole. The admission rate for Tropical Texas is 93 per 100,000 compared to 46 per 100,000 for the state. The re-admission rate is 118.2 per 100,000 for Tropical Texas and 67.4 per 100,000 for the state.

**SUMMARY**

Resources in the LRGV are not adequate to meet the needs of the population resulting in the area being designated a health, dental, and mental health professional shortage area. This deficiency has prompted the state to implement programs such as loan repayment grants designed to increase the numbers of health professionals serving in the LRGV. While the number of primary health care providers is insufficient to meet the needs of the LRGV, the situation with specialists is equally troubling. In some physician specialties, the population to physician ratio is five times higher than the state ratio.

There is also a lack of health facilities to serve the region. In particular, the lack of mental health facilities concerns both the Tropical Texas Center for MHMR and the local community. Especially disconcerting is the lack of adolescent mental health facilities. The data on facilities and providers suggest that residents are traveling outside of the area to seek treatment particularly specialized treatment. This situation exacerbates existing barriers like lack of health insurance and poverty by compounding them with barriers such as lack of transportation and child care.
References

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ftp://www.bne.state.tx.us/01-cntstat.pdf


Texas Department of Health, Health Professions Resource Center.  *Nurse Practitioners (NP) by County of Residence.*  Austin, TX (September 2000).  http://www.tdh.state.tx.us/dpa/RN-lnk.htm


Texas State Board of Medical Examiners. *Physicians by County,* Austin, TX (September 1999). [http://www.tsbme.state.tx.us/demo/docs/0999/0999stats.htm](http://www.tsbme.state.tx.us/demo/docs/0999/0999stats.htm)
Chapter 7

Do Cultural Factors Affect Hispanic Health Status?

Antonio N. Zavaleta

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INTRODUCTION

ISSUES CONCERNING HISPANIC SUBCULTURAL ORIGIN
ISSUES CONCERNING HEALTH CHOICE DETERMINISM
ISSUES CONCERNING HISPANIC LOCATION
ISSUES CONCERNING THE CULTURAL CONTEXT OF THE FAMILY
ISSUES OF HISPANIC GENDER AS A DETERMINANT
ISSUES CONCERNING FOLK RELIGION
ISSUES CONCERNING FOLK HEALING (CURANDERISMO)
WHERE DO WE GO FROM HERE?

INTRODUCTION

The question, do cultural factors characteristic of Hispanic populations affect their health status and health care delivery systems, has been addressed professionally in both the research literature and in practice for more than thirty years. The question may be answered emphatically, YES. In spite of all that we have learned and after more than thirty years of research, this critical population continues to be the least understood in Texas. The importance of Hispanic cultural beliefs in modern medical treatment and the general lack of attention to it
is no exception. Texas institutions of higher education and especially medical education have failed to meaningfully and systematically incorporate curricula intended to understand the unique cultural factors affecting the Texas Hispanic population, both native and immigrant. It is widely known and accepted that Hispanics are the fastest growing population in Texas and the American Southwest if not in the nation as a whole, yet there has been little done to directly address this fact (Sharp, 1998). The rapid growth of this population is a combination of its natural increase through a very high birth rate and an equally high rate of in-migration from Spanish-Speaking countries. A special issue of Texas Medicine, the journal of the Texas Medical Association, featured a Symposium on Immigrant Health (Texas Medical Association, 1996) that explained the importance of developing awareness and understanding of Hispanic culture in the delivery of health and medical care in Texas. The intended purpose of the special issue was heighten to Texas physician’s and allied health professional’s awareness of the tremendous need to recognize this huge area of importance which often goes overlooked in both the private practices and public clinics of Texas.

ISSUES CONCERNING HISPANIC SUB-CULTURAL ORIGIN

Importantly, and among the first concepts that health care providers must understand and take into consideration when treating Hispanics, is that terms like “Hispanic” and “Latino” are “catch-terms” that tend to lump people together without regard to the very real sub-cultural variation that exists within the Hispanic population in Texas. In reality, the Hispanic population in Texas and throughout the U.S. is incredibly diverse drawing origin from numerous regions of Mexico, Central and South America as well as from a host of Caribbean countries. The health care provider must always take into consideration the origin of the person they are treating. Simply stated, a person’s sub-cultural origin, whether Tamaulipas, in the northern border of Mexico, or Chiapas on
Mexico’s southern border with Guatemala, will determine for example, linguistic and dialectic variation as well as differences in beliefs, lifestyle, customs, and hence will define a person’s primary choice for health care. Within the Texas population of Mexican descent, Mexican-Americans, dramatic differences exist between urban and rural life and realities; between socio-economic levels as a determiner of the availability of health care services; between educational levels and one’s knowledge base; between generational status and intra-familial differences; between levels of acculturation and attitudes toward health care delivery modalities and the various regions of the state (Valley vs. Metroplex), just to name a few. Mexican American sub-cultural variation outside the State of Texas is even more dramatic.

**ISSUES CONCERNING HEALTH CHOICE DETERMINISM**

It is also critically important for the health care provider to understand that all Hispanic populations and all Spanish-Surnamed people are not alike. Avoid the age-old mistake of stereotyping when dealing with Hispanics. While cultural factors are real, it is important not to make the mistake of confusing economic with cultural determinism. That is to say, that it is simply too easy to pass something off as caused or determined by a person’s cultural beliefs when in fact it is caused or determined rather by economic circumstances. It is important to note that in general, the Hispanic population in Texas is poor. While there are notable exceptions, as is evidenced by the significantly emergent Hispanic middle class, economic marginalism remains the major determining and characterizing factor of Hispanics in Texas. As such, the major barrier to health care in Texas for Hispanics is not culture but rather it is a lack of adequate income or financial resource.

I believe that it is critical that as health care professionals we resist falling into the trap of old stereotypes and in this new century should construct new and effective health care models for treating the Hispanic populations of Texas.
There is no mystery that new models must incorporate modern medicine and culturally appropriate alternatives into a single functioning system.

**ISSUES CONCERNING HISPANIC LOCATION**

Hispanics in Texas are located in every county and especially in the major metropolitan areas of the state, thus it is erroneous to characterize all Texas Hispanics as living a rural agricultural lifestyle in Texas-Mexico border counties or in the Valley. Most Hispanics in Texas today live in the major metropolitan centers of Dallas-Fort Worth, Houston, San Antonio, and Austin. In addition, the 2000 Census of Population will recognize that the concentration of Spanish-Surnamed Texans living, in what is commonly referred to as the Lower Rio Grande Valley, is experiencing explosive growth. Because of its proximity to Mexico and because such a large percentage of this population is foreign-born or first-generation U.S.-born, the Valley Hispanic population serves as a living laboratory of how culture affects health beliefs and hence health care delivery systems and Hispanic health status.

**ISSUES CONCERNING THE CULTURAL CONTEXT OF THE FAMILY**

Throughout the literature on Hispanics spanning more than thirty years, the resilience and cohesiveness of the “Hispanic Family” has always been singled out as a primary determinant for what is “best” in Hispanic culture. The Hispanic family remains a cultural super-glue in spite of the powerful argument that there is no such thing as the stereotypic Hispanic family remaining as a cultural entity. There are however, very real characteristics which embody the values often found in any prototypic “traditional” family, and in the best sense, Hispanic families often demonstrate these characteristics. Clearly, the family is
the focal point for the inculcation of one’s beliefs, values, norms, and customs and as such, the social context of the family determines one’s cultural reality (Trotter and Chavira, 1981). Therefore, whether there is, or is not, such a thing as a “Hispanic family” as a cultural construct surviving in the early 21st century, the fact still remains that, like other traditional families found in industrializing settings, Hispanic families impart cultural beliefs and serve as a critical safety net for its members. The existence and integrity of the culturally defined family-based safety net will directly impact, both positively and negatively, upon a person’s health status. For example, perceived Hispanic fear or mistrust of “official” bio-medical health care delivery systems, such as hospitals and social service agencies, is often an unfounded urban myth held in the family or by the family matriarch who is at least one generation out of touch. Simply stated, it is important in treating Hispanic families to involve the multi-generational extended family in the health care delivery process. In this sense it really does take “a village.” The social network of family and family involvement with the individual is critical to the emotional and physical well being of the individual, the family and the community at large. For example, family members often accompany one another to a provider’s office, especially when treatment is invasive or out of the ordinary. This fact should be understood and used to maximize patient compliance instead of being seen as an unnecessary nuisance in the provider office. The socialization and enculturation of children, adolescents and adults alike in the Hispanic family today is something that takes place within the larger framework of the extended family, which includes ritual kin networks such as compadres and comadres, concepts not addressed here.
Exhaustive research and experience in practice in recent decades has shown conclusively that there are very real differences in the cultural interpretation of illness and disease. The work of Finkler (1994), in her extensive anthropological work in Mexico, has demonstrated the clear impact of culture on illness and wellness in both urban and rural Mexico. We can be confident that sickness is much more than a simple fact of biology or the invasion of the body by an antigen. The way in which a person reacts to the symptoms of illness are culturally derived and culturally manifested. That is, the illness scenario is played out by each family member via a pre-determined and culturally appropriate script. After age, gender ranks second as the largest differential in rate of illness (Verbrugge, 1990). During their life time women experience more illness than men and women’s wellness and illness experience is accumulated and passed on from generation to generation. The conclusion for us is simple, when treating the Hispanic population; gender must be foremost on the minds of the health care delivery team. What does the Grandmother think? What does the mother think? Verbrugge concluded that, “women’s lives are filled with more health problems, higher incidence of acute conditions, higher prevalence of most nonfatal chronic ones, more frequent botherations by health problems,” than men’s. From her work with Mexican women, Finkler (1994) accurately concludes that psychosocial factors affect the perceptions of symptoms, the evaluation of their cause and severity, choice and continuation of therapeutic actions, and short- and long-term disability. Psychosocial factors affect all people of every culture. If we know that, then why do we ignore the fastest growing population in Texas, the Hispanic? The point here is that anyone who has treated or been involved with the treatment of Hispanic populations will immediately recognize the importance of this conclusion. Avoiding the obvious
stereotype, it is clear that in the majority of Hispanic families, if not all families, the female head of household and especially the extended family matriarch, grand or great-grand mother is responsible for the interpretation of family issues concerning wellness and illness. This critical observation must be brought into the health care delivery picture.

ISSUES CONCERNING FOLK-RELIGION

Beliefs common to both mainstream religion and folk-religion in Hispanic populations include many concepts, which characterize and define one’s perception of the origin, nature, and treatment of illness (Crumrine and Morinis, 1991). It is a commonly held belief in contemporary Hispanic populations that God or at the very least “supernatural” forces are directly involved in illness. Religious belief systems are crucial aspects of Hispanic culture and hence it is commonly believed that religious entities like Catholic Saints and Folk-Saints, and the supernatural in general, is physically capable of affecting the lives of the living. As strange as it might seem, that means both causing illness and serving as the pathway to wellness. The belief in the influence of Saints, promises to them, the existence of sacred sites dedicated to the Saints and the requirement of the faithful to make pilgrimages to these sites in order to fulfill promises and as thanks to miraculous cures delivered are central features of Hispanic belief systems. In Hispanic cultures today, traditional religion and folk-religion co-exist as a single interacting system involved in the health care delivery system. The majority of Hispanics are spread out across Texas, living in large metropolitan cities, and in small towns, many are recent arrivals. Their extended kinship groups are dynamic and influence their perceptions of illness and health care choices. A very complete examination of how folk-religions function can be found in Frank Graziano’s recent publication, The Millennial New World (1999).
ISSUES CONCERNING FOLK HEALING
(CURANDERISMO)

Hispanic populations have an active and long time tradition of alternative health care delivery systems. These systems and practices are highly complex, diverse and are generally lumped together into what anthropologists commonly call the cultural system of “Curanderismo” (the folk usually call it curanderia) (Zavaleta, 1998). The body of Curanderos/a in Texas is comprised of both men and women who are essentially folk-healers (Avila, 1999). That is, locally based persons of one’s own culture who have a culturally received gift and an equally received imperative to assist the population in the treatment of illness, physical, emotional, and spiritual. Many decades of research has shown that first time visits to a folk-healer or curandero/a almost always are prompted by a serious or catastrophic physical, emotional, personal, or economic problem in the visitor’s life. Contrary to popular belief, people who seek physical care from a spiritual folk-healer do not do so as a first choice. Almost without exception, physicians have been consulted first. If medical therapy has not been successful, alternative therapies, especially miraculous treatment, is sought. Every curandero/a has a regular group of persons who give impassioned and convincing testimony concerning impossible and miraculous cures that they have received through the intercession of the healer. These claims are often documented.

Chronic ailments commonly go untreated in Mexican-American communities. Therefore, diabetes, hypertension, arthritis, and similar chronic ailments are common in the folk-healer’s client-patient load and it is essential that the folk-healers be networked with medical professionals-not rejected and alienated, or as has been seen in some notable cases, prosecuted. There is no systematic process for becoming a Hispanic folk-healer or singular body of knowledge or cultural certification of a person as trained in folk-healing. Therefore, not all folk-healers in the Hispanic population in Texas are reputable. Some cause great harm while others are revered as living folk-saints.
Physical ailments are treated by Mexican-American folk-healers in a variety of ways. Twenty years ago Trotter and Chavira (1981) demonstrated that they either work on the physical (material), or the mental, or the spiritual level. Material level treatment at curandero healing centers is consistent with the techniques and remedies found in non-spiritual healing traditions described by Kiev in 1969. While material and mental levels of treatment are common, spiritual treatment, directly from the “spirit” of a folk-saint like Don Pedrito Jaramillo or El Niño Fidencio, is more highly valued and increasingly common. Spirit channeling is popular throughout “new age” alternative healing practices, however it requires a much more accomplished folk-healer. Folk-healers who are “spirit” mediums are said to work spiritually when in a trance state. Individual spiritist healing sessions usually follow a similar pattern. The patient is greeted by the spirit and returns the salutation. The initial greeting is followed by a personal discussion with the spirit about the person’s problem. In physical ailments, the spirit working through the healer, immediately approaches the problem using a combination of techniques. These include massage, limpias or ritual sweeping, and in serious cases, “spiritual surgery.” A recent publication, *La Medicina tradicional de el norte de Mexico*, is a very complete examination for the diversity of alternative folk-healing traditions operating on Mexico’s northern frontier (Ortiz, 1999). Often the folk-healer prescribes a remedy that may be a mixture of herbal and religious items and requests that the patient follow some prescribed process or ritual at home, followed by a return visit to the healer. The average number of visits to a curandero/a for physical ailments is equally matched or surpassed by visits for other personal reasons. While many of these consultations are of a serious nature involving major family problems, many are simply routine visits by the faithful for emotional reinforcement. Research has shown consistently that the Mexican-American community is severely under-served in mental health care (The Hogg Foundation for Mental Health, 1985). In the United States mental and emotional health treatment has become commonplace, this is not the case in Texas or within the Hispanic population. Commonly held ethnic stereotypes in the allied health community continue to promote myths suggesting Hispanics,
while poor, are content with their choice of cultural mental and emotional health care. A common belief in the health community is that Hispanics, lead well-adjusted, simple lives, free from the common emotional and mental health problems experienced by middle-class Americans. This stereotype supports the contention that Hispanics are not in need of mental health care and justifies why state appropriations have not been made to support the increasing Hispanic mental and emotional health problems. Consequently, the fastest growing population in the state has little or no access to even minimal emotional and mental health care. Because of these high growth rates and the fact that the Hispanic population is disproportionately poor relative to the general population, we can expect alternate healing systems like the Hispanic folk-healing to continue to thrive. In almost every other country in the world, including Mexico, lay practitioners, community health workers called, *promotoras* or *asistentes de salud*, with limited medical support, care for approximately 80 percent of the population’s physical and emotional needs (Velimirovic, 1978).

Curanderos/a generally dedicate their lives to serving the physical and mental health needs of their local population. Additionally, an important dimension of folk-healing and folk-religions is the emergence of social movements surrounding wellness and illness. Throughout Latin America, native belief systems have commingled with folk-Catholicism and folk-healing systems (Madsen, 1967). The syncretic hybrids that have been produced are thriving alternatives to modern health care delivery systems, which operate side by side. That is, religion and health care. The rejection by the bio-medical model of these large grassroots movements serves to further alienate huge segments of the Latin American population rather than to provide them with health care.

WHERE DO WE GO FROM HERE?

Public health problems in Texas and along the Texas-Mexico border continue to be unique and present very real challenges to the health care delivery team. The establishment of a Regional Area Health Center including a
School of Public Health (UTHSC-Houston School of Public Health Regional Campus Center) in the Lower Rio Grande Valley at the beginning of the 21st century provides an important opportunity to assess and address these border challenges within the context of science. The phenomenon of folk-healing or Curanderismo is not diminishing, not in Texas or any place in Latin America. Movement toward culturally informed health care delivery systems must therefore, take into consideration the reality that cultural factors play a role in our attempts to produce a healthier Hispanic population in Texas. Additionally, increased knowledge and understanding of native alternative health care delivery systems will assist us in addressing the continued problem of lack of resources and help us to deal effectively with continued in-migration from Latin America and especially Mexico. Today’s health care delivery system in Texas is faced with heretofore unknown challenges including HIV and STD’s, drug resistant TB, and little known infectious diseases which may only be addressed as public health concerns and treated effectively by incorporating what we have learned about culture. Untreated chronic illnesses in Hispanic populations in Texas continue to rank high as an unmet health need, which affects the entire population and the economic viability of the state. Lack of support and treatment networks for physicians continues to be a problem in Texas, especially along the border, and lack of physician understanding must be addressed if we are to be successful. Significant issues such as the continued health manpower shortage issue, provider-patient ratio and interest in the training and coordination of Community Health Aides now called Promotoras de Salud is critical. The development of networking and community-based coalitions along with cooperation with Mexico through cross-border programs along with more health education programs will only be effective if we take culture into account. A recent “Future of South Texas” regional conference1 held on South Padre Island in July, 2000, identified the importance of understanding the language and culture of the patient; the importance of the inclusion of the family and community in health care delivery

1 South Texas Future of the Region Conference Phase I, 2000, South Padre Island, Texas, Conference Coordinators, E. Gerlach and R. Manzano.
systems; how critical it is to listen to what the people are saying about their health care needs; the importance for health care providers to avoid making stereotypic value judgments about peoples beliefs; the desperate need for the establishment of effective mental health care delivery systems in South Texas; and maybe, most importantly, the critical need for the increased development of diversified and culturally appropriate health education programs for the Hispanic populations of South Texas.
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Promotoras are health outreach persons working within their communities of residence to promote health among those typically lacking access to adequate services. Whether inaccessibility is secondary to cultural, language, economic, or educational barriers, or related to isolated living conditions, promotoras enable the formation of bridges connecting mainstream health and social service institutions with the community.

The prototype of lay persons working to improve health conditions within their communities finds root in the concept of *promotoras de salud*—also known as Community Health Workers, Consejeras, Health Outreach Workers, Animadoras de Salud, Health Technicians, or Lay Health Educators—whose long history within the health systems of Latin America and other developing nations has proven invaluable in the provision of health care services where medical facilities and personnel are extremely limited (Briceño-León, 1998; Global Health Action, 2000). Their effectiveness in fulfilling vital roles as community health educators, providing immunizations, offering basic curative services such as first aid and treatment of minor illnesses, monitoring community health via communicable disease screening, collecting vital statistics and maintaining records, and acting as liaisons between the general population and providers has been imitable (International Medical Volunteers Association [IMVA], 1999).

Based on the positive outcomes experienced in community-based health worker programs of other countries, appreciation of promotoras as instrumental in improving the health status of individuals and families within the most vulnerable populations has experienced growing popularity north of the border within the past fifteen years. In view of the substantial health problems facing
border residents—medical professional shortages, institutional discrepancies including current welfare policies and racial discrimination, occupational attributes of the population inclusive of low pay without health care benefits, client unfamiliarity with procedures required to navigate the medical and social services system, impediments to physical accessibility, as well as cultural, socioeconomic, and linguistic differences between providers and clients—the promotora model presents the most cost-effective and beneficial model to strengthen community health care systems (Rylander, 1998; U.S.-Mexico Border Health Collaborative Outreach Demonstration, 1999). Reflecting the linguistic and cultural diversity of the community, promotoras provide an invaluable linkage between mainstream health and social service institutions and those for whom accessibility to adequate care is frequently limited, namely the low-income residents of the colonias.

Although conceptual origins are derived from community-based health worker programs in developing nations, utilization of lay persons as an extension of health services within the United States is distinct. As can be seen in such popular lay health worker training manuals as Donde No Hay Doctor [Where There Is No Doctor] (Werner, 1992), promotora responsibilities in other countries may include diagnosing illnesses and providing such medical treatment as giving injections or recommending antibiotics bought over-the-counter (IMVA, 1991). Moreover, lay health workers are often well-versed in the use of alternative therapies—herbal remedies, massage therapy, reflexology, among others—which are utilized for healing as well as taught to community members (Dickey, 2000). Secondary to stricter drug enforcement laws and standards of practice, such practices would be unacceptable in the U.S. Nevertheless, the role of the promotora within this country remains founded upon the same premise as that of other nations: lay health promoters working within their own communities can be a cornerstone of truly comprehensive health care.

Responsibilities of the promotora within the U.S. system of health care may be actualized in a variety of ways. A condensed description of services is offered in House Bill 1864 (Capelo, 1999), in which a promotora is defined as
one who “promotes health within the community in which the person resides, without regard to whether the person is compensated, by engaging in activities such as providing health education, making referrals to health and social services providers, coaching families on effective ways to access health services, conducting needs assessments, identifying barriers to health care delivery, making home visits, providing language services, collecting information regarding the outcome of health services provided to families, and acting as a liaison between families and health care providers.”

The role of the promotora can basically be categorized into four major components, each encompassing varied but interrelated activities (Rosenthal and Koch, 1998; De Llano, 2000):

**FACILITATOR:** Facilitates access to quality health care and social services by:
- being a visible and available health care presence within the community;
- providing linguistic and cultural mediation between the providers and community residents;
- networking with community agencies/resources to assure availability of needed services for residents;
- bringing health care services to the community via direct outreach (see below) as well as participation in health promotion activities such as local health fairs to assist in.

**HEALTH EDUCATOR:** Educates the community through the provision of:
- linguistically and culturally appropriate education on such topics as hypertension, diabetes, TB, STDs/HIV, occupational hazards, lead poisoning, dental/eye care, and other relevant community issues;
- information related to system accessibility such as health center services/locations/hours, and requirements for service eligibility;
- assistance in operating within the system to obtain benefits;
- education to local health care professionals and social service providers regarding culturally relevant concerns, lifestyles, health needs, barriers to access, and similar issues affecting the community;
HEALTH ADVOCACY: Advocates for improved health conditions through:

- recognizing special needs of the population and assisting in priority-setting as well as increased awareness among residents, political leaders, and health care professionals related to these needs;
- advocating on behalf of individuals or the community when needs are not being met due to barriers such as cultural misunderstandings, socioeconomic hindrances, or complexity in navigating the health care system;
- encouraging community members to become equal participants in their own health care;

DIRECT OUTREACH in colonias via

- home visitation, patient screenings, assessments;
- assisting in follow up services as warranted by making appropriate referrals to community health centers/clinics, health departments, or social service agencies;
- serving as community resource persons to connect residents with available medical and social services programs;
- participating in community health assessments, data collection, etc.

How each of these roles is implemented is specific to the organizational setting and needs of the community in which the promotora is working. For example, those who work within a community center or clinic may assist in activities such as case conferences, patient education and translation services for clients; promotoras working out in the community may organize and conduct health classes, make home visits and referrals, or assist with needs assessments (Rylander, 1998). Furthermore, how roles are carried out may depend upon identified needs of a population. For example, although health education and outreach is commonly the focus of promotoras, assisting families in problem-solving to access services or providing parenting programs may be of higher priority in some communities and therefore may be given particular attention by health workers. This versatility is a major foundation upon which lay health promoters’ programs have operated.

Recognizing the innate value of such programs, numerous health and social service agencies in the Lower Rio Grande Valley have embraced health
promoters as part of a comprehensive outreach strategy in the past decade. At present three programs operating in the Valley are coordinated as well as served by promotoras. Mano-A-Mano is the largest of these with 75 promotoras working as health educators and assisting with accessibility to service in border colonias (De Llano, 2000). Project Arise operates with 31 outreach persons—called “animadoras” which is translated as “community animators”—working in four Valley colonias. Responsibilities of the animadoras vary, with some visiting homes to determine and respond to child development needs while others network with area agencies to coordinate small group presentations in residents’ homes or give information door-to-door regarding available services (Casas, 2000). Migrant Health Promotion (MHP) is another promotora-based program, having 25 to 30 migrant women who provide local outreach from December through March and then follow the migrant stream to the north in summer months. As well, MHP is presently initiating two new programs—one related to teaching breast and cervical cancer awareness; the second for HIV education—in which 14 promotoras will be hired to work in the Valley year-round (G. Martinez, 2000).

Organizations working to improve the lives of colonia residents have come to appreciate the effectiveness of promotoras in outreach within communities. The Center for Housing and Urban Development at Texas A & M, for example, began building Community Resource Centers (CRCs) in the Lower Rio Grande Valley several years ago with the goal of reducing isolation of colonia residents. After several years, however, it became evident that a bridge between services offered in the CRCs and the population to whom they were directed was crucial to a successful outcome (Pramanik, 1998). Consequently, 30 promotoras have recently been employed to work in connection with CRCs, advising colonia residents of planned activities in the centers as well as providing information on locally available health and social services (Rincones, 2000). Avance is another program incorporating the services of promotoras as a means of more effectively reaching the intended population. Emphasizing the strengthening of family life in low-income areas, Avance employs six full-time promotoras who work with
parents, offering lessons in parenting skills as well as providing health information. Additionally, 15 volunteers make home visits to give information on health-related themes (Gonzalez, 2000).

Recognizing the possibilities of expanding community education efforts, health organizations have recently begun to incorporate the concept of the promotora into outreach strategies. The Valley AIDS Council has 20 promotoras providing education on topics relevant to HIV, AIDS, and STDs (Noriega, 2000), while Planned Parenthood employs two promotoras to disseminate information about the importance of services available through the organization such as yearly PAP smears and breast exams for women. Planned Parenthood has also recently initiated a Summer Youth Program in which seven young women aged 14 to 19 have been trained as promotoras to offer general health information. A unique aspect of this project is that the teens involved are pregnant or parenting; in conjunction with their participation, the young women receive education through Planned Parenthood including tutoring in reading and writing, parenting skills, job preparation, and themes related to personal development (Lievanos, 2000).

Health institutions are beginning to enlist the aid of promotoras as well. Nuestra Clinica del Valle serving Hidalgo county has five promotoras, and Su Clinica Familiar operating in the counties of Cameron and Willacy employs two promotoras, whose roles as information specialists increase dissemination of health and human service information in the colonias while opening doors for people to access clinic services (A. Martinez, 2000).

These programs/organizations represent well over 200 promotoras integrally involved in the expansion of public health services and enhancement of accessibility to care in the Lower Rio Grande Valley. Although some are volunteer, many of the promotoras are part-time or full-time paid employees. For example, although 50 of the 75 promotoras with Mano-A-Mano serve voluntarily, 25 work part-time through Project Alberto—a national health access initiative for low income, uninsured children founded by the Robert Wood Johnson-Covering Kids project (Robert Wood Johnson Foundation, 2000). State or federal funds
assist in paying promotoras working in other projects, such as the Texas A&M CRCs, which rely on Vista grants and Americorp (Rincones, 2000). Private funding is another major source for programs such as Project Arise which is sponsored by organizations of women religious (Casas, 2000). Promotoras working with other organizations receive combined funding, such as MHP through the Catholic Consortium for Migrant Health as well as grants from CDC and TDH (Migrant Health Promotion, 1999; G. Martinez, 2000). There are divergent points of view, however, related to the issue of monetary reimbursement for promotoras services, with opponents considering this to be a digression from tradition in which lay persons serve voluntarily with recompense being the creation of a better, healthier community rather than economic gain.

Pertaining to this issue, there is also concern regarding formalized preparation for promotoras. At present, Texas has no official curriculum or certification policy regarding lay health workers. The level of training received varies with the individual programs, each organization being responsible for its own curriculum (Rylander, 1998). As a result, some promotoras may receive in-depth preparation whereas others may be acquainted with only limited information according to the capacity in which they function in a given program or community.

Even programs providing extensive training have variations in curriculum depending on program objectives. Promotoras working with Mano-A-Mano and MHP, for example, receive training on numerous health topics including diabetes, cancer, high blood pressure, nutrition, family planning and prenatal health, first aid, sexually transmitted disease and HIV/AIDS prevention, adult and childhood illnesses, and immunizations. Themes related to domestic violence, child abuse, and chemical dependency are also integrated, as are appropriate referral-making and accessing community resources. Additionally, training specific to the identified goals of each of these programs is incorporated. For example, promotoras with Mano-A-Mano are instructed in techniques for door-to-door information-sharing as well as group presentations secondary to the program’s emphasis on bringing information directly to the people of the colonias while
promotoras with MHP who focus on outreach to migrants receive training on topics relevant to environmental concerns, workers’ rights and occupational safety laws (Migrant Health Promotion, 1999; De Llano, 2000). While the responsibility of promotoras as health educators is emphasized in both Mano-A-Mano and MHP, promotoras working within CRCs receive training emphasizing familiarity with existing health and social service programs and assisting residents in accessing these (Center for Housing and Urban Development, 2000).

Taking into consideration the preparation offered promotoras working in the above-mentioned programs, it becomes evident that, although commonalities in training exist, there is variability in content contingent upon program objectives and the needs of those being served. This has presented as a concern for health professionals who believe it important that promotoras have identifiable skills. This concern is compounded by the fact that at present anyone is able to employ the title of promotora regardless of whether training has been received or what the training may have entailed (Rylander, 1998).1

In view of these issues, it has been suggested that development of a uniform academic model could be of great benefit in standardizing and expanding the capacity of a grassroots health work force. Consistency in training and certification would enable clinics, service organizations, and clients to identify professional qualifications expected of promotoras and could provide a basis for a more complete public health response in the border region.

Several organizations have been working to this end. An example is the pilot project under the Health Education Training Centers Alliance of Texas (HETCAT) focused on the development of a uniform curriculum for promotora education and the establishment of a certification process along the Texas-Mexico border (Rylander, 1998). Promotoras themselves have also organized around this as well as related issues, forming the South Texas Promotoras

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1 This is particularly important along the border where lay persons with knowledge of blood pressure monitoring, injection giving, or other clinical skills from previous work in Mexico may continue to function in a similar capacity in U.S. colonias as promotoras working on their own or occasionally even in conjunction with agencies.
Association (formerly Promovision) which has as one of its objectives the setting of standards to certify workers for Medicaid reimbursement qualification (Dickey, 2000).

More recently, the Texas State Legislature has taken an interest in these issues, giving impetus to the creation of House Bill No. 1864 (Capelo, 1999). Effective on September 1, 1999, the Bill established a temporary committee—the Promotora Program Development Committee, Article 1, HB 1864—to advise the Texas Department of Health and the State Legislature on “the study and development of outreach and education programs for promotoras or community health workers under which community residents provide public health education services.” The committee is composed of 15 members, including two TDH employees; one representative of the Texas Higher Education Coordinating Board; one representative of the Texas Tech University Health Science Center; two representatives of the Texas A&M University System, including one from the Center for Housing and Urban Development in the Texas A&M University School of Architecture and another from the South Texas Center for Rural Public Health; two representatives of the University of Texas System, one representing the Valley Border Health Coordination Office and one from the Health Education Training Centers Alliance of Texas; one representative of the Texas Association of Community Colleges; two persons currently serving as promotoras as designated by the Texas Association of Community Health Centers; one representative of the Texas Workforce Commission; one representative of the Texas-Mexico Border Health Services Delivery Project as designated by the University of Texas Health Science Center at Houston; and two representatives of the general public as designated by the State Office of Rural Health of the Center for Rural Health Initiatives. Specific responsibilities of this committee include:

- reviewing and assessing promotora programs currently in operation around the state;
- studying the feasibility of establishing a standardized curriculum for promotoras;
• studying the options for certification of promotoras and the settings in which certification may be appropriate;
• assessing available methods to evaluate the success of promotora programs;
• creating, overseeing, and advising local pilot projects established under this article, subject to the availability of appropriations that may be used for this purpose; and
• evaluating the feasibility of seeking a federal waiver so that promotora services may be included as a reimbursable service provided under the state Medicaid program.

A report to TDH, as well as to the Texas State governor and legislature regarding findings and recommendations for a program for the development of promotoras is to be submitted by the committee by December 31, 2000.

As well as commissioning the study of a promotora development program, the legislature amended the Health and Safety Code through the addition of Chapter 46 entailing the training and regulation of promotoras. TDH is therein directed to establish and operate both a program designed to train and educate promotoras—using as a resource the curriculum developed by the Health Education Training Centers Alliance of Texas—as well as a program of certification to provide minimum standards and guidelines as related to issuance of certificates for persons acting as promotoras, to be accomplished not later than January 1, 2000 (Capelo, 1999).

Although standards for certification are to include participation in the training and education program as outlined above, the amendment also specifies that, “Participation in a training and education program established under this section is voluntary,” and that, “Receipt of a certificate issued under this section may not be a requirement for a person to act as a promotora.” These statements present a compromise in face of concerns voiced by some that formalized education and certification will have a detrimental effect upon the core ideal of promotoras as lay persons voluntarily trained and working within their respective communities for altruistic motives of improving the health status and living conditions of those whom they serve.
Despite these concerns, there is much data suggesting that formalized training for promotoras may be integral to their effectiveness within the community. According to the International Medical Volunteers Association (1999), analysis of international organizations with long histories of working with health promoter programs has consistently demonstrated that success is dependent upon an integrated system of support inclusive of adequate funding, recognition of their importance, such practical elements as patient referral options and accessibility to sufficient supplies, as well as the provision of well-founded initial training supplemented by regular continuing education and access to further information as needed. Formalized training and certification can play a vital role in the procurement of this support system, providing a solid educational foundation which will lead to recognition by the health and social services community of promotoras as vital members of the health care team. The potential for establishing more effective working relationships and increasing assistance for promotoras from within the system itself will ultimately result in benefiting not only the promotoras, but those to whom outreach is directed. As promotoras become recognized as essential partners in the health care system not only within the community but on the level of national health care as well, increased funding opportunities may be a natural outcome.

In the Rio Grande Valley, advocates for uniformity in the education and certification of promotoras believe it only just that promotoras who have been working with little or no pay and—more importantly—without health benefits, may now be able to earn a living wage, and, hopefully, health coverage for themselves as well as for their families. At the same time, it is recognized the some promotoras do not desire financial reimbursement, nor does every promotora wish to attain additional training or certification. Thus, House Bill 1864’s (1999) allowance for exceptions for those who do not want further training and certification is an acceptable response mediating between the those who seek certification and those who do not.

Regardless of the eventual outcome of the development of uniform training and certification, promotoras will no doubt continue to enjoy increasing
recognition as invaluable resource persons in a comprehensive health strategy for providing outreach among the medically underserved population of the Rio Grande Valley.
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In grateful acknowledgement of information pertaining to numbers, services provided, and training received by promotoras working within individual programs in the Lower Rio Grande Valley as provided through telephone interviews with:

Maria Teresa De LLano, Chairperson, South Texas Promotoras Association, Brownsville, Texas, July 6, 2000 and July 8, 2000.

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